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Wayne National Forest Supplemental Environmental Assessment

DOI-BLM-Eastern States-M000-2023-0005-EA

*Oil and Gas Leasing, Wayne National Forest,
Marietta Unit of the Athens Ranger District,
Monroe, Noble, and Washington Counties, Ohio*

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TABLE OF CONTENTS

TABLE OF CONTENTS.....	1-1
Appendices.....	1-5
Acronyms and Abbreviations	1-7
CHAPTER 1. INTRODUCTION AND PURPOSE AND NEED	1-10
1.1. Background.....	1-16
1.2. Purpose and Need.....	1-16
1.2.1. Actions to Be Taken.....	1-17
1.3. Legal and Regulatory Authorities.....	1-18
CHAPTER 2. ALTERNATIVES.....	2-18
2.1. Alternative A – No-Action Alternative	2-19
2.2. Alternative B – Proposed Action	2-19
2.2.1. Reasonably Foreseeable Development Scenario for Potential Oil and Gas Development	2-22
2.2.2. Phases of Oil and Gas Development.....	2-24
2.2.3. Environmental Protection Measures, Lease Stipulations, and Avoidance and Minimization Measures	2-24
2.3. Alternatives Considered, but Eliminated from Detailed Analysis	2-32
2.3.1. No Surface Occupancy	2-32
CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS	3-32
3.1. Resources Considered for Analysis.....	3-35
3.2. Scope of the Analysis	3-36
3.2.1. Vertically Drilled/Vertical Completions versus Horizontally Drilled/Hydraulically Fractured Completions	3-36
3.2.2. Cumulative Impact Analysis Area	3-47
3.3. Air Resources	3-48
3.3.1. Affected Environment.....	3-48
3.3.2. Environmental Impacts	3-49
3.3.3. Cumulative Impacts	3-52
3.4. Climate Impacts.....	3-55
3.4.1. Affected Environment.....	3-55
3.4.2. Environmental Impacts	3-55
3.4.3. Monetized Impacts from Greenhouse Gas Emissions	3-60
3.4.4. Cumulative Impacts	3-63

3.5.	Vegetation and Rare Plants	3-66
3.5.1.	Affected Environment.....	3-66
3.5.2.	Environmental Impacts	3-70
3.5.3.	Cumulative Impacts	3-73
3.6.	Water Resources	3-74
3.6.1.	Affected Environment.....	3-74
3.6.2.	Environmental Impacts	3-88
3.6.3.	Cumulative Impacts	3-102
3.7.	Aquatic Wildlife.....	3-105
3.7.1.	Affected Environment.....	3-105
3.7.2.	Environmental Impacts	3-111
3.7.3.	Cumulative Impacts	3-116
3.8.	Terrestrial Wildlife	3-120
3.8.1.	Affected Environment.....	3-120
3.8.2.	Environmental Impacts	3-125
3.8.3.	Cumulative Impacts	3-131
3.9.	Transportation	3-135
3.9.1.	Affected Environment.....	3-135
3.9.2.	Environmental Impacts	3-135
3.9.3.	Cumulative Impacts	3-138
3.10.	Socioeconomics and Local Economics.....	3-139
3.10.1.	Affected Environment.....	3-139
3.10.2.	Environmental Impacts	3-149
3.10.3.	Cumulative Impacts	3-151
CHAPTER 4.	CONSULTATION, COORDINATION, AND LIST OF PREPARERS	4-1
4.1.	Agency and Tribal Consultations.....	4-1
4.1.1.	National Historic Preservation Act and Tribal Consultation	4-1
4.1.2.	Endangered Species Act Section 7 Consultation	4-2
4.2.	Public Involvement.....	4-2
4.3.	List of Preparers	4-3
APPENDIX A – CBD DECISION COURT ORDER		1
APPENDIX B – ISSUES NOT CONSIDERED IN DETAIL IN THIS ENVIRONMENTAL ASSESSMENT		2
APPENDIX C – REFERENCES		3
APPENDIX D – REASONABLY FORESEEABLE DEVELOPMENT SCENARIO		1

APPENDIX E – LEGAL AND REGULATORY AUTHORITIES	2
APPENDIX F –STIPULATIONS, NOTIFICATIONS, GUIDELINES, AND STANDARDS.....	3
APPENDIX G – WAYNE NATIONAL FOREST OIL AND GAS LEASING BIOLOGICAL ASSESSMENT	1
APPENDIX H – PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS.....	2
APPENDIX I – AIR QUALITY AND CLIMATE IMPACTS	3
APPENDIX J – DRAFT SUPPLEMENTAL EA PUBLIC COMMENTS AND BLM RESPONSES	4

Tables

Table 2-1.	Potential Disturbance in the Action Area Projected by the Reasonably Foreseeable Development Scenario	2-23
Table 2-2.	Situation 1: Action, Authorized Agency, and Application of AMMs	2-27
Table 2-3.	Situation 2: Action, Authorized Agency, and Application of AMMs	2-28
Table 2-4.	Situation 3: Action, Authorized Agency, and Application of AMMs	2-30
Table 2-5.	Situation 4: Action, Authorized Agency, and Application of AMMs	2-31
Table 3-1.	Issues Analyzed in Detail.....	3-35
Table 3-2.	Representative Differences between Vertically Drilled Wells and Horizontally Drilled Wells Completed using Hydraulic Fracturing	3-38
Table 3-3.	Range of Estimated Maximum-Year, Average-Year, and 40-Year Total Air Pollutant Emissions (tons) for Reasonably Foreseeable Development Scenario During Well Development and Production	3-51
Table 3-4.	Comparison of Estimated Air Pollutant Emissions (tons/year) for the Reasonably Foreseeable Development Scenarios in Ohio to Existing Sources.....	3-54
Table 3-5.	Estimated Life-of-Lease Greenhouse Gas Emissions from Well Development, Well Production Operations, Mid-Stream, and Downstream End-Use (Metric Tonnes) – Low and High Scenarios	3-57
Table 3-6.	Estimated Greenhouse Gas Emissions from the Lease Parcels on Annual Basis (Metric Tonnes)	3-58
Table 3-7.	Estimated Greenhouse Gas Emissions from the Lease Parcels on Annual Basis (Metric Tonnes)	3-58
Table 3-8.	Comparison of Lease Sale Emissions to Other Sources (megatonnes).....	3-60
Table 3-9.	GHG Emissions from Past, Present, and Reasonably Foreseeable Federal Onshore (MT of CO ₂ e)	3-64

Table 3-10.	Regional Forester Sensitive Plant Species in the Action Area	3-68
Table 3-11.	Effects Determination Summary – Vegetation and Rare Plant Species	3-74
Table 3-12.	HUC-12 Watersheds within the Analysis Area	3-78
Table 3-13.	Water Quality Descriptions in HUC-12 Subwatersheds within the Analysis Area.....	3-82
Table 3-14.	Registered Groundwater Withdrawals in the Analysis Area from 2017 to 2021	3-84
Table 3-15.	Registered Surface Water Withdrawals in the Analysis Area from 2017 to 2021	3-87
Table 3-16.	Streamflow Summary for the Little Muskingum River from 1959 to 2022	3-97
Table 3-17.	Streamflow Summary for the Ohio River from 2014 to 2023	3-99
Table 3-18.	Cumulative Surface Water Withdrawals Estimated in the Analysis Area.....	3-104
Table 3-19.	Potential Federally Protected Aquatic Species in the Analysis Area ¹	3-106
Table 3-20.	Regional Forester Sensitive Aquatic Species in the Analysis Area.....	3-110
Table 3-21.	Effects Determination Summary – Aquatic Wildlife Species	3-119
Table 3-22.	Potential Federally Protected Terrestrial Species in the Action Area.....	3-121
Table 3-23.	Regional Forester Sensitive Terrestrial Species in the Action Area.....	3-123
Table 3-24.	Effects Determination Summary – Terrestrial Wildlife Species	3-135
Table 3-25.	Average Truck Trip Generation Estimates for Vertical and Horizontal Drilling Techniques	3-136
Table 3-26.	Population in Southeastern Ohio and West Virginia	3-141
Table 3-27.	Economic Status as Ranked by the Appalachian Regional Commission	3-143
Table 3-28.	Wages and Jobs by Industry, in 2023 dollars	3-145
Table 3-29.	Median Household Income in Southeastern Ohio and West Virginia	3-146
Table 3-30.	Poverty Levels in Southeastern Ohio and West Virginia	3-146
Table 3-31.	Air Quality Indicator Summary of Analysis Area Counties	3-147
Table 3-32.	Hazardous Waste Indicator Summary of Analysis Area Counties	3-148
Table 3-33.	Traffic Indicator Summary of Analysis Area Counties	3-148
Table 4-1.	List of Preparers.....	4-3

Figures

Figure 1.	Proclamation Boundary of the Wayne National Forest, including the Three Management Units (Ironton Unit, Athens Unit, Marietta Unit)	1-13
Figure 2.	Counties in the Vicinity of the Marietta Unit of the Wayne National Forest.....	1-14
Figure 3.	Expressions of Interest on the Marietta Unit	1-15
Figure 4.	Terrestrial Analysis Area for Terrestrial Species (Marietta Unit plus a 4.5-mile buffer).....	3-34
Figure 5.	Oil and Gas Drilling Using Vertical and Horizontal Drilling Techniques	3-37
Figure 6.	Estimated Greenhouse Gas Emissions Profile over the Production Life of a Lease (Low Scenario – 29 Wells)	3-59
Figure 7.	Estimated Greenhouse Gas Emissions Profile over the Production Life of a Lease (High Scenario – 81 Wells)	3-59
Figure 8.	Aquatic Analysis Area - HUC-12 Watersheds within the Marietta Unit, Plus a 4-Mile Buffer	3-76
Figure 9.	Little Muskingum Watershed in Relation to the Analysis Area	3-77
Figure 10.	Groundwater Uses for Registered Withdrawals in the Analysis Area.....	3-85
Figure 11.	Surface Water Uses for Registered Withdrawals in the Analysis Area.....	3-88
Figure 12.	Annual Mean Streamflow in the Little Muskingum River from 1959 to 2023	3-98
Figure 13.	Socioeconomics and Local Economics Analysis Area for the Proposed Action.....	3-140

Appendices

Appendix A, *CBD Court Orders*

Appendix B, *References*

Appendix C, *Issues Not Considered in Detail in this Environmental Assessment*

Appendix D, *Reasonably Foreseeable Development Scenario*

Appendix E, *Legal and Regulatory Authorities*

Appendix F, *Lease Stipulations, Notifications, Guidelines, and Standards*

Appendix G, *Wayne National Forest Oil and Gas Leasing Biological Assessment*

Appendix H, Past, Present, and Reasonably Foreseeable Future Actions

Appendix I, Air Quality and Climate Impacts

Appendix J, Draft Supplemental EA Public Comments and BLM Responses

Acronyms and Abbreviations

ACRONYM/ ABBREVIATION	FULL TERM
°C	degrees Celsius
2012 SIR	<i>Supplemental Impact Report: Horizontal Drilling Using High Volume Hydraulic Fracturing – Wayne National Forest</i>
Action Area	Marietta Unit
AMM	Avoidance and Minimization Measure
Analysis Area	Marietta Unit and surrounding 4-mile buffer
Annual GHG Report	<i>2023 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends</i>
APD	Application for Permit to Drill
ARC	Appalachian Regional Commission
b/d	barrels per day
BA	Biological Assessment
Bcf/d	billion cubic feet per day
BLM	U.S. Department of the Interior, Bureau of Land Management
BLM NEPA Handbook	<i>BLM National Environmental Policy Act Handbook H-1790-1</i>
BMP	best management practice
BO	Biological Opinion
<i>CBD</i>	<i>Center for Biological Diversity et al. v. United States Forest Service et al.</i>
Census	U.S. Census Bureau
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH ₄	Methane
CIAA	Cumulative Impact Analysis Area
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
COA	condition of approval
CSU	controlled surface use
CWA	Clean Water Act
DOGRM	Division of Oil and Gas Resources Management
DOI	U.S. Department of the Interior
EA	Environmental Assessment
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EO	Executive Order
EOI	Expression of Interest
ESA	Endangered Species Act
FLPMA	Federal Land Policy and Management Act of 1976
FMO	Federal mineral ownership
FONSI	Finding of No Significant Impact
Forest Plan	<i>Wayne National Forest 2006 Land and Resource Management Plan</i>

ACRONYM/ ABBREVIATION	FULL TERM
FPL	Federal poverty level
ft ³ /sec	cubic feet per second
GFW	forest-wide guideline
GHG	greenhouse gas
Gold Book	<i>Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development</i>
GWP	global warming potentials
HAP	hazardous air pollutant
HUC	Hydrologic Unit Code
IPCC	Intergovernmental Panel on Climate Change
IRA	Inflation Reduction Act of 2022
MAGICCMAGICC	Model for the Assessment of Greenhouse Gas Induced Climate Change
Mgal	million gallons
MLA	Mineral Leasing Act of 1920
MT	metric tons
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFS	National Forest System
n-hexane	normal-hexane
NO ₂	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NSO	no surface occupancy
O ₃	Ozone
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code
PM ₁₀	particulate matter 10 micrometers or less in diameter
PM _{2.5}	particulate matter 2.5 micrometers or less in diameter
RFDS	Reasonably Foreseeable Development Scenario
RFSS	Regional Forester Sensitive Species
RUMA	road use maintenance agreement
SFW	forest-wide standard
SHPO	State Historic Preservation Office
SO ₂	sulfur dioxide
STEO	short-term energy outlook
SUPO	Surface Use Plan of Operations
TDS	total dissolved solids
TMDL	Total Maximum Daily Load
TSS	total suspended solids
USC	United States Code

ACRONYM/ ABBREVIATION	FULL TERM
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WNF	Wayne National Forest
WNS	white-nose syndrome
WOTUS	Waters of the United States

CHAPTER 1. INTRODUCTION AND PURPOSE AND NEED

The United States Department of the Interior (DOI), Bureau of Land Management (BLM) and the United States Forest Service (USFS), as a cooperating agency, have prepared this Supplemental Environmental Assessment (EA) to evaluate the environmental impacts of resuming oil and gas development in the Marietta Unit of the Wayne National Forest (WNF), located in southeastern Ohio. The Proposed Action is (i) the leasing of parcels within 40,000 acres of Federal mineral estate in the WNF, though it is expected that only a very small percentage of this acreage will actually be developed, (ii) potential resumption of activities on 36 leases in the Marietta Unit that were issued following lease sales in December 2016 and March 2017 and subsequently challenged in court; and (iii) potential resumption of activities on 29 leases that were issued following lease sales in 2017, 2018, and 2019, where development is currently on hold pending a decision on this EA. The 65 leases identified in (ii) and (iii) relied, for NEPA compliance purposes, on a 2016 environmental assessment which this EA supplements and which is further discussed below. Figure 1 provides a location overview of the three units that make up the WNF, showing the location of the Marietta Unit (the “Action Area” in this EA) in relation to the Ironton Unit and Athens Unit, which lie within the WNF National Forest System Proclamation Boundary but are not part of the Action Area. The Marietta Unit lands are located in Monroe, Noble, and Washington Counties in Ohio (Figure 2).

The parcels that could be leased for oil and gas development and the 65 leased parcels consist of all Federal mineral estate underlying the National Forest System (NFS) lands within the Action Area, estimated to include up to 40,000 acres of Federal mineral estate (USFS 2006a), though it is expected that only a very small percentage of this acreage would actually be developed. Under the Proposed Action, parcels could be offered at competitive lease sales for potential future oil and gas development and, on the 65 leases, lessees or operators could immediately submit Applications for Permits to Drill (APDs) (previous APD approvals on the 65 leases have all expired). However, drilling into Federal minerals under these parcels would require an additional site-specific environmental analysis. Such analysis occurs when the BLM receives APDs from lessees or operators that detail plans for surface disturbances, such as construction of well pads, access roads, natural gas gathering and distribution pipelines, and other infrastructure, as well as water withdrawals and other details.

The BLM and USFS prepared the noted 2016 EA to analyze impacts of potential future lease sales within approximately the same 40,000 acres, and BLM completed a Decision Record in 2016 (BLM 2016). BLM then held lease sales in December 2016 and March 2017, issued 36 leases, and soon thereafter commenced its defense of a lawsuit filed by environmental groups in the U.S. District Court for the Southern District of Ohio. Plaintiffs challenged the 2016 EA and the first 36 of 65 leases that were eventually issued in reliance on the 2016 EA. In 2020, the district court found on the merits that the 2016 EA fell short of the requirements of the National Environmental Policy Act of 1969 (NEPA). *See Center for Biological Diversity et al. v. United States Forest Service et al.* (S.D. Ohio, No. 2:17-cv-372) (CBD). The court’s 2020 decision and a 2021 remedy order (which remanded the leases but did not vacate them) are included as Appendix A (CBD Court Orders) of this EA.

Under mineral leasing statutes and regulations, interested parties, such as private individuals or companies, may file Expressions of Interest (EOIs) with the BLM to nominate parcels for competitive bid and leasing. *See* 43 CFR 3120.1-1(e)(f). As of August 2024, the BLM has

received at least 33 EOIs nominating parcels on the Marietta Unit. These EOIs have been adjudicated and deemed acceptable but they remain pending. Importantly, not all EOIs will necessarily result in lease issuance, and not all leases will result in development.

The pending EOIs are in addition to the EOIs that led to issuance of the 65 leases, which were issued between December 2016 and December 2019. Of these leases, 36 were issued following the first two lease sales and were challenged in *CBD*, and another 29 were issued during subsequent lease sales but were not formally challenged in the litigation. Consistent with the BLM's obligation under the Mineral Leasing Act of 1920 (MLA) and the MLA for Acquired Lands of 1947 to evaluate nominated parcels and hold quarterly competitive lease sales for available oil and gas parcels, *see* 5 USC 226(b)(1), this EA will be used as a basis for evaluation of pending and future EOIs in the Marietta Unit and will serve as supplemental NEPA analysis for the 65 leases that relied, for NEPA compliance purposes, on the 2016 EA challenged in *CBD*. The USFS is reconsidering six 2016 consent letters for the 36 leases challenged in *CBD*, and six additional consent letters from 2017 and 2018 for the 29 leases making up the noted 65 leases. Refer to Appendix A (*CBD Court Orders*) for additional information on the terms of the remand.

For future competitive lease sales, the BLM will review nominated parcels to ensure that potential environmental impacts have been adequately considered and disclosed to the public. This begins with confirming the adequacy of the analysis in this EA and other prior analyses, such as the 2016 EA. If BLM determines no additional NEPA analysis is required, the USFS would then review each proposed lease and its supporting analysis to support a determination by the Secretary of Agriculture whether to consent to a given lease or group of leases being offered at competitive sales, as required by statute.

A Federal oil and gas lease is a legal contract that grants exclusive rights to the lessee to develop Federally owned oil and gas resources. However, it does not, by itself, authorize surface-disturbing activities on Federal surface or obligate the lessee to drill a well on the parcel or into the minerals underlying or near the parcel. Should the lessee submit a detailed plan for oil and gas development at the APD stage, including a plan for any intended surface occupancy on a Federal parcel, then the BLM and USFS would conduct appropriate site-specific environmental analysis and required consultations. If the parcel to be developed is on NFS surface lands, then development must be consistent with the Forest Service's management area direction and applicable standards and guidelines, as identified in the governing Forest Plan, the *Wayne National Forest 2006 Land and Resource Management Plan* (Forest Plan) (USFS 2006a).

If a lessee submits an APD seeking to develop a lease from private surface, then the BLM would conduct site-specific environmental analysis and provide management direction, but Forest Plan standards and guidelines would not apply on the private land. However, the BLM would require appropriate design features, and would apply Avoidance and Minimization Measures (AMMs) and other measures discussed below as conditions of APD approval (COAs). It is important to note that this site-specific development and associated analysis is not part of the Proposed Action evaluated in this EA, as further described in 0, **Error! Not a valid bookmark self-reference..**

Given recent court decisions and other executive action,¹ including issuance of Executive Order (EO) 14154, *Unleashing American Energy* (Jan. 20, 2025) and Secretary’s Order 3418 (Feb. 3, 2025) which implemented the EO at Interior, , the BLM has prepared the EA under CEQ’s 2020 NEPA regulations and BLM’s own NEPA regulations at 43 CFR Part 46, guided by Departmental Manual Section 516, Environmental Quality (DOI 2020), and BLM’s National Environmental Policy Act Handbook H-1790-1 (BLM NEPA Handbook) (BLM 2008). The information presented in this document serves as the basis for the BLM’s Authorized Officer to decide whether the Proposed Action may result in significant impacts on the environment. A finding that significant impacts may occur requires the preparation of an Environmental Impact Statement (EIS). If the BLM Authorized Officer determines that no significant impacts are expected, then the officer would issue a Finding of No Significant Impact (FONSI). The USFS will use this EA in reconsidering its twelve previous consent authorizations (pertaining to the 65 leases that relied on the 2016 EA challenged in CBD), and in determining whether to consent to future BLM leasing proposals on the Marietta Unit (36 CFR 228).

¹ In February 2025, the Council on Environmental Quality (CEQ) promulgated an interim final rule removing its NEPA regulations, 40 CFR 1500-1508, from the Code of Federal Regulations. *See* 90 Fed. Reg. 10610, *Removal of National Environmental Policy Act Implementing Regulations* (Feb. 25, 2025). The rule, which is effective April 11, 2025, cited recent Executive Order (E.O.) 14154, *Unleashing American Energy* (Jan. 20, 2025), which expressly revoked E.O. 11991. 42 Fed. Reg. 26967 (May 25, 1977). The latter had directed CEQ to promulgate the original NEPA regulations and required Federal agencies to comply with those regulations. The Interim Final Rule explained that removal of the CEQ regulations “does not strip agencies of discretion to continue following similar procedures” including their own “NEPA implementing procedures.” *Id.* at 10614-10615. Shortly after issuance of EO 14154, the Court of Appeals for the District of Columbia Circuit denied a petition to reconsider its November 2024 decision in *Marin Audubon Society v. Federal Aviation Administration*, 121 F.4th 902 (D.C. Cir. 2024), *reh’g en banc denied*, 2025 WL 374897 (Jan. 31, 2025) (NEPA challenge to an FAA “Air Tour Management Plan” for certain national parks). The court held that CEQ’s NEPA regulations are *ultra vires* because the agency lacks statutory authority to promulgate binding regulations. Three days later, on February 3, 2025, the United States District Court for the District of North Dakota similarly concluded that CEQ lacks authority to promulgate rules implementing NEPA and vacated the challenged 2024 amendments to CEQ’s 2020 NEPA regulations. *State of Iowa v. Council on Env’l Quality*, Dkt. 145, No. 24-cv-89 (D.N.D. 2024).

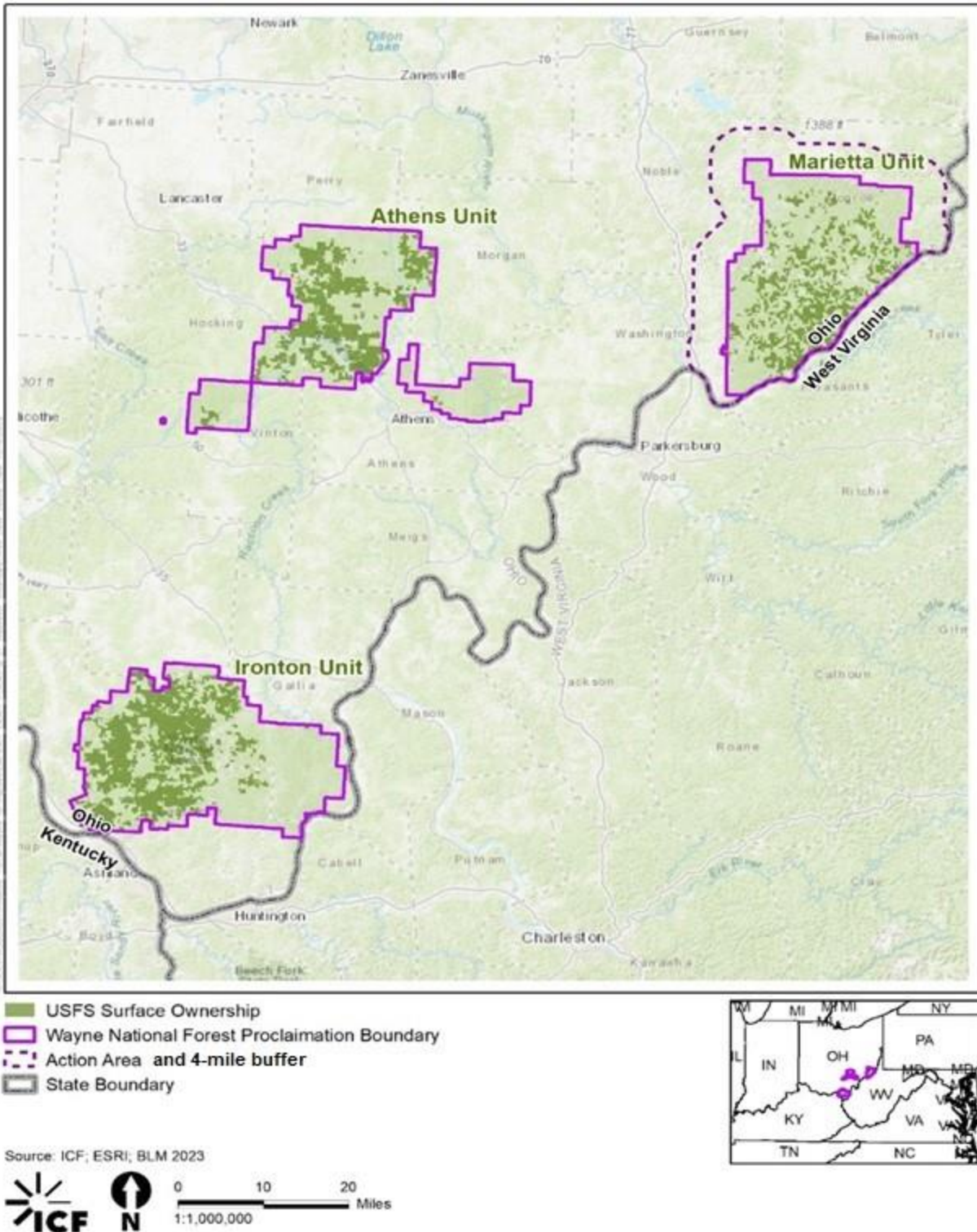


Figure 1. Proclamation Boundary of the Wayne National Forest, including the Three Management Units (Ironton Unit, Athens Unit, Marietta Unit)

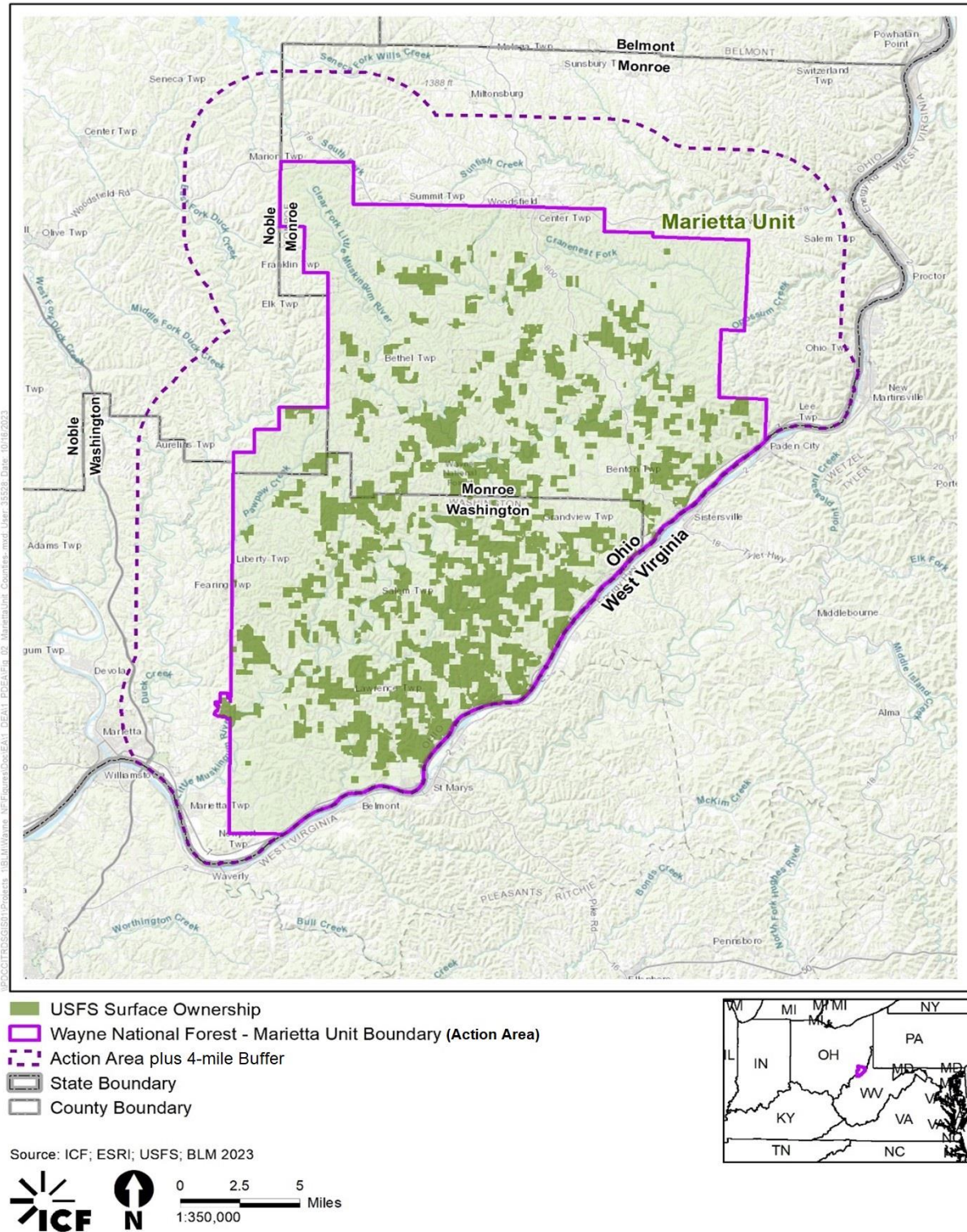


Figure 2. Counties in the Vicinity of the Marietta Unit of the Wayne National Forest

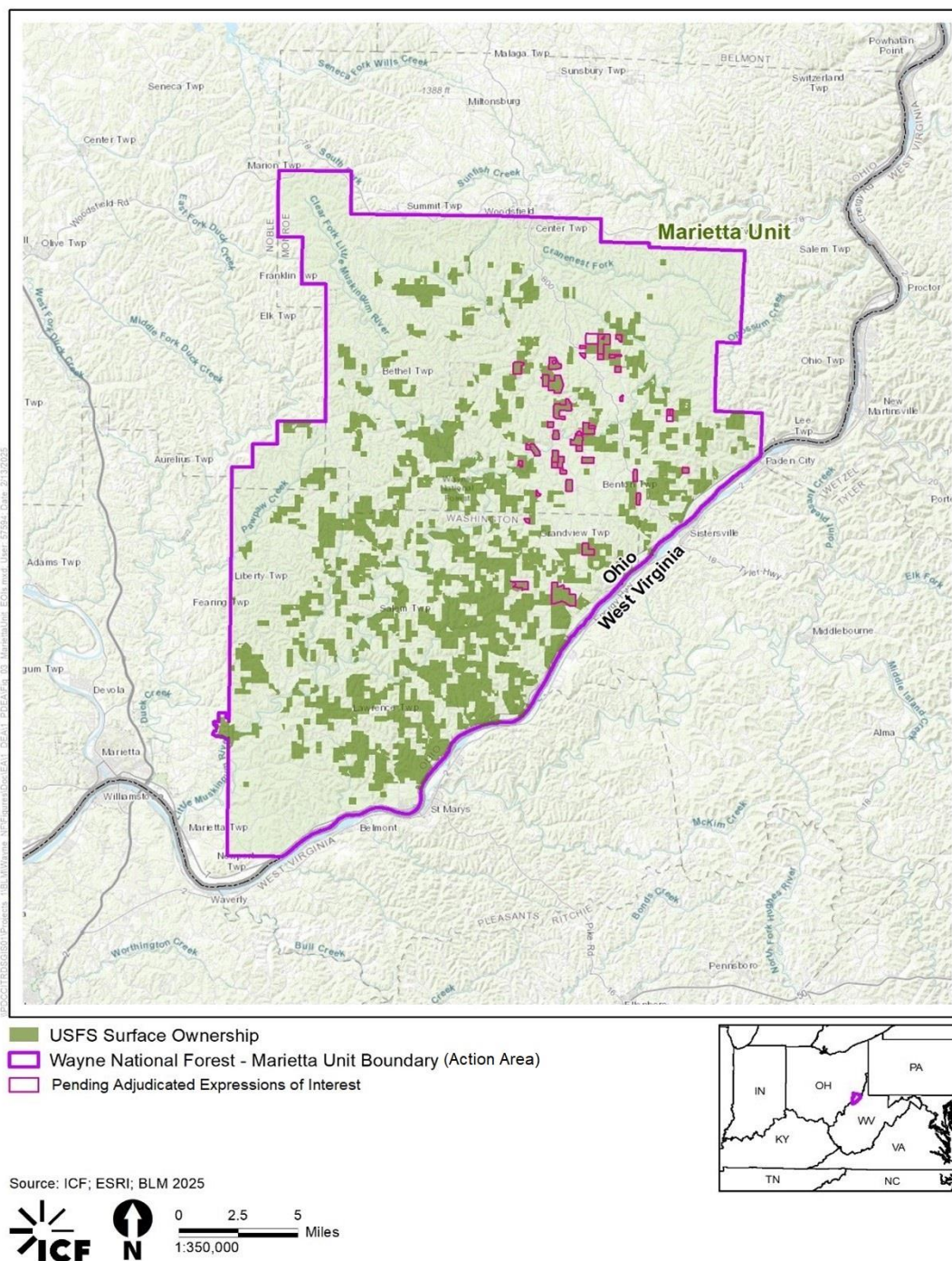


Figure 3. Expressions of Interest on the Marietta Unit

1.1. Background

The WNF's Proclamation Boundary was established by Congress in 1934 and comprises three separate administrative units that encompass parts of 12 counties: (1) the Athens Unit; (2) the Ironton Unit; and (3) the Marietta Unit. These three administrative units compose two Ranger Districts: (1) the Athens Ranger District (Athens and Marietta administrative units); and (2) the Ironton Ranger District. Of the approximately 855,532 acres within the WNF Proclamation Boundary, approximately 244,265 acres, or about 29 percent, are NFS lands that USFS manages. The NFS surface lands overlie oil and gas resources that are both Federally and privately owned, and are intermixed with small communities, roadways, and county or State-held lands. As of 2020, approximately 172,157 acres of Federal minerals were located within the WNF Proclamation Boundary (Appendix D, *Reasonably Foreseeable Development Scenario*).

The Record of Decision approving the Forest Plan made all Federally owned minerals in the WNF administratively available to be leased. At that time, horizontal drilling was generally not economically feasible. Technological developments in the following years resulted in horizontal drilling and hydraulic fracturing becoming more economically viable. In 2012, the USFS prepared the *Supplemental Information Report: Horizontal Drilling Using High Volume Hydraulic Fracturing – Wayne National Forest* for oil and gas activity (2012 SIR; USFS 2012), which projected that 13 horizontal well sites could possibly be developed using high-volume hydraulic fracturing technology across the WNF through the remainder of the first 10 years of Forest Plan implementation. The BLM then prepared the 2016 EA, later challenged in *CBD* (Appendix A), to evaluate the anticipated environmental impacts of leasing Federal mineral estate within the Marietta Unit. To estimate anticipated impacts in the 2016 EA, the analysis relied on the 2006 Reasonably Foreseeable Development Scenario (RFDS) (Appendix G of the 2006 Forest Plan [USFS 2006a]) and the 2012 SIR (USFS 2012).

Except for the distinct circumstances of the 65 leases, the Proposed Action in the 2016 EA remains essentially the same in this EA, but the projections of oil and gas activity have been changed. In 2018, USFS announced plans to revise the 2006 Forest Plan. In response to a 2019 USFS request, the BLM prepared and in 2020 completed a new RFDS (Appendix D) to support revision of the Forest Plan. Although the Forest Plan revision was discontinued in 2020, this EA nonetheless incorporates the updated projections made in the 2020 RFDS (BLM 2020) to characterize environmental impacts rather than the projections made in the 2006 RFDS (USFS 2006a) or the 2012 SIR (USFS 2012), because the 2020 RFDS incorporates more current information. According to the 2020 RFDS (Appendix D), it is expected that all wells in the WNF would be gas wells and that many of these would produce some oil. No oil-only wells were projected in the WNF. Most of these wells were projected in the 2020 RFDS to be horizontally drilled gas wells, accessed from well pads on non-Federal surface property using high-volume hydraulic fracturing.

1.2. Purpose and Need

The purpose of the proposed action is to reactivate the noted 65 leases and respond to EOIs seeking to lease Federal oil and gas resources through a competitive leasing process by addressing deficiencies in the 2016 EA, as identified in *CBD* (Appendix A). The need for the action is established by both the court's ruling, as further discussed below, and by the BLM's responsibility under the MLA and the Mineral Leasing Act for Acquired Lands to promote the

exploration and development of Federal oil and gas resources. It is the policy of the BLM—as required by various laws, including the MLA (30 United States Code [USC] 181 *et seq.*), the MLA for Acquired Lands of 1947 (30 USC 351-359), the National Forest Management Act (16 USC 1604(e)(1)), the Federal Land Policy and Management Act of 1976 (FLPMA), and the Energy Policy Act of 2005 (Public Law 109-58, Sections 362-374 (Subtitle F) (Aug. 8, 2005))—to make mineral resources available for development to meet national, regional, and local needs. Consistent with applicable law, BLM’s oil and gas leasing program encourages the responsible development of domestic oil and gas reserves and multiple-use and sustained yield management goals and aligns with recent EO 14154, *Unleashing American Energy* (Jan. 20, 2025).

With respect to deficiencies identified in *CBD* (Appendix A), the need to develop a EA was established by the court’s finding that neither the USFS nor the BLM had taken a hard look at the reasonably foreseeable impacts of hydraulic fracturing operations in connection with: (1) impacts of surface-area disturbance; (2) cumulative impacts on the Indiana bat (*Myotis sodalis*) and the Little Muskingum River; and (3) impacts on air quality.

1.2.1. Actions to Be Taken

Based on the analysis in this EA, BLM will decide whether, in the future, to offer lands determined to be eligible and available in the WNF Marietta Unit for oil and gas development and, if leased, what terms and conditions in the form of stipulations, would apply to any leases issued. In addition, under *CBD* (Appendix A), the agencies must also determine whether, based on consideration of the impacts identified in this NEPA document, the prior BLM leasing decisions and USFS consent to BLM’s proposals to lease now comply with NEPA and will be affirmed.

This EA addresses the impacts and alternatives that the 2016 EA analyzed and supplements them with consideration of the 2020 RFDS and additional analyses in response to *CBD*. In particular, this EA analyzes impacts of the expected use of high-volume hydraulic fracturing technology on NFS lands and BLM-administered mineral estate in the Marietta Unit. No decisions based on this EA would change the independent rights or authority of private landowners or other surface-management agencies. Information from the 2016 EA is discussed throughout this EA and the 2016 EA is incorporated herein by reference. The 2016 EA and related information may be found under the “Documents” tab at <https://eplanning.blm.gov/eplanning-ui/project/53939/510>.

It is important to note that this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use planning, except for the distinct circumstances of the 65 leases. This reflects the fact that oil and gas development occurs in multiple stages of Federal environmental analysis and authorization. Consideration of environmental impacts is required at each of the following three stages of environmental review in the leasing and development of Federal mineral estate underlying NFS lands:

1. Stage 1: Environmental review in support of identifying areas that are available for or closed to oil and gas leasing, here the *Wayne National Forest 2006 Land and Resource Management Plan* (Forest Plan);
2. Stage 2: Environmental review in support of conducting competitive lease sales for parcels that are available for leasing and nominated in Expressions of Interest; and

3. Stage 3: Environmental review in support of approving Applications for Permits to Drill (APDs) based on specific development proposals.

The Forest Plan identified areas as available for or closed to oil and gas leasing and adopted appropriate lease stipulations that would limit surface use if oil and gas leasing and development is approved. The Forest Plan also adopted other standards and guidelines that would be applied to areas identified as available for leasing (Stage 1 review). The environmental review for conducting lease sales (Stage 2 review) identifies which parcels should be offered for leasing and the conditions under which leasing and eventual development should occur. The environmental review for development of leased parcels, including well-completion techniques such as high-volume hydraulic fracturing, consists of the site-specific analysis of potential impacts from a specified proposal (Stage 3 review).

This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in *CBD* (Appendix A). It will also support USFS's review of its consent authorizations to BLM leasing proposals that were remanded in *CBD* (Appendix A), and its consideration of consent authorizations to future BLM proposals to lease on the Marietta Unit. Determining whether to authorize consent to BLM leasing proposals is part of USFS's regulatory duties where NFS lands are involved (36 CFR 228.102(e)). The consent authorization review consists of verifying whether leasing of specific lands has been adequately addressed in a NEPA document and is consistent with the governing Forest Plan, ensuring that appropriate conditions of surface occupancy are included in the lease stipulations, and confirming that surface use is permitted somewhere on the lease (except in no surface occupancy [NSO] leases). This document supplements the NEPA analyses used for this verification to address deficiencies identified in *CBD*.

For leases that proceed to development, lessees or operators are required to submit APDs as part of the Stage 3 review. Stage 3 reviews typically include an (1) initial on-the-ground field evaluation by BLM and, if drilling from NFS surface will occur, by USFS resource specialists, and (2) site-specific environmental analysis. Not all leases that are issued proceed to development. The environmental review performed during Stage 3 allows site-specific information regarding local resource conditions to be evaluated and potential impacts disclosed. During the Stage 3 project-specific analysis, the BLM would finalize design features, and best management practices (BMPs) that would be applied to a specific project, along with standards and guidelines from the Forest Plan where a project proposes to occupy NFS surface lands. If surface occupancy on NFS lands is proposed, a Surface Use Plan of Operations (SUPO) would be submitted for review by the agencies and approval by USFS. See Section 0,

Alternative B – Proposed Action, for more information.

1.3. Legal and Regulatory Authorities

Refer to Appendix E (*Legal and Regulatory Authorities*) for a description of legal and regulatory authorities relevant to the Proposed Action.

CHAPTER 2. ALTERNATIVES

Section 102(2)(H) of NEPA provides that agencies of the Federal government shall “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal

which involves unresolved conflicts concerning alternative uses of available resources.” This chapter provides a detailed description of the Proposed Action and alternatives considered.

2.1. Alternative A – No-Action Alternative

NEPA requires consideration of a No-Action Alternative assessing environmental consequences that may occur if the Proposed Action is not implemented. The No-Action Alternative also serves as a baseline, helpful to the public and agency decision makers in evaluating potential impacts of the Proposed Action (see Chapter 3, *Affected Environment and Environmental Impacts*). The No-Action Alternative in this EA is generally the same as the No-Action Alternative in the 2016 EA.

Under the No-Action Alternative, the BLM would not make Federal minerals in the Marietta Unit available for oil and gas leasing, including both the parcels requested in currently pending EOIs and all other Federal minerals in the Marietta Unit. Additionally, selecting the No-Action Alternative would necessitate rescinding any leasing decisions that were supported, for NEPA-compliance purposes, by the 2016 EA. The affirmative act of rescinding the leases is necessary because the *CBD* court, its 2021 remedy order (Appendix A, *CBD Court Orders*), expressly declined to vacate the leases. As a result, they remain in effect, although they are subject to certain use restrictions specified in the 2021 remedy order. Without any leases (the No-Action Alternative), operators would not be authorized to access Federal minerals, resulting in stranding of Federal minerals and loss of potential future royalties, and instead may develop adjacent, privately owned minerals, potentially resulting in drainage of Federal minerals. However, in the absence of a Forest Plan amendment closing the lands to leasing, they would be considered for inclusion in future lease sales, if they are renominated.

2.2. Alternative B – Proposed Action

The Proposed Action is the potential offering for sale and possible leasing of Federal mineral estate in the WNF, resumption of activities on the thirty-six leases challenged in *CBD*, and resumption of activities on 29 leases that were issued during subsequent lease sales where development is currently on hold pending a decision associated with this EA. A decision by BLM to adopt the Proposed Action would not approve any oil and gas construction, development, or operations. For leases that proceed to development, lessees or operators are required to submit APDs as part of the Stage 3 environmental review process (see Section 1.2.1, *Actions to Be Taken*) and development of Federal mineral estate would only occur after the BLM approves the APDs, with USFS consent authorization. This applies to the 65 leases associated with the 2016 EA and any future parcels that are offered competitively, and leases subsequently issued.

This EA responds to the 2021 *CBD* remedy order (Appendix A) by analyzing opening of parcels of Federally owned mineral estate in the WNF, Athens Ranger District, Marietta Unit, in Monroe, Noble, and Washington Counties in Ohio to nominations for oil and gas leasing, and resumption of activities on the 65 leases. This acreage figure represents the total amount of Federally owned minerals that have been leased or could be nominated and potentially made available for leasing on the Marietta Unit. Although this EA assumes that both oil and gas may be produced in the future within the Marietta Unit, natural gas is more likely to be produced.

The Proposed Action from the 2016 EA remains essentially the same for this EA, except for the distinct circumstances of the 65 leases and new assumptions on development. In 2018, USFS announced plans to revise the 2006 Forest Plan. In 2020, responding to a USFS request, the BLM prepared a new RFDS (to replace the 2006 RFDS that had supported the Forest Plan and a 2012 SIR). Although the Forest Plan revision was discontinued, this EA nonetheless has utilized and incorporates the updated projections made in the 2020 RFDS (Appendix D) to characterize environmental impacts in this EA.

According to the 2020 RFDS, all wells in the WNF are projected to be primarily gas wells, many of which would also produce some oil. No oil-only wells are projected in the WNF. Most of these wells are projected to be horizontally drilled gas wells from non-Federal surface pads using hydraulic fracturing. For reader reference, an overview of the drilling process, hydraulic fracturing, and how it is practiced is provided in the 2016 EA (BLM 2016), Section 2.2.1, as well as in Section 9.2 of the 2020 RFDS. That information is incorporated by reference into this EA.

The BLM's 2020 RFDS also identified the potential leasing area as all lands (Federal and non-Federal) within the Proclamation Boundary of the WNF plus four miles into other portions of Ohio, though the Marietta Unit is the only unit in the WNF where development is reasonably foreseeable. This area encompasses the extent of where potential surface impacts associated with drilling would occur because hydraulic fracturing technologies allow lessees up to four miles outside of the Marietta Unit to access Federal subsurface minerals in the WNF. Coordination with the Ohio Department of Natural Resources (ODNR) indicates it is not realistic for an operator to drill from West Virginia into Ohio minerals. At present, the states of Ohio and West Virginia have not approved a MOU that would authorize oil and gas wells drilled in West Virginia to extend into minerals under Ohio (Holzel and Grubaugh, pers. comm.). If such a MOU was approved in the future, it is still not reasonably foreseeable that Federal minerals in Ohio would be accessed from a well in West Virginia, due to the necessity for an operator to obtain separate permits from West Virginia, Ohio, and the BLM prior to drilling the well. Since drilling into Ohio minerals from West Virginia is not foreseeable to occur, there is no reasonable chance to drill from West Virginia under the Ohio River and into Ohio to access Federal minerals. Based on recent drilling activity, the 2020 RFDS forecast of proposed wells estimated that all wells would be developed within the Marietta Unit and a four-mile buffer, where operators can access the underlying Point Pleasant/Utica formations, Marcellus Shale, and Clinton sandstone.

Of the approximately 855,532 acres within the WNF Proclamation Boundary, USFS manages approximately 244,265 acres of surface estate (29 percent). When the 2020 RFDS was prepared, approximately 172,157 acres of Federal minerals were within the WNF Proclamation Boundary (BLM 2020). The Proposed Action only applies to the leasing of Federal minerals, regardless of the amount of Federal surface interest. USFS has authority to purchase lands, and some mineral rights owned by private parties may revert to United States ownership after a set period of time, which may add to the total acreage of Federal minerals available for lease.

The EOI process is used to review Federal minerals nominated for leasing. To date, interested parties have submitted at least 33 pending adjudicated EOIs for parcels on the Marietta Unit (Figure 3). To date, 65 total leases relying for NEPA compliance on the 2016 EA have been executed, including the 36 leases challenged in *CBD* (Appendix A) that were issued from

December 2016 to March 2017 and 29 additional leases that were issued following lease sales held from June 2017 through December 2019.

As leasing nominations are received, the BLM and USFS will review specific information about the lands nominated to ensure they contain Federal minerals and are administratively available for lease (e.g., not already leased or located within incorporated towns).² BLM approval of the Proposed Action would affirm prior decisions to issue the 65 leases and make “eligible and available” determinations for those nominated parcels that have not yet been offered for competitive lease. Prior to offering any parcels at a lease sale, the BLM must first request and obtain USFS consent. Prior to providing consent to the BLM, the Forest Service would consider if this EA, in concert with the 2016 EA, adequately addresses NEPA for each parcel in compliance with 36 CFR 228.102(e). The USFS is reconsidering six 2016 consent letters for the 36 leases challenged in CBD, and six consent letters from 2017 and 2018 for the additional 29 leases making up the 65 leases that relied, for NEPA compliance, on the 2016 EA.

In compliance with 43 CFR 3120.41, prior to a lease sale, parcels proposed for leasing would be identified, along with any attached lease stipulations or other measures in a Notice of Competitive Lease Sale. Under 43 CFR 3120.42, the notice must be posted at the BLM office (here, the Northeastern States District Office and Eastern States Office) having jurisdiction over the lands at least 45 days prior to a lease sale. Oil and gas leases are issued for a 10-year period and continue for as long thereafter as oil or gas is produced in paying quantities.

A Federal oil and gas lease is a legal contract that grants exclusive rights to the lessee to develop Federal oil and gas resources, however it does not, by itself, authorize surface-disturbing activities, nor does it obligate the lessee to drill a well on the parcel. For leases that proceed to development, lessees or operators are required to submit APDs as part of the Stage 3 environmental review, which typically includes: (1) an initial on-the-ground field evaluation by BLM resource specialists and, where NFS surface is involved, by USFS resource specialists; and (2) a site-specific environmental analysis. This review allows site-specific information regarding local resource conditions to be evaluated and potential impacts disclosed. During the Stage 3 analysis, the BLM would finalize design features, BMPs, AMMs (see Appendix G, *Wayne National Forest Biological Assessment*, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3, and 2.6.1.4), and other measures that would be applied to APDs as conditions of approval. Additionally, standards and guidelines from the Forest Plan will be applied where a project proposes to occupy NFS surface lands.

If surface occupancy on NFS lands is proposed, a Surface Use Plan of Operations (SUPO) would be submitted by the lessee and analyzed under NEPA by the USFS. No permit to drill on a Federal oil and gas lease on NFS lands may be granted without the analysis and approval of a SUPO covering proposed surface-disturbing activities. An operator must obtain approval before conducting surface-disturbing operations on NFS Lands. Refer to 36 CFR 228.106 for additional information on the USFS oil and gas leasing provisions associated with SUPOs.

Although there would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, this EA nonetheless analyzes reasonably foreseeable impacts of development to determine whether significant environmental impacts would require further

² For the BLM, this process is known as adjudication.

environmental analysis in the form of an EIS, or whether a Finding of No Significant Impact (FONSI) may be issued. The EA applies the projections and estimates of the 2020 RFDS (BLM 2020) in examining the possible environmental effects of the Proposed Action. Estimates can be made about the number of wells that would be constructed, but the specific locations and other important factors cannot be determined until site-specific APDs are submitted by operators. At that stage (Stage 3), additional analysis of potential impacts associated with surface disturbance and other project-related activity would occur.

2.2.1. Reasonably Foreseeable Development Scenario for Potential Oil and Gas Development

This EA relies on the scenarios in the 2020 RFDS (Appendix D) to estimate the amount and extent of future oil and gas development that could result from leases that are issued under the Proposed Action and the anticipated impacts associated with that development in the Action Area. The 2016 EA relied on the 2006 RFDS (Appendix G of the 2006 Forest Plan [USFS 2006a]) and the 2012 SIR (USFS 2012) to consider the anticipated impacts, both of which included estimates of horizontal well development and surface disturbance that were lower than estimates in the 2020 RFDS. The 2012 SIR noted that horizontal wells were becoming an economically feasible approach to mineral development in the area. More recently, the 2020 RFDS acknowledged the feasibility of using high-volume hydraulic fracturing based on improved technology and other factors and it projected an increased level of well development and surface disturbance compared to the 2006 RFDS. While the 2020 RFDS focused on a fifteen-year development period (2020-2034), BLM has since determined that the estimated numbers described in the 2020 RFDS continue to remain valid in projecting future development for the next fifteen years. Accordingly, this EA relies on the 2020 RFDS for its more current and accurate data and estimates of the potential for future lease development.

2.2.1.1. *Number of Wells and Well Pads*

The 2020 RFDS projected that up to 29 well pads supporting up to 81 wells within the Action Area would be constructed between 2020 and 2034. Most of the wells are projected to be unconventional (horizontally drilled) gas wells from non-Federal surface well pads. Many of the wells would also produce some oil. Based on this forecast of proposed wells, construction of up to two well pads are anticipated each year, with two to three wells estimated per pad. The result is that six wells per year could be drilled, completed and placed in production (Appendix D, pp. 36–38).

2.2.1.2. *Surface Disturbance*

The 2020 RFDS predicts that 81 new horizontally drilled wells (some potentially drilled from well pads containing multiple wells) would be drilled in the Action Area. Some of these wells would target the Marcellus Shale or the Clinton sandstone, but most were projected to target the deeper Point Pleasant/Utica formations. Well pads used to support horizontally drilled wells in southeastern Ohio have ranged in disturbance acreage from 6 to 35 acres, depending on topography, access, pipelines (including gathering and distribution lines), and the number of wells proposed per pad. After initial construction of a well pad, access roads, and any pipelines, most of the associated disturbance is typically regraded and seeded as interim reclamation measures for preventing erosion. Well pads, access roads, and other disturbance remaining after

interim reclamation range from 3 to 10 acres and typically remain until final reclamation is complete (i.e., when wells are plugged).

Reclamation activities for disturbances associated with accessing Federal minerals from Federal or private surface would be performed in accordance with the *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (commonly referred to as the Gold Book) (BLM 2007), which addresses the requirements for permit approval and conducting environmentally responsible oil and gas development, operation, and reclamation on Federal lands and private surface where disturbance is authorized by BLM in an APD approval (i.e., excluding Situation 1 and some aspects of Situation 2; these Situations are further described in Section 2.2.3.1 of this EA). Interim reclamation consists of reducing the original disturbance footprint by reclaiming portions of the well site not needed for production operations. Final reclamation requires the well site to be regraded to original contour or to a contour that blends with the surrounding landform, with stockpiled topsoil evenly redistributed and the site revegetated (BLM 2007). Refer to Section 9.2.3 in the 2020 RFDS for additional information about reclamation.

Based on recently installed well pads and wells in the Action Area, it is estimated that oil and gas activity in the Action Area for the 15-year development period would result in between 171 and 1,015 new acres of initial disturbance and 86 to 285 acres of longer-term disturbance³ remaining after interim reclamation and until final reclamation of the pad, access roads, and other infrastructure is complete (Table 2-1). The projected surface disturbance in the 2020 RFDS included all acreage potentially affected by future oil and gas development activities, such as road construction, well-pad construction, water storage tanks, construction of turnaround/production facility areas, pipelines (including gathering and distribution lines), staging areas, water impoundments, and other related activities.

Table 2-1. Potential Disturbance in the Action Area Projected by the Reasonably Foreseeable Development Scenario

SURFACE DISTURBANCE DESCRIPTION	DEVELOPMENT PERIOD
Total Initial Acres of Surface Disturbed by Oil and Gas Drilling before Reclamation	171 to 1,015 ³
Total Acres of Surface Needed to Support Long-Term Production (Disturbance Remaining After Interim Reclamation)	86 to 285

Source: BLM 2020.

Note: As described in the 2020 RFDS, (Appendix D, p. 34), unconventional well pads in southeastern Ohio have ranged in disturbance acreage from 6 to 35 acres, depending on topography, access, pipelines, and the number of wells proposed per pad. After initial construction of a well pad, access roads and any pipelines, most of the associated disturbance is typically regraded and seeded as interim reclamation to prevent erosion. Well pads and

³ This acreage was based on an estimated 29 pads at 35 acres per pad for a total of 1,015 acres. The 2020 RFDS contained a math error for total estimated acres of long-term disturbance that has been updated from 998 acres to 1,015 acres, the acreage figure utilized in this EA.

access disturbances remaining after interim reclamation range from 3 to 10 acres and typically remain until final reclamation (i.e., when wells plugged).

2.2.2. Phases of Oil and Gas Development

Section 2.2.1 of the 2016 EA and Section 9.2 of the 2020 RFDS characterize the phases of oil and gas development for both conventional (i.e., vertical) and horizontal drilling techniques. In addition, Table 3-2 of this EA provides a comparison of techniques, equipment, and impacts resulting from conventionally (vertically) completed wells versus hydraulically fractured wells using horizontal drilling.

2.2.3. Environmental Protection Measures, Lease Stipulations, and Avoidance and Minimization Measures

To lease and develop Federal minerals, operators must execute a standardized lease form (BLM Form 3100-011, *Lease for Oil and Gas* [BLM 2023]) regardless of whether the operator intends to drill on Federal or private surface.

Form 3100-011 sets forth 14 lease terms (Sections 1 to 14), including Section 6, *Conduct of operations*, which directs:

Lessee must conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee must take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures.... Lessee may be required to complete minor inventories or short-term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee must immediately contact lessor. Lessee must cease any operations that would result in the destruction of such species or objects (BLM 2023).

Under Section 6, the lessee agrees to minimize environmental impacts, and the BLM has authority as lessor to require the lessee to do so. Inventories and technical studies may be requested to ensure impacts are minimized and operations may be suspended if sensitive resources are identified (BLM 2023).

Appendix F, *Lease Stipulations, Notifications, Guidelines, and Standards*, identifies applicable lease stipulations, prohibitions and protections from the governing Forest Plan that apply on Federal oil and gas leases.

2.2.3.1. *Environmental Protections Required for a Federal Minerals Lessee Applying to Drill on NFS Lands*

Appendix F contains existing forest-wide standards, guidelines, lease stipulations, and notices for NFS lands. Standards and guidelines are required components for every lease that would be issued under the Forest Plan that proposes accessing Federal minerals from Federal surface. Special Lease Notification #1 states that operations under the lease will be consistent with standards and guidelines in the Forest Plan. Therefore, surface use proposals for NFS lands will not be approved unless consistent with the current Forest Plan.

Standards set limits on management activities. These limitations are designed to help USFS attain desired Forest conditions and fulfill management objectives for the WNF. Standards also ensure compliance with laws, regulations, Executive Orders (EOs), and policy direction. Departures from standards must be analyzed and documented in a Forest Plan Amendment; therefore, a proposal to use NFS surface that required an amendment of a standard would not be consistent with the Forest Plan and would be rejected. In contrast to standards, guidelines are preferred limits on management actions. They help USFS attain desired forest conditions and fulfill objectives for the WNF, while permitting some operational flexibility to respond to specific situations. Departures from guidelines must be analyzed during environmental review at the APD stage and documented in a project decision document. However, these departures do not require a Forest Plan amendment; therefore, surface use proposals for NFS lands that depart from a guideline may be permitted while maintaining Forest Plan consistency.

2.2.3.2. Avoidance and Minimization Measures for Species Protected under the Endangered Species Act (Applicable to All Lands)

Pursuant to Section 7 of the Endangered Species Act (ESA), the BLM and USFS are consulting with the U.S. Fish and Wildlife Service (USFWS) on potential impacts on Federally listed threatened, endangered, proposed, and candidate species. The USFWS has outlined a two-tiered process for consultations with BLM and USFS for future oil and gas development under the Proposed Action.

- Tier 1 is programmatic consultation completed in conjunction with this EA that identifies listed species that could be affected by proposed oil and gas development and identifies a set of AMMs (such as those in Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3 and 2.6.1.4), some or all of which may be applied to APDs as conditions of approval during tier 2 consultation.
- Tier 2 is consultation on site-specific development proposals included in APDs. The agencies would select appropriate AMMs from the set of AMMs identified during Tier 1 consultation and apply those AMMs to APDs as conditions of approval. Additionally, if necessary to further protect Federally listed species, the agencies could decide that additional AMMs are needed as conditions of approval.

Agency coordination with the USFWS has resulted in identification of AMMs designed to avoid and minimize potential impacts on listed species (Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3, and 2.6.1.4). They include protective measures for Federally protected species that have potential to occur in the Analysis Area, as described in Chapter 3. The BLM will apply appropriate AMMs identified in Appendix G of this EA to all APDs as conditions of approval, whether on new leases or on the 65 noted leases. These AMMs would be applied to APDs on both Federal land and private land development activities that access Federal minerals throughout the entire life of leases issued under the Proposed Action and the life of reasonably foreseeable development of the leases.

During the site-specific APD permitting process, the BLM and USFS will conduct Tier 2 consultation with the USFWS based on the specific elements of development proposals. This Section 7 consultation would result in site-specific AMMs for APDs to address potential impacts on Federally listed species.

Federal minerals in the Marietta Unit may be accessed either from Federal or private surface. Access from private surface is subject to the guidance of BLM’s Permanent Instruction Memorandum (PIM) 2018-014 (*Directional Drilling into Federal Mineral Estate from Well Pads on Non-Federal Locations*), which discusses three situations under which Federal minerals are accessed from private surface. For analysis purposes, a Situation 4 is discussed where Federal minerals are accessed from Federal surface. The situations are discussed below and in Appendix G of this EA.

As a preliminary matter, we note three important factors that apply in all situations:

1. The issuance of a lease does not automatically result in drilling: Once a lease is obtained, an operator seeking to develop that lease must submit an APD to BLM that includes site-specific details necessary for BLM to perform site-specific environmental analysis.
2. As identified in Section 2.9 of the BA, the State of Ohio (through the ODNR) has authority to regulate the construction of well pads and development of wells accessing minerals underlying private surface land in Ohio (Ohio Revised Code (ORC) Sec. 1509). Appendix E describes the state’s authority to protect resources, and we presume state agencies will follow their regulations. Operators are also subject to the prohibitions of ESA section 9, 16 USC. 1538 *et seq.* Section 9 prohibits the “take” of any endangered species. *Id.* 1538(a)(1)(B). Unauthorized take is punishable by substantial civil or criminal penalties. *Id.* § 1540(a), (b), (g).
3. Any action proposed for extracting Federal minerals, even if the action originates from private property, will be subject to Federal oversight. If accessing Federal minerals from private surface will involve any surface disturbance, the BLM will include, as conditions of APD approval, such AMMs, Best Management Practices, and lease stipulations as are deemed necessary, based on BLM’s review of site-specific plans. Where private surface is fully built out and no surface disturbance is needed to add a Federal well to an existing well pad, any APD approval will include AMMs, BMPs, and lease stipulations consistent with BLM’s authority to regulate downhole drill operations and surface activities that occur during operations, but not including the surface disturbance already completed for well pads, roads and related infrastructure.

Discussed below are the four situations BLM would encounter upon receiving an APD and how BLM would apply AMMs and other measures to APDs as conditions of approval.

Private Property: a well pad and other surface disturbance previously occurred-no new disturbance requested
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Situation 1:

Under BLM regulations, an applicant could cause surface disturbance on private land, clear a well pad, and drill up to the border of Federal minerals prior to submitting an APD. In Situation 1, an operator submits an APD for drilling a new Federal wellbore or horizontal leg into Federal minerals from an existing well pad that was constructed on private surface lands. All the disturbance at the well pad will have occurred prior to BLM involvement, subject to State of Ohio regulatory oversight and ESA section 9 prohibitions.

As further discussed in Appendix E in this EA, the ODNR has sole authority for regulating the construction of well pads and development of private wells on private surface land in Ohio (ORC 1509). Ohio regulations impose strict requirements for the protection of natural resources, including compliance with the ODNR Best Management Practices for Oil and Gas Well Site Construction (ODNR 2013), so as to reduce impacts from surface disturbance, vegetation removal, sedimentation and erosion, waste disposal, construction of well sites and access roads, and other activities.

Non-Federal parties are also subject to the ESA section 9 take prohibitions. During the state process, the applicants have the option to contact the USFWS for technical assistance to obtain USFWS recommendations for avoiding take of Federally listed species. The USFWS regularly provides such technical assistance to entities conducting oil and gas activities on private lands in Ohio.

In Situation 1, BLM would only assess the down-hole impacts of the proposed drilling to access Federal minerals and the impacts of production operations, such as truck trips. Any construction impacts (tree clearing, soil disturbance, road building) that did not have Federal involvement (i.e., it occurred before an APD was sought) would be considered under cumulative impacts in any formal consultation with USFWS in Tier 2 if they occurred within the area likely to be affected by a Federal action. These effects are also considered under the cumulative impacts analysis. Although they are outside of BLM's or USFS's control, they have been considered in both the BA as well as the EA. Impacts to mussels could occur if significant water withdrawal is required for boring of the well to reach Federal minerals. Any such impacts would be connected to BLM's authorization and therefore subject to agency oversight. In Situation 1, Tier 2 consultation with USFWS under Section 7 of the ESA would be conducted upon receipt of an APD from an operator and the BLM would apply appropriate AMMs from the set of AMMs in Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3, and 2.6.1.4 and other measures to APDs as conditions of approval, such as prohibiting water withdrawals from the Little Muskingum River for oil and gas operations, to avoid and minimize impacts to listed species on a site-specific basis.

Table 2-2. Situation 1: Action, Authorized Agency, and Application of AMMs

Resources/Actions for Review That May Affect T&E Species	Authority (Ohio DNR/BLM/FWS)	AMM (Stipulations to Leases and APDs as specified in BA (Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3 and 2.6.1.4) of this EA)), site specific determinations
Disturbance - Noise	BLM/ODNR	<u>Already disturbed surface</u> : All Necessary State Permits; Bat AMM 6
Vegetation and Rare Plants, including suitable habitat, spread of invasive species and site remediation	BLM/ODNR	<u>Already disturbed surface</u> : All Necessary State Permits; Plant AMMs 2, 3,5; Monarch AMMs 1, 2 (mowing), 3

Tree Clearing/Cutting Terrestrial Species/Bats	BLM/FWS	<u>Already disturbed surface:</u> All Necessary State Permits; Bat AMMs 3, 5, 6, 7
Water Quantity (withdrawal)	BLM/ODNR/FWS	<u>Already disturbed surface:</u> All Necessary State or Federal Permits; Aquatic AMMs 5, 6, 7, 9
Water Quality (Mussels/Eastern hellbender)	BLM/ODNR/FWS	<u>Already disturbed surface:</u> All Necessary State or Federal Permits; Aquatic AMMs 1, 3, 4, 8

Private Property: Some disturbance on private surface previously occurred *and* additional private surface disturbance is requested to reach Federal minerals

Situation 2:

In Situation 2, an operator submits an APD for drilling a new Federal wellbore or horizontal leg into Federal minerals from an existing surface disturbance constructed on private surface lands, but additional surface disturbance (e.g., well pad or road expansion) is anticipated. Previous disturbance will have already occurred prior to BLM involvement, under State of Ohio regulatory oversight. The applicant may have contacted USFWS for technical assistance under Section 9 of the ESA and USFWS may have provided recommendations for avoiding take of Federally listed species. Any such impacts (tree clearing, soil disturbance, road building) that did not have Federal involvement (i.e., it occurred before and APD was sought) would be considered under the cumulative impacts analysis if they occurred within the area likely to be affected by a Federal action. Although they are outside of the BLM's or USFS's control, they have been considered in both the BA as well as the EA. Section 7 (i.e., Federal) consultation is triggered when the APD is submitted. The additional/new disturbance would be considered effects resulting from the BLM's authorization to access Federal oil/gas and reviewed under the ESA Consultation Framework.

The analysis of the cumulative impacts on the resources affected by approving an APD would recognize any ongoing or future environmental effects of other actions if the effects of those actions are relevant to assessing how the Federal action or undertaking will affect specific resources. Tier 2 consultation with USFWS under Section 7 of the ESA would be conducted upon receipt of an APD from an operator and the BLM would apply appropriate AMMs from the set of AMMs in Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3, and 2.6.1.4 of this EA and other measures to APDs as conditions of approval to avoid and minimize impacts to listed species on a site-specific basis.

Table 2-3. Situation 2: Action, Authorized Agency, and Application of AMMs

Resources/Actions for Review That May Affect T&E Species	Authority (Ohio DNR/BLM/FWS)	AMM (Stipulations to Leases and APDs as specified in BA (Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3 and 2.6.1.4) of this EA)), site specific determinations

Disturbance - Noise	BLM/ODNR/FWS	<u>Already disturbed surface:</u> All Necessary State Permits; Bat AMM 6 <u>New surface disturbance:</u> All Necessary State Permits; All appropriate Bat AMMs that would apply to noise based on site-specific drilling plans
Vegetation and Rare Plants, including suitable habitat, spread of invasive species and site remediation	BLM/ODNR/FWS	<u>Already disturbed surface:</u> All Necessary State Permits; Plant AMMs 1, 2, 3, 4, 5; Monarch AMMs 1, 3 <u>New surface disturbance:</u> All Necessary State Permits; All appropriate Plant AMMs and Monarch AMMs that would apply to vegetation and rare plants, invasive species, and site remediation based on site-specific drilling plans
Tree Clearing/Cutting Terrestrial Species/Bats	BLM/FWS	<u>Already disturbed surface:</u> All Necessary State Permits; Bat AMMs 4, 5, 7 <u>New surface disturbance:</u> All Necessary State Permits; All appropriate Bat AMMs that would apply to tree cutting and clearing based on site-specific drilling plans
Water Quantity (withdrawal)	BLM/ODNR/FWS	<u>Already disturbed surface:</u> All Necessary State or Federal Permits; Aquatic AMMs 5, 6, 7, 9 <u>New surface disturbance:</u> All Necessary State or Federal Permits; All appropriate Aquatic AMMs that would apply to water withdrawals based on site-specific drilling plans
Water Quality (Mussels/Eastern hellbender)	BLM/ODNR/FWS	<u>Already disturbed surface:</u> All Necessary State or Federal Permits; Aquatic AMMs 1, 2, 3, 4, 9 <u>New surface disturbance:</u> All Necessary State Permits; All appropriate Aquatic AMMs that would apply to water quality based on site-specific drilling plans

Private property – No disturbance has occurred on private surface and an Operator submits an APD seeking to build roads, well pads, and associated infrastructure

Situation 3:

In Situation 3, an operator submits an APD for drilling a new Federal wellbore or horizontal leg into Federal minerals on undeveloped private land and for construction of roads and well pads to access Federal minerals. The new disturbance would be considered an effect of the Federal action and is subject to the ESA Consultation Framework described below. New disturbance triggers analysis of potential environmental effects associated with construction and operation of the well, including the well pad, access roads, pipelines, or other infrastructure, as appropriate. In general, the NEPA analysis at the APD Stage will consider a range of reasonable alternatives in the siting of surface facilities, to the extent such alternatives would be substantially different in effect from the proposed action.

For all APDs in Situation 3, BLM will consult with USFWS under Section 7 upon receipt of an APD from an operator. BLM will apply appropriate AMMs from Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3, 2.6.1.4 of this EA and other measures to APDs as conditions of approval to avoid and minimize impacts to listed species on a site-specific basis.

Table 2-4. Situation 3: Action, Authorized Agency, and Application of AMMs

Resources/Actions for Review That May Affect T&E Species	Authority (Ohio DNR/BLM/FWS)	AMM (Stipulations to Leases and APDs as specified in BA (Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3 and 2.6.1.4) of this EA)), site specific determinations
Disturbance - Noise	BLM/ODNR/FWS	All Necessary State Permits; All appropriate Bat AMMs that would apply to noise based on site-specific drilling plans
Vegetation and Rare Plants, including suitable habitat, spread of invasive species and site remediation	BLM/ODNR/FWS	All Necessary State Permits; All appropriate Plant AMMs and Monarch AMMs that would apply to vegetation and rare plants, invasive species and site remediation based on site-specific drilling plans
Tree Clearing/Cutting Terrestrial Species/Bats	BLM/FWS	All Necessary State Permits; All appropriate Bat AMMs that would apply to tree cutting and clearing based on site-specific drilling plans
Water Quantity (withdrawal)	BLM/ODNR/FWS	All Necessary State or Federal Permits; All appropriate Aquatic AMMs that would apply to water withdrawals based on site-specific drilling plans

Water Quality (Mussels/Eastern hellbender)	BLM/ODNR/FWS	All Necessary State or Federal Permits; All appropriate Aquatic AMMs that would apply to water quality based on site-specific drilling plans
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Public Lands – An operator seeks to access Federal minerals from Federal surface and submits an APD

Situation 4:

In Situation 4, an operator submits an APD for drilling a new Federal wellbore or horizontal leg into Federal minerals from a well pad to be constructed on Wayne National Forest (or other Federal agency) surface. Impacts on Forest Service lands would require adherence to Forest requirements and the governing Forest Plan. The new disturbance would be an effect of the Federal action and regulated under the ESA Consultation Framework described below. No surface disturbance could occur until the lead Federal agency has completed Tier 2 section 7 consultation, and the applicant has obtained the necessary permits from the surface management agencies. The environmental analysis must consider all potential environmental effects associated with construction and operation of the well, including the well pad, access roads, pipelines, or other infrastructure, as appropriate. In general, the NEPA analysis will consider a range of reasonable alternatives in the siting of surface facilities. Consultation with USFWS under Section 7 of the ESA would be conducted upon receipt of an APD from an operator and BLM would apply appropriate AMMs from Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3, 2.6.1.4 of this EA, Forest Service lease stipulations, notifications, standards, guidelines from the Forest Plan and other measures to all APDs associated with developing leases that may be issued under the Proposed Action and to any APD for developing the noted 65 leases as conditions of approval to avoid and minimize impacts to listed species on a site-specific basis.

Table 2-5. Situation 4: Action, Authorized Agency, and Application of AMMs

Action – Receipt of a complete APD	Authority	AMM (Stipulations to Leases and APDs as specified in BA (Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3 and 2.6.1.4) of this EA)), site specific determinations
Site-specific NEPA analysis	Forest Plan/BLM	BLM imposes appropriate notices, stipulations, standards, and guidelines from the Forest Plan to site-specific APDs
Section 7 Consultation with FWS	FWS/BLM/FS	BLM imposes appropriate AMMs (Appendix G) to site-specific APDs
Section 106- Cultural Resources	FS/BLM	Consultation and SHPO Concurrence

2.3. Alternatives Considered, but Eliminated from Detailed Analysis

2.3.1. No Surface Occupancy

Offering all leases with a NSO stipulation was suggested during internal discussions between the agencies. Such lease stipulations, if adopted, would have prohibited the surface use of USFS lands to access Federal minerals. As indicated in the BLM Planning for Fluid Mineral Resources Handbook (BLM 2013; H-1624-1), designating an area as NSO is a land use planning decision. The governing Forest Plan contains no blanket NSO designation and making such a designation would necessitate a Forest Plan amendment, which is not under consideration at this time. This alternative was eliminated from detailed analysis for this reason and because it would not fulfill the purpose and need described in 0 of this EA for two reasons. First, this alternative would severely constrain oil and gas occupancy, especially in this highly fragmented landscape, where the ability to cross Federal land may be critical to enabling an operator to develop minerals. Second, requiring all future drilling to take place off the Federal surface may force operators to use locations that result in greater adverse impacts on natural resources compared to impacts on the Federal surface. The lease stipulations provided in the Forest Plan would mitigate impacts from oil and gas development on Federal surface and the Federal government has more authority to protect natural resources on Federal lands than on private lands.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

This chapter discusses potential impacts of the Proposed Action and No-Action Alternative, organized by resource. Section 3.1, *Resources Considered for Analysis*, describes all resources studied in the evaluation of the Proposed Action and No-Action Alternative and their treatment in this EA. Each resource section begins with a description of the existing conditions within a specified review area, followed by an analysis of the potential impacts consistent with Title 40 Code of Federal Regulations [CFR], Parts 1500–1508 (2020), that would result from each alternative. The administrative act of offering oil and gas parcels for sale and the subsequent issuing of leases does not authorize development to occur. Only a BLM-approved APD does. APDs include information on timing and scale of development, as well as site-specific details, and operator input that are not known at the leasing stage. Despite the lack of site-specific detail at the present stage, BLM nonetheless made reasonable development estimates to better inform decision makers and the public of potential impacts and the differences between alternatives.

Based on recent drilling activity, the 2020 RFDS (Appendix D) forecasts that any wells developed would all be located within the Marietta Unit and a 4-mile buffer, where operators can access the underlying Point Pleasant/Utica formations, Marcellus Shale, and Clinton sandstone. For this reason, the Analysis Area for most resources analyzed in this EA is the Marietta Unit plus a 4-mile buffer, excluding West Virginia, plus an additional 0.5-mile buffer (Figure 3-1). This area encompasses the extent of potential surface impacts that could occur from reasonably foreseeable development of the leases using hydraulic fracturing technologies, allowing private landowners up to 4 miles outside of the Proclamation Boundary to access Federal minerals underlying the Marietta Unit. An additional 0.5-mile buffer has been included in the Analysis Area to account for potential impacts that can extend outside the disturbance area such as noise, dust deposition, erosion, and sedimentation. With respect to the noted exclusion of West Virginia (see Section 2.2), the states of Ohio and West Virginia have not approved a MOU that would

authorize oil and gas wells drilled in West Virginia to extend into minerals under Ohio (Holzel and Grubaugh, pers. comm.). If such a MOU was approved in the future, it is still not reasonably foreseeable that Federal minerals in Ohio would be accessed from a well in West Virginia, due to the necessity for an operator to obtain separate permits from West Virginia, Ohio, and the BLM. As such, there would be no anticipated impacts to surface resources in West Virginia and this area is excluded from the general Analysis Area. Where appropriate, this EA assigns certain resources a larger analysis area to account for the geographic extent of impacts specific to that resource, including air quality, water resources, aquatic wildlife, and socioeconomics.

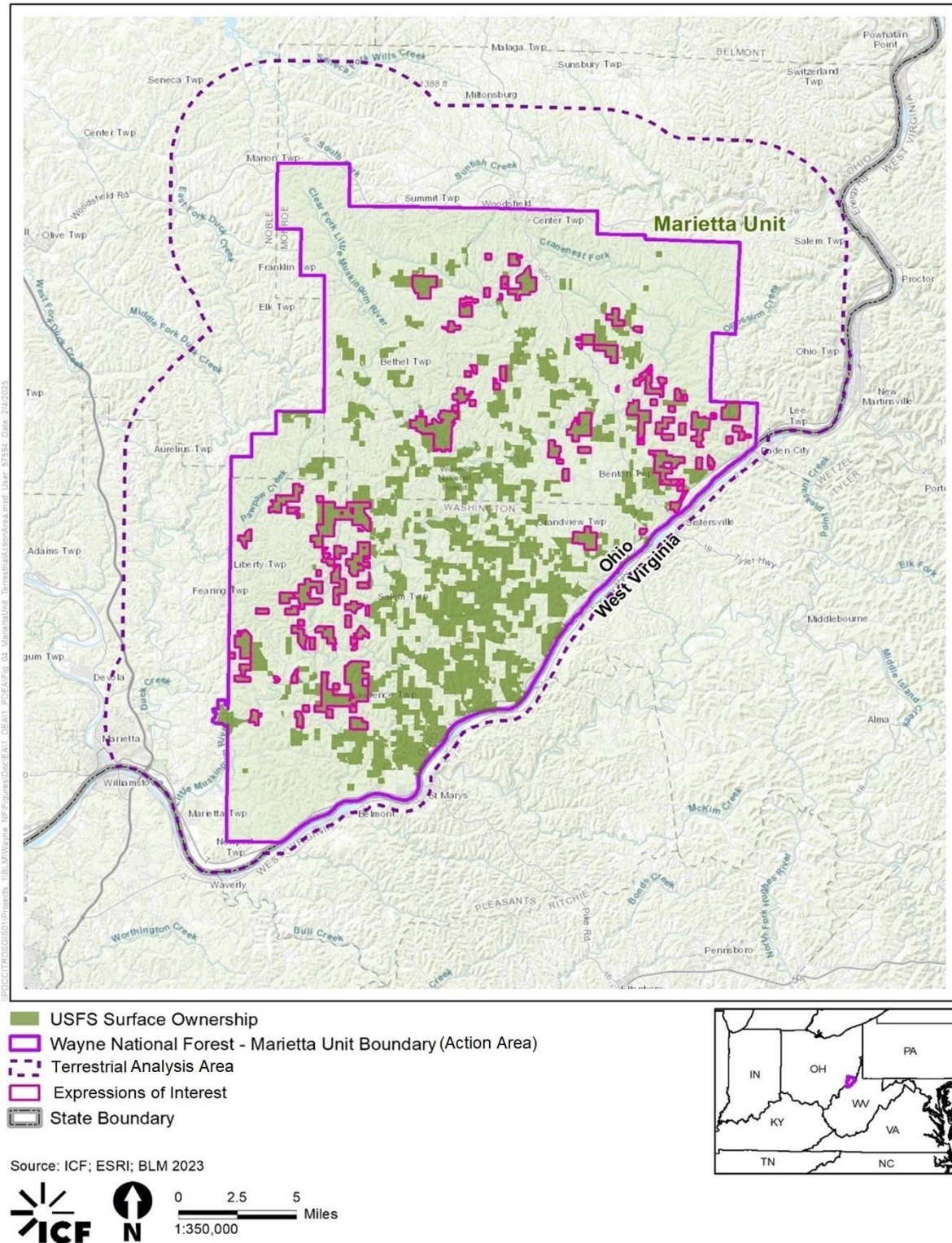


Figure 4. Terrestrial Analysis Area for Terrestrial Species (Marietta Unit plus a 4.5-mile buffer)

The timeframe of the analysis in this EA is 55 years, to account for time needed to develop a lease (15 years) and the typical 25 to 40-year production period of wells (BLM 2020).

3.1. Resources Considered for Analysis

The *CBD* Court Orders (Appendix A) found deficiencies in the following areas, each of which is analyzed in detail in this EA:

- Surface area disturbance associated with hydraulic fracturing including well pads, gathering pipelines, water impoundments, staging areas, access roads, and other typical infrastructure associated with hydraulic fracturing development,
- Cumulative impacts on Indiana bat and Little Muskingum River associated with hydraulic fracturing, and
- Impacts on air quality associated with hydraulic fracturing

Table 3-1 presents the issues analyzed in detail in this EA. Refer to Appendix C (*Issues Not Considered in Detail in this Environmental Assessment*) for a description of resource issues that were considered but not carried forward in this EA and the rationale.

Table 3-1. Issues Analyzed in Detail

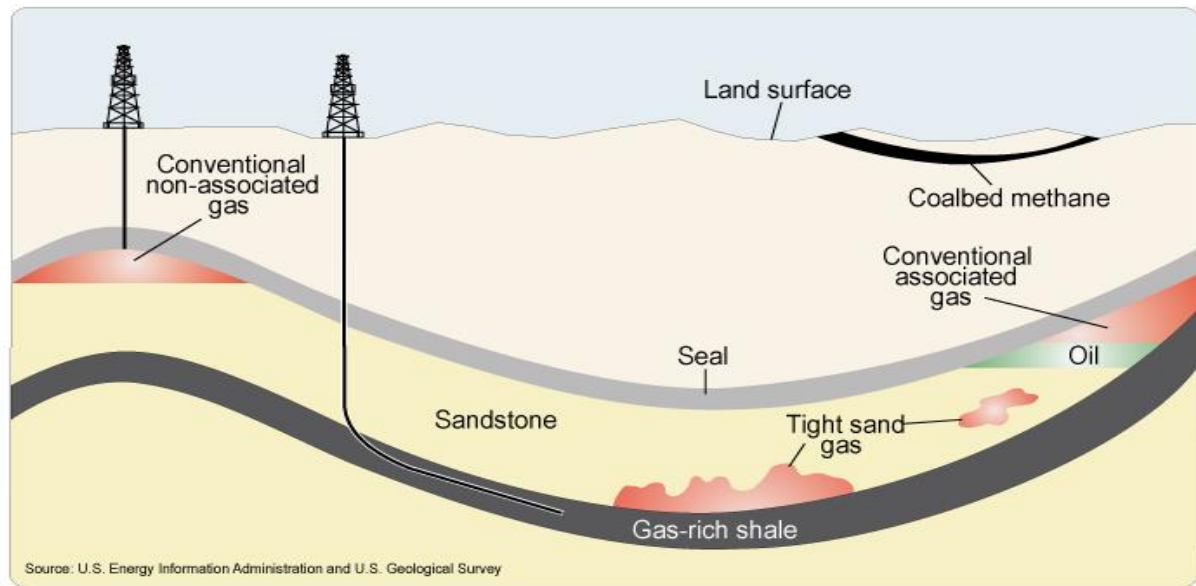
ISSUE #/RESOURCE	ISSUE STATEMENT
Issue 1: Air Resources	How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing techniques impact local air quality?
Issue 2: Climate Impacts	How would increases in surface disturbance and use of high-volume hydraulic fracturing drilling techniques impact climate change and greenhouse gas emissions?
Issue 3: Vegetation and Rare Plants	How would increases in surface disturbance and use of high-volume hydraulic fracturing drilling techniques impact vegetation communities and rare plant species in the region?
Issue 4: Water Resources	How would increases in surface disturbance and use of high-volume hydraulic fracturing drilling techniques impact water resource quantity and quality, wetlands, and riparian areas in the region, including the Little Muskingum River watershed?
Issue 5: Aquatic Wildlife	How would increases in surface disturbance and use of high-volume hydraulic fracturing drilling techniques impact aquatic wildlife species in the region, including Federally protected mollusk species?
Issue 6: Terrestrial Wildlife	How would increases in surface disturbance and use of high-volume hydraulic fracturing drilling techniques impact terrestrial wildlife species in the region, including Indiana bat, northern long-eared bat, and tricolored bat?
Issue 7: Transportation	How would increases in surface disturbance and use of high-volume hydraulic fracturing drilling techniques impact transportation in the region?
Issue 8: Socioeconomics and Local Economics	How would increases in surface disturbance and use of high-volume hydraulic fracturing drilling techniques impact socioeconomics and local economic conditions?

3.2. Scope of the Analysis

In this EA, the 2020 RFDS has been used to estimate the extent of future oil and gas development in the Analysis Area and the associated potential impacts from reasonably foreseeable oil and gas development as a result of leasing Federal minerals in the Marietta Unit. In the analysis which follows, *short-term impacts* from potential development are considered those that would be stabilized or mitigated within five years, and *long-term impacts* are those that would substantially remain for more than five years. *Cumulative impacts* include the combined impact of past, present, and reasonably foreseeable future projects, such as siting of infill wells (wells drilled between producing wells to promote more efficient recovery of minerals). AMMs, standard operating procedures, and mitigation measures that would be applied to APDs as conditions of approval are also discussed within the context of each resource section. If actual mineral development on one or more lease parcels were proposed, then additional site-specific environmental analysis would be conducted at the APD stage.

3.2.1. Vertically Drilled/Vertical Completions versus Horizontally Drilled/Hydraulically Fractured Completions

Horizontal drilling and hydraulic fracturing technologies have made it possible to commercially develop certain gas reserves that are difficult to by vertical drilling, particularly shale gas reserves. See Figure 5, below. The 2020 RFDS assumed that most new wells in the WNF would be horizontally drilled, natural-gas wells, with high-volume hydraulic fracturing the predominant well-stimulation technique (BLM 2020). Consistent with this likelihood, Table 3-2 compares the general activities associated with horizontally drilled, hydraulically fractured wells to vertically drilled and completed wells, addressing a deficiency identified in the 2020 decision in *CBD* (Appendix A) relating to an unwarranted emphasis on vertical drilling in the 2016 EA.. The parameters described in this EA for vertical well completions are provided for comparison purposes, as horizontal drilling is assumed. It should be noted that the level of disturbance (well pad, access road, soil stockpiles, erosion-control features, pipelines, guard shacks, etc.) associated with oil and gas development varies depending on the depth of the well and type of well drilled (unconventional or conventional). Conventional well pads in the area of the WNF typically contain one well. Unconventional well pads in the area of the WNF may contain one to eighteen or more wells, with three wells per well pad being common; therefore, on a per well basis, by comparison, long-term surface disturbances for horizontally drilled wells are typically less than for vertical wells (BLM 2020). The horizontally drilled, hydraulically fractured well-parameter values summarized in Table 3-2 are considered in the impact analysis described in this Chapter. Figure , below, depicts oil and gas drilling using vertical (the drill on the far left of Figure) and horizontal drilling techniques (the drill second to the left on Figure).



Source: U.S. Energy Information Administration 2011.

Figure 5. Oil and Gas Drilling Using Vertical and Horizontal Drilling Techniques

Table 3-2. Representative Differences between Vertically Drilled Wells and Horizontally Drilled Wells Completed using Hydraulic Fracturing

CATEGORY	VERTICALLY DRILLED AND COMPLETED WELLS/PADS	COMPLETED HORIZONTALLY DRILLED AND HYDRAULICALLY FRACTURED WELLS/PADS
Disturbance Area	Short-term Disturbance⁴: - The total acreage of surface disturbance by oil and gas drilling activity before interim reclamation averages approximately 0.7 to 1.1 acres (USFS 2012). - Short-term disturbance lasts approximately 2 to 4 weeks (Lioudis 2022). - Vertical wells require tighter spacing and are typically drilled from individual well pads.	Short-term Disturbance: - The total acreage of surface disturbance by oil and gas drilling activity before interim reclamation averages approximately 6 to 35 acres (BLM 2020).⁶ - Short-term disturbance lasts approximately 8 to 10 weeks (Lioudis 2022). - Horizontal wells can be dispersed more than vertical wells (due to longer lateral reach) and typically include multiple wells per pad.
	Long-term Disturbance⁵: - The total acreage of surface needed to support drilled wells that were completed for production (excess disturbance reclaimed) averages approximately 0.6 to 0.7 acre (USFS 2012). - Long-term disturbance persists approximately 20 to 30 years, until the well is plugged (BLM 2020).	Long-term Disturbance: - The total acreage of surface needed to support drilled wells that were completed for production (excess disturbance reclaimed) averages approximately 3 to 10 acres (BLM 2020). - Long-term disturbance persists approximately 25 to 40 years, until the well is plugged (BLM 2020).

⁴ *Short-term surface disturbance impacts* are defined as disturbance associated with well-pad construction (including access roads, staging areas, water impoundments, pipelines) and well completion (when well is ready to produce oil or gas). Interim reclamation occurs following these activities.

⁵ *Long-term surface disturbance impacts* are defined as disturbance associated with well operation.

⁶ The estimated surface disturbance of 6 to 35 acres for construction and drilling of a horizontal well pad includes all acreage potentially affected by reasonably foreseeable future oil and gas development of the leases that could be issued or affirmed under the Proposed Action, such as road construction and maintenance, well-pad construction, water storage tanks, construction of turnaround/production facility areas, pipelines (including gathering and distribution lines), staging areas, water impoundments, and other related activities (BLM 2020).

CATEGORY	VERTICALLY DRILLED AND COMPLETED WELLS/PADS	COMPLETED HORIZONTALLY DRILLED AND HYDRAULICALLY FRACTURED WELLS/PADS
Well Depth	Well depth varies from less than 1,000 feet to more than 10,000 feet (BLM 2020).	- Horizontal wells in the Marcellus and Utica Shales can reach from 5,000 to 10,000 feet below the surface (BLM 2020). - Horizontal wells in the area are around 10,000 feet deep.
Well Lateral Reach	There is no lateral reach associated with vertical wells as the well bore is generally vertical as depicted on Figure .	- In 2017, the average length of laterals in the Utica formation (located primarily in Ohio) was 8,628 feet (EIA 2018). - The reasonably foreseeable extent of lateral reach for a horizontal well in this EA is assumed to be up to 4 miles (BLM 2020). For example, in Monroe County, Ohio, a horizontal well reached a total horizontal reach of approximately 4 miles (ODNR 2018).

CATEGORY	VERTICALLY DRILLED AND COMPLETED WELLS/PADS	COMPLETED HORIZONTALLY DRILLED AND HYDRAULICALLY FRACTURED WELLS/PADS
Process Duration (Days of continuous 24-hour drilling activity)	Although many variables can affect drilling time, a typical vertical well takes about 3 days to drill (BLM 2020).	- Although many variables can affect drilling time, a typical horizontal well takes from 5 days to 25 days to drill (BLM 2020). - Multiple wells may be drilled in succession, thus increasing the number of consecutive drilling days. Well pads used for horizontal drilling in the area of the WNF may contain one to 18 or more wells, with three wells per well pad being common (BLM 2020). - Completing a well using hydraulic fracturing typically takes an additional 10 days. If there are multiple wells on a pad, completions would take longer to complete each well.

CATEGORY	VERTICALLY DRILLED AND COMPLETED WELLS/PADS	COMPLETED HORIZONTALLY DRILLED AND HYDRAULICALLY FRACTURED WELLS/PADS
Noise Impacts per Pad	- Drilling is a continuous operation until the total depth of the well is reached, typically about 3 days (BLM 2020). - Noise levels at drilling sites measured at approximately 63 decibels at 200 feet from the source (BLM 1999)	- Drilling is a continuous operation until the total depth of the well is reached, typically about 5 days (BLM 2020). As such, duration of noise impacts during drilling is typically longer than for vertical drilling. - Noise levels during well construction and drilling generally average 65 decibels (dBA)⁷ at 350 feet from the source (Radtke 2016). - Noise levels during hydraulic fracturing of wells generally average 69 dBA at 350 feet from the source (Radtke 2016). - Noise levels during well production generally average 47 dBA at 350 feet from the source (Radtke 2016). - Increased amounts of heavy-truck traffic, mainly for hydraulic fracturing waste transport, would result in increased noise levels along access routes with noise level increases being higher closer to the source of the heavy-truck traffic
Visual Impacts per Well	Short-Term: - Disturbance averages 0.7 to 1.1 acres and lasts in the landscape 2 to 4 weeks (USFS 2012; Lioudis 2022). - The height of the drilling rig (its tallest component) is typically 80 to 100 feet, depending on well depth (BLM 2020).	Short-Term: - Disturbance averages 6 to 35 acres and stays in the landscape for 8 to 10 weeks (BLM 2020; Lioudis 2022). - The height of the drilling rig (its tallest component) is typically 80 to 100 feet, depending on well depth (BLM 2020).

⁷ Decibel levels cited are all reported in 5 Second Leq A-weighted Decibels. The Leq (Equivalent Continuous Sound Level) is a key metric in acoustics and noise studies, representing the average sound level over a designated period, in this case the average sound level over 5 seconds during the monitoring periods.

CATEGORY	VERTICALLY DRILLED AND COMPLETED WELLS/PADS	COMPLETED HORIZONTALLY DRILLED AND HYDRAULICALLY FRACTURED WELLS/PADS
	- Because drilling is a continuous operation until the total depth of the well is reached, sites are lit at night, and the rig masts are lit for aircraft safety (BLM 2020). - Short-term impacts associated with construction also would include heavy equipment and employee vehicles (stationary and traveling to/from well pad locations) and fugitive dust. Long-Term: - Disturbance averages 0.6 to 0.7 acre and lasts in the landscape 20 to 30 years (USFS 2012). - Wells might produce for many years, depending on the resource; drilling rigs are typically in place only during the drilling phase.	- Because drilling is a continuous operation until the total depth of the well is reached, sites are lit at night, and the rig masts are lit for aircraft safety (BLM 2020). - Short-term impacts associated with construction would also include heavy equipment, heavy-truck traffic, employee vehicles (stationary and traveling to/from well pad locations), and fugitive dust. - The tallest hydraulic fracturing–related unit on site is typically a 43-foot-tall pump in place for limited days needed to conduct hydraulic fracturing on all wells (BLM 2019). - Short-term impacts are associated with increased amounts of heavy-truck traffic, mainly for hydraulic fracturing waste transportation. Long-Term: - Disturbance averages 3 to 10 acres and lasts 20 to 30 years in the landscape (BLM 2020). - Wells might produce for many years, depending on the resource; drilling rigs are typically in place only during the drilling phase. - Hydraulic fracturing would occur at any time during a well’s productive life (typically lasting 1 to 2 days). To help retain a consistent production rate, a well may need to be hydraulically fractured on a periodic basis, which necessitates additional heavy equipment, water storage, and vehicle traffic (OEPA 2020).

CATEGORY	VERTICALLY DRILLED AND COMPLETED WELLS/PADS	COMPLETED HORIZONTALLY DRILLED AND HYDRAULICALLY FRACTURED WELLS/PADS
Air Emissions	In addition to contributing to the formation of ozone, hazardous air pollutants (HAPs) from the oil and gas industry include air toxics, such as benzene, ethylbenzene, and n-hexane (USEPA 2022).	- In addition to contributing to the formation of ozone, hazardous air pollutants (HAPs) from the oil and gas industry include air toxics, such as benzene, ethylbenzene, and n-hexane (USEPA 2022). - During hydraulic fracturing's gas-collection process, it is estimated that 3.6 to 7.9 percent of methane leaks into the atmosphere during the service life of a hydraulically fractured well (Mrdjen and Lee 2016). - Additional vehicle trips required for hydraulic fracturing would increase tailpipe emissions (see Vehicle Trips per Pad, below).
Water Use	Conventional drilling activities typically use approximately 44,000 to 85,000 gallons (or 0.044 to 0.085 Mgal) of water per well during drilling and completion (BLM 2012). If recompletion of a well is required additional water would be needed.	- Horizontal wells in Monroe, Washington, and Noble Counties have been reported to use between 19 and 27 Mgal of water per well during drilling and completion (OEPA 2020). During operations, horizontal wells have been found to use between 2 and 6 Mgal of water per well (University of Michigan 2013). If recompletion of a well is required additional water would be needed. - Because horizontal completions take longer and require more water, the timeframe during which water is drawn is longer than for vertical drilling and conventional completions.

CATEGORY	VERTICALLY DRILLED AND COMPLETED WELLS/PADS	COMPLETED HORIZONTALLY DRILLED AND HYDRAULICALLY FRACTURED WELLS/PADS
Water Disposal	- Wastewater discharge tends initially to be modest and increases with a well's production age, producing a smaller amount of near-term wastewater volume but a larger amount of water discharges the longer they exist (Xu et al. 2022). - Flowback from hydraulic fracturing is required to be treated separately. It is typically maintained in segregated tanks and disposed of per ODNR-DOGRM regulations. - Approximately 98 percent of produced wastewater is disposed of via underground injection into Class II wells that USEPA and the State of Ohio regulates, and 2 percent is spread for dust and ice control subject to local government approval and requirements (ODNR 2023b).	- Wastewater generation is concentrated in the early stage of production and declines with a well's production age, producing a larger amount of near-term wastewater volume and water discharge decreasing the longer they exist (Xu et al. 2022). - Concentrations of inorganic elements and radioisotopes are generally higher (USEPA 2019). - Flowback from hydraulic fracturing is required to be treated separately. It is typically maintained in segregated tanks and disposed of per ODNR-DOGRM regulations. - Approximately 98 percent of produced wastewater and fracturing flowback is disposed of via underground injection into Class II wells that USEPA and the State of Ohio regulates (ODNR 2023b).
Pad Operations	- Pad operations typically have a 20- to 30-year life span (BLM 2019). - Hydraulic fracturing would occur at any time during a well's productive life and lasts 1 to 2 days. This most frequently occurs as soon as a well drilling is complete, or shortly thereafter (BLM 2019) but additional rounds of hydraulic fracturing may occur on a periodic basis during production to help maintain target production rates (OEPA 2020).	- Pad operations typically have a 25-to-40-year life span (BLM 2020). - Hydraulic fracturing would occur at any time during a well's productive life and lasts 1 to 2 days. This most frequently occurs as soon as a well drilling is complete, or shortly thereafter (BLM 2019) but additional rounds of hydraulic fracturing may occur on a periodic basis during production to help maintain target production rates (OEPA 2020).

CATEGORY	VERTICALLY DRILLED AND COMPLETED WELLS/PADS	COMPLETED HORIZONTALLY DRILLED AND HYDRAULICALLY FRACTURED WELLS/PADS
Pad Construction Vehicle Trips	- Vehicle trips during the construction phase of vertical drilling include equipment trucks, worker trips, water trucks, and product transport. - On average, 287 trips are needed for construction of one well pad with one vertical well that is not hydraulically fractured (CDOT 2015).	- Vehicle trips during the construction phase include equipment trucks, worker trips, water trucks, and product transport. - A study in Colorado found that on average, 1,941 trips are needed for construction of one well pad with one horizontal well that is hydraulically fractured (CDOT 2015) and on average, 6,414 trips are needed for construction of one well pad with three horizontal wells that are hydraulically fractured (CDOT 2015). - If wells require additional rounds of hydraulic fracturing during the production lifetime additional vehicle trips would occur. A study in the Permian Basin estimated that re-fracking a well can require up to 80 percent of the original truck trips needed during initial completions/fracking (Texas A&M 2016).
Well Operations Vehicle Trips	Vehicle trips during the operational phase of vertical drilling could include trucking water to dispose of produced water.	Increased vehicle trips during the operational phase of horizontal drilling could include trucking water to dispose of produced water. A study in the Permian Basin estimated that up to 349 truck trips are required during well operation/production activities for a single horizontal well (Texas A&M 2016)

CATEGORY	VERTICALLY DRILLED AND COMPLETED WELLS/PADS	COMPLETED HORIZONTALLY DRILLED AND HYDRAULICALLY FRACTURED WELLS/PADS
Workers for Well Pad Construction and Drilling	• Crews of two to five daytime workers are typically employed to construct each well pad. Well pad construction typically lasts seven to 10 days (BLM 2019) • Crews of approximately 12 workers are typically employed to drill each well (BLM 2019). BLM data indicates that wells drilled in shallow formations typically take two to four days to drill (BLM 2019).	• Crews of two to five daytime workers are typically employed to construct each well pad. Well pad construction typically lasts seven to 10 days (BLM 2019). • Crews of approximately 12 workers are typically employed to drill each well (BLM 2019). BLM data indicates that wells drilled in shallow formations typically take two to four days to drill (BLM 2019) with longer/deeper wells taking longer.
Workers for Well Pad Operations/Production	• Typically, five to eight employees for a standard 12-hour shift (BLM 2019).	• Typically, eight to 15 employees are required for each shift (typically a 12-hour standard shift), and usually no more than one shift is required per day. Additional personnel from the owner/operator may be on site to observe and run ancillary equipment, as necessary (BLM 2019).

3.2.2. Cumulative Impact Analysis Area

This EA supplements the 2016 EA and has been prepared in the same organizational form as March 2024 draft EA, which includes an examination of “cumulative impacts.” The 2016 EA also examined cumulative impacts. BLM is retaining the format of the 2024 draft EA for continuity, for consistency of reference between these interrelated documents, and to simplify the EA’s numerous incorporations by reference of information contained in the 2016 EA. In this organizational form, discussions of impacts are organized by natural resource, such as air, climate, and terrestrial wildlife. For each resource, the analysis appears in three subsections: Affected Environment, Environmental Impacts, and Cumulative Impacts. BLM is retaining this structure despite minor deviations from the form required in CEQ’s 2020 regulations. It believes doing so is not arbitrary in the unique circumstances of this proceeding because the information presented in the EA satisfies the substantive requirements of the 2020 regulations and because its thorough analysis and careful consideration of deficiencies identified in CBD satisfies NEPA’s twin objectives of informed decision making and public disclosure.

Regarding form, the CEQ’s 2020 amendments to the 1978 NEPA regulations repealed the definition of “cumulative impacts,” see 40 CFR 1508.1(g)(3) (2020), which was one element of an impacts analysis under the 1978 regulations. Those regulations required an agency to consider impacts of other past, present, and foreseeably foreseeable future actions. Despite repeal of the definition (including language about past, present, and future actions), an agency must still take a hard look at project impacts. Section 1501.5 of the 2020 regulations implements this requirement by directing an agency to consider “the environmental impacts of the proposed action and alternatives.” *Id.* 1501.5(c)(2) (2020). This requirement is refined in section 1508.1 (Definitions), where the term “impacts” and the term “effects” are co-defined as

changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives. . . .

Id. 1508.1(g) (2020). Separate from the requirement of an impacts analysis, the 2020 amendments also require an agency to address “reasonably foreseeable environmental trends and planned actions.” *Id.* 1502.15, as part of the environmental baseline, to be examined in the “Affected Environment” section. *Id.* As CEQ explained in its preamble to the 2020 amendments, the provision was added in response to public comments expressing concerns that “eliminating the definition of cumulative impact (40 CFR 1508.7) would result in less consideration of changes in the environment.” See 85 Fed. Reg. 43304, Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act (Jul. 16, 2020).

The information contained in this EA meets the substantive requirements of sections 1502.15 and 1508.1(g) and nothing in the 2020 regulations hampers an agency’s latitude to structure its own proceedings appropriately, including considering impacts through the lens of a traditional cumulative impacts analysis where circumstances warrant. Retaining separate consideration of cumulative impacts provides the noted benefit of continuity in analysis and recognizes that this EA is intended to correct deficiencies in the 2016 EA. Those deficiencies were identified by the

district court in *CBD* in its 2020 merits decision (Appendix A), which found error in the 2016 EA’s cumulative impacts analysis, among other things. In a 2021 remedy order, the court enjoined surface development on the challenged leases until the deficiencies are corrected. Although the court did not affirmatively order BLM to prepare a separately labeled cumulative impacts analysis, BLM does not believe it should deviate from the court’s prescriptions or generate an EA that does not squarely address the court’s stated concerns.

To estimate the potential for and significance of cumulative impacts, the impacts of each alternative were considered in conjunction with past and present actions and reasonably foreseeable future actions. See Appendix H (*Past, Present, and Reasonably Foreseeable Future Actions*) for a list of all actions considered in the cumulative impacts analysis.

The BLM NEPA Handbook (BLM 2008) recommends the establishment of geographic and temporal boundaries for cumulative impacts analysis. For the majority of resource categories in this EA, the Cumulative Impact Analysis Area (CIAA) includes the Marietta Unit of the WNF and a 4-mile buffer surrounding the unit, excluding West Virginia, plus an additional 0.5-mile buffer. This area encompasses the extent of where potential impacts associated with the Proposed Action would overlap impacts from past, present, and reasonably foreseeable future actions (see Appendix H, Figures 1-3) and thus potentially result in cumulative impacts, that is, impacts “greater than the sum of [their] parts.” *Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 994 (9th Cir. 2004). The CIAA also includes other notable development activities that would contribute to cumulative impacts. Certain resource categories, as specified in their respective discussions, include a larger CIAA based on the nature of potential impacts on that resource, such as water resources, which includes a CIAA that encompasses the extent of watersheds that are assigned Hydrologic Unit Code (HUC-) 12 that intersect with the Action Area. See Section 3.6 (Water Resources)

The cumulative impacts analysis timeframe (temporal scope) considered is 75 years, including 20 years into the past and up to 55 years into the future. Oil and gas leases are typically issued for an initial 10-year period and continue for as long as oil or gas is produced in paying quantities. The average life expectancy of producing unconventional wells is up to 40 years (BLM 2020), to which 15 years is added for initial lease development.

3.3. Air Resources

Issue 1: How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing techniques impact local air quality?

3.3.1. Affected Environment

The affected environment for air resources is analyzed in Section 3.2 of the 2016 EA (BLM 2016), and that analysis is incorporated here by reference.

The Clean Air Act requires EPA to set National Ambient Air Quality Standards (NAAQS) for six commonly occurring air pollutants: particulate matter, ground-level ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. These are referred to as “criteria” pollutants because the standards are based on established scientific criteria regarding their potential health and environmental effects. As was the case in 2016, Monroe and Noble counties remain designated as “attainment” areas for all NAAQS, meaning that air pollutant levels are within a healthy

range. Waterford Township in Washington County has been designated as a “nonattainment” area for sulfur dioxide (SO₂) since 2010, although the SO₂ nonattainment area does not include and is not within the Analysis Area. All of Washington County, including part of the Marietta Unit, is designated as an “attainment-maintenance” area for ozone (O₃) and particulate matter 2.5 micrometers or less in diameter (PM_{2.5}) under standards issued in 1997 (USEPA 2023a), meaning that the county was recently a non-attainment area and requires special measures to maintain its “attainment” status.. Additional information regarding the existing climate and air quality within the area potentially impacted by the parcels under consideration for leasing is provided in Appendix I (*Air Quality and Climate Impacts*) of this EA.

3.3.2. Environmental Impacts

Potential impacts on air resources from all activities associated with oil and gas development were analyzed in Section 4.2 of the 2016 EA (BLM 2016), and that analysis is incorporated here by reference. New and relevant information is added to support this EA because the analysis of air resources in the 2016 EA did not quantify estimated air quality emissions (e.g., emissions related to the four phases of post lease development (further described on p. 3-40 of this EA): well development; well production; mid-stream; and downstream consumption) or consider the updated reasonably foreseeable development and associated emissions in the 2020 RFDS (Appendix D).

3.3.2.1. *Impacts of Alternative A – No-Action Alternative*

Under the No-Action Alternative, the BLM would not offer Federal minerals in the Marietta Unit for oil and gas leasing, including both the parcels requested in currently pending EOIs and all other Federal minerals in the Marietta Unit and would not affirm any leasing decisions that were supported, for NEPA-compliance purposes, by the 2016 EA. Therefore, the No-Action Alternative would not result in any substantive change to the estimated impacts on air resources from oil and gas leasing and development, as analyzed in Section 4.2 of the 2016 EA (BLM 2016). Although no new impacts from criteria pollutants or greenhouse gas (GHG) emissions would result under the No-Action Alternative, the national and global demand for energy is not expected to differ regardless of BLM decision-making.

3.3.2.2. *Impacts of Alternative B – Proposed Action*

Future development of leased parcels is expected to lead to air quality impacts from the emission of air pollutants, including carbon monoxide (CO), nitrogen dioxide (NO₂), particulate matter 10 micrometers or less in diameter (PM₁₀), PM_{2.5}, SO₂, and volatile organic compounds (VOCs), all criteria pollutants.). Ozone is not emitted by oil and natural gas production; rather, it is formed from a photochemical atmospheric reaction between oxygen, VOCs, and NO₂ in the presence of sunlight. VOC emissions are regulated as criteria pollutants in order to control O₃ formation, and for this reason, VOC emissions are considered in this analysis. Increases in CO, VOCs, PM₁₀, and other criteria pollutants in the ambient air due to oil and gas operations can also affect health, especially in areas near the source of the emissions where concentrations are higher. Health effects associated with exposure to criteria pollutants in the air include dermal and respiratory symptoms, increased risk for asthma, chronic rhinosinusitis, migraine, fatigue, and birth defects (Rabinowitz et al. 2015; Tustin et al. 2017). Potential health effects of oil and gas-associated emissions are also analyzed in Section 4.8 of the 2016 EA (BLM 2016).

Hazardous air pollutants (HAPs), a regulated pollutant category distinct from criteria pollutants, and other emissions from oil and gas development are known or suspected to cause cancer and other serious health effects, such as reproductive effects, birth defects, asthma, increased mortality in elderly populations, and other health effects, as well as adverse environmental impacts. The U.S. Environmental Protection Agency (USEPA) has classified 188 air pollutants as HAPs. Examples of listed HAPs associated with the oil and gas industry include formaldehyde, benzene, toluene, ethyl benzene, isomers of xylene compounds, and normal-hexane (n-hexane). Additional information for HAP impacts within Ohio is included in Appendix I (*Air Quality and Climate Impacts*).

Air pollutants would be emitted from developing leases and from the subsequent combustion and end-use of oil and gas resources that may be produced. However, at the leasing stage, the BLM cannot reasonably determine whether, when, and in what manner a lease would be explored or developed. The uncertainty that exists at the time the BLM offers a parcel for sale includes crucial factors that would affect actual emissions and associated impacts, including the future feasibility of developing the lease, well density, geological conditions, development type (vertical or horizontal), hydrocarbon characteristics, specific equipment used during construction, drilling, production, abandonment operations, transportation, scale, and mitigation measures that a future operator may propose in their development plan, and potential regulatory changes over the expected 55-year well life if the leases are brought into production.

For the purposes of analyzing and estimating impacts from future development associated with the Proposed Action, the BLM relied on the 2020 RFDS, which includes the potential impacts on air quality based on likely levels of production. This analysis estimates potential air pollution from projected oil and natural-gas development on the parcels proposed for leasing using available information from existing oil and natural-gas development in Monroe, Noble, and Washington counties, Ohio. The RFDS projects, over the next 15 years, the construction of up to 81 wells distributed across approximately 29 well pads within the Marietta Unit, resulting from the leasing of Federal oil and gas minerals. This projection encompasses the development of new wells, most expected on private lands, seeking to access Federal minerals in the Marietta Unit.

Four general phases of post-lease development would generate air pollutants.

1. **Well Development:** Well site construction (roads, pads, storage tanks, etc.), well drilling, and well completion
2. **Well Production:** Oil and gas mineral extraction, separation, and gathering for transmission
3. **Mid-Stream:** Refining (oil), processing (natural gas), storage, and transport/distribution
4. **Downstream Consumption:** Combustion or other use of the fuels produced

Although well development and production emissions (phases 1 and 2) occur on-lease and within the BLM's program authority, emissions from midstream and consumption activities (phases 3 and 4) are not within lease parameters. The BLM has no programmatic authority to regulate emissions from activities associated with midstream and consumption oil and gas use. Criteria pollutant emissions would also occur outside the Analysis Area, resulting from the transport, processing, distribution, and end-use of produced oil and gas. Downstream emissions, whether in stationary facilities and motor vehicles/airplanes are regulated by the USEPA, other Federal agencies, and state agencies under delegated authority. In Ohio, Clean Air Act permitting

authority is the responsibility of the Division of Air Pollution Control of the Ohio Environmental Protection Agency (OEPA). This regulatory framework covers downstream impacts on regional and local air quality and is intended to ensure compliance with existing national and state ambient air quality standards and hazardous air pollutant emission standards.

To estimate reasonably foreseeable on-site emissions (i.e., well construction, development, and production) at the leasing stage, this EA uses estimates of well numbers and required equipment from similar lease developments within the Marietta Unit. For purposes of estimating air emissions for development and production, potential wells were assumed to produce oil and natural gas in amounts similar to existing nearby wells. Emissions vary annually over the production life of a well due to declining production over time. Table 3-3 provides a range of maximum-year and average-year emissions for air pollutants and HAPs resulting from well site construction, development, and production activities. The minimum estimated emissions range from a low-development scenario of 29 wells (the RFDS predicted number of well pads, with one well on each well pad) to a high-development scenario of 81 wells (the RFDS predicted maximum number of wells, with three wells on each of 29 well pads).

Table 3-3. Range of Estimated Maximum-Year, Average-Year, and 40-Year Total Air Pollutant Emissions (tons) for Reasonably Foreseeable Development Scenario During Well Development and Production

ACTIVITY	PM ₁₀	PM _{2.5}	VOC	NO ₂	CO	SO ₂	HAPs
Max Year							
Low Scenario 29 wells	177.2	29.0	564.2	52.6	42.0	0.270	33.188
Max Year							
High Scenario 81 wells	501.4	81.9	1,576.2	152.2	118.6	0.753	92.711
Average Year							
Low Scenario 29 wells	120.0	20.2	432.9	27.1	28.6	0.207	25.498
Average Year							
High Scenario 81 wells	335.1	56.4	1,209.2	75.6	79.9	0.577	71.219
40-Year Total							
Low Scenario 29 wells	4,679.0	787.0	16,885.0	1,056.0	1,116.0	8.0	994.0
40-Year Total							
High Scenario 81 wells	13,069.0	2,198.0	47,160.0	2,949.0	3,117.0	22.0	2,778.0

Source: BLM Lease Sale Emissions Tool. Emissions include well construction, development, and production activities.

CO = carbon monoxide; HAPs = hazardous air pollutants; NO₂ = nitrogen dioxide; PM_{2.5} = particulate matter less than 2.5 microns in diameter; PM₁₀ = particulate matter less than 10 microns in diameter; RFDS = Reasonably Foreseeable Development Scenario; SO₂ = sulfur dioxide; VOC = volatile organic matter.

In general, the air quality-related measures presented in Appendix F (*Lease Stipulations, Notifications, Guidelines, and Standards*) have been demonstrated to be effective at reducing

impacts on air resources to meet Federal, state, and local goals for air quality standards. Environmental review during APD permitting would assess specific equipment types, numbers, and methodologies proposed in order to analyze air emissions and identify additional site-specific measures that may be applied to APDs as conditions of approval, to meet Forest Plan objectives (Appendix F, Reference Number GFW-AIR-1) and to reduce emissions to ensure compliance with Federal and state air quality standards.

3.3.3. Cumulative Impacts

The CIAA includes industrial oil and gas sources within Ohio, including Federal mineral estate that the BLM's Northeastern States District Office manages with active leases for oil and natural-gas development as well as nearby counties in West Virginia (Tyler, Pleasants, and Wood counties). As part of a leasing decision, it is not possible to predict or model in any meaningful way the geographic extent of emissions and associated impacts in a particular area because the scale, location, and types of equipment associated with potential and subsequent development are unknown. The potential for impacts that could occur in a larger area (e.g., into West Virginia) will be assessed during the environmental review process for APDs when specific development proposals, locations, and associated emissions are known.

To assess cumulative impacts, the BLM reviewed air pollutant emissions from the operation of industrial oil and gas sources in Ohio including private and Federal oil and natural gas wells. For this analysis, the BLM used national, per-well average air pollutant emissions estimates, which may underestimate or overestimate actual emissions on a per well basis in Ohio. As of 2021, there were 291 Federal mineral ownership (FMO) leases in Ohio, with 581 wells on 233 FMO leases that were producing oil or natural gas (BLM 2022a)⁸. Cumulative air pollutant emissions from the Proposed Action scenarios (low and high development) are estimated in Table 3-4. These estimates include on-lease emissions for well development and production, but they exclude construction-related emissions, to allow for comparison to the existing wells that have already been constructed and thus do not reflect construction or well-development emissions in their reported totals. BLM estimated emissions for the current 581 producing FMO wells using the BLM Single Well Emissions Tool which allows for multiple wells to be included on a single pad. This is consistent with the total number of active wells (581) compared to the number of leases (233) and indicates each existing lease has two to three wells per pad. Emissions for the low- and high-development scenarios associated with the RFDS were estimated using the BLM Lease Sale Emissions Tool. The tool assumes a single well is developed on each pad under each scenario: 29 wells on 29 pads for the low scenario and 81 wells on 81 pads for the high scenario. This methodology is conservative and likely overestimates the emissions, since it is more likely that two to three wells would be drilled on a single pad, which would result in lower overall emissions due to half the number of pads being developed. Estimated emissions for the existing 581 wells only include current operating and production emissions, since these wells have already been constructed and drilled. USEPA's 2020 National Emissions Inventory (USEPA 2020) was used to determine air pollutant emissions from other oil and gas activities and sources in the state. The National Emissions Inventory does not include emissions from well construction and most drilling activities since those emissions are not required to be reported. Emissions for

⁸ More than 80 percent of effective FMO leases had producing wells, with an average of 2.5 wells per lease (BLM 2022a).

Ohio Oil and Gas include nonpoint emission sources and facility point source emissions. Nonpoint sources include emissions from oil and gas sources located on well pads such as heaters, dehydrators, wellsite compressors, tanks, fugitive emissions and some drilling emissions that have been reported. Facility point sources include gas plants, refineries, compressor stations, and bulk fuel storage facilities. Ohio Fossil Fuel Electric Power Generation emissions represent emissions from combustion of fossil fuels at Ohio power plants for the purpose of electricity generation. Emissions for oil and gas sources in the neighboring West Virginia counties of Tyler, Pleasants and Wood are combined and included for comparison purposes.

Cumulative emissions of criteria pollutants and HAPs can increase health risks including dermal and respiratory symptoms, increased risk for asthma, chronic rhinosinusitis, migraine, fatigue, and birth defects (Rabinowitz et al. 2015; Tustin et al. 2017). Potential health effects of oil and gas-associated emissions are also analyzed in Section 4.8 and Section 4.16.2.7 of the 2016 EA (BLM 2016), incorporated here by reference.

Table 3-4. Comparison of Estimated Air Pollutant Emissions (tons/year) for the Reasonably Foreseeable Development Scenarios in Ohio to Existing Sources

SCENARIO/AREA	PM ₁₀	PM _{2.5}	VOC	NO ₂	CO	SO ₂	HAPs
Low Scenario 29 wells	146.00	25.00	562.00	27.00	35.00	0.27	33.00
High Scenario 81 wells	407.00	70.00	1,570.00	75.00	98.00	0.75	93.00
Current Ohio FMO Emissions¹	68.15	37.60	679.25	354.28	504.20	0.25	156.80
Ohio Oil and Gas²	497.00	485.00	24,197.00	9,521.00	3,973.70	787.40	920.00
Ohio Fossil Fuel Electric Power Generation from Power Plants³	5,556.50	4,830.00	694.50	40,744.00	5,775.00	75,639.00	4,301.00
West Virginia Counties, Oil and Gas⁴	15.68	15.47	24,796.80	1,000.30	1,947.60	1.85	2,453.41

Sources: BLM 2023; USEPA 2020, 2023g.

¹ Annual operational emissions for existing 581 producing wells estimate using BLM Single Well Emission Tool (BLM 2023).

² 2020 NEI Data Retrieval Tool: <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>. Includes nonpoint and facility source emissions for associated with oil and gas production and refining.

³ 2020 NEI Data Retrieval Tool. Emissions from existing fossil fuel power plants in Ohio.

⁴ Emissions for oil and gas sources in Tyler, Pleasants, and Wood Counties only.

CO = carbon monoxide, HAPs = hazardous air pollutants; NO₂ = nitrogen dioxide; PM_{2.5} = particulate matter less than 2.5 microns in diameter; PM₁₀ = particulate matter less than 10 microns in diameter; SO₂ = sulfur dioxide; VOC = volatile organic matter.

3.4. Climate Impacts

Issue 2: How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing impact climate change?

3.4.1. Affected Environment

The affected environment for climate is analyzed in Section 3.2 of the 2016 EA (BLM 2016) and is incorporated here by reference. Since the release of the 2016 EA, the USEPA has issued updated standards for emissions from oil and natural-gas production and natural-gas processing activities (GPO 2020). Additional information regarding the existing climate and air quality within the area that the Proposed Action would potentially impact is provided in Appendix I (*Air Quality and Climate Impacts*).

3.4.2. Environmental Impacts

Potential climate change impacts from all activities in the oil and gas program were analyzed in Sections 4.2 of the 2016 EA (BLM 2016), and that summary is incorporated here by reference. New and relevant information is needed to support this EA because the analysis of climate change in the 2016 EA did not consider the projections in the 2020 RFDS (Appendix D). Thus, the 2016 EA did not capture the full range of impacts that would result from horizontal drilling with hydraulic fracturing.

3.4.2.1. Impacts of Alternative A – No-Action Alternative

Under the No-Action Alternative, the BLM would not offer Federal minerals in the Marietta Unit for oil and gas leasing, including the parcels requested in currently pending EOIs and all other Federal minerals in the Marietta Unit and would rescind any leasing decisions that were supported, for NEPA-compliance purposes, by the 2016 EA. Therefore, the No-Action Alternative would not result in any substantive change to the estimated impacts on climate from oil and gas management, as analyzed in Section 4.2 of the 2016 EA (BLM 2016).

3.4.2.2. Impacts of Alternative B – Proposed Action

Development of leases would lead to emissions of carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), the three most-common GHGs associated with oil and gas development. These GHG emissions would be emitted from equipment and vehicles used for construction and operation and from drilling, production, and processing activities associated with oil and gas development, transmission, distribution, and combustion.

As discussed in section 3.3.2.2, there are four general phases of post-lease development that would generate GHG emissions: (1) well development (well site construction, well drilling, and well completion); (2) well production operations (extraction, separation, gathering); (3) mid-stream (refining, processing, storage, and transport/distribution); and (4) end-use (combustion or other uses) of the fuels produced. While well development and production operation emissions (phases 1 and 2) occur on-lease and the BLM has authority over these activities, mid-stream and end-use emissions (phases 3 and 4) typically occur off-lease where the BLM has little to no authority.

Emissions inventories at the leasing stage are imprecise due to uncertainties including the type of mineral development (oil, gas, or both), scale, and duration of potential development; types of equipment (drill rig engine tier rating, horsepower, fuel type); and the mitigation measures that a future operator may propose in their development plan. Due to these uncertainties, the BLM applies several assumptions to estimate emissions at the leasing stage. The estimated number of well numbers per parcel are based on State data for past lease development combined with per-well drilling, development, and operating emissions data from representative wells in the area. The amount of oil or gas that may be produced if the offered parcels are developed is unknown. For purposes of estimating production and end-use emissions, potential wells are assumed to produce oil and gas in similar amounts as existing nearby wells. While the BLM has no authority to direct or regulate the end use of the products, for this analysis, the BLM assumes all produced oil or gas would be combusted (such as for domestic heating or energy production). The BLM acknowledges that there may be additional sources of GHG emissions along the distribution, storage, and processing chains (i.e., mid-stream operations) associated with production from the lease parcels. These sources may include emissions of CH₄ (a more potent GHG than CO₂ in the short term) from pipeline and equipment leaks, storage, and maintenance activities. These sources of emissions are highly speculative at the leasing stage; therefore, the BLM has chosen to assume that mid-stream emissions associated with lease parcels for this analysis would be similar to the national level emissions identified by the Department of Energy's National Energy Technology Laboratory (NETL 2009, 2019). Section 6.5 of BLM's Annual GHG Report includes a more detailed discussion of the methodology for estimating mid-stream emissions.

The emission estimates calculated for this analysis were generated using the assumptions described above in section 3.3.3 for the BLM Lease Sale Emissions Tool and lease development analysis. Emissions are presented for each of the four noted phases of post-lease development processes.

- Well development emissions occur over a short period and may include emissions from heavy equipment and vehicle exhaust, drill rig engines, completion equipment, pipe venting, and well treatments such as hydraulic fracturing.
- Well production operations, mid-stream, and end-use emissions occur over the entire production life of a well, which is assumed to be up to 40 years for this analysis based on the productive life of a typical oil/gas field.
- Production operation emissions may result from fluid storage tank breathing and flashing, truck loading, pump engines, heaters and dehydrators, pneumatic instruments or controls, flaring, fugitives, and vehicle exhaust.
- Mid-stream emissions occur from the transport, refining, processing, storage, transmission, and distribution of produced oil and gas. Mid-stream emissions are estimated by multiplying the estimated ultimate recovery of produced oil and gas with emissions factors from National Energy Technology Laboratory life-cycle analysis of U.S. oil and natural gas. Additional information on emissions factors can be found in the Annual GHG Report (Chapter 6, Tables 6-8 and 6-10).
- For the purposes of this analysis, end-use emissions are calculated assuming all produced oil and gas is combusted for energy use. End-use emissions are estimated by multiplying the estimated ultimate recovery of produced oil and gas with emissions factors for combustion established by the USEPA (Tables C-1 and C-2 to Subpart C of 40 CFR 98). Additional

information on emissions factors and estimated ultimate recovery factors can be found in the Annual GHG Report (Chapter 6).

Further discussion of climate change science and predicted impacts, as well as the reasonably foreseeable and cumulative GHG emissions associated with BLM’s oil and gas leasing actions and methodologies are included in the 2023 *BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends* (Annual GHG Report, BLM 2024). This report presents the estimated emissions of greenhouse gases attributable to development and consumption of fossil fuels produced on lands and mineral estate managed by the BLM. The Annual GHG Report is incorporated by reference (BLM 2024).

The BLM evaluated the potential climate impacts that would result from development of the Proposed Action leases by estimating and analyzing potential GHG emissions from projected oil and natural gas development based on the RFDS (Appendix D), past oil and natural gas development, and available information from existing development in Ohio.

Table 3-5 lists the estimated GHG emissions from well development, well production, midstream, and downstream consumption/end use in metric tonnes (MT) for the subject leases over the average 40-year production life of the lease as well as the CO₂ equivalent (CO₂e) for all GHG emissions. Refer to Appendix I (*Air Quality and Climate Impacts*) for additional information on the methods used to estimate the emissions in Table 3-5.

Table 3-5. Estimated Life-of-Lease Greenhouse Gas Emissions from Well Development, Well Production Operations, Mid-Stream, and Downstream End-Use (Metric Tonnes) – Low and High Scenarios

ACTIVITY TYPE	CO ₂	CH ₄	N ₂ O	CO ₂ E (100 YR)
<i>Low Well Development Scenario (29 wells)</i>				
Well Development	30,234	25.83	0.237	31,069
Well Production Operations	276,355	6,404.94	1.834	467,723
Midstream	207,410	1,553.52	3.213	254,582
Downstream End-Use	1,397,178	45.17	8.059	1,400,724
Total (Low Scenario)	1,911,178	8,029.46	13.342	2,154,099
<i>High Well Development Scenario (81 wells)</i>				
Well Development	84,448	72.15	0.661	86,779
Well Production Operations	771,889	17,889.65	5.123	1,306,399
Midstream	579,319	4,339.15	8.974	711,075
Downstream End-Use	3,902,463	126.15	22.509	3,912,367
Total (High Scenario)	5,338,119	22,427.11	37.27	6,016,620

Source: BLM 2024.

CH₄ = methane; CO = carbon monoxide, CO₂e = carbon dioxide equivalent; MT = metric tons; N₂O = nitrous oxide; YR = year.

Table 3-6 and Table 3-7 show the estimated maximum year and average year GHG emissions over the life of the lease for both 100-year and 20-year global warming potentials (GWP).

Additional information on global warming potentials can be found in Section 3.4 of the BLM 2023 Annual GHG Report.

Table 3-6. Estimated Greenhouse Gas Emissions from the Lease Parcels on Annual Basis (Metric Tonnes)

LOW SCENARIO (29 WELLS)	CO₂	CH₄	N₂O	CO₂E (100-YR)	CO₂E (20-YR)
Max Year	178,054.00	364.77	1.259	189,268.00	208,491.00
Average Year	49,005.00	205.88	0.342	55,233.00	66,083.00

Source: BLM 2024.

CH₄ = methane; CO = carbon monoxide, CO₂e = carbon dioxide equivalent; MT = metric tons; N₂O = nitrous oxide; YR = year.

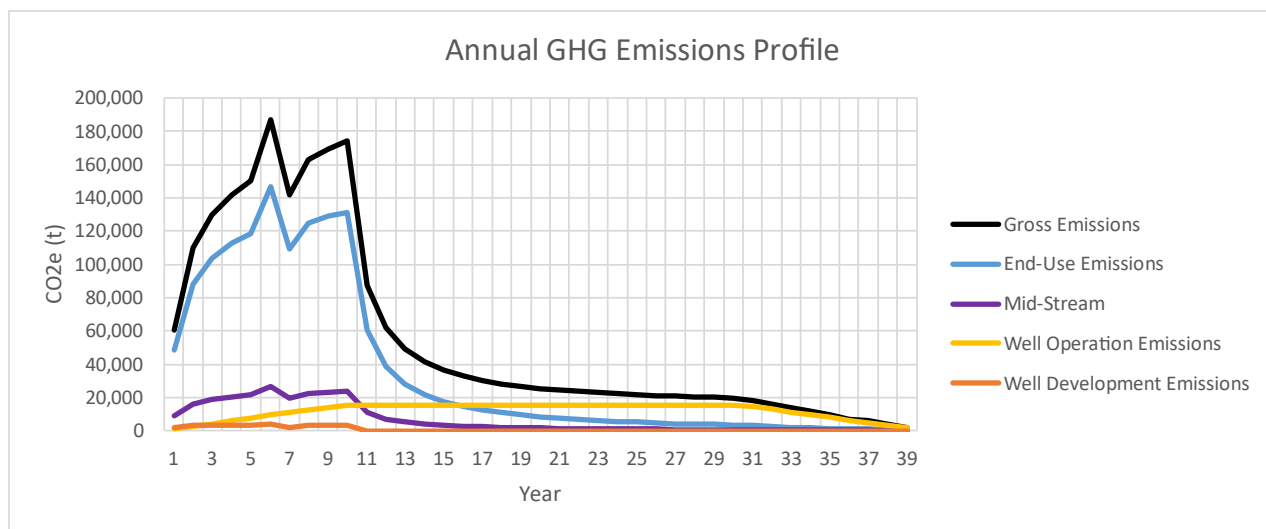
Table 3-7. Estimated Greenhouse Gas Emissions from the Lease Parcels on Annual Basis (Metric Tonnes)

HIGH SCENARIO (81 WELLS)	CO₂	CH₄	N₂O	CO₂E (100-YR)	CO₂E (20-YR)
Max Year	468,235.00	1,031.34	3.298	499,869.00	554,221.00
Average Year	136,875.00	575.05	0.956	154,272.00	184,578.00

Source: BLM 2024.

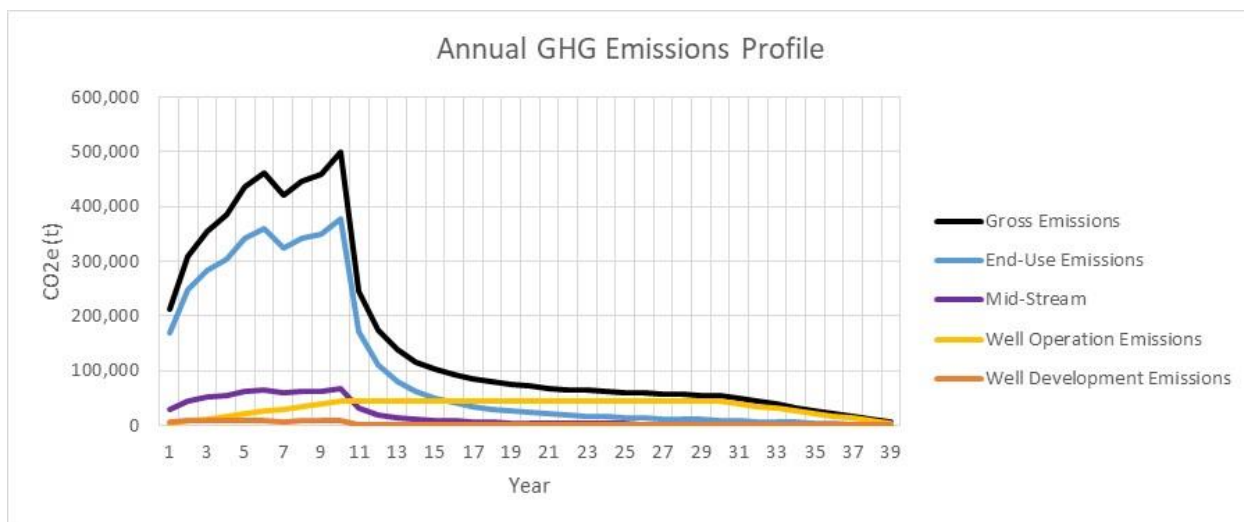
CH₄ = methane; CO = carbon monoxide, CO₂e = carbon dioxide equivalent; MT = metric tons; N₂O = nitrous oxide; YR = year.

GHG emissions vary annually over the production life of a well because of declining production rates over time. Figure 6 and Figure show the estimated GHG emissions profile over the production life of a typical lease, including well development, well-production operational, midstream, downstream end-use, and gross (total of well development, well production, midstream, and downstream end-use) emissions.



Source: BLM 2024

Figure 6. Estimated Greenhouse Gas Emissions Profile over the Production Life of a Lease (Low Scenario – 29 Wells)



Source: BLM 2024

Figure 7. Estimated Greenhouse Gas Emissions Profile over the Production Life of a Lease (High Scenario – 81 Wells)

To put the estimated GHG emissions for the Proposed Action into a relatable context, potential emissions that would result from development of the lease parcels for the Proposed Action can be compared to other common activities that generate GHG emissions and to emissions at the state and national level. The USEPA GHG equivalency calculator (<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>) can be used to express the potential average-year GHG emissions on a scale relatable to everyday life. For example, the projected average annual GHG emissions from potential development of the subject lease were

equivalent to a range of 11,094 to 33,248 gasoline-fueled passenger vehicles driven for 1 year, or the emissions that would be offset by the yearly carbon sequestration capacity of 65,754 to 183,658 acres of forest land.

Table 3-8 compares the estimated annual lease sale emissions to existing Federal and state fossil fuel (oil, gas, and coal) emissions from the four phases of post-lease development processes described in Section 3.3.2.2

Table 3-8. Comparison of Lease Sale Emissions to Other Sources (megatonnes)

REFERENCE	MT CO ₂ E ¹ (PER YEAR)
Lease Sale Emissions: Max Year – 29 wells	0.189
Lease Sale Emission: Max Year – 81 wells	0.499
Ohio Onshore Federal (oil and gas) ²	0.241
United States Onshore Federal (oil and gas) ²	611.55
United States Federal – All (oil and gas) ²	1,462.29
United States Onshore Federal (oil, gas, and coal) ²	1,046.33
Ohio Total (all sectors) ³	235.42

¹ Estimates were based on 100 year-Global Warming Potential values.

² Federal values come from the 2023 BLM Specialist Report on Annual Greenhouse Gas Emissions Tables ES-1 and ES-2 and Figure ES-1 (state). U.S Federal – All includes offshore oil and natural gas production (BLM 2024).

³ Values derived from the BLM Specialist Report on Annual Greenhouse Gas Emissions (BLM 2024, Table 5-2). Mt (megatonne) = 1 million metric tons.

3.4.3. Monetized Impacts from Greenhouse Gas Emissions

The National Environmental Policy Act (NEPA) does not require an agency to quantify project impacts through a specific methodology, such as estimating the “social cost of carbon,” “social cost of methane,” or “social cost of greenhouse gases.” A protocol to estimate what is referenced as the “social cost of carbon” (SCC) associated with greenhouse gas (GHG) emissions was developed by a Federal Interagency Working Group on the Social Cost of Greenhouse Gases (IWG).

Executive Order 14154, *Unleashing American Energy* (Jan. 20, 2025), disbanded the IWG and withdrew any guidance, instruction, recommendation, or document issued by the IWG. Section 6(c) of Executive Order 14154 states:

The calculation of the “social cost of carbon” is marked by logical deficiencies, a poor basis in empirical science, politicization, and the absence of a foundation in legislation. Its abuse arbitrarily slows regulatory decisions and, by rendering the United States economy internationally uncompetitive, encourages a greater human impact on the environment by affording less efficient foreign energy producers a greater share of the global energy and natural resource market. Consequently, within 60 days of the date of this order, the Administrator of the EPA shall issue guidance to address these harmful and detrimental inadequacies, including consideration of eliminating the “social cost of carbon” calculation from any Federal permitting or regulatory decision.

Executive Order 14154 further directs agencies to ensure consistency with the guidance in OMB Circular A-4 of September 17, 2003, when estimating the value of changes in greenhouse gas emissions from agency actions, until further EPA guidance is received.

The BLM has not included any estimates for the SCC in this EA for multiple reasons. First, this action is not a rulemaking. Rulemakings are the administrative actions for which the IWG originally developed the SCC protocol. Second, Executive Order 14154 disbanded the IWG and its guidance has been withdrawn.

Further, NEPA does not require agencies to conduct a cost-benefit analysis. Including an SCC analysis without a complete cost-benefit analysis, which would include the social benefits of the proposed action to society as a whole and other potential positive benefits, would be unbalanced, potentially inaccurate, and would not foster informed decision-making. Any increased economic activity—in terms of revenue, employment, labor income, total value added, and output—that is expected to occur as a result of the proposed action is simply an economic impact, not an economic benefit, inasmuch as any such impacts might be viewed by another person as a negative or undesirable impact due to a potential increase in the local population, competition for jobs, and concerns that changes in population will change the quality of the local community. “Economic impact” is distinct from “economic benefit,” as understood in economic theory and methodology, and the socioeconomic impact analysis required under NEPA is distinct from a cost-benefit analysis, which NEPA does not require. In addition, many benefits and costs from agency actions cannot be monetized and, even if monetizable, cannot meaningfully be compared directly to SCC calculations for a number of reasons, including because of differences in scale (local impacts versus global impacts).

Finally, purported estimates of SCC would not measure the actual environmental impacts of a proposed action and may not accurately reflect the effects of GHG emissions. Estimates of SCC attempt to identify economic damages associated with an increase in carbon dioxide emissions—typically expressed as a one metric ton increase in a single year—and typically includes, but is not limited to, potential changes in net agricultural productivity, human health, and property damages from increased flood risk over hundreds of years. The estimate is developed by aggregating results across models, over time, across regions and impact categories, and across multiple scenarios. The dollar cost figure arrived at based on consideration of SCC represents the value of damages avoided if, ultimately, there is no increase in carbon emissions. But SCC estimates are often expressed in an extremely wide range of dollar figures, depending on the particular discount rates used for each estimate, and would provide little benefit in informing BLM’s decision. For these reasons, the Department of the Interior has also rescinded its memorandum of October 16, 2024, entitled, “Updated Estimates of the Social Cost of Greenhouse Gases,” which had directed Interior bureaus to calculate SCC using the methodology contained in the Environmental Protection Agency’s Final Rule of March 8, 2024, 89 Fed. Reg. 16,820.

To summarize, the BLM is not evaluating SCC for this EA because: (1) the BLM is not engaged in a rulemaking for which the now-rescinded SCC protocol was originally developed; (2) the IWG has been disbanded and all technical supporting documents and associated guidance have been withdrawn; (3) NEPA does not require agencies to prepare SCC estimates or cost-benefit

analyses; (4) costs attributed to GHGs are often so variable and uncertain that they are unhelpful for BLM’s analysis; and (5) the full social benefits of carbon-based energy production cannot be monetized, and quantifying only the costs of GHG emissions, but not the benefits, would yield information that is both potentially inaccurate and not useful.

3.4.4. Best Management Practices, Standard Operating Procedures, and/or Mitigation Measures for Climate Impacts

GHG emissions contribute to changes in atmospheric radiative forcing resulting in climate change impacts. GHGs act to contain solar energy loss by trapping longer wave radiation emitted from the Earth’s surface and act as a positive radiative forcing component. The buildup of these gases has contributed to the current changing state of the climate equilibrium toward warming. Chapters 8 and 9 of the 2023 Annual GHG Report provides a detailed discussion of climate change science, trends, and impacts (BLM 2024). The relationship between GHG emissions and climate impacts is complex, but a project’s potential to contribute to climate change declines as its net emissions decline. When net emissions approach zero, the project has little or no contribution to climate change. Net-zero emissions can be achieved through a combination of controlling and offsetting emissions. Emission controls (e.g., vapor recovery devices, no-bleed pneumatics, leak detection and repair requirements) can substantially limit the amount of GHGs emitted to the atmosphere, while offsets (e.g., sequestration, low carbon energy substitution, plugging abandoned or uneconomical wells) can remove GHGs from the atmosphere or otherwise reduce emissions. Chapter 10 of the 2023 Annual GHG Report provides a more detailed discussion of GHG mitigation strategies (BLM 2024).

The USEPA is the Federal agency charged with regulation of air pollutants and establishing standards for protection of human health and the environment. The USEPA has issued regulations that would reduce GHG emissions from any development related to the proposed action. These regulations include the New Source Performance Standard for Crude Oil and Natural Gas Facilities (40 CFR 60, OOOOa); Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After November 15, 2021 (40 CFR 60, OOOOb); and Waste Emissions Charge for Petroleum and Natural Gas Systems (40 CFR 99). These regulations impose emission limits, equipment design standards, and monitoring requirements on oil and gas facilities and a waste emissions charge on CH₄ emissions that exceed 25,000 MT of CO₂e for applicable petroleum and natural gas facilities currently required to report under the Greenhouse Gas Reporting Rule. A detailed discussion of existing regulations that apply to BLM management of Federal lands as well as current Federal and state regulations that apply to oil and gas development and production can be found in Chapter 2 of the Annual GHG Report.

As Figures 5 and 6 show, the majority of GHG emissions resulting from Federal fossil fuel authorizations occur outside of the BLM’s authority and control. These emissions are referred to as downstream emissions and generally occur off-lease during the transport, distribution, refining, or end-use of the produced Federal minerals. The USEPA regulations and performance standards apply to all oil and gas facilities regardless of surface or mineral ownership. The BLM’s regulatory authority is limited to those activities authorized under the terms of the lease and applicable regulations, which primarily occur in the “upstream” portions of oil and gas development (wellsite construction and production). This authority is applicable when

development is proposed on public lands and the BLM assesses the specific location, design, and plan of development. In carrying out its responsibilities under NEPA, the BLM has developed BMPs designed to reduce emissions from field production and operations. BMPs may include limiting emissions from stationary combustion sources, mobile combustion sources, fugitive sources, and process emissions that may occur during development of the lease parcel. Analysis and approval of future development may include the application of BMPs within the BLM's authority, included as COAs accompanying APDs or mitigate GHG emissions. Additional measures proposed at the project development stage may be incorporated as applicant-committed measures by the project proponent or added to necessary air quality permits. Additional information on mitigation strategies, including emissions controls and offset options, are provided in Chapter 10 of the Annual GHG Report (BLM 2024).

3.4.5. Cumulative Impacts

The analysis of GHGs contained in this EA includes estimated emissions from existing and potential leases, as described in Section 3.4.2.2. An assessment of GHG emissions from other BLM fossil-fuel authorizations, including coal leasing and oil and natural gas leasing and development, is included in Chapter 7 of the Annual GHG Report (BLM 2024). The Annual GHG Report also includes estimates of reasonably foreseeable GHG emissions related to the BLM's lease sales that are anticipated during the 2021 fiscal year, as well as the best estimate of emissions from ongoing production and development of parcels sold in previous lease sales. This analysis estimates cumulative GHG emissions from the BLM's national fossil fuel-leasing program, based on actual production and statistical trends presently known at the time of the report.

The methodologies used in the Annual GHG Report provide estimates of foreseeable short-term and projected long-term GHG emissions from activities across the BLM's oil and gas program. The foreseeable short-term methodology includes a trends analysis of (1) leased Federal lands that are held-by-production⁹; (2) approved APDs; and (3) leased lands from competitive lease sales projected to occur over the next annual reporting cycle (12 months). The data are used to provide a 40-year life of lease projection of potential emissions from all Federal oil and gas activities and potential lease actions over the next 12 months. The projected long-term methodology uses oil and gas production forecasts from the U.S. Energy Information Administration (EIA) to estimate GHG emissions out to 2050 that would occur from past, present, and future development of Federal fluid minerals. For both methodologies, the emissions are calculated using life-cycle-assessment data and emission factors. These analyses are the basis for projecting GHG emissions from lease parcels that are likely to go into production during the analysis period of the Annual GHG Report and represent both a hard look at GHG emissions from oil and gas leasing and the best available estimate of reasonably foreseeable cumulative emissions related to any one lease sale or set of quarterly lease sales that would occur annually across the entire Federal onshore mineral estate.

Table 3- presents the summation of the 40-year life-of-project emissions estimates for both the short and long term as previously described for each state where Federal mineral actions have

⁹ Held-By-Production: A provision in an oil or natural gas property lease that allows the lessee to continue drilling activities on the property as long as it is economically producing a minimum amount of oil or gas. The held-by-production provision thereby extends the lessee's right to operate the property beyond the initial lease term.

been authorized. The differences between the short- and long-term emissions estimates can be thought of as an approximation of additional leasing that would occur on Federal lands and does not take into consideration additional policies, technological advancements in production or end-use efficiency standards, or an accelerated economy-wide transition away from fossil fuel–derived energy production. A detailed explanation of the short-term and long-term emissions estimate methodologies are provided in Sections 6.6 and 6.7 of the Annual GHG Report.

Table 3-9. GHG Emissions from Past, Present, and Reasonably Foreseeable Federal Onshore (MT of CO₂e)

STATE	EXISTING WELLS (REPORT YEAR)	EXISTING WELLS (PROJECTED)	APPROVED APDs	NEW LEASING	SHORT-TERM FORESEEABLE TOTALS	LONG- TERM PROJECTED TOTALS
AL	0.57	8.52	0.00	0.18	8.70	16.62
AK	1.27	18.90	20.82	43.96	83.67	36.10
AZ	0.00	0.00	0.00	0.00	0.00	0.00
AR	0.60	9.52	0.24	0.24	9.99	17.56
CA	5.10	70.48	4.75	2.17	77.41	140.49
CO	44.72	387.63	16.46	16.29	420.39	1,293.28
ID	0.00	0.00	0.00	0.29	0.30	0.00
IL	0.01	0.10	0.00	0.02	0.12	0.21
IN	0.00	0.00	0.00	0.02	0.02	0.00
KS	0.23	3.43	0.00	0.22	3.65	6.70
KY	0.01	0.07	0.00	0.03	0.10	0.22
LA	5.20	64.56	31.84	14.98	111.38	151.44
MD	0.00	0.00	0.00	0.00	0.00	0.00
MI	0.06	1.17	0.00	0.29	1.46	1.74
MS	0.11	1.50	0.38	0.38	2.25	3.06
MT	2.02	20.63	1.53	5.41	27.57	56.36
NE	0.01	0.21	0.00	0.03	0.24	0.39
NV	0.13	0.99	0.03	0.10	1.12	3.53
NM	399.96	2,844.84	729.98	113.24	3,688.06	11,218.30
NY	0.00	0.01	0.00	0.00	0.01	0.01
ND	33.50	280.74	29.58	6.63	316.95	933.79
OH	0.24	2.29	0.00	2.65	4.94	7.04
OK	1.34	13.21	1.42	1.18	15.81	38.41
OR	0.00	0.00	0.00	0.12	0.12	0.00
PA	0.00	0.05	0.00	0.67	0.72	0.11
SD	0.10	1.61	0.11	0.11	1.82	2.70
TN	0.00	0.00	0.00	0.00	0.00	0.00
TX	3.20	35.25	15.07	1.31	51.62	93.23

STATE	EXISTING WELLS (REPORT YEAR)	EXISTING WELLS (PROJECTED)	APPROVED APDs	NEW LEASING	SHORT-TERM FORESEEABLE TOTALS	LONG- TERM PROJECTED TOTALS
UT	12.93	161.65	14.42	29.97	206.04	369.79
VA	0.01	0.13	0.00	0.03	0.16	0.25
WV	0.00	0.06	0.00	0.59	0.64	0.12
WY	100.22	892.55	100.35	253.66	1,246.56	2,872.25
Total Onshore Federal	612	4,820	967	495	6,282	17,264

Source: BLM 2024.

As detailed in the 2023 Annual GHG Report, which the BLM has incorporated by reference, the BLM also looked at other tools to inform its analysis, including the [Model for the Assessment of Greenhouse Gas Induced Climate Change \(MAGICC\)](#) (see Section 9.0 of the Annual GHG Report). The BLM conducted MAGICC runs evaluating potential contributions to global climate change and related values for two climate change projection scenarios. In one scenario, global CO₂ emissions are cut to net zero around 2050, keeping global warming to around 1.5 degrees Celsius (°C) above pre-industrial temperatures. In the second “middle of the road” scenario, global CO₂ emissions remain around current levels before starting to fall by 2050 but do not reach net zero by 2100. In this scenario, temperatures would rise 2.7 °C by the end of the century. The maximum BLM fossil fuel (oil, gas, and coal) contribution to global temperature increases under these two scenarios is 0.015 °C and 0.013 °C, respectively.

The most recent short-term energy outlook (STEO) projections published by the EIA predicts that the world’s oil and gas supply and consumption would increase over the next 24 months (EIA 2025). The STEO projections provide useful context for the No Action discussion. The global forecast models used for the STEO are not dependent on whether the BLM issues onshore leases but are based on foreseeable short-term global supply and demand and include oil and gas development/operations on existing U.S. onshore leases. The most recent STEO includes the following projections for the next two years:

- **U.S. liquid fuels consumption** is projected to increase to 20.58 million barrels per day (b/d) in 2026 up from 20.55 million b/d in 2025.
- **U.S. crude oil production** is expected to average 13.59 million b/d in 2025 and rise to 13.73 million b/d in 2026.
- **U.S. natural gas consumption** is expected to average 90.7 billion cubic feet per day (Bcf/d) in 2025, decreasing slightly to 90.2 Bcf/d in 2026.
- **U.S. liquified natural gas exports** are expected to increase from 14 Bcf/d in 2025 to 16 Bcf/d in 2026.
- **U.S. coal production** is expected to total 478 million short tons in 2025 and 476 million short tons in 2026 and remain at 16 percent of total U.S. electricity generation for 2025 and 15 percent in 2026 compared to 16 percent in 2024, driven by ongoing retirement of coal-fired generating plants.

Recent events, both domestically and internationally, have resulted in abrupt changes to the global oil and gas supply. EIA studies and recent U.S. analyses (associated with weather impacts, etc.) regarding short-term domestic supply disruptions and shortages or sudden increases in demand demonstrate that reducing domestic supply (in the near-term under the current supply and demand scenario) would likely lead to the import of more oil and natural gas from other countries, including countries with lower environmental and emission control standards than the United States (EIA 2021).

The EIA 2023 Annual Energy Outlook projects increases in world energy consumption through 2050, as population and economic growth outweighs efficiency gains (EIA 2023). As a result, U.S. production of natural gas and petroleum and liquids will rise amid growing demand for exports and industrial uses. U.S. natural gas production is projected to increase by 15 percent from 2022 to 2050. However, renewable energy will be the fastest-growing U.S. energy source through 2050 as electricity generation shifts to using more renewable sources. Domestic natural gas consumption for electricity generation is expected to decrease from 2022 to 2050. As a result, energy-related CO₂ emissions are expected to fall 25 percent to 38 percent below the 2005 level, depending on economic growth factors. Further discussion of past, present, and projected global and state GHG emissions may be found in Chapter 5 of the Annual GHG Report (BLM 2024).

While continued fossil fuel authorizations will occur over the next decade to support energy demand and remain in compliance with the leasing mandates in the Inflation Reduction Act of 2022 (IRA), the EIA International Energy Outlook expects renewable energy consumption to double between 2020 and 2050 and nearly equal liquid fuels consumption by 2050.

3.5. Vegetation and Rare Plants

Issue 3: How would increases in surface disturbance and use of horizontal drilling with high volume hydraulic fracturing impact vegetation communities and rare plant species in the region?

3.5.1. Affected Environment

The affected environment for vegetation is analyzed in Section 3.3 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference. The 2016 EA indicates that four Federally listed plant species have the potential to occur in the Action Area and be potentially impacted: northern monkshood (*Aconitum noveboracense*), small whorled pogonia (*Isotria medeoloides*), Virginia spirea (*Spirea virginiana*), and running buffalo clover (*Trifolium stoloniferum*). However, a final rule to delist running buffalo clover due to recovery efforts was published in the *Federal Register* and took effect on September 7, 2021 (USFWS 2021a). Running buffalo clover is now considered a Regional Forester Sensitive Species (RFSS). The subsections below provide a description of occurrences and suitable habitat for northern monkshood, small whorled pogonia, and Virginia spirea.

The BLM and USFS consulted with the USFWS under ESA Section 7 with respect to Federally listed plant species and conferenced for proposed and candidate species. To satisfy ESA requirements, the BLM prepared a biological assessment (BA) to analyze impacts on listed plant species and wildlife that are anticipated to occur in the Analysis Area. The USFWS utilized the

BA to inform the consultation regarding impacts on Federally listed species and AMMs to be applied in APD approvals.

3.5.1.1. Northern Monkshood

Three populations of northern monkshood are known to exist in Ohio: one each in Summit, Portage, and Hocking Counties. None of the known populations occur on WNF lands. The closest known population to the WNF is approximately 6.5 miles from the Athens Unit boundary in the Hocking Hills area of Hocking County (approximately 50 miles west of the Marietta Unit boundary, i.e. the Action Area). All known Ohio populations reside in shaded, cliff-lined habitat with cold air drainage and occur on moist shelves and lower slopes near cliff bases (USFS 2022).

Suitable habitat for northern monkshood is relatively restricted on the WNF. Most of the natural habitat occurs on sandstone features on the Ironton and Marietta Units. There is artificially created habitat for Northern monkshood at mine portals, but only if those areas have cold air or water flow (USFS 2022).

3.5.1.2. Small Whorled Pogonia

Ohio has two known small whorled pogonia populations, one in western Scioto County and one in western Hocking County. The closest population is about 4 miles from the WNF Athens Unit boundary in Hocking County, approximately 50 miles west of the Action Area. The Scioto County population is a record of a single plant found in 1985, but this occurrence has not produced another individual since the 1985 record (USFS 2022). The Hocking County population was discovered in 1998 and consists of few infrequently flowering individuals (USFS 2022).

Small whorled pogonia suitable habitat occurs primarily in second- and third-growth hardwood and mixed hemlock-hardwood forests with sparse understory, scattered tree-fall canopy gaps, and adjacent, permanent canopy gaps such as stream corridors. This habitat occurs across the WNF on the Ironton, Marietta, and Athens Units (USFS 2022).

3.5.1.3. Virginia Spirea

The closest known Virginia spiraea population to the WNF is approximately 13 miles from the Ironton Unit boundary along Scioto Brush Creek in Scioto County, which is approximately 70 miles west of the Action Area. Streams throughout the area are largely unsuitable for Virginia spiraea. This is largely due to human-caused impacts, including past mining, farming, and land clearing that have resulted in siltation of regional streams. As a result, most streams on the WNF lack gravel bars, gravel/cobble substrate, rocky banks, and sufficient stream flow. However, upper portions of the Little Muskingum River in Washington and Monroe Counties share similarities with the Scioto Brush Creek site. In these portions, the Little Muskingum River is not overly silted; has gravel, cobble, and some boulder substrate; has some gravel bars and rocky banks; and has higher stream flows than lower sections of the river. As such, this section of the Little Muskingum River contains assumed suitable habitat for Virginia spiraea on the WNF (USFS 2022).

3.5.1.4. Regional Forester Sensitive Species

Table 3- presents the 2024 Regional Forester Sensitive Plant Species List in the Action Area and identifies the sensitive plant species' typical habitat association and potential to occur. Since publication of the 2016 EA, five new plant species have been added to the RFSS list, bringing the total number of sensitive plant species in the Action Area to 13 (USFS 2024).

Table 3-10. Regional Forester Sensitive Plant Species in the Action Area

SPECIES	RETAINED OR ADDED SINCE 2016 EA	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Little-flowered Alumroot (<i>Heuchera parviflora</i>)	Added	Moist crevices of sandstone cliffs and rock shelters in rolling bottomland mixed-hardwood forest and mixed-mesophytic and cove forest habitats.	Low. This species occurs in the Ironton District of the WNF. Suitable habitat occurs in the Action Area but is at the northern limit of its known range.
Buttercup Scorpionweed (<i>Phacelia covillei</i>)	Added	Dry to mesic well-drained open woodlands and small stream terraces in dry oak forest, dry/mesic mixed-oak hardwood forest, dry/mesic oak forest, rolling bottomland mixed-hardwood forest, and dry/mesic oak forest habitats.	Moderate. The species occurs in the on the Ironton District of the WNF but is not known to occur in the Marietta Unit. Suitable habitat for this species occurs in the Action Area.
Rock-loving Swan-necked Moss (<i>Campylostelium saxicola</i>)	Added	Moist sandstone rocks/cliffs in rolling bottomland mixed-hardwood forest and mixed-mesophytic and cove forest habitats.	Moderate. The species occurs in the Ironton District and Athens District of the WNF but is not known to occur in the Marietta Unit. Suitable habitat for this species occurs in the Action Area.
Porter's Reedgrass (<i>Calamagrostis porteri</i> ssp. <i>insperata</i>)	Added	Found in dry oak forests with open conditions and disturbances such as fire. Well-drained, typically acidic ridgetops and clifftops exposed to direct sun and semi-shade	Low. This subspecies occurs in the Ironton District of the WNF. Suitable habitat occurs in the Action Area but is the northern and eastern limit of its range.
Running Buffalo Clover (<i>Trifolium stoloniferum</i>)	Added	Moist, semi-shaded area associated with mowing, cattle grazing, trampling, logging, or other moderate ground disturbance occurs	Moderate. Known to occur in the WNF in the Ironton Unit and Athens Unit but no known occurrences in the Marietta Unit. The Action Area contains suitable habitat.

SPECIES	RETAINED OR ADDED SINCE 2016 EA	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Fernleaf Yellow False Foxglove (<i>Aureolaria pedicularia</i>)	Retained	Thin sandy or rocky soils, under oaks within dry oak forests	Moderate. This species occurs in the Athens District of the WNF but it is not known to occur in the Marietta Unit. Suitable habitat occurs in the Action Area.
Giant Sedge (<i>Carex gigantea</i>)	Retained	Large stream floodplains, wetland-obligate species found in vernal pools within flatwoods/floodplain swamps within rolling bottomland hardwoods	Moderate. The species occurs on the WNF in the Ironton District, but it is not known to occur in the Marietta Unit. Suitable habitat for this species occurs in the Action Area.
Juniper Sedge (<i>Carex juniperorum</i>)	Retained	Open dry oak forests, dry openings, glades	Moderate. This species occurs in the Athens District of the WNF, but it is not known to occur on the Marietta Unit. Suitable habitat occurs in the action area.
Carolina/Soft Thistle (<i>Cirsium carolinianum</i>)	Retained	Open/semi-open woods in dry oak forests, bluffs, ravines, and thickets	Moderate. Known to occur in the Ironton and Athens Districts of the WNF, but it is not known to occur on the Marietta Unit. The Action Area contains suitable habitat.
Yellow/Plain Gentian (<i>Gentiana alba</i>)	Retained	Moist meadows/prairies; open woods; edges	Moderate. Known to occur in the Ironton and Athens Districts of the WNF, but it is not known to occur in the Marietta Unit. The Action Area contains suitable habitat.
Butternut (<i>Juglans cinerea</i>)	Retained	Moist woods, field edges, and riparian corridors in dry-mesic, mixed mesophytic, and cove forests	High. The WNF contains several populations across the Ironton, Athens, and Marietta Unit. The Action Area contains suitable habitat.

SPECIES	RETAINED OR ADDED SINCE 2016 EA	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Yellow-fringed Orchid (<i>Platanthera ciliaris</i>)	Retained	Wet, sandy bogs & meadows, fields & woods; sandy open mixed pine woods	High. The Marietta Unit of the WNF has two known populations. The Action Area contains suitable habitat
(Smooth) Rock Skullcap (<i>Scutellaria saxatilis</i>)	Retained	Moist banks/woods also dry slopes & openings; often associated with thin soils and rock outcroppings	High. The WNF contains several populations across the Ironston and Marietta Units. The Action Area contains suitable habitat.

Source: USFS 2024.

3.5.2. Environmental Impacts

Potential impacts on vegetation from activities in the oil and gas program are analyzed in Section 4.3 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference. The following analysis considers new and relevant information needed to support this EA because the analysis of vegetation management in the 2016 EA, among other things, did not have the benefit of the analysis and the projections in the 2020 RFDS (Appendix D) and, as noted in *CBD*, (Appendix A), did not capture the full range of impacts that would result from horizontal drilling with hydraulic fracturing. The newly added species are similar to those analyzed in the 2016 EA. The potential effects for the new species are within the scope of the original analysis as well as the scope of the current analysis for Federally listed species.

3.5.2.1. Impacts of Alternative A – No-Action Alternative

Under the No-Action Alternative, the BLM would not offer Federal minerals in the Marietta Unit for oil and gas leasing, including the parcels requested in currently pending EOIs and any other Federal minerals in the Marietta Unit, and it would rescind any leasing decisions that were supported, for NEPA-compliance purposes, by the 2016 EA. Therefore, the No-Action Alternative would not result in any substantive change to the estimated impacts on vegetation from those impacts analyzed under the No-Action Alternative in Section 4.3 of the 2016 EA (BLM 2016).

3.5.2.2. Impacts of Alternative B – Proposed Action

The Proposed Action would make Federal mineral estate available for oil and gas nominations and potential leasing that, if developed through future approved APDs, is expected to result in up to 1,015 acres of surface disturbance (2.5 percent of the Action Area) during well construction and development and up to 285 acres of long-term surface disturbance (0.05 percent of the Action Area) during the productive life of wells. Increased surface disturbance, truck traffic, and potential for hazardous spills associated with horizontal drilling and hydraulic fracturing would intensify impacts on vegetation and rare plants compared to vertical drilling. Increased surface disturbance can result in increased mortality of individual plants from uprooting, disruption, or removal. Additionally, increased surface disturbance can lead to increased exposure and changes

in vegetative conditions along the edge of cleared areas (i.e., *edge effects*). Creation of an abrupt transition between two adjacent ecosystems (or an edge) causes changes in local biotic and abiotic conditions that can negatively impact vegetation. Abiotic changes along the edge such as the temperature, moisture, and light intensity can create an environment that is no longer suitable for native or rare plant species to survive. Because of the varied physiological tolerances of species, such changes can alter biotic factors such as stem density and species composition, which can result in increased competition for resources (Murcia 1995). Furthermore, increased surface disturbance can lead to increased erosion, runoff, and sedimentation that may impact vegetation and rare plants by washing away individuals, eroding, or destabilizing soils, or reducing soil quality. These factors would ultimately reduce plant productivity.

Increased truck traffic required for horizontal drilling and hydraulic fracturing (Table 3-2 and Section 3.9, *Transportation*) would result in potential impacts on vegetation due to dust deposition on plants along roadways and near construction sites. Dust has been documented to affect plant photosynthesis, respiration, and transpiration, leading to decreased plant productivity (Farmer 1993). Potential impacts also include the possibility of fluid spills (e.g., diesel, lubricants, oil, produced water) and associated contamination of soils, which would cause reduction in or loss of plant productivity.

Impacts from loss of vegetation, expansion of the road network, and increased vehicle traffic would include an increased risk of establishment and spread of nonnative, invasive plant species and noxious weeds that may outcompete native flora and reduce the overall diversity of native vegetation. Ohio maintains a list of prohibited and restricted noxious weeds (Ohio Administrative Code [OAC] Rule 901:5-27-06), and the 2016 EA identifies garlic mustard (*Alliaria petiolata*), Japanese stiltgrass (*Microstegium vimineum*), and multiflora rose (*Rosa multiflora*) as known invaders of the WNF that were not on the Ohio noxious weeds list (BLM 2016). Many nonnative species and noxious weeds are opportunistic colonizers that respond particularly well to disturbance and prevent native plants from establishing successive communities (Sieg et al. 2003). Because of the projected increase in surface disturbance, more opportunities would be created for the establishment and spread of invasive species compared to vertical drilling and completions. Because less habitat fragmentation results from horizontal drilling due to increased spacing/drainage area of each well, if an invasive species was established, the chance of spread beyond the location would be limited. Low road density may also lessen the potential for establishment and spread of invasive species to new areas in comparison to tightly spaced vertical wells which result in a greater amount of habitat fragmentation. Additional vehicle trips associated with horizontal well development and hydraulic fracturing (Table 3-2) would increase the risk of transporting invasive, nonnative vegetation and noxious weeds to and from well-development sites. USFWS AMMs (see below) would reduce potential impacts resulting from invasive and noxious weeds by requiring equipment to be washed to remove potential plant propagules prior to entering any work site.

The Proposed Action would result in potential impacts on RFSS described above, especially for RFSS known to occur in the Analysis Area including butternut, yellow-fringed orchid, and rock skullcap. However, application of lease stipulations and notifications from the Forest Plan for RFSS and implementation of AMMs (see below) would reduce the potential impacts on RFSS. In addition, due to the overall minimal amount of surface disturbance that would occur in the

Action Area (2.5 percent of the Action Area) overall impacts on RFSS are expected to be minimal.

Impacts from project actions on undiscovered listed plants would include injury or death by crushing or uprooting from equipment utilization during road and trail creation or rehabilitation of old access routes, site clearing, earth moving, or well pad construction. Materials placed in staging areas would also crush or kill Federally listed or RFSS plants if they were to occur. However, potential impacts on Federally listed plant species is unlikely due to the relatively small amount of surface disturbance that would occur at each well site, the lack of known populations of Federally listed plant species in the Analysis Area, and requirements to avoid suitable habitat or to conduct site surveys for RFSS or Federally listed plant species during APD permitting.

In accordance with BLM's Section 6 lease term (BLM 2023), all adverse impacts on biological resources must be minimized. Additionally, site-specific environmental reviews would be required for APDs proposing surface disturbance on both Federal and private land to analyze the impacts of proposed development on vegetation and rare plants. Design features, COAs, and BMPs would be applied to the APD as appropriate to minimize impacts on vegetation and rare plants. Processing an APD would also require site-specific surveys for Federally listed plants and potentially for RFSS within suitable habitat on both private and Federal land. If individuals or populations are identified during surveys, appropriate measures would be applied as COAs to the APD to avoid and minimize potential impacts. For example, forest-wide standard SFW-MIN-11 requires a controlled surface use (CSU) stipulation for locations where Federally listed species and RFSS are known to occur on NFS lands.

As part of the ongoing Section 7 consultation process for this EA, the USFWS has provided a set of measures (AMMs) to avoid and minimize potential impacts on Federally listed plants associated with the Proposed Action, some or all of which could later be applied to APDs as conditions of approval. The AMMs (Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3, 2.6.1.4 of this EA) include the following:

- Prohibit disturbance to suitable habitat for Virginia spiraea and northern monkshood.
- The applicant or BLM will conduct a desktop analysis to determine if potentially suitable habitat for plant species is present. Desktop analysis should include mapping of habitat types in the area, review of soils/geology in the area, and review of aerial maps to see if the area is within a completely closed forest. If the project area is entirely mowed lawn or is entirely developed (such as parking lot, buildings) then the project would have no effect to listed plant species. USFWS will review the desktop analysis to determine if it is acceptable and then provide guidance on whether a presence/absence plant survey is needed when BLM requests Tier 2 consultation.
- If Federally listed plants are present onsite, BLM will coordinate with USFWS during Tier 2 consultation to develop a protective buffer to avoid adverse effects to these species.
- Clean equipment before entering a site to prevent movement and spread of invasive species.

- Revegetate disturbed areas with a mix of noninvasive annual ground cover and perennial native species that has been approved by USFWS.

Application of the measures described above would be effective in reducing the potential for impacts on vegetation and rare plants. During the Stage 3 environmental review of APDs, the BLM would further assess the effectiveness of measures approved in the Decision Record for the lease action based on site-specific development proposals and associated impacts. If site-specific impacts are identified during the Stage 3 environmental review of APDs, the BLM would consider and as appropriate, apply additional AMMs, as well as monitoring measures and other measures in order to avoid, minimize, and reduce potential impacts on vegetation and rare plants. Application of site-specific measures based on individual APDs would be effective at further avoiding, minimizing, and reducing impacts on vegetation and rare plants.

3.5.3. Cumulative Impacts

The CIAA for vegetation encompasses the Marietta Unit of the WNF and a 4-mile buffer, excluding West Virginia, plus an additional 0.5-mile buffer, which includes the area where vegetation could be impacted by fluid spills, movement of soils and runoff, and by deposition of dust from project-related activities. Given the nature of current drilling technology, impacts on vegetation beyond this buffer would be unlikely, except in the case where noxious weeds and invasive species would be transported by project-related vehicles and dispersed outside the 4-mile buffer. Historical activities, current ongoing projects, and reasonably foreseeable future actions that would result in vegetation impacts in the CIAA are outlined in Appendix H (*Past, Present, and Reasonably Foreseeable Future Actions*). Cumulative impacts on vegetation associated with the Proposed Action would result from increased surface disturbance and equipment in the natural landscape of the WNF when considered in conjunction with ongoing and future projects in the CIAA.

In addition to discrete USFS projects throughout the Marietta Unit, existing and future oil and gas development on private land is expected to be the largest contributor to cumulative vegetation impacts in the CIAA, especially in the situation where lessees proceed with private surface development in place (such as developing a well pad, drilling a private well, etc. and vegetation clearing) prior to submitting an APD (the point where there is a Federal nexus) to the BLM to access Federal minerals. There are 21,598 oil and gas-related wells, including both traditional vertical and newer horizontal wells, that have been permitted or constructed in the CIAA as of August 2024, with 86 percent of those wells located on private land as depicted on Figure H-2 in Appendix H (*Past, Present, and Reasonably Foreseeable Future Actions*). As of 2022, there were an estimated 53,491 acres of developed land/existing disturbance within the CIAA (Figure H-3), which accounts for approximately 9.8 percent of the total acreage within the CIAA (LANDFIRE 2022). The Proposed Action would result in an incremental increase in surface disturbance, with 1,015 acres projected in the short term during well development and 285 acres in the long term during well production (BLM 2020). As a result, the total cumulative surface disturbance in the CIAA, including the Proposed Action, is estimated to be 54,506 acres in the short term and 53,776 acres in the long term, less any acreage remediated on non-Marietta leases in the CIAA. The figure of 54,166 acres which represents an increase of 2.7 percent of cumulative disturbance in the short term and an increase of 1.3 percent in the long term. This cumulative disturbance has and would continue to affect vegetation and rare plants due to

removal and clearing of vegetation, increased mortality of individual plants, increased exposure and changes in vegetative conditions due to edge effects, increased risk of establishment and spread of invasive plant species and noxious weeds, and other types of effects similar to those described in Section 3.5.2 (*Vegetation and Rare Plants – Environmental Impacts*). The BLM has the authority to apply AMMs, such as restricting where water can be withdrawn for drilling operations, as COAs to APDs, as described in Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3, 2.6.1.4 of this EA before approving APDs. However, operators are also required to obtain a state permit to drill and must comply with State of Ohio regulations and standards. As Appendix E informs, Ohio regulations impose strict requirements for the protection of natural resources, including compliance with the ODNR’s Best Management Practices for Oil and Gas Well Site Construction (ODNR 2013), so as to reduce impacts from surface disturbance, vegetation removal, sedimentation and erosion, waste disposal, construction of well sites and access roads, and other activities.

A summary of the effects determination from the BA (Table 3-) lists the plant species considered in the Analysis Area, their listing status, and the effects determination, assuming all required AMMs are implemented. If AMMs cannot be applied to surface development on Federal land, additional coordination and consultation may be required with the USFWS.

Table 3-11. Effects Determination Summary – Vegetation and Rare Plant Species

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	DETERMINATION
<i>Plant Species</i>			
Northern monkshood	<i>Aconitum noveboracense</i>	Threatened	may affect, not likely to adversely affect
Small whorled pogonia	<i>Isotria medeoloides</i>	Threatened	may affect, not likely to adversely affect
Virginia spiraea	<i>Spiraea virginiana</i>	Threatened	may affect, not likely to adversely affect

3.6. Water Resources

Issue 4: How would increases in surface disturbance and use of horizontal drilling with high volume hydraulic fracturing impact water resources, wetlands, and riparian areas in the region, including the Little Muskingum River Watershed?

3.6.1. Affected Environment

The affected environment for water quality, water quantity, wetlands, and riparian zones within the Marietta Unit is analyzed in Section 3.6 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference. This section summarizes the affected environment for the Aquatic Analysis Area (Figure 8) that includes the Marietta Unit plus a 4-mile buffer. Additional detail may be found in the *Wayne National Forest Aquatic Ecosystems and Watersheds Assessment Supplemental Report* (USFS 2020b), which is incorporated into this EA by reference.

The U.S. Geological Survey (USGS) uses a system of hydrologic unit codes or HUCs to classify watersheds in the United States and the Caribbean. HUCs consist of 2 to 12 digits, based on six levels of classification: Region (first-level, 2-digit HUC), Subregion (second-level, 4-digit HUC), Accounting Unit (third-level, 6-digit HUC), Cataloging Unit (fourth-level, 8-digit HUC), Watershed (fifth-level, 10-digit HUC), and Subwatershed (sixth-level, 12-digit HUC). The Aquatic Analysis Area for water resources in this EA includes the subwatersheds designated as HUC-12, which overlap the Marietta Unit and the surrounding 4-mile buffer (8). A total of 32 HUC-12 watersheds are located at least partially within the Analysis Area. The acreage of each HUC-12 subwatershed within the Analysis Area is shown in Table 3-. This HUC level was chosen because water-quality reporting to USEPA and water withdrawals reported to ODNR are performed at the HUC-12 level.

As noted, the 2020 *CBD* decision (Appendix A) found that the analysis of impacts on the Little Muskingum River was deficient. As such, information in this section focuses on the Little Muskingum River and Little Muskingum subwatershed units. All portions of the Little Muskingum River within the Analysis Area are in the Little Muskingum–Middle Island cataloguing unit (HUC-8 0503020; Figure). This unit comprises 574,048 acres of the entire 627,351-acre Analysis Area (91.50 percent) as shown in Table 3-.

Wetlands and riparian zones in the Analysis Area largely follow the Little Muskingum and Ohio Rivers. Most wetlands found in the WNF are palustrine emergent, forested, or shrub-scrub wetlands, as described in the USFWS classification system (Cowardin et al. 1979; FGDC 2013). Although wetlands can be groundwater dependent, they do not always receive groundwater discharge. Many of the larger wetlands in the WNF were artificially constructed, and there is little evidence to suggest that they are heavily dependent on groundwater (USFS 2020b). Additional regional information about goals and objectives related to wetlands and riparian zones for the WNF is provided in the aquatic and riparian resources section of the Forest Plan Final EIS (USFS 2006b).

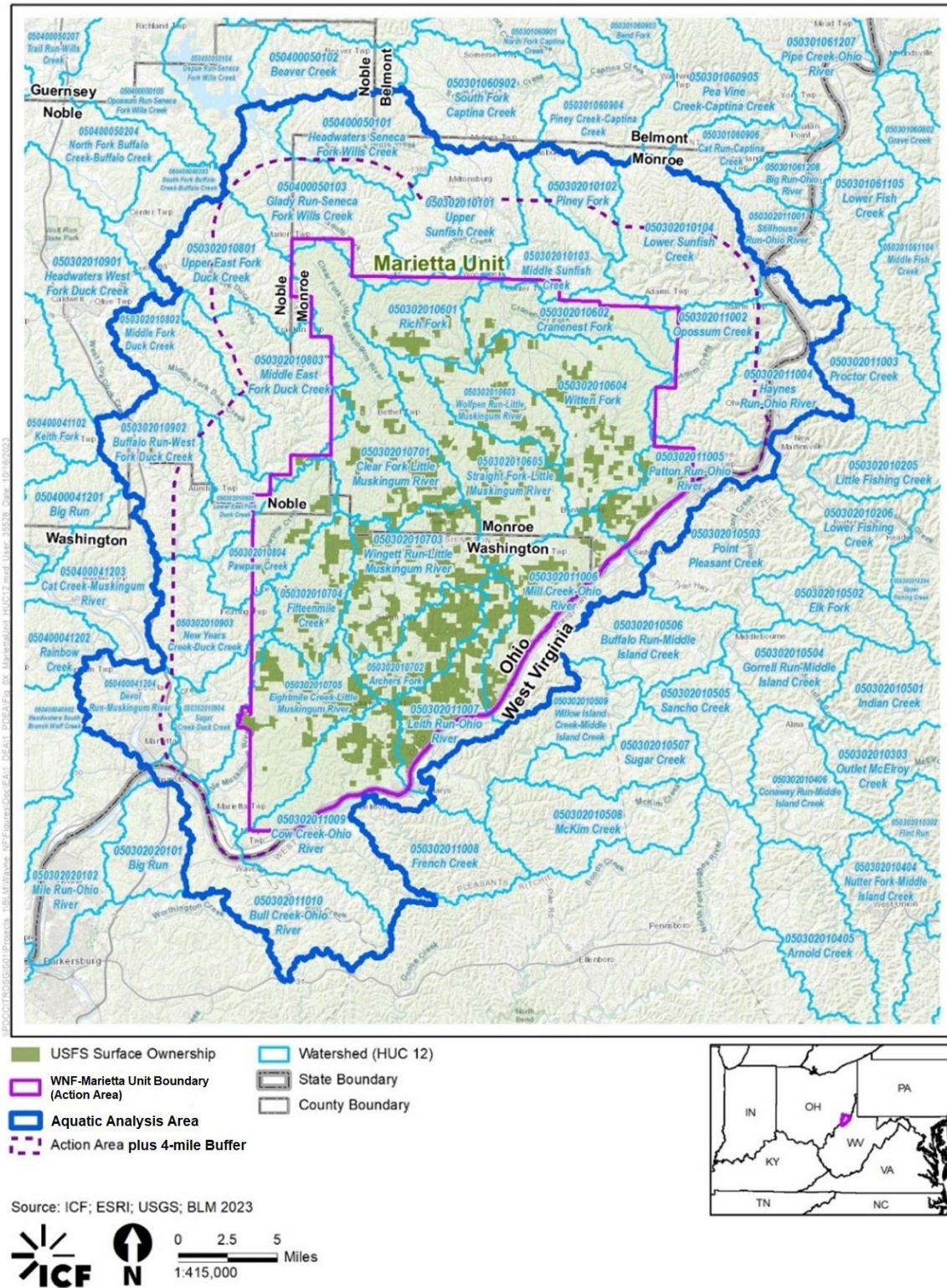


Figure 8. Aquatic Analysis Area - HUC-12 Watersheds within the Marietta Unit, Plus a 4-Mile Buffer

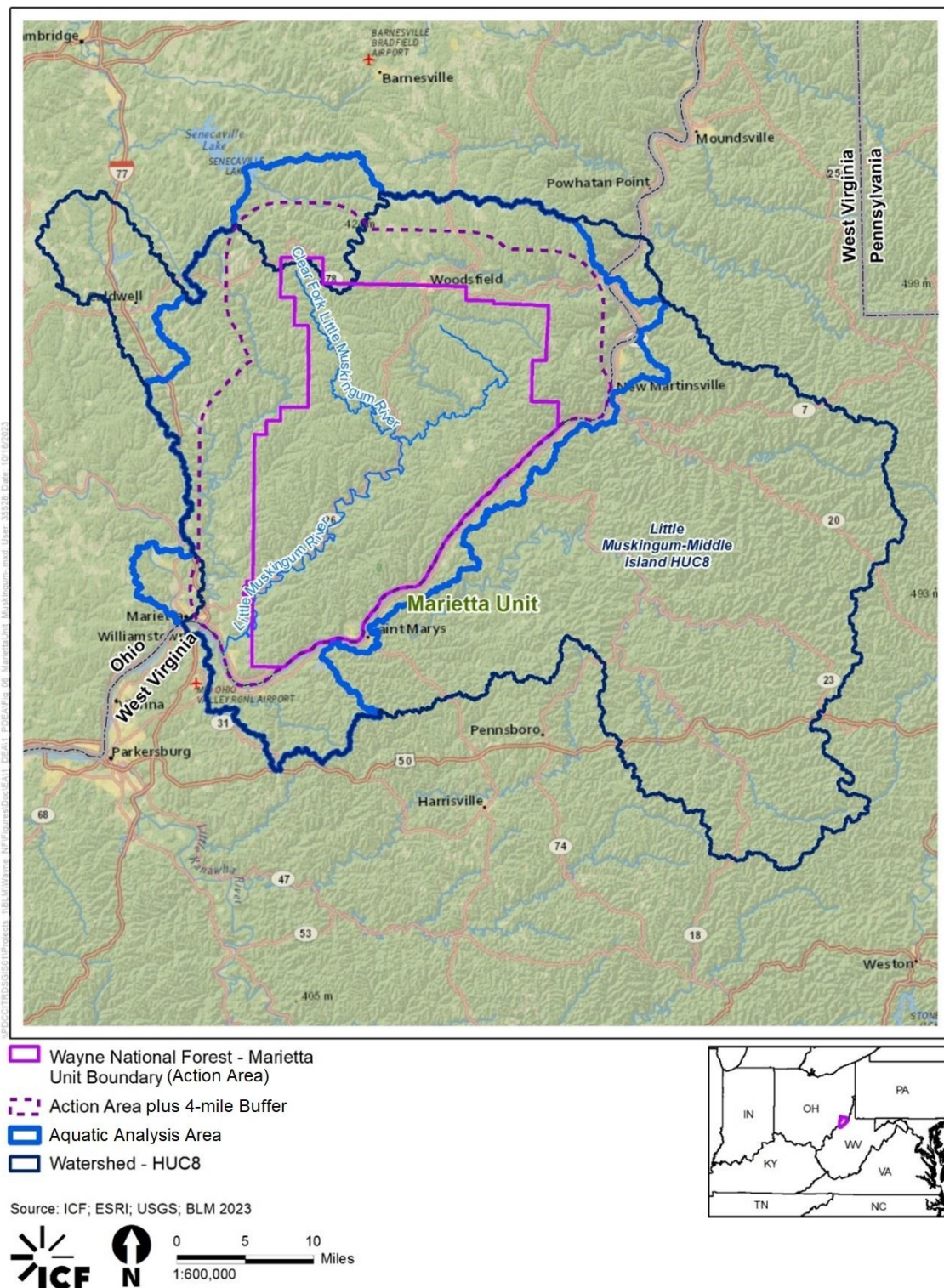


Figure 9. Little Muskingum Watershed in Relation to the Aquatic Analysis Area

Table 3-9. HUC-12 Watersheds within the Analysis Area

WATERSHED NAME	STATE	HUC-12 (SUBWATERSHED)	ACRES WITHIN THE AQUATIC ANALYSIS AREA	PERCENTAGE OF THE AQUATIC ANALYSIS AREA
<i>Little Muskingum–Middle Island (HUC-8 – Subbasin)</i>				
Archers Fork	Ohio	050302010702	11,873	1.89%
Buffalo Run–West Fork Duck Creek	Ohio	050302010902	20,355	3.24%
Bull Creek–Ohio River	Ohio	050302011010	2,145	0.34%
	West Virginia	050302011010	25,424	4.05%
Clear Fork Little Muskingum River	Ohio	050302010701	31,242	4.98%
Cow Creek–Ohio River	Ohio	050302011009	15,675	2.50%
	West Virginia	050302011009	15,138	2.41%
Cranenest Fork	Ohio	050302010602	16,839	2.68%
Eightmile Creek–Little Muskingum River	Ohio	050302010705	26,676	4.25%
Fifteenmile Creek	Ohio	050302010704	13,135	2.09%
Haynes Run–Ohio River	Ohio	050302011004	9,018	1.44%
	West Virginia	050302011004	10,366	1.65%
Leith Run–Ohio River	Ohio	050302011007	13,174	2.10%
	West Virginia	050302011007	3,978	0.63%
Lower East Fork Duck Creek	Ohio	050302010805	9,171	1.46%
Lower Sunfish Creek	Ohio	050302010104	27,595	4.40%
Middle East Fork Duck Creek	Ohio	050302010803	25,812	4.11%
Middle Fork Duck Creek	Ohio	050302010802	16,958	2.70%
Middle Sunfish Creek	Ohio	050302010103	12,724	2.03%
Mill Creek–Ohio River	Ohio	050302011006	16,872	2.69%
	West Virginia	050302011006	10,827	1.73%
New Years Creek–Duck Creek	Ohio	050302010903	16,302	2.60%
Opossum Creek	Ohio	050302011002	16,197	2.58%

WATERSHED NAME	STATE	HUC-12 (SUBWATERSHED)	ACRES WITHIN THE AQUATIC ANALYSIS AREA	PERCENTAGE OF THE AQUATIC ANALYSIS AREA
Patton Run–Ohio River	Ohio	050302011005	14,481	2.31%
	West Virginia	050302011005	6,090	0.97%
Pawpaw Creek	Ohio	050302010804	14,990	2.39%
Piney Fork	Ohio	050302010102	9,992	1.59%
Rich Fork	Ohio	050302010601	14,343	2.29%
Straight Fork–Little Muskingum River	Ohio	050302010605	23,489	3.74%
Sugar Creek–Duck Creek	Ohio	050302010904	11,342	1.81%
Upper East Fork Duck Creek	Ohio	050302010801	20,248	3.23%
Upper Sunfish Creek	Ohio	050302010101	22,463	3.58%
Wingett Run–Little Muskingum River	Ohio	050302010703	23,258	3.71%
Witten Fork	Ohio	050302010604	27,111	4.32%
Wolfpen Run–Little Muskingum River	Ohio	050302010603	13,597	2.17%
Little Muskingum–Middle Island Subtotal			568,901	90.69%
<i>Muskingum (HUC-8 – Subbasin)</i>				
Devol Run–Muskingum River	Ohio	050400041204	13,249	2.11%
<i>Wills (HUC-8 – Subbasin)</i>				
Gladys Run–Seneca Fork Wills Creek	Ohio	050400050103	26,451	4.22%
Headwaters Seneca Fork Wills Creek	Ohio	050400050101	18,681	2.98%
Aquatic Analysis Area Total			627,283	100.00%

Sources: OEPA 2022

3.6.1.1. Water Quality

Section 303 of the Clean Water Act (CWA), 33 USC 1313, requires states to adopt and revise water quality standards for waters within the state (see 33 USC1313(a)–(c)(1)). Section 303(d) requires states to identify and maintain a prioritized list of surface waterbodies that are polluted. Listing of these impaired waterbodies, referred to as “water quality limited segments,” indicates that they do not meet water quality standards even after discharges of waste from “point sources” have undergone pollution-control treatment. Section 303(d) also requires states to develop Total Maximum Daily Loads (TMDLs), which are calculations of the maximum amount of a given pollutant that may enter a waterbody without causing it to violate water quality standards for that pollutant. States report on their assessed waterbodies under Section 305(b) and those listed as impaired under section 303(d) in a single Integrated Report. States submit an Integrated Report to fulfill reporting requirements under both CWA Sections 303(d) and 305(b) every 2 years. Water quality standards designate the use of the particular waterbody (e.g., recreation, protection of aquatic life), establish water quality criteria to protect the waterbody, and implement requirements to protect and maintain healthy waters (USEPA 2025a).

Table 3- identifies the 32 HUC-12 watersheds that occur in the Analysis Area and indicates whether the Section 303 water quality standards are being met for each watershed. The majority of HUC-12 watersheds within the Analysis Area (78 percent) are not meeting current water quality standards. The data for five of the 32 watersheds—Clear Fork Little Muskingum River, Leith Run–Ohio River, Lower Sunfish Creek, Opossum Creek, and Piney Fork—indicate that they are attaining some designated beneficial uses under the CWA. These watersheds support aquatic life (warmwater habitat and coldwater habitat) and their condition allows for recreational use. Additionally, 12 of the 32 watersheds listed as impaired were fully supporting beneficial uses (OEPA 2022). *Impairment* refers to a condition in which the waterway does not meet the water quality standards for the designated beneficial use. A waterway can be impaired and still be fully supporting some beneficial uses because the water quality requirements vary depending on the beneficial use.

Watersheds can be impaired for a single reason or multiple reasons, and most streams have some sort of impairment. Of the 32 watersheds in the Analysis Area, 19 (59 percent) are impaired as a result of bacteria and other microbes, 11 (34 percent) are impaired as a result of metals, nine (28 percent) are impaired as a result of polychlorinated biphenyls), and nine (28 percent) are impaired as a result of low oxygen. Other impairments in the Analysis Area include algae, toxic chemicals, sediment, abnormal flow, dioxins, murky water, degraded habitat, degraded aquatic life, and other known and unknown causes (Table 3-).

The ODNR protects Ohio’s groundwater resources by regulating the disposal of brine and other wastes produced from the drilling, well stimulation, and production of oil and natural gas in Ohio. Within the State, approximately 98 percent of all brine is disposed of by underground injection into brine-bearing or depleted oil and gas formations deep below the surface (ODNR 2024a, 2024b). The other 2 percent is spread for dust and ice control and used with local government approval. There are seven Class II brine injection wells within the Marietta Unit of the WNF: five in Washington County, one in Monroe County, and one in Noble County (ODNR 2024b). In accordance with Ohio Administrative Code 1501:9-3-07(G), Class II disposal well owners must file Quarterly Reports as well as Annual Reports, documenting the total volume of brine or other waste substances received, the maximum injection pressure reached, the average

daily injection pressure, the volume and delivery date for each shipment of brine or other waste substances, and proof of the lawful disposal of waste.

Table 3-13. Water Quality Descriptions in HUC-12 Subwatersheds within the Analysis Area

WATERSHED NAME	HUC-12	MEETING 303(d) STANDARDS? ¹	IMPAIRMENT CATEGORIES
<i>Little Muskingum–Middle Island</i>			
Archers Fork	050302010702	No	Bacteria and Other Microbes
Buffalo Run–West Fork Duck Creek	050302010902	No	Total Toxic Chemicals; Sediment; Low Oxygen; Abnormal Flow; Cause Unknown
Bull Creek–Ohio River	050302011010	Unknown	PCBs; Metals; Bacteria and Other Microbes; Dioxins; Total Toxic Chemicals; Sediment; Low Oxygen; Abnormal Flow; Impaired, Other Cause
Clear Fork Little Muskingum River	050302010701	Yes	N/A
Cow Creek–Ohio River	050302011009	No	Bacteria and Other Microbes; Metals; PCBs; Degraded Aquatic Life; Dioxins
Cranenest Fork	050302010602	No	Bacteria and Other Microbes
Eightmile Creek–Little Muskingum River	050302010705	No	Bacteria and Other Microbes; PCBs
Fifteenmile Creek	050302010704	No	Bacteria and Other Microbes; Impaired, Other Cause
Haynes Run–Ohio River	050302011004	Unknown	Bacteria and Other Microbes; PCBs; Dioxins; Metals
Leith Run–Ohio River	050302011007	Yes	Bacteria and Other Microbes; PCBs; Dioxins; Metals
Lower East Fork Duck Creek	050302010805	No	Murky Water; Total Toxic Chemicals; Sediment; Low Oxygen; Metals; Abnormal Flow; Degraded Habitat; Cause Unknown
Lower Sunfish Creek	050302010104	Yes	N/A
Middle East Fork Duck Creek	050302010803	No	Murky Water; Total Toxic Chemicals; Sediment; Low Oxygen; Metals; Abnormal Flow; Degraded Habitat; Cause Unknown
Middle Fork Duck Creek	050302010802	No	Murky Water; Total Toxic Chemicals; Sediment; Low Oxygen; Metals; Abnormal Flow; Degraded Habitat; Cause Unknown
Middle Sunfish Creek	050302010103	No	Bacteria and Other Microbes
Mill Creek–Ohio River	050302011006	No	Bacteria and Other Microbes; Metals; PCBs; Dioxins; Degraded Aquatic Life

WATERSHED NAME	HUC-12	MEETING 303(D) STANDARDS? ¹	IMPAIRMENT CATEGORIES
New Years Creek–Duck Creek	050302010903	No	Total Toxic Chemicals; Sediment; Low Oxygen; Abnormal Flow; Cause Unknown
Opossum Creek	050302011002	Yes	N/A
Patton Run–Ohio River	050302011005	Unknown	PCBs; Bacteria and Other Microbes; Metals; Dioxins
Pawpaw Creek	050302010804	No	Murky Water; Total Toxic Chemicals; Sediment; Low Oxygen; Metals; Abnormal Flow; Degraded Habitat; Cause Unknown
Piney Fork	050302010102	No	N/A
Rich Fork	050302010601	No	Bacteria and Other Microbes
Straight Fork–Little Muskingum River	050302010605	No	Bacteria and Other Microbes
Sugar Creek–Duck Creek	050302010904	No	Total Toxic Chemicals; Sediment; PCBs; Low Oxygen; Abnormal Flow
Upper East Fork Duck Creek	050302010801	No	Murky Water; Total Toxic Chemicals; Sediment; Low Oxygen; Metals; Abnormal Flow; Degraded Habitat; Cause Unknown
Upper Sunfish Creek	050302010101	No	Algae
Wingett Run–Little Muskingum River	050302010703	No	Bacteria and Other Microbes
Witten Fork	050302010604	No	Bacteria and Other Microbes
Wolfpen Run–Little Muskingum River	050302010603	No	Bacteria and Other Microbes
Muskingum			
Devol Run–Muskingum River	050400041204	No	Bacteria and Other Microbes; Impaired, Other Cause; PCBs
Wills			
Gladys Run–Seneca Fork Wills Creek	050400050103	No	Sediment; Bacteria and Other Microbes
Headwaters Seneca Fork Wills Creek	050400050101	No	Bacteria and Other Microbes

Sources: USEPA 2023c.

¹ Yes = use attaining or available data indicate some uses attaining; Unknown = use attainment unknown/insufficient information; No = impaired.

N/A = not applicable; PCBs = polychlorinated biphenyls

During the APD process, the BLM encourages operators to identify the chemical constituents of hydraulic fracturing fluids. However, the BLM does not currently have the authority to require operators to identify the chemicals used in hydraulic fracturing. Oil and gas operators are encouraged to report specific information about fracturing fluid used at an individual well via a voluntary, publicly accessible website: FracFocus.org. FracFocus.org serves as a reporting method to meet state disclosure for 26 states, including Ohio. In addition, safety data sheets contain safety, health, and environmental information for ingredients of the products used (including those denoted as proprietary). Safety data sheet documents must be available on site for the substances used in the hydraulic fracturing process as required by the Occupational Safety and Health Administration.

3.6.1.2. Water Quantity

Owners of land in Ohio adjacent to lakes or watercourses possess riparian water rights, entitling them to make reasonable use of the groundwater underlying their land or the water in an adjacent lake or watercourse. These rights are protected by Article 1, Section 19b, of the Ohio Constitution. ODNR’s Water Withdrawal Facilities Registration Program requires the owner of any facility with the capacity to withdraw more than 100,000 gallons of water per day (70 gallons per minute) must register the facility with the ODNR, Division of Water Resources (Ohio Revised Code [ORC] § 1521.16). Facilities registered with ODNR’s Division of Water Resources must complete and submit an annual report of all water withdrawn in a calendar year. This reporting requirement applies to groundwater withdrawals, surface water withdrawals, or any combination of the two (ODNR 2021). Withdrawals in the Analysis Area that were reported from 2017 and 2021 are outlined in Table 3-14 and Table 3- below. All groundwater and surface water withdrawals reported in the Analysis Area during this time are within the Little Muskingum–Middle Island HUC-8 cataloguing unit.

Table 3-14. Registered Groundwater Withdrawals in the Analysis Area from 2017 to 2021

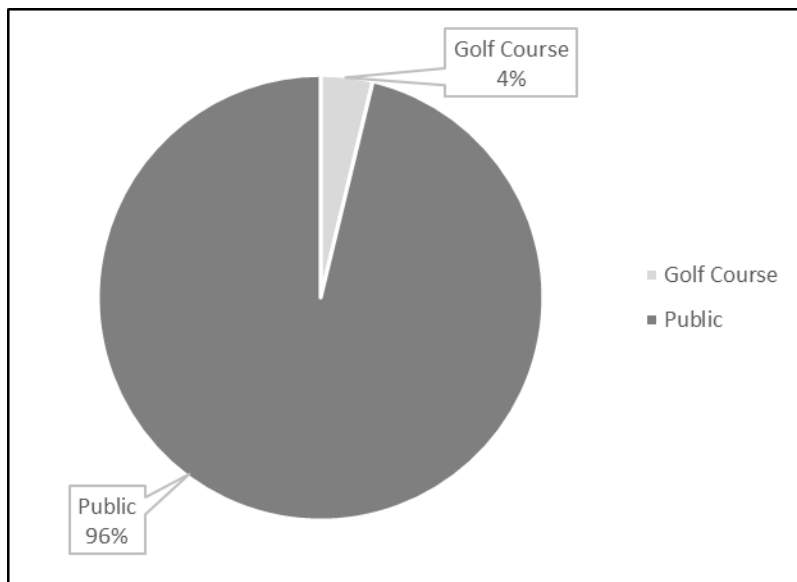
WATERSHED NAME	HUC	WATER WITHDRAWALS (MGAL)					HUC Avg
		2017	2018	2019	2020	2021	
Patton Run–Ohio River	050302011005	238.0	269.7	262.9	272.0	278.3	264.2
Mill Creek–Ohio River	050302011006	35.5	34.6	26.6	24.3	22.3	28.7
Cow Creek–Ohio River	050302011009	52.2	56.4	65.4	60.7	52.4	57.4
Little Muskingum– Middle Island	05030201	325.7	360.7	354.9	357.0	353.0	350.3

Source: ODNR 2023a.

Avg = Average; HUC = Hydrological Unit Code; Mgal = million gallons.

As reflected in Table 3-14, facilities registered with ODNR withdrew an average of 350.3 million gallons (Mgal) of groundwater annually from the Little Muskingum–Middle Island HUC-8 between 2017 and 2021. These withdrawals were from three HUC-12s, with the majority of water withdrawn from the Patton Run–Ohio River watershed. None of the reported groundwater withdrawals (Figure) are associated with hydraulic fracturing or mineral extraction; withdrawals were all associated with public uses (96 percent) or golf courses (4 percent). Records from existing well logs in the WNF and surrounding area indicate that groundwater is

unlikely to exist in sufficient quantities to support hydraulic fracturing operations (Thompson 2012).



Source: ODNR 2023a.

Figure 10. Groundwater Uses for Registered Withdrawals in the Analysis Area

Most groundwater drinking wells in the Action Area produce less than 10 gallons per minute and, because of this low production rate, it is unlikely operators involved in high-volume hydraulic fracturing would utilize groundwater wells (BLM 2016). While groundwater wells along the Ohio River and the Muskingum River valleys can produce up to several hundred gallons per minute, both Monroe and Washington Counties, which make up a majority of the Marietta Unit, lie within the Nonglaciated Central hydrogeologic setting, where wells are only capable of producing low-flow groundwater yields. The geologic formations beneath the Little Muskingum and its tributary streams are primarily consolidated bedrock, which generally provide low-producing aquifers (averaging less than three gallons a minute), although yields can be slightly higher if wells are drilled within stream valleys (ODNR 2025, 2016, 2002). The groundwater yield is dependent on other factors besides the value of the aquifer, such as the number and type of wells drilled. Occasionally within the Unit area, bedrock zones can intersect with several aquifers and bedding planes. In these locations, the result can be a decrease in depth to water and the wells can produce slightly higher groundwater yields. In many places along the tributaries of the Little Muskingum, depth to water averages less than 30 feet. However, even in these areas, groundwater wells within the Marietta Unit connect to low-producing aquifers, with averages between three and ten gallons per minute. For this reason, domestic wells are typically smaller in diameter and are low-producing wells (ODNR 2025, 2016, 2002).

Reported surface water withdrawals in the Little Muskingum–Middle Island HUC-8 averaged 1,570.9 Mgal between 2017 and 2021 (Table 3-). These withdrawals are from 14 different HUC-12 watersheds, with approximately 58 percent of water withdrawn during this time coming from the Cow Creek–Ohio River HUC-12 for mineral extraction (ODNR 2023a). It is important to note that the data presented in Table 3- are associated with water withdrawals that are reported,

in accord with reporting requirements applying to facilities and operations that have capacity to withdraw more than 2 Mgal of water per day (60 Mgal per month). Operators and facilities that consume and have a capacity less than 2 Mgal per day would also be withdrawing surface water from the Little Muskingum–Middle Island HUC-8 watershed, which would increase the total water withdrawals beyond what is presented in Table 3-.

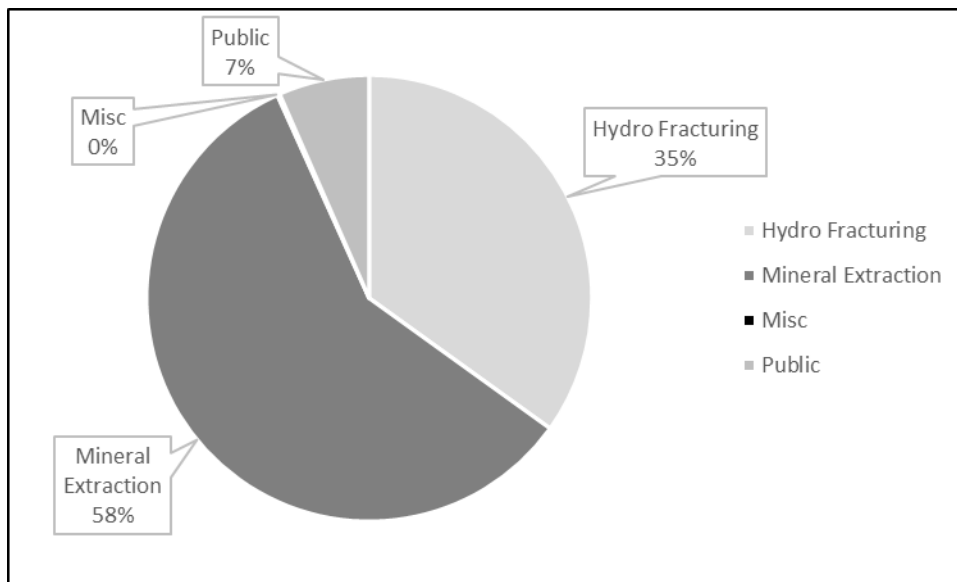
Table 3-15. Registered Surface Water Withdrawals in the Analysis Area from 2017 to 2021

WATERSHED NAME	HUC	WATER WITHDRAWALS (MGAL)					HUC Avg
		2017	2018	2019	2020	2021	
Upper Sunfish Creek	050302010101	109.0	105.8	96.4	122.6	151.2	117.0
Piney Fork	050302010102	7.7	0.0	NDA	NDA	NDA	3.9
Middle Sunfish Creek	050302010103	0.0	35.2	152.3	47.9	0.0	47.1
Lower Sunfish Creek	050302010104	132.4	164.4	189.3	84.4	151.8	144.5
Wolfpen Run–Little Muskingum River	050302010603	27.7	45.2	0.0	69.3	0.0	28.4
Witten Fork	050302010604	0.0	82.9	94.0	0.0	16.6	38.7
Straight Fork–Little Muskingum River	050302010605	44.7	0.0	37.4	0.0	68.3	30.1
Clear Fork Little Muskingum River	050302010701	120.0	0.0	0.0	0.0	0.0	24.0
Upper East Fork Duck Creek	050302010801	9.1	8.3	9.7	3.8	2.4	6.7
Lower East Fork Duck Creek	050302010805	5.1	7.5	8.6	2.5	2.1	5.2
Haynes Run–Ohio River	050302011004	0.0	7.8	52.8	105.0	0.0	33.1
Patton Run–Ohio River	050302011005	127.2	104.8	283.9	154.1	87.8	151.6
Mill Creek–Ohio River	050302011006	3.5	53.3	6.8	5.9	50.9	24.1
Cow Creek–Ohio River	050302011009	894.8	1532.2	647.7	808.7	667.0	910.1
Little Muskingum–Middle Island	05030201	1,525.9	2,147.5	1,579.0	1,404.1	1,198.1	1,581.2

Source: ODNR 2023a.

Avg = Average; NDA = no data available.

Of the surface water withdrawals reported between 2017 and 2021, an average of 921.9 Mgal (58 percent) of water were used for solid mineral extraction (coal, salt, sand and gravel, limestone), 552.1 Mgal (35 percent) for hydraulic fracturing, 104.1 Mgal (7 percent) for public uses, and 3.0 Mgal (0.2 percent) for miscellaneous uses (Figure). Withdrawals for solid mineral extraction and hydraulic fracturing during these years came from 23 different facilities.



Source: ODNR 2023a.

Figure 11. Surface Water Uses for Registered Withdrawals in the Analysis Area

3.6.2. Environmental Impacts

Potential impacts on water quality and water resources, including wetlands, and riparian zones, from all projected activities in the Marietta Unit in the oil and gas program are analyzed in Section 4.3.6 and Section 4.6 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference. BLM expands that analysis below in Section 3.6.2.2, *Impacts of Alternative B – Proposed Action*. New and relevant information has been used to support this EA because the analysis of water resources in the 2016 EA did not have the benefit of information and projections in the 2020 RFDS (Appendix D), and, as noted in *CBD*, did not capture the full range of impacts that would result from horizontal drilling with high-volume hydraulic fracturing. The analysis uses a watershed approach to review potential impacts associated with increased horizontal drilling and hydraulic fracturing within all HUC-12 watersheds overlapping with the Marietta Unit and a four-mile buffer into Ohio.

3.6.2.1. Impacts of Alternative A – No-Action Alternative

Under the No-Action Alternative, the BLM would not offer Federal minerals in the Marietta Unit for oil and gas leasing, including the parcels requested in currently pending EOIs and all other Federal minerals in the Marietta Unit and would rescind any leasing decisions that were supported, for NEPA-compliance purposes, by the 2016 EA. Therefore, the No-Action Alternative would not result in any substantive change to the estimated impacts on water

resources from those impacts analyzed under the No-Action Alternative in Section 4.6 of the 2016 EA (BLM 2016).

3.6.2.2. Impacts of Alternative B – Proposed Action

Increased water required for horizontal drilling and hydraulic fracturing would impact water resources by increasing withdrawals of surface water and possibly groundwater and may reduce available quantities of water for wetlands and riparian areas, public drinking water, aquatic habitat, and recreational uses. However, at the current leasing stage, where no APDs are pending, the specific water sources that would be used for horizontal drilling and hydraulic fracturing are unknown. Water sources proposed for future activities would be described in an APD. Accordingly, this analysis assesses potential impacts on surface water, groundwater, wetlands, and riparian areas in the Analysis Area based on an assumption that all water needed for hydraulic fracturing would be withdrawn from sources within the Analysis Area. This is a very conservative approach, as explained below.

Two factors potentially reduce the demand for surface water and groundwater in the Analysis Area considerably. First, water withdrawn from sources outside of the Analysis Area may be trucked into the Analysis Area for well development and production under the Proposed Action, but because the location of this water is not reasonably foreseeable at this time, it is not reviewed as part of this analysis. Secondly, while not a condition of APD approval, oil and gas wastewater is increasingly being treated at facilities with advanced technologies, such as desalination, producing reusable water at rates approaching 90 percent reuse (Jackson et al. 2013). Thus, there is a possibility that trucked-in water could be used and could result in decreased impacts if withdrawals from surface water or groundwater sources are not needed. The location and siting of Oil and Gas Waste Facilities (which includes wastewater recycling) is outlined under the OAC (OAC 2022). Applicants who meet the siting requirements may submit a permit to construct an oil and gas waste facility that must be designed, constructed, and operated in a manner that supports the proposed operations as well as protects public health and prevents damage to the environment.

Water Quality

Following the issuance of leases and APD approval, site-specific development would result in increased surface disturbance and removal of vegetation and soil, relative to the 2016 EA. This would result in impacts on surface water and groundwater, including in the Little Muskingum watershed, that would also impact wetlands and riparian areas. The 2020 RFDS (Appendix D) projected 29 well pads (containing up to 81 wells) compared to the 10 well pads previously analyzed in the 2016 EA. The majority of these 29 well pads would support horizontal drilling with high-volume hydraulic fracturing. Construction of such pads results in disturbance of up to an estimated 35 acres more surface in the short term and up to 10 acres more surface per well pad in the long term than vertical drill pads (Table 3-2). The 2020 RFDS (Appendix D) estimated a total of up to 1,015 acres of short-term disturbance (lasting 8 to 10 weeks) and up to 285 acres of long-term disturbance (lasting 20 to 30 years) across the entire Analysis Area. Impacts from removal of vegetation and soil compaction within the watershed and Analysis Area may cause short-term hydrological disruption and would cause increased risks of erosion, runoff, and offsite sedimentation where erosion control measures are inadequate or absent. These processes may lead to a measurable increase in total dissolved solids (TDS) and total suspended

solids (TSS) in water resources throughout the Analysis Area. If sustained, a decline in water quality that would also affect wetlands and riparian areas. Short-term disturbance would typically last 8 to 10 weeks, followed by interim reclamation to reduce water quality impacts on the greatest extent possible (Lioudis 2022). Long-term surface disturbance would exist in the landscape for 20 to 30 years, until well abandonment, at which time operators must return disturbed land to its pre-development state in accordance with ODNR – Division of Oil and Gas Resources Management (DOGRM) and Gold Book requirements (Lioudis 2022; BLM 2007).

Certain oil and gas exploration, production, processing, and treatment operations or transmission facilities are conditionally exempt from construction and industrial stormwater permitting requirements under the CWA’s National Pollutant Discharge Elimination System (NPDES). The CWA permitting provisions are only applicable if there is a discharge of stormwater resulting in a discharge of a reportable quantity of oil or hazardous substances, or if the activity/facility contributes to a water quality violation of a water quality standard or has a general permit for oil and gas operations that requires operators to develop and implement a stormwater pollution prevention plan. These operators must include in drilling plans measures to prevent and control discharge of pollution to stormwater, and OEPA must review and approve the stormwater pollution prevention plan before operations can begin (OEPA 2022). Additionally, operators developing wells on private or NFS lands must include in drilling plans preventive measures for stormwater runoff and erosion from well-pad construction activities.

Although instream construction work is not anticipated, Section 404 of the CWA and OAC Chapter 3745-1 require authorization from USACE and OEPA for any construction activity impacting a wetland, stream, river, or other Waters of the United States (WOTUS) or state. On September 8, 2023, the USACE promulgated a new rule (88 FR 61964), amending its prior regulatory definition of WOTUS. The new rule conforms the USACE’s definition of WOTUS to the U.S. Supreme Court’s May 25, 2023, decision in *Sackett v. Environmental Protection Agency*, and is referred to as the “Conforming Rule.” The Conforming Rule establishes that wetlands are only considered WOTUS if they have a hydrological surface connection to other WOTUS (88 FR 61964). However, the State continues to define wetlands as “areas that are inundated or saturated by surface or ground water at a frequency and duration that are sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (OAC § 3745-1-02(B)(97)). Regulated activities include: (1) excavating or placing fill material in the waterway to construct pad sites, access roads, water lines, or production lines; (2) stream piping, rerouting, or straightening for construction; (3) dredging a wetland to create a pond; and (4) culverting streams or filling wetlands for roadway water or wastewater piping. These projects require a Section 404 Dredge and Fill permit from USACE and a Section 401 Water Quality Certification permit from OEPA, regardless of whether the project is on private or public property. Issuance of a Section 404 Dredge and Fill permit requires a separate NEPA analysis to review environmental impacts.

The increase in well-pad numbers over those analyzed in the 2016 EA, and associated increases in well activity, may also increase the risk and severity of accidental discharges, such as surface spills or leaks of hazardous materials, fuels, or fracturing chemicals, which would result in impacts on the Little Muskingum watershed in the Analysis Area if there is inadequate emergency response and containment strategies in place. Some spills may be the result of human error (e.g., vehicle collisions, improper handling, improper equipment operation or installation),

whereas others would stem from equipment failure (e.g., broken pipes, torn pit liners, leaking tanks) or acts of nature (e.g., fire, flood). The most common causes of spills associated with oil and gas drilling are equipment failure and corrosion (Wenzel 2012). Between 2002 and 2018, oil and gas-related activities resulted in 17 spills of crude oil, oil, brine, or diesel fuel reportedly occurring in the Little Muskingum River watershed (OEPA 2020). Though these spilled materials are common to both vertical and horizontal drilling, the frequency at which the spills occur would increase with more wells developed.

The chemicals associated with hydraulic fracturing fluid and wastewater can also be more toxic and/or higher in concentration than fluids used in vertical drilling. The USEPA has compiled a list of 1,606 chemicals associated with hydraulic fracturing, including 1,084 chemicals that are used in hydraulic fracturing fluid and 599 chemicals that have been detected in produced water. Of these chemicals, the USEPA found a median of 14 chemicals are used for one well with 90 percent of wells using from four to 28 chemicals (USEPA 2019). Hydraulic fracturing wastewaters are generally high in TDS, especially those from shales and tight formations. The TDS in wastewaters from shale formations is typically dominated by sodium and chloride and may also include elevated concentrations of bromide, bicarbonate, sulfate, calcium, magnesium, barium, boron, strontium, radium, organics, and heavy metals. Hydraulic fracturing wastewater typically contains some heavy metals, as well as barium and strontium, in concentrations that can reach hundreds or even thousands of milligrams per liter (USEPA 2019). Infiltration or runoff of spilled hazardous materials and chemicals results in potential groundwater and surface water contamination that can affect these resources as well as the vegetation, aquatic species, and wildlife that occur in and utilize these resources. If there are spills or leaks of wastewater, failure of injection wells, or use of brine that contains radioactive chemicals or heavy metals, these chemicals would migrate into water resources and affect water quality, aquatic habitat, and human health if humans are exposed to water with high levels of these chemicals and there is inadequate emergency response and containment strategies in place. Exposure to oil and gas wastewater can affect the health and reproductive success of aquatic organisms and wildlife. Exposure to oil and gas wastewater has also been linked to health effects in humans, especially when contaminants leach into drinking water. Health effects associated with exposure to chemicals in drinking water include increased rates of cancer, neurotoxicity, immune system effects, changes in body weight, changes in blood chemistry, liver and kidney toxicity, and reproductive and developmental toxicity (USEPA 2016). Potential health effects from oil and gas development are also described in Section 4.8 of the 2016 EA (BLM 2016).

Future oil and gas development resulting from the Proposed Action and approved APDs would increase the volume of wastewater that must be disposed through underground injection or other methods such as trucking the wastewater to disposal or recycling facilities. Due to the high brine content and other chemical constituents of wastewater used in hydraulic fracturing, if there are leaks in injection wells or spills of wastewater, or if wastewater is not properly disposed of or adequately regulated/monitored under the ODNR Class II injection regulations, there would likely be impacts on surface water and groundwater quality. The potential impacts on water resources from spills of contaminated water and leaks or failure of injection wells would be highly dependent on the location of site-specific projects, hydrogeology and the presence of interconnected fractures to usable water zones or aquifers, methods of wastewater disposal, location/extent of spills and contamination, and a variety of other factors that would be further analyzed during site-specific permitting of APDs during the Stage 3 environmental review.

Injection of large volumes of wastewater underground also has the potential to induce small-magnitude seismic events. Eastern Ohio saw an increase in seismicity rates in the early 2010s corresponding to the increase in hydraulic fracturing and the production and injection of wastewater (Brudzinski and Kozłowska 2019), including various episodes of induced seismicity that were temporally and spatially linked to operational activity. However, the activities have not been as pervasive as in other areas of North America, such that the cases are typically isolated and concentrated to a narrow corridor that extends north to south in eastern Ohio and into central West Virginia.

As of 3rd quarter, 2024, there were 230 active Class II brine injection wells, 14 being drilled or drilling, 12 permitted, and 8 plugged and/or abandoned, in Ohio (ODNR, 2024f). ODNR has regulatory authority over Class II injection wells in Ohio. If there are issues with injection wells, the ODNR is notified by the operator and may issue orders that suspend/cease operations of these wells to address a mechanical integrity issue or where active leaking of the wells has been identified. ODNR may also issue an order to operators that fail to submit injection well fees. Suspension orders essentially shut in the injection wells and these orders can only be terminated when an operator demonstrates that the conditions that caused the orders are repaired satisfactorily to ODNR standards.

Between 2019 and 2024, the DOGRM Chief issued 47 violations for Class II injection wells. Orders by the Chief can be found at <https://ohiodnr.gov/discover-and-learn/safety-conservation/about-ODNR/oil-gas/oil-gas-resources/chiefs-orders> (ODNR, 2025). Of the 47 Chief's Orders for violations issued, 21 were for failure to submit injection well fees and 26 were to suspend/cease operations to address mechanical integrity or for injection wells that were detected to be actively leaking. Additionally, ODNR can deny APDs for injection wells for a variety of reasons; permits to drill five saltwater injection wells were denied in 2022.

If operators utilize brine mixtures or water mixtures with other pollutants to control dust on dirt roads, there would be increased potential for contamination of water resources, especially if brine water is mobilized during stormwater events or if brine is applied close to surface water resources, including the Little Muskingum River. During the Stage 3 environmental review of site-specific APDs, the BLM will assess operator proposals for dust control in relation to nearby surface water features, drought conditions, and other factors and will apply appropriate COAs to APDs, consistent with its authority, to avoid and minimize potential impacts on water resources.

It is important to note that a decrease in surface water quantity can exacerbate impacts on surface water quality from contamination due to the overall lower volume of water in the resource depending on the amount of water withdrawal, the hydraulic connection of groundwater and surface water resources, and other factors. Accidental spills, contamination, erosion, and runoff can impact wetlands and riparian areas by degrading water quality and affecting the vegetative and biological health of these areas. Wastewater generation and disposal activities associated with horizontal drilling and hydraulic fracturing are discussed in detail in Sections 3.6, 3.7, 4.6, 4.7, and 4.8 of the 2016 EA, and impacts resulting from the Proposed Action are not anticipated to be greater than those previously discussed. Please refer to the 2016 EA for that analysis.

During site-specific development of oil and gas resources, impacts on wetlands and riparian zones may occur from physical disturbance to these habitats, such as filling or draining. Impacts from removal of vegetation and soil may cause an increased risk of hydrologic alteration,

erosion, runoff, and offsite sedimentation, which would lead to a decline in wetland and riparian ecological functions.

Dredging or filling of wetlands is not anticipated for reasonably foreseeable wells on Federal land; however, private landowners accessing Federal minerals may seek to perform these activities that would affect water resources and riparian and wetland areas. However, in Ohio, anyone who wishes to discharge dredged or fill material into the waters of the U.S., regardless of whether on private or public property, must obtain a Section 404 permit from the U.S. Army Corps of Engineers and a Section 401 Water Quality Certification from the State (OEPA 2024).

As seen in Table 3-, the majority of watersheds within the Analysis Area are not currently meeting water quality standards set under section 303(d) of the CWA due to bacteria and other microbes, metals, polychlorinated biphenyls, and low oxygen. Developing up to 29 well pads and up to 81 wells could further contribute to these watersheds (including the Little Muskingum) not meeting water quality standards due to potential impacts described above. For the five watersheds in the Analysis Area meeting water quality standards, or the 12 watersheds fully supporting designated uses, developing up to 29 well pads in the Analysis Area would pose a risk to these watersheds of retaining their functional status, especially if accidental spills of hydraulic fracturing fluid and wastewater occur that can have high heavy metal concentrations. However, the type of chemical release that may occur from spills or leaks would not have an additive effect to impairments that are of a different nature, such as bacteria, PCBs (now banned), or low oxygen. Potential spills and contamination could impact water quality in the Little Muskingum River if they were to occur close to the river or upstream of the river. The Little Muskingum River bisects the Action Area in the northeast/southwest direction (Figure). During site-specific permitting of APDs, further analysis of potential impacts on the Little Muskingum River would be conducted based on the specific location of proposed development, especially if development is proposed in close proximity to or upstream of the river. Decreases in water quality can impact wetlands and riparian areas by degrading water quality and affecting the vegetative and biological health of these areas.

Several Federal and State regulations are currently in place to prevent and respond to hazardous material spills resulting from oil and gas development. Federal oil and gas regulations applicable to oil and gas operations on Federal lands (43 CFR 3160) impose requirements and standards for safe drilling and well abandonment, as well as methods for responsible disposal of produced waters associated with oil and gas operations. During well-pad permitting on private land, DOGRM geologists perform a complete and thorough review of every permit application. Detailed examinations verify that wells are designed to minimize environmental impacts, that proper environmental safeguards are in place, and that all legal requirements are met. One of these safeguards involves lining the surface extent of well pads with a secondary containment system for spill control and then topping that lining with gravel. The BLM also promotes the proper management of hazardous and non-hazardous substances by requiring the preparation of a Spill Prevention, Control, and Countermeasure Plan.

A concern surrounding oil and gas drilling is how individual subsurface oil and gas activities would potentially impact groundwater. Static groundwater levels in the Marietta Unit range from 0 to 183 feet below the surface. The mean depth of drinking-water wells in the Marietta Unit is 86 feet, with a maximum depth of 475 feet (BLM 2016). Horizontal wells in the Marcellus and Utica Shales can reach from 5,000 to 10,000 feet below the surface (BLM 2020). Most

horizontal wells in the area were estimated to be around 10,000 feet deep. During hydraulic fracturing, the potential for fluid migration between the fractured formation and drinking-water resources is related to the vertical distance between these formations and the presence of fluid-migration pathways (Reagan et al. 2015; Jackson et al. 2013). The likelihood of a fluid-migration pathway occurring from the fractured formation to the drinking-water resource decreases as the distance between these two areas increases (Birdsell et al. 2015).

To protect groundwater in the long-term, the normal and legally required practice is to install various types of casing as the borehole reaches certain depths or encounters changes in geological/hydrogeological conditions. Each type of casing is set inside the previously installed one. Typically, the initial casing is the “conductor” casing which is set through soils and other near surface materials that may cave into the borehole. “Surface” casing is set from the ground surface to a point below the lowest groundwater zone, as specified by regulations. Depending on regulatory requirements and subsurface conditions below the groundwater zone, “intermediate” casing may be set next. Once the target zone is reached, “production” casing is set to the top of or into the producing formation. With the exception of conductor casing (casing set through unconsolidated material above bedrock to keep it out of the wellbore) and perhaps production casing, after each type of casing is set cement is pumped up between the casing and the walls of the borehole (the annular space) to create an annular space seal. Under Ohio regulations production casing is only required to be cemented in place where it crosses a subsurface interval with characteristics (i.e., corrosive fluids) that would degrade the casing and cause it to fail and leak or that have an enhanced potential for causing fluid migration along the outside of the casing (Thompson 2012).

While some target formations for production may contain “usable waters” (less than 10,000 TDS), production from that target formation is going to be authorized consistent with lease rights granted, assuming the APD is compliant with regulation. If an application is submitted that would produce from a formation that contains usable water and is an underground source of drinking water, additional development restrictions may be necessary including the use of non-toxic drilling and completion fluids (such as in the case of coal bed methane where the wells are drilled and completed with freshwater). Before BLM could grant an APD, review of the drilling plan would have to confirm that those specific resources would be protected.

A 2019 report by EPA entitled “Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States” (USEPA 2021) warned “the lack of vertical separation between hydraulically fractured oil- or gas-bearing rock formations and usable water sources can cause contamination and that the issue of shallow fracking is largely concentrated in certain areas, such as Wyoming (and, particularly, Pavillion).” The EPA report considered findings in a 2016 publication by DiGiulio and Jackson (DiGiulio and Jackson 2016) which posited that hydraulic fracturing may have been the source of “unexpectedly high” organic compounds found in two monitoring wells within the Pavilion field. However, DeGiulio stated that the “data suggests impacts, which is a different statement than a definitive impact” and “monitoring wells need to be installed.” While the EPA report acknowledged challenges with identifying the precise source(s) of the water quality issues, this study did not conclusively show contamination resulting from hydraulic fracturing.

Adequate isolation of zones containing usable water from the production zone(s), is confirmed through the use of completion reports and well logs. Where adequate isolation is not confirmed, remedial measures will be required.

Improper placement of the annular space seal or cement is the main cause of leaks of well fluids into freshwater aquifer zones. There are methods for testing the integrity of an installed seal, but unless required by regulation, those tests are not always run. Leaks of well fluids can also occur if there is a casing defect that causes it to fail. However, the chances of this occurring in a way that impacts groundwater is small given that there are typically at least two sets of casing across the groundwater zone (Thompson 2012).

If groundwater contamination were to occur it would impact surface water expressions if there is a hydraulic connection. Although wetlands can be groundwater dependent, they do not always receive groundwater discharge. Many of the larger wetlands in the WNF are artificially constructed and there is little evidence that they rely on groundwater (USFS 2020b). As such, if groundwater were to be contaminated it may not affect the larger and artificially constructed wetlands in the Analysis Area. As the Little Muskingum is not a groundwater receiving stream, if withdrawals of groundwater were used to support drilling and completion operations, they would likely not affect the total volume of water being transmitted through the watershed which could also affect overall water quality by increasing the concentration of pollutants. There could be isolated stretches that are groundwater receiving but they appear unlikely based on limited data.

Water Quantity

Horizontal wells in Monroe, Washington, and Noble Counties have been reported to require approximately 19 Mgal to 27 Mgal of water to drill and complete each well, as compared to only 0.044 to 0.085 Mgal per vertical well (Table 3-2). In addition, during operations, horizontal wells have been found to use between 2 and 6 Mgal of water per well (University of Michigan 2013).

In general, the source of the water for hydraulic fracturing is either surface water, groundwater, or reused hydraulic fracturing wastewater. As seen on Figure , no groundwater was withdrawn from HUC-12s in the Analysis Area for solid mineral extraction or hydraulic fracturing between 2017 and 2021. Local groundwater aquifers within the Marietta Unit do not yield sufficient water to support industrial activities within the Marietta Unit (BLM 2016). Most groundwater drinking wells produce less than 10 gallons per minute, and because of this low production rate, it is unlikely that operators engaged in high-volume hydraulic fracturing would utilize water withdrawn from groundwater aquifers in the Marietta Unit (BLM 2016). Therefore, the likelihood that issuing leases under the Proposed Action would impact groundwater quantity is discountable.

Unless water is trucked in, surface water would be the primary source for well development in the Analysis Area, with 93 percent of surface water withdrawals between 2017 and 2021 having been used for solid mineral extraction or hydraulic fracturing. The RFDS (BLM 2020) predicts one oil and gas well in Noble County and up to 80 wells in Monroe County.

Based on the assumption that one well in Monroe County or Noble County requires 19 to 27 Mgal, and on the 2020 RFDS (Appendix D) projection that five to six wells would be developed

each year over the 15-year development period, it is predicted that approximately 114 to 162 Mgal of water would be required each year during well development, or total water use of up to 1,539 Mgal to 2,187 Mgal during well development. Considering that the surface water withdrawals in the Analysis Area averaged 1,581.2 Mgal per year between 2017 and 2021, the development of wells projected in the 2020 RFDS would result in an approximate 10-percent increase in withdrawal per year if all water used for drilling and hydraulic fracturing activities is surface water withdrawn from the Analysis Area. In addition, during operations horizontal wells have been found to use between 2 and 6 Mgal of water per well (Table 3-2). Assuming that all 81 wells are developed, operation of these wells would result in total water use of 486 Mgal during the operation/production phase. The annual distribution of this total estimated water use of 486 Mgal during operation/production would be spread out over the productive lifetime of the wells, which can range from 20 to 30 years (16.2 Mgal per year if production lasts 30 years and 24 Mgal per year if production lasts 20 years). This amount of water use during operation equates to an approximate increase of 1 to 1.5 percent of total annual water withdrawals per year if all water withdrawals for operation come from surface water in the Analysis Area.

The BLM reviewed the permits that the State of Ohio issued for five wells that the BLM had approved, known as the Forni wells. Among the 65 leases that relied, for NEPA compliance purposes, on the 2016 EA, the BLM approved six wells, of which five were completed between 2019 and 2021. These permits are available at <https://ohiodnr.gov/business-and-industry/energy-resources/well-information/well-locator>. The volumes of water used were within the range described above. The BLM learned from the ODNR that the company that drilled the Forni wells had four registered water withdrawal facilities within 5 miles of the well pad, including three facilities on the Little Muskingum River and one on the Ohio River. The company obtained 75 percent of the water used in completing the Forni wells from the Little Muskingum River. These withdrawals occurred during months when the Little Muskingum-Middle Island watershed was not experiencing drought. During months for which the Little Muskingum-Middle Island watershed experienced drought, the company's reported water withdrawals were from the Ohio River.

Considering that all surface water withdrawals in the Analysis Area between 2017 and 2021 were within the Little Muskingum–Middle Island HUC-8, future withdrawals for mineral development are expected to be made in in this watershed as well. Concentration of withdrawals in this HUC-8 watershed would result in impacts on water quantity with the extent of impacts depending on where within the watershed the withdrawals occur; timing of water use throughout the year and if use would occur during drought or low-flow conditions; the extent to which all 81 wells would be constructed, drilled, and completed during the same timeframe; and other factors. The primary surface waters that would potentially be utilized to supply water for the reasonably foreseeable development of the leases include the Little Muskingum River (due to its location in the Marietta Unit) and the Ohio River (due to the proximity to the Marietta Unit and the relatively high volumes of water in the river). To determine the extent of potential impacts on these surface waters, this analysis uses publicly available streamflow data from the USGS (USGS 2023b, 2025).

In the Little Muskingum–Middle Island HUC-8, USGS maintains seven streamflow-monitoring stations that provide streamflow and stream volume data. Because the 2020 *CBD* decision (Appendix A) found the analysis of impacts on the Little Muskingum River watershed deficient,

this analysis uses streamflow and stream volume data from Little Muskingum River Site 03115400 as representative data for the Little Muskingum River. Additionally, this monitoring site provides the largest available dataset for the river, with measurements taken from October 1958 through September 1981, and from October 1995 to today. Other surface-water monitoring stations only provide data from as early as 2012. Smaller streams, tributaries, and drainages would have lower flows and would be affected more by changes in flows due to water use from reasonably foreseeable development of the leases. Similarly larger streams and waterways such as the Ohio River would have larger flows and would likely be less affected by changes in flows due to water use from reasonably foreseeable development of the leases.

Using Site 03115400 stream gage data (USGS 2023b), Table 3- below presents calculated streamflow measurements in the Little Muskingum River. The predicted volumes of water passing through the river annually were then calculated based on streamflow.

Table 3-16. Streamflow Summary for the Little Muskingum River from 1959 to 2022

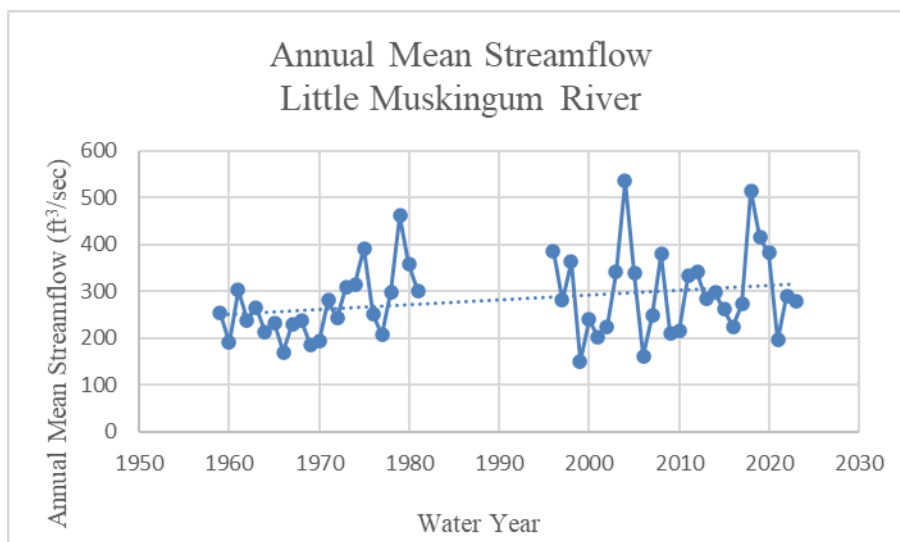
MEASUREMENT	STREAMFLOW (FT ³ /S)	ANNUAL WATER VOLUME (MGAL/YEAR)	DATE RECORDED
Annual Mean	284.1	67,020.8	–
Highest Annual Mean	535.7	126,374.7	2004
Lowest Annual Mean	150.7	35,551.0	1999
Highest Daily Mean	28,000.0	–	September 18, 2004
Lowest Daily Mean	0.0	–	September 18, 1967
Annual 7-day Minimum	0.047	–	September 23, 1999
10% Exceeds	658.0	155,225.9	–
50% Exceeds	96.8	22,835.7	–
90% Exceeds	4.80	1,132.3	–

Source: USGS 2023b.

ft³/s = cubic feet per second

Annual streamflow of the Little Muskingum River over the past 63 years averaged 284.1 cubic feet per second (ft³/sec). In 2004, the river saw its highest annual mean streamflow at 535.7 ft³/sec and in 1999 its lowest annual mean flow at 150.7 ft³/sec. The highest daily mean streamflow for the Little Muskingum River was recorded on September 18, 2004, at 28,000 ft³/sec, and the lowest daily mean was recorded on September 18, 1967, at 0 ft³/sec (Table 3-).

Figure 12. presents the annual mean streamflow in the Little Muskingum River from 1959 to 2023. The annual stream flow, a metric of water quantity, in the Little Muskingum River has been variable over time since 1959, mostly reflecting annual precipitation patterns. The overall trend line indicates that the Little Muskingum River has been gaining flow since 1959.



Source: USGS 2023b.

Figure 12. Annual Mean Streamflow in the Little Muskingum River from 1959 to 2023

Projected surface-water usage during well construction, drilling, and hydraulic fracturing based on development estimates in the 2020 RFDS (Appendix D) is approximately 114 to 162 Mgal of water needed annually. Based on the average streamflow rate of 284.1 ft³/sec, the Little Muskingum River carries about 183.6 Mgal per day (approximately 67,020.8 Mgal per year). If all of the water required for construction, drilling, and hydraulic fracturing of the 81 reasonably foreseeable wells were withdrawn directly from the Little Muskingum River, then this use would equate to approximately 0.17 to 0.24 percent of the river's average annual water total. In 1999, the year with the lowest annual mean streamflow rate (150.7 ft³/sec) over the past 63 years, approximately 35,551.0 Mgal passed through the Little Muskingum River. If all the water for construction, drilling, and hydraulic fracturing of the 81 reasonably foreseeable wells were withdrawn from the Little Muskingum River, then projected surface-water usage would equate to removing about 0.32 to 0.46 percent of the river's water in the lowest streamflow year. Removal of this percentage of the river's water, even during low-streamflow years, is anticipated to have minimal impacts on the Little Muskingum River's streamflow. If all water used during operations (estimated at 16.2 Mgal per year if production lasts 30 years and 24 Mgal per year if production lasts 20 years) were taken from the Little Muskingum River potential impacts on streamflow would be correspondingly minimal. Moreover, water needs associated with operation of a well are generally concentrated in the early stage of production and decline with a well's production age (Table 3-2) and thus the minimal streamflow impacts during operation would further decline with time. In addition, as depicted on Figure 12., the trendline for annual mean streamflow in the Little Muskingum River indicates that the river has generally been gaining flow since 1959.

Harmon et al. (2023) modeled and calculated the potential impacts of hydraulic fracturing–related water withdrawals on daily flow in HUC-12 watersheds of the Ohio River Basin and concluded that extreme withdrawals (withdrawals that are substantially above average withdrawal levels) would result in episodic and relatively short-lived, but potentially harmful, reduced streamflow depending on location and timing, and in the absence of appropriate

mitigation measures. The Little Muskingum River experienced the lowest mean streamflow for a 7-consecutive-day period in 1999, at 0.047 ft³/sec (Table 3-). This streamflow equates to approximately 0.03 Mgal per day, which is not enough water to support the 0.31 Mgal to 0.44 Mgal required per day (based on 114 to 162 Mgal per year) for horizontal drilling and hydraulic fracturing. As seen in Table 3-, these low-flow events are infrequent, with 90 percent of water years experiencing streamflow above 4.80 ft³/sec, totaling 1,132.3 Mgal through the river per year. Although withdrawals are unlikely during these low-flow events due to the decreased quantity of flowing of water, if withdrawals did occur, streamflow reductions in the Little Muskingum River and other surface waters within the Little Muskingum–Middle Island HUC-8 would occur.

There is one USGS streamflow-monitoring station that provides streamflow and volume data for the Ohio River within the water resource Analysis Area: Station USGS 031143060. Using Site 031143060 stream gage data (USGS 2025), Table 3- below presents calculated streamflow measurements in the Ohio River at this monitoring station. The predicted volumes of water passing through the river annually were then calculated based on streamflow.

Table 3-17. Streamflow Summary for the Ohio River from 2014 to 2023

MEASUREMENT	STREAMFLOW (FT ³ /S)	ANNUAL WATER VOLUME (MGAL/YEAR)	DATE RECORDED
Annual Mean	44,918	10,603,667.7	–
Highest Annual Mean	62,500	14,754,201.7	2019
Lowest Annual Mean	33,970	8,019,203.7	2016
Highest Daily Mean	290,000	–	September 11, 2018
Lowest Daily Mean	576	–	September 28, 2016
Annual 7-day Minimum	5,451.4	–	August 9, 2020
10% Exceeds	94,570	22,324,877.6	–
50% Exceeds	33,200	7,837,431.9	–
90% Exceeds	9,420	2,223,753.3	–

Source: USGS 2025.

Based on the average streamflow rate of 44,918 ft³/sec, the Ohio River at the monitoring station carries about 29,051.1 Mgal per day (approximately 10,603,667 Mgal per year). If all of the water required for construction, drilling, and hydraulic fracturing of the 81 reasonably foreseeable wells were withdrawn directly from the Ohio River, then this use would equate to approximately 0.0010 to 0.0015 percent of the river’s average annual water total. In 2016, the year with the lowest annual mean streamflow rate (33,970 ft³/sec) over the past 10 years, approximately 8,019,203.7 Mgal passed through the Ohio River at the monitoring station. If all the water for construction, drilling, and hydraulic fracturing of the 81 reasonably foreseeable wells were withdrawn from the Ohio River during the lowest streamflow year, then projected surface-water usage would equate to removing about 0.0014 to 0.0020 percent of the river’s water in the lowest streamflow year. Given the relatively large streamflows and water volume in the Ohio River, and the relatively low percentage of the annual water totals that would be

withdrawn from the Ohio River if all 81 reasonably foreseeable wells sourced all water from the Ohio River, there would be no anticipated impacts on the water quantity in the Ohio River or on other uses of water from the Ohio River.

Poorly timed water withdrawal, such as extreme withdrawals during drought or low-flow periods, would deplete minimum flows or shorten the duration of periods of inundation for wetlands, and lower levels in lakes, ponds, and reservoirs especially in streams and rivers with lower flows such as the Little Muskingum River and its tributaries. This would impact ecosystem functions like primary productivity and leaf litter processing (Poff et al. 1997). Increased water withdrawals would also create “simplified” streams and rivers by reducing flow in one or several sites, resulting in the loss of branches and stream features in riparian areas. Simplified streams lose their ability to adapt to disturbances like floods, fires, or landslides (Penaluna et al. 1997). Because these low-flow events are infrequent, potential impacts on water resources, wetlands, and riparian areas from poorly timed withdrawals are possible.

As described in Appendix G, Section 2.6.1.2 and Appendix F for all leases issued under the Proposed Action, the BLM will prohibit water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future. As such, the Proposed Action, and reasonably foreseeable development of leases issued under the Proposed Action, would cause limited impacts on water quantity in the Little Muskingum River.

Additional protections for water resources are reflected in the Forest Plan, which contains a guideline allowing USFS to prevent water withdrawals from waterways or groundwater on NFS lands if that activity were proposed as part of a SUPO or special-use permit request associated with oil and gas development (Appendix F, Reference Number GFW-WSH-1). This guideline states that water should not be diverted from streams, lakes, or springs when instream flow needs or water-level assessments indicate that diversion would impact stream processes, aquatic and riparian habitats and communities, or recreation and aesthetic values. However, USFS does not have the ability to prevent surface water or groundwater withdrawals occurring on non-NFS lands, even if the oil or gas well were located on NFS surface and would access Federal minerals. Ohio landowners have the right as riparian water rights owners (protected by Article 1, Section 19b, of the Ohio Constitution) to make reasonable use of the groundwater underlying their land or the water in a lake or watercourse located on or flowing through or along their riparian land. While this allows USFS to prevent withdrawals of water on, in, or flowing through NFS lands, it allows other landowners to sell water to oil and gas companies.

Withdrawals from lakes, rivers, and reservoirs, the most likely sources of water to be utilized for well development and production in this area, require approval from the source owner/manager and water withdrawal registration with ODNR and may entail potential requirements from USACE (ODNR 2014). The ODNR registration requirement is triggered by capability of withdrawal, not actual withdrawal. However, registration with ODNR is not a permit to withdraw water, nor does it place any restrictions on withdrawals such as during droughts or low-flow conditions (OEPA 2020; ODNR 2020).

Under ORC Section 1521.23, facilities with new or increased consumptive uses of more than 2 Mgal of water per day, averaged over any 30-day period (60 Mgal per month), must obtain a permit from the Chief of the Division of Water Resources. *Facilities* are defined in ORC Section

1522.10 as any site, installation, or building at which water withdrawal and consumptive use activities take place or are proposed to take place, that is located at a property or on contiguous properties. *Consumptive uses* are defined in ORC Section 1521.01 as a use of water resources, other than a diversion, that results in a loss of that water to the basin from which it is withdrawn and includes “incorporation of water into a product” (ORC § 1521.01). For oil and gas operations, this can include the incorporation of water into drilling fluids and hydraulic-fracturing fluids (ODNR 2020). Therefore, with a consumptive use of 19 to 27 Mgal predicted for development of each horizontal well, resulting in about 114 Mgal to 162 Mgal of water use each year, it is possible that wells projected in the 2020 RFDS would trigger the requirement for a consumptive use permit. In order to receive a consumptive use permit, the owner or operator of a facility is required to declare and document potential impacts on water resources. Failure to consider the impacts of the requested withdrawal on water resources and conservation practices to protect these resources would result in denial of the permit. Therefore, impacts on surface waters resulting from water withdrawals on private lands may be reduced through the permit process. However, where a facility would withdraw water below the 60 Mgal per month (2 Mgal per day) threshold a permit may not be required, even though the impacts of those depletions would contribute to overall water depletions in the Analysis Area. These potential impacts would be exacerbated under a scenario where multiple facilities that withdraw less than 60 Mgal per month are developed to provide water for reasonably foreseeable development of leases that may be issued under the Proposed Action.

BLM’s Section 6 lease term (BLM 2023) requires that adverse impacts on water resources, including water quality and quantity, be minimized. If the conduct of operations results in substantial unanticipated environmental impacts, the lessee must immediately contact the BLM (BLM 2023). Additionally, site-specific environmental reviews would be required for APDs proposing surface disturbance on both Federal and private land to analyze the impacts of proposed development on water resources, wetlands, and riparian areas. Design features, COAs, and BMPs would be applied to each approved APD, as appropriate, to minimize impacts on water resources, wetlands, and riparian areas. For example, stipulations and guidelines in the Forest Plan require that operators avoid adverse impacts on ephemeral wetlands during ground-disturbing activities and require application of a Controlled Surface Use stipulation for development on NFS lands in proximity to riparian areas and wetlands (Appendix F, Reference Number GFW-ARR-23 and SFW-MIN-11). Stipulation GFW-WSH-1 states that water should not be diverted from streams, lakes, or springs when instream flow needs or water-level assessments indicate that diversion would impact stream processes, aquatic and riparian habitats and communities, or recreational and aesthetic values (Appendix F, Reference Number GFW-WSH-1).

Additionally, application of other USFWS recommended AMMs (Appendix G) for Federally listed species would reduce potential impacts on certain water resources, including prohibiting well pads within 1,000 feet of a mussel stream, establishment of a 300-foot no-disturbance buffer along each side of a designated mussel stream, and prohibiting water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future. Operators developing wells on private or NFS surface lands must include in drilling plans preventive measures for stormwater runoff and erosion from well-pad construction activities. GFW-WSH-11 also requires actions on NFS lands to plan for and implement erosion control

measures for management activities that create bare mineral soil conditions. The guideline also requires stabilization of disturbed areas based on direction in SFW-WSH-6, and GFW-WSH 7 and GFW-WSH-8.

Application of the measures, standards, and practices described above would be effective in reducing the potential for impacts on water resources. During the Stage 3 environmental review of site-specific APDs, the BLM would review the proposed source, timing, and amount of water use and wastewater disposal and would apply appropriate COAs to avoid, minimize, and reduce impacts on water resources that would affect other beneficial uses and aquatic wildlife. This would include ensuring that streams maintain the minimum flow necessary to support the mussel species by prohibiting water withdrawals in mussel and hellbender streams (see Appendix G, Section 2.6.1.2, Aquatic AMM 5) and proper disposal of wastewater to avoid impacts on water quality. Application of site-specific measures based on individual APDs would be effective at further avoiding, minimizing, and reducing impacts on water resources.

3.6.3. Cumulative Impacts

The CIAA for water resources, wetlands, and riparian areas includes the extent of the HUC-12 watersheds overlapping the Marietta Unit and a 4-mile buffer that includes Ohio and West Virginia. Historical activities, current ongoing projects, and reasonably foreseeable future actions that would result in water-related impacts in the CIAA are outlined in Appendix H (*Past, Present, and Reasonably Foreseeable Future Actions*). Cumulative impacts on water resources associated with reasonably foreseeable development of mineral leases issued under the Proposed Action would result from increased surface disturbance, increased surface water withdrawals, increased subsurface drilling and hydraulic fracturing, and increases in the potential for inadvertent spills and contamination when considered in conjunction with ongoing and reasonably foreseeable future projects in the WNF.

3.6.3.1. Water Quality

Existing and future oil and gas development on private land is expected to be the largest contributor to cumulative impacts on water quality, water quantity, wetlands, and riparian areas in the CIAA, especially under the scenario where operators who are awarded leases proceed with private surface development prior to submitting an APD to the BLM to access Federal minerals. In 2022, there were an estimated 65,117 acres of existing development/disturbance in the Analysis Area, which accounts for approximately 10.4 percent of the total acreage within the Analysis Area (LANDFIRE 2022). Reasonably foreseeable development of the leases is estimated to result in up to 1,015 acres of short-term disturbance and up to 285 acres of long-term disturbance. As a result, the total cumulative surface disturbance in the CIAA, including the Proposed Action, is estimated to be 66,132 acres in the short term and 65,402 acres in the long term, which represents an increase of 1.5 percent of cumulative disturbance in the short term and an increase of 0.4 percent in the long term. This cumulative disturbance has and would continue to affect water resources through the potential for increased runoff, erosion, and sedimentation that would mobilize to downstream water resources. The total cumulative surface disturbance likely contributes to cumulative impacts on water quality, including increased sedimentation that may contribute to the impairment status of watersheds, especially those where sediment is already an impairment factor (see Table 3-). However, the Proposed Action would contribute to a minimal incremental increase in cumulative surface disturbance and associated erosion, runoff

and sedimentation to waterways due to the limited amount of surface disturbance in relation to the total cumulative disturbance.

Cumulative impacts on water quality from increased sedimentation and erosion may be more pronounced under the scenario where operators who are awarded leases proceed with private surface development prior to submitting an APD to the BLM to access Federal minerals because vegetation clearing, and surface disturbance would occur prior to the APD process where the BLM has the authority to require AMMs and resource protection measures as COAs accompanying the APD approvals. However, under this scenario, operators would still be required to comply with the State of Ohio regulations and standards to minimize potential impacts on natural resources, including standards and requirements to control sedimentation and erosion, as described in Appendix E (*Legal and Regulatory Authorities*). Due to the relatively minimal increase in cumulative surface disturbance compared to the total acreage in the CIAA and the State of Ohio standards that are in place for stormwater and erosion control, potential impacts on water quality and mussel species from disturbance, erosion, and sedimentation from development of well sites on private land are expected to be minimal.

Development of private surface to access Federal minerals would also increase the potential for spills and contamination, resulting in cumulative impacts in combination with other sources of contamination that may occur within the Analysis Area from point sources such as wastewater treatment plants and from nonpoint sources such as runoff from agricultural areas or pesticides use. Increased potential for spills and contamination of water resources can result in cumulative impacts that affect public health including increased rates of cancer, neurotoxicity, immune system effects, changes in body weight, changes in blood chemistry, liver and kidney toxicity, and reproductive and developmental toxicity (USEPA 2016). Potential cumulative health effects from oil and gas development are also described in Section 4.16.2.7 of the 2016 EA (BLM 2016).

Climate change would also contribute to cumulative impacts on water resources, wetlands, and riparian zones. In general, climate change is predicted to increase the potential for extreme weather events including flooding and drought (IPCC 2021). Flooding and drought can both impact water quality and water quantity and affect wetlands and riparian zones and these impacts can also be exacerbated by warmer temperatures associated with climate change.

3.6.3.2. Water Quantity

There are 21,598 oil and gas-related wells that have been permitted or constructed in the CIAA as of August 2024, with 86 percent of those wells located on private land as depicted on Figure H-2 in Appendix H (*Past, Present, and Reasonably Foreseeable Future Actions*). Table 3- presents estimates of the cumulative water withdrawals in the Little Muskingum watershed during the development phase and production phase of reasonably foreseeable development associated with the Proposed Action. These estimates assume that all water withdrawals for reasonably foreseeable development and production are from surface water resources in the CIAA and annual water withdrawal trends for ongoing and future development are consistent with average water withdrawals from 2017 to 2021 in the Little Muskingum watershed. As indicated in Table 3-, cumulative water withdrawal during the 15-year well development period is estimated at up to 1,743.2 Mgal (10 percent maximum increase over average annual water use in the watershed) and up to 1,597.4 Mgal during well production (one percent increase over

average annual water use in the watershed). These cumulative estimates represent a worst-case scenario where the maximum number of reasonably foreseeable wells are developed each year.

As indicated in Section 3.6.1 (*Water Resources – Affected Environment*), annual surface water withdrawals in the Little Muskingum watershed average an estimated 1,581.2 Mgal, which is inclusive of water for oil and gas operations and other activities. Development and production of the reasonably foreseeable 29 well pads and up to 81 wells under the Proposed Action would incrementally add to the cumulative surface water withdrawals, especially if all of the water withdrawals come from surface water sources in the Little Muskingum watershed. A 10 percent annual increase in cumulative water withdrawals in the watershed would represent a notable increase in total water use in the watershed; however, there are no indications that this increased water use would affect water flows in streams and rivers or affect the availability of water for other water uses in the watershed. For example, the Little Muskingum River carries approximately 183.6 Mgal per day (approximately 67,020.8 Mgal per year) (USGS 2023b). If all the water required for reasonably foreseeable horizontal drilling and hydraulic fracturing in the 2020 RFDS (Appendix D) were withdrawn directly from the Little Muskingum River, then this use would equate to approximately 0.17 to 0.24 percent of the river’s average annual water total. Removal of this percentage of the river’s water, even during low-streamflow years, is anticipated to have minimal impacts on the Little Muskingum River’s streamflow given the total streamflow volumes in the river. Furthermore, with the requirement for the BLM to prohibit water withdrawals from mussel streams to ensure streams maintain minimum flows suitable to biological uses (see Appendix G, Section 2.6.1.2 for Aquatic AMMs), the Proposed Action should not contribute to cumulative impacts of water withdrawals within the watershed.

Table 3-18. Cumulative Surface Water Withdrawals Estimated in the Analysis Area

WATERSHED NAME	AVERAGE ANNUAL WITHDRAWAL FROM 2017 TO 2021 (MGAL)	REASONABLY FORESEEABLE DEVELOPMENT ANNUAL WITHDRAWALS (MGAL)	CUMULATIVE ANNUAL WITHDRAWALS DURING DEVELOPMENT (MGAL)	REASONABLY FORESEEABLE PRODUCTION ANNUAL WITHDRAWAL (MGAL)	CUMULATIVE ANNUAL WITHDRAWAL DURING PRODUCTION (MGAL)
Little Muskingum– Middle Island Total	1,581.2	162	1,743.2	16.2	1,597.4

Source: ODNR 2023a.

Note: Reasonably foreseeable development withdrawal estimates assume up to six wells would be developed annually with up to 27 Mgal per well during the development phase. The reasonably foreseeable production estimates assume that all 81 of the reasonably foreseeable wells would be in production at the same time with each well requiring a total of up to six Mgal of water for production during an up to 30-year production phase (16.2 Mgal per year for well production water withdrawals).

Mgal = million gallons.

The ODNR uses water withdrawal registrations and permits to manage cumulative withdrawals (see Appendix E, *Legal and Regulatory Authorities*), but the BLM is not aware of how this system may prevent an individual withdrawal during a drought period from affecting aquatic habitat. The most effective way for the BLM to ensure that it is not causing a negative effect on mussel populations is to prohibit water withdrawals from the Little Muskingum River and

associated waterways that are susceptible to degradation of their mussel habitat by water withdrawals.

3.7. Aquatic Wildlife

Issue 5: How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing impact aquatic wildlife species in the region, including Federally protected mollusk species?

3.7.1. Affected Environment

The affected environment for wildlife, including aquatic wildlife, is analyzed in Section 3.3 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference. The affected environment for water resources and water quality is discussed above and in Section 3.6 of the 2016 EA. Updates to the affected environment for water resources since publication of the 2016 EA are included in Section 3.6.1, *Water Resources – Affected Environment*. As with water resources and wetlands, the Analysis Area for aquatic wildlife is the extent of the HUC-12 watersheds overlapping the Marietta Unit and the surrounding 4-mile buffer.

Since the 2016 EA, several changes have occurred to the list of potentially affected ESA species. Specifically, the round hickorynut (*Obovaria subrotunda*) mussel was listed as threatened under Section 4(d) of the ESA on April 10, 2023 (DOI 2023a), and three species of mussels not previously analyzed are considered to potentially occur within the expanded Analysis Area: clubshell (*Pleurobema clava*), northern riffleshell (*Epioblasma rangiana*), and purple cat's paw (*Epioblasma obliquata*) (USFWS 2024e). Further, USFWS announced the proposed listing of salamander mussel (*Simpsonaias ambigua*) as endangered in 2023 (DOI 2023b), and proposed listing of the eastern hellbender in 2024 (DOI 2024b). The updated list of threatened and endangered aquatic species with potential to occur in the Analysis Area is shown in Table 3-.

The Little Muskingum River watershed is one of the highest-quality watersheds in the state of Ohio. It flows through densely wooded areas of the WNF and has a total of 73 species of fish including breeding populations of Muskellunge, a State-listed Species of Concern. There are also populations of State-listed endangered Ohio lamprey and numerous species that are sensitive to pollution including bigeye chub, black redhorse, river redhorse, silver shiner, rosyface shiner, mimic shiner, channel shiner, stonecat madtom, brindled madtom, slenderhead darter, dusky darter, blackside darter, sand darter, variegate darter, banded darter, and bluebreast darter (ODNR 2024b). A total of 22 species of mussels have been documented from the Little Muskingum River watershed including two species listed by ODNR as Species of Concern (salamander mussel and deertoe) and one State-listed as Threatened (threehorn wartyback) (OEPA 2020).

Table 3-19. Potential Federally Protected Aquatic Species in the Analysis Area¹

SPECIES	STATUS	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Clubshell (<i>Pleurobema clava</i>)	FE	Small to medium streams with gravel and sand substrate with little silt content.	No known populations in the WNF or Little Muskingum River watershed. USFWS introduced the species into the Ohio River Islands National Wildlife Refuge within the Analysis Area between 2014 and 2018. Has potential to occur in Muskingum River (USFWS 2024g, 2024e).
Fanshell (<i>Cyprogenia stegaria</i>)	FE	Characteristic habitat is medium to large streams. It has been found in river habitats with gravel substrates and a strong current, in both deep and shallow water.	Recent surveys (2012, 2016, 2019, and 2020) have documented this species in the portion of the Ohio River within the Analysis Area (USFWS 2024e). Documented in Muskingum River with at least five different sites having documentation (USFWS 2024e).
Northern Riffleshell (<i>Epioblasma rangiana</i>)	FE	A wide variety of streams in various sizes. This species buries itself in firmly packed gravel or sand. Remaining populations of this species occur in large and small rivers and streams (USFWS 2024b) and existing populations are very small.	No known populations occur in the WNF, Muskingum River, or Little Muskingum River watershed. This species has been reintroduced in the Ohio River Islands National Wildlife Refuge within the Analysis Area (USFWS 2024e).

SPECIES	STATUS	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Pink Mucket mussel (<i>Lampsilis abrupta</i>)	FE	Found in waters with strong currents and rocky or boulder substrates, with depths up to about 1 meter, but also found in deeper waters with slower currents and sand and gravel substrates.	No known populations exist in the WNF or Little Muskingum River watershed (USFS 2022). A portion of the Ohio River in the southwestern portion of the Analysis Area has occurrences of this species (USFWS 2024e, 2024c). The lower portion of the Muskingum River within the Analysis Area is unlikely to support this species due to the system of 10 dams located upstream and associated impacts on flow, sedimentation, water quality, and interconnectedness of aquatic habitats (USFWS 2024h).
Purple Cat's Paw (<i>Epioblasma obliquata</i>)	FE	Large to medium-large rivers in the Ohio River Watershed; prefers shallow water and requires a swift current. Found on bottom substrates ranging from sand to boulders.	No known populations in the WNF, Muskingum River, or Little Muskingum River watershed. This species has been reintroduced in the Ohio River Islands National Wildlife Refuge within the Analysis Area (USFWS 2022a, 2024e, 2024h). The reintroduced populations contain only young individuals. While some of these may have reached sexual maturity, evidence of reproduction has not yet been documented (USFWS 2022a).
Longsolid mussel	FT	Found in small streams to large rivers, including the Ohio River, and prefers a mixture of sand, gravel, and cobble stream bottoms.	Known from Little Muskingum -Middle Island Management Unit with an overall population condition of low and from the Ohio River in the Willow Island Pool (USFWS 2018b). Mapping indicates species also found in Muskingum River.

SPECIES	STATUS	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Round Hickorynut (<i>Obovaria subrotunda</i>)	FT	Medium to large rivers in areas with slow to swift currents over a mixture of sand and gravel substrates. Currently occupied and potentially suitable habitat in the Marietta Unit is limited to the Little Muskingum River mainstem and Ohio River within Washington County and represents a small portion of the historical distribution.	Currently occupied and potentially suitable habitat in the Marietta Unit is limited to the Little Muskingum River mainstem and Ohio River within Washington County, with approximately 1,200 miles of habitat. Documented in Muskingum River with at least five different sites having documentation (USFWS 2024g).
Salamander Mussel (<i>Simpsonaias ambigua</i>)	PE	Swift-flowing rivers and streams with areas of shelter under rocks or in crevices.	Known to occur within the past decade near the WNF in the lower reaches of the mainstem of the Little Muskingum River in the Little Muskingum– Middle Island watershed. Documented in Muskingum River within Washington County (USFWS 2024g).
Sheepnose Mussel (<i>Plethobasus cyphus</i>)	FE	Larger rivers and streams in shallow areas with moderate to swift currents that flow over gravel or coarse sand; also may be found in areas of cobble, boulders, or mud, or deep areas of rivers.	No known populations within the WNF or Little Muskingum River watershed. The closest known extant population is in the Belleville pool, which starts at the Willow Island Locks and Dam, just south of the Marietta Unit and within the Aquatic Analysis Area. However, there is potential for this species to occur within the Ohio River and Muskingum River in the Aquatic Analysis Area and has been documented since 2011 (USFWS 2024e).

SPECIES	STATUS	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Snuffbox Mussel (<i>Epioblasma triquetra</i>)	FE	Small to medium creeks in areas with swift current; also found in Lake Erie and other larger rivers. This species buries deep in sand, gravel, and cobble substrates.	This species is assumed to occur in low densities in the Ohio River within the Analysis Area in Washington County (USFWS 2024e). A small population exists in the Muskingum River upstream from the Analysis Area, but the potential to occur within the Analysis Area is low due to the same factors as noted above for pink mucket pearlymussel (USFWS 2024g).
Rabbitsfoot	FT	Small to medium sized streams and some larger rivers. It usually occurs in shallow water areas along the bank and adjacent runs and shoals with reduced water velocity.	There is suitable habitat for this species in the Aquatics Analysis Area and this species is known to occur in the Muskingum River in the Aquatic Analysis Area (USFWS 2025).
Eastern Hellbender (<i>Cryptobranchus alleganiensis</i>)	PE	Large slabs of rock or other shelter-providing objects (logs and boards) with loose sand and gravel (not silt) on the bottom of large to medium streams or rivers with fast-moving water.	There is suitable habitat for this species in the Aquatics Analysis Area and there are documented occurrences for this species in the Little Muskingum River in both Monroe and Washington Counties (USFWS 2025).

Source: Badra 2001; USFWS 1997a, 1997b, 1997c, 2012a, 2012b, 2018a, 2018b, 2019a, 2019b, 2019c, 2022a, 2022d, 2023, 2024a, 2024b, 2024c, 2024d, 2024e, 2024g, 2024h, 2025; USFS 2022; USACE 2018; OEPA 2019.

¹ Species added since publication of 2016 EA.

FE = Federally listed as endangered, FT = Federally listed as threatened, PE = Federally proposed for listing as endangered

The BLM and USFS is consulting with the USFWS under ESA Section 7 concerning Federally listed species as well as proposed and candidate species occurring or potentially occurring in the Analysis Area. The BLM prepared a BA to analyze impacts on listed species that are anticipated to occur in the Analysis Area. Those species with low likelihood to occur in the Analysis Area or that are unlikely to be impacted by well development and production activities as determined through agency coordination were not included in the BA analysis. The USFWS is using the BA

to inform the consultation regarding potential impacts on Federally listed species and critical habitat, with consideration of AMMs to be applied as conditions of APD approval. Agency coordination with the USFWS has resulted in identification of AMMs designed to avoid and minimize potential impacts on Federally listed mussel species and are incorporated into the Proposed Action (see Appendix G, Sections 2.6.1.1, 2.6.1.2, 2.6.1.3 and 2.6.1.4).

Table 3- presents the 2024 Regional Forester Sensitive Aquatic Species List in the Action Area along with their typical habitat association and potential to occur. Since publication of the 2016 EA, two new aquatic species have been added to the RFSS list (USFS 2024).

Table 3-20. Regional Forester Sensitive Aquatic Species in the Analysis Area

SPECIES	RETAINED OR ADDED SINCE 2016 EA	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
<i>Fish</i>			
Ohio Lamprey (<i>Ichthyomyzon bdellium</i>)	Retained	Primary headwater streams with fast moving clear water and sand or cobble substrates connected by free-flowing stretches to larger, slower-moving streams and rivers to meet all life stages.	High. Well-distributed in the Little Muskingum River and its tributaries and connected to the Ohio River.
<i>Mollusks</i>			
Creek Heelsplitter (<i>Lasmigona compressa</i>)	Added	Typically high-quality headwater streams in sand and cobble, in a current or in slackwater.	High. It is found sporadically throughout the entire Ohio River drainage and is known from the mainstem of the Little Muskingum River.
<i>Insects</i>			
Uhler's Sundragon (<i>Helocordulia uhleri</i>)	Added	Located near small, rapid forest streams, often with impeded flow, and occasionally lakes.	Low. Periphery of range is in Ohio, where it is rare. One observation in the Marietta Unit from 2019.
Green-faced Clubtail (<i>Hylogomphus viridifrons</i>)	Retained	Egg-laying: medium to large, clear-flowing rivers with mixture of gravelly sand and silt among rocks; feeding (in and around breeding habitat); larvae burrow in silt; adults forage in trees.	Moderate. Rare but known from the lower Little Muskingum River watershed.

SPECIES	RETAINED OR ADDED SINCE 2016 EA	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Rapids Clubtail (<i>Phanogomphus quadricolor</i>)	Retained	Egg-laying: clear streams with strong currents and riffles over clean gravel, cobbles, or bedrock; feeding (in and around breeding habitat): larvae burrow in silt; adults forage in trees.	Low. Rare but known from the Little Muskingum River watershed; Ohio Odonata Survey (2017) reports it is primarily distributed in the northern half of Ohio.
Amphibians			
Green Salamander (<i>Aneides aeneus</i>)	Retained	In Ohio: south-facing or unshaded, moist crevices in rock outcrops, within 7 miles of the Ohio River, which is the northern limit of this species' range.	Low. Extensive range that includes the southern tip of Ohio, but no populations known from the Marietta Unit.
Eastern Hellbender (<i>Cryptobranchus alleganiensis</i>)	Retained	Large slabs of rock or other shelter-providing objects (logs and boards) with loose sand and gravel (not silt) on the bottom of large to medium streams or rivers with fast-moving water.	Low. Extensive range that includes Ohio but extremely limited in the WNF with possibility of presence in the Little Muskingum River watershed.
Mud Salamander (<i>Pseudotriton montanus</i>)	Retained	Stream bank burrows or muddy areas under large, flat stones or logs along shallow, sluggish woodland streams, springs, and seeps.	Low. Extensive range that includes Ohio, but no populations known from the Marietta Unit.

Source: USFS 2024.

3.7.2. Environmental Impacts

Potential impacts on aquatic wildlife from previously reviewed activities in the oil and gas program are analyzed in Section 4.3 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference. New and relevant information is needed to support this EA because of changes to the list of Federally protected species and RFSS and the analysis of aquatic wildlife management in the 2016 EA did not consider the projections in the 2020 RFDS (Appendix D) and, as noted in *CBD*, did not capture the full range of impacts that would result from horizontal drilling with hydraulic fracturing.

3.7.2.1. Impacts of Alternative A – No-Action Alternative

Under the No-Action Alternative, the BLM would not offer Federal minerals in the Marietta Unit for oil and gas leasing, including the parcels requested in currently pending EOIs and all other Federal minerals in the Marietta Unit and would rescind any leasing decisions that were supported, for NEPA compliance purposes, by the 2016 EA. Therefore, the No-Action Alternative would not result in any substantive change to the estimated impacts on aquatic

wildlife from those impacts analyzed under the No-Action Alternative in Section 4.3 of the 2016 EA (BLM 2016).

3.7.2.2. Impacts of Alternative B – Proposed Action

During any site-specific development that may occur subsequent to APD approval, impacts on aquatic wildlife would result from physical disturbance to, or removal of, aquatic wildlife individuals and habitats as well as from water withdrawals, especially during low-flow conditions, or through contaminants from spills or run-off. During site-specific development, impacts would also occur from introduction of nonnative or invasive species, decreased aquatic habitat quality and quantity, and increased surface water withdrawals. If a reduction in surface water quantity and stream flows were to result from site-specific development of the leases, the total available habitat area in stream ecosystems would be reduced and would increase competition among aquatic species for preferred water conditions. These types of impacts, if not avoided, would be especially pronounced in smaller streams, tributaries, and drainages that are more susceptible to impacts.

As discussed in Section 3.6.2, *Water Resources – Environmental Impacts*, compliance with all applicable regulations and implementation of lease stipulations and BMPs would minimize risks associated with hazardous material spills and associated impacts on water resources and aquatic species.

Instream work is not anticipated as part of development that may arise from the Proposed Action; however, it is possible that an operator may propose the installation of pipelines or gathering lines that may need to cross waterways. If required, then use of equipment adjacent to and within waterways would result in physical disturbance to aquatic wildlife individuals or long-term destruction of aquatic wildlife habitats, including wetlands, riparian areas, streams, and rivers. In Ohio, any construction activity that would create an impact on a wetland, stream, river, or other Waters of the United States requires a CWA Section 404 Dredge and Fill permit from USACE and a CWA Section 401 Water Quality Certification permit from OEPA, regardless of whether the activity would occur on private or public property. Despite the recent Conforming Rule (88 FR 61964), the State continues to protect wetlands “inundated or saturated by surface or ground water at a frequency and duration that are sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (OAC § 3745-1-02(B)(97)). Issuance of a CWA Section 404 permit requires its own NEPA analysis to review environmental impacts. Although oil and gas activities are typically exempt from the NPDES program, CWA Section 402 permitting provisions are applicable if there is a discharge of stormwater with a reportable quantity of oil or hazardous substances, or the facility contributes to a water quality violation, or if a general permit for oil and gas operations is in place that requires operators to develop and implement a stormwater pollution prevention plan. The potential presence of Federally listed species on either Federal or private land would also trigger the need for additional analysis under ESA and consultation with USFWS during site-specific permitting of APDs, with the potential for additional required conservation measures.

Increased surface disturbance projected in the 2020 RFDS (Appendix D) may result in impacts on aquatic wildlife, such as soil compaction, introduction of nonnative and invasive species, and increased sedimentation from erosion and runoff. Mussels are sedentary and are not able to move

long distances to more suitable areas in response to heavy silt load. Siltation has been documented to adversely affect native freshwater mussels both directly and indirectly. Siltation degrades water and substrata quality, limiting the available habitat for freshwater mussels (and their fish hosts), thereby limiting their distribution and potential for expansion and maintenance of their populations (USFWS 1996). These impacts may cause declines in suitable aquatic habitat for native species and reduce aquatic wildlife habitat quality. Nonnative and invasive plant species in particular can outcompete native aquatic vegetation and clog waterways (Ailstock et al. 2001). Short-term surface disturbance would last 8 to 10 weeks, followed by interim reclamation to reduce water quality impacts on the greatest extent possible. Long-term surface disturbance would exist in the landscape for 20 to 30 years, until well abandonment, at which time operators must return disturbed land to its pre-development state in accordance with DOGRM and Gold Book requirements (BLM 2007).

Impervious surfaces cause disruption to surface-water flow and absorption and increase erosion and runoff, which can increase potential for water source contamination (Shuster et al. 2005). Well-pad construction would increase the amount of impervious surface, resulting in more long-term runoff. Well construction and operation also increase the risk of accidental surface spills or leaks of hazardous materials, fuels, and hydraulic fracturing chemicals. The physical nature of sediment movement causes scouring and deposition and can alter suitable habitat conditions including important spawning habitat for host fishes. Tree clearing within riparian areas would result in increased instream temperatures, which would potentially affect water conditions (i.e., dissolved oxygen).

Sedimentation of waterways is one of the most harmful impacts on aquatic wildlife species, causing smothered eggs, young, and habitat, which can result in a loss of viability of a population. Sediment entering streams in the Analysis Area would potentially alter the survival of mussels by disrupting filter-feeding, burying them, or displacing suitable habitat by filling in the interstitial spaces between stable substrates (NatureServe 2023). Mussels, such as round hickorynut, salamander mussel, sheepnose and others, that rely on sight-feeding organisms as part of their life cycles are especially sensitive to sedimentation of habitat because cloudy water at critical reproductive periods (late spring to early summer) may affect reproductive success. These impacts would be mostly like to occur in the Little Muskingum River and other rivers and streams if disturbance occurs in close proximity to or upstream of the river or stream.

Under Ohio law, operators developing wells on private land must commit to preventive measures for stormwater runoff and erosion from well-pad construction activities in drilling plans they submit to ODNR. For APDs and SUPOs proposing development on NFS lands, compliance with Forest Plan standards and guidelines and Federal and State regulations would further limit the potential for surface-water contamination. There are several standards and guidelines for the protection of aquatic resources, such as GFW-ARR-5 that requires the establishment of filter strips along perennial, intermittent, and ephemeral waterbodies where earth-disturbing activities expose mineral soil on NFS lands and GFW-WSH-8 and Stipulation #8 that are aimed at reducing erosion and sedimentation that can affect water quality (Appendix F).

As described in Section 3.6.2, *Water Resources – Environmental Impacts*, accidental spills and contamination would impact water resources and the aquatic species that rely on those water resources. Potential spills and contamination would affect aquatic species in the Little Muskingum River, especially if they were to occur close to the river or upstream of the river.

The Little Muskingum River bisects the Action Area in the northeast/southwest direction (Figure). During site-specific permitting of APDs, further analysis of potential impacts on the Little Muskingum River and aquatic species in the river would be conducted based on the specific location of proposed development, especially if development is proposed in close proximity to or upstream of the river.

In addition, the Proposed Action would increase the volume of wastewater that must be disposed through underground injection or other methods such as trucking the wastewater to disposal or recycling facilities. Due to the high brine content and other chemical constituents of wastewater, if there are spills of wastewater or if wastewater is not properly disposed of or adequately regulated/monitored under the ODNR Class II injection regulations, there would be impacts on surface water and groundwater that affect aquatic wildlife that rely on those resources.

If operators utilize brine mixtures or water mixtures with other pollutants to control dust on dirt roads, there would be increased potential for contamination of water resources that would affect aquatic wildlife, especially if brine water is mobilized during stormwater events or if brine is applied close to surface water resources, including the Little Muskingum River. During the Stage 3 environmental review of site-specific APDs, the BLM would assess operator proposals for dust control in relation to nearby surface water features, drought conditions, and other factors and will apply COAs to APDs as appropriate to avoid potential impacts to aquatic wildlife species that would jeopardize the species.

Withdrawal of surface water for well construction, drilling, and hydraulic fracturing may also impact aquatic species by depleting water sources essential to their habitats, though it is possible that trucked-in water would be used in some instances. USFWS identified several primary threats to salamander mussels including changes in water flow and depth, contaminants, landscape alteration, lack of connectivity, invasive species, and risks to its host species, the mudpuppy (*Necturus maculosus*). The analysis of impacts on water quantity in the Little Muskingum River from reasonably foreseeable development of the leases (Section 3.6.2.2) shows that most of the time withdrawals do not result in substantial streamflow reductions, even in low-flow years. Nonetheless, Harmon et al. (2023) modeled and calculated the potential impacts of hydraulic fracturing-related water withdrawals on daily flow in HUC-12 watersheds of the Ohio River Watershed and concluded that extreme withdrawals would result in episodic and relatively short-lived reduced streamflow that would potentially be harmful to aquatic organisms dependent on that streamflow in the absence of appropriate mitigation measures. These events are considered uncommon (occurring less than 10 percent of the time) but depending on location and timing and in the absence of appropriate mitigation measures, substantial streamflow reduction in surface waters could occur.

During site-specific permitting, the BLM will review the proposed source, timing, and amount of water use and wastewater disposal and would apply appropriate COAs to avoid impacts on water resources that would jeopardize aquatic wildlife or result in the take of Federally protected mussel species or eastern hellbender. This would include ensuring that streams maintain the minimum flow necessary to support the mussel species and eastern hellbender by prohibiting water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future.

Processing an APD would also require site-specific assessments of Federally listed aquatic species within suitable habitat on both private and Federal land. Although the BLM does not have the authority to enter the non-Federal lands without the landowner's consent, the BLM may deny the APD if the inability to access the surface prevents the BLM from meeting its obligations under the ESA. During site-specific permitting of APDs that propose to occupy Federal surface, standards and guidelines for watershed health, aquatic and riparian resources (riparian corridors), wildlife, and plants from the Forest Plan would be applied to maintain watershed and aquatic-ecosystem health, which would, in turn, protect aquatic wildlife species. GFW-WSH-1 requires avoidance of water diversions from streams, lakes, or springs when instream flow needs or water-level assessments indicate that diversion would adversely impact stream processes, aquatic and riparian habitats and communities, or recreational and aesthetic values (Appendix F).

Pursuant to Section 7 of the ESA, the BLM is consulting with the USFWS on potential impacts on Federally listed threatened, endangered, proposed, and candidate aquatic species. The USFWS provided a set of measures, some or all of which could be attached to APDs as conditions of approval to avoid and minimize potential impacts associated with the Proposed Action. These AMMs are included in Appendix G, Section 2.6.1.2 and summarized below.

- Prohibit in-water work in Group 2 and 4 mussel streams (currently identified in Appendix A of the 2024, or most recent version, of the Ohio Mussel Survey Protocol and hereafter identified as “mussel streams”) as well as eastern hellbender streams. If in-stream work is proposed within a mussel stream, mussel surveys would be required using the FWS-approved mussel survey methodology from the most recent version of the Ohio Mussel Survey Protocol. If in-stream work is proposed within an eastern hellbender stream, a survey in coordination with FWS would be required.
- Prohibit well pads within 1,000 feet of a mussel stream or eastern hellbender stream.
- Establish 300-foot no-disturbance buffers along each side of mussel or eastern hellbender streams (no access roads within this buffer).
- Require the use of best management practices (BMPs) for construction of access roads.
- The BLM will prohibit water withdrawals from the Little Muskingum River, Muskingum River (these are the Group 2 and 4 streams that currently occur within the Action Area), and any additional Group 2 and 4 streams and eastern hellbender streams that may be identified in the future.
- BLM will encourage the use of recycled water to minimize the amount of water withdrawals from surface sources.
- BLM will track annual water withdrawal from all surface water sources used to support development of leases issued under the Proposed Action to confirm withdrawals do not exceed the limits expected and analyzed (total water use of 1,539 Mgal to 2,187 Mgal during well development).
- BLM will prohibit the use of brine on roads for dust and ice control within 1,000 feet of a mussel or eastern hellbender stream. BLM will require safe disposal of brine in accordance with state requirements.

- BLM will require monitoring of stream flow to confirm that it is maintained at a level to maintain aquatic functions as required by USFWS at the tier 2 review stage.

While the measures above were developed to address potential impacts on Federally protected mussel species, they would also incidentally help to avoid and minimize potential impacts on other aquatic species and habitats.

In order to reduce the amount of runoff and sedimentation after construction, USFS and the BLM will also require well operators to reclaim all disturbed areas as soon as possible. As part of the APD process, the BLM will invite private surface owners to participate in the onsite and final reclamation inspections and will take into consideration the needs of the surface owner when reviewing APDs and reclamation plans and when approving final abandonment and reclamation (BLM 2007).

Due to the limited amount of surface disturbance associated with the Proposed Action and application of some or all of the AMMs described above as conditions of APD approval, potential impacts on aquatic resources and Federally protected mussel species are anticipated to be minimal. Application of the measures described above would be effective in reducing the potential for impacts on aquatic wildlife. During Stage 3 environmental review of APDs, the BLM would further assess the effectiveness of measures adopted in the Decision Record for the lease action based on the site-specific development proposals and associated impacts. If site-specific impacts are identified during Stage 3 environmental review of APDs, the BLM would consider and apply additional AMMs or and monitoring measures to effectively avoid, minimize, and reduce potential impacts on aquatic wildlife. Application of site-specific measures would further assist in avoiding, minimizing, and reducing impacts on aquatic wildlife.

3.7.3. Cumulative Impacts

The CIAA for aquatic wildlife encompasses the extent of HUC-12 Watersheds within the Marietta Unit, plus a 4-mile buffer in Ohio and West Virginia. Historical activities, current ongoing projects, and reasonably foreseeable future actions that would result in impacts on aquatic wildlife in the CIAA are outlined in Appendix H (*Past, Present, and Reasonably Foreseeable Future Actions*). Cumulative impacts on aquatic wildlife would result from increased surface disturbance, surface-water withdrawals, and increased oil and gas development that increases potential for accidental spills and contamination.

In 2022, there were an estimated 65,117 acres of existing development/disturbance in the CIAA, which accounts for approximately 10.4 percent of the total acreage within the CIAA (LANDFIRE 2022). Reasonably foreseeable development of the leases is estimated to result in up to 1,015 acres of short-term disturbance and up to 285 acres of long-term disturbance, resulting in an approximate 1.5-percent increase in cumulative short-term disturbance and an approximate 0.4-percent increase in cumulative long-term disturbance in the CIAA. The cumulative amount of surface disturbance and development in the CIAA has and likely would continue to result in cumulative impacts on aquatic wildlife from erosion, sedimentation, increases in impervious surfaces, and other effects.

Cumulative impacts on aquatic wildlife from increased sedimentation and erosion may be more pronounced under the scenario where operators who are awarded leases proceed with private

surface development prior to submitting an APD to the BLM to access Federal minerals because surface disturbance would occur prior to the APD process where the BLM has the authority to require AMMs and resource protection measures as COAs accompanying the APD approvals. However, as described in Appendix E (*Legal and Regulatory Authorities*), the State of Ohio requires a variety of controls for oil and gas projects on private land to limit the movement of sediment that would affect water resources including requiring a sediment and erosion control plan, soil stabilization measures, stormwater control structures that must be capable of managing a 10-year storm event, and reclamation standards that must be met by operators. Due to the relatively minimal increase in cumulative surface disturbance compared to the total acreage in the CIAA and the State of Ohio standards that are in place for stormwater and erosion control, potential impacts on water quality and mussel species from disturbance, erosion, and sedimentation from development of well sites on private land are expected to be minimal

As of August 2024, approximately 21,598 oil and gas-related wells, including both traditional vertical and newer horizontal wells, have been permitted or drilled in the CIAA. Reasonably foreseeable development of leases that may be issued under the Proposed Action would result in an estimated 81 additional horizontal wells in the CIAA, representing an increase of 0.4 percent in oil and gas wells in the CIAA. An increase in the cumulative total number of wells in the CIAA would increase the potential for spills, contamination, and well bore or injection well failures that may contribute to impacts on aquatic wildlife and their habitat if accidental spills or leaks were to occur and inadequate contingency and containment strategies exist. There is limited information on the extent and frequencies of injection well failures or spills associated with oil and gas development in the CIAA, and it is not feasible to predict future rates of failures and spills associated with oil and gas drilling, completion, and production operations. In addition, the re-use of wastewater and brine-laden water for activities such as dust control on roads and construction sites would contribute to cumulative impacts on aquatic wildlife. These activities would most notably affect aquatic wildlife during low-water events or if disposal is concentrated in areas near occupied mussel streams. As described in Appendix E (*Legal and Regulatory Authorities*), the ODNR protects Ohio's water resources by regulating the disposal of brine and other wastes produced from the drilling, stimulation, and production of oil and natural gas in Ohio. Class II disposal well owners must file Quarterly Reports to the ODNR as well as Annual Reports documenting the total volume of brine or other waste substances received, the maximum injection pressure reached, the average daily injection pressure, the volume and delivery date for each shipment of brine or other waste substances, and proof of the lawful disposal of waste.

Surface-water withdrawals from within the CIAA, particularly the Little Muskingum–Middle Island HUC-8, are likely to increase as more wells are permitted in the CIAA, unless water is trucked to the wellsite. Water withdrawals on private land are subject to ORC Section 1521.23, which requires facilities with new or increased consumptive uses of more than 2 Mgal of water per day, averaging over any 30-day period (60 Mgal per month), to obtain a permit from the Chief of the Division of Water Resources. It is likely that wells projected in the 2020 RFDS would trigger the requirement for a consumptive use permit due to the typical amount of water needed for hydraulic fracturing drilling and completions being more than the 2-Mgal-per-day permit threshold. Because the permit application requires the applicant to consider the effects of the withdrawal with respect to the existing uses of water resources and to describe conservation practices that would be followed, failure to do so would result in denial of the consumptive use

permit. Therefore, impacts on aquatic wildlife resulting from water withdrawals on private lands may be minimized through the State of Ohio permit process. However, in certain cases, well sites may require less than 2 Mgal of water per day and may not be subject to a consumptive use permit.

Streamflow reductions related to the reasonably foreseeable development of leases that may be issued under the Proposed Action are expected to incrementally contribute to a minor reduction (from 0.32 percent to 0.46 percent) in cumulative annual surface-water availability in the Little Muskingum River (see Section 3.6, *Water Resources*). If all the water required for reasonably foreseeable development of leases under the Proposed Action were withdrawn directly from the Little Muskingum River, then this use would equate to approximately 0.17 to 0.24 percent of the river's average annual water total. Removal of this percentage of the river's water, even during low-streamflow years, is anticipated to have minimal cumulative impacts on the Little Muskingum River's streamflow given the total streamflow volumes in the river. However, withdrawals during rare (less than 10 percent of the time), extreme, low-flow events would potentially harm the biology of streams and their adjacent riparian zones (Harmon et al. 2023). Removing water during low-flow events would potentially strand and kill aquatic wildlife, including mussels, if there is not enough water to maintain biological functions.

The Ohio Department of Natural Resources uses water withdrawal registrations and permits to manage cumulative withdrawals, but the BLM is not aware of how this system may prevent an individual withdrawal during a drought period from affecting aquatic habitat or protected species. The most effective way for the BLM to ensure that oil and gas development of Federal minerals is not causing a negative effect to mussel populations or eastern hellbenders is by prohibiting the withdrawal of water from the waterways that harbor listed mussel populations and eastern hellbenders. As such, the BLM has developed an AMM that will prohibit water withdrawals from Little Muskingum River, Muskingum River (these are the Group 2 and 4 streams that currently occur within the Action Area), and any additional Group 2 and 4 streams and eastern hellbender streams that may be identified in the future (see Appendix G, Section 2.6.1.2 of this EA). With application of this AMM there would be limited effects on Federally protected mussel species or eastern hellbender from water withdrawals associated with reasonably foreseeable development of Federal leases.

Low-flow events can also concentrate waste and potentially affect aquatic wildlife, including freshwater mussels. Compliance with Federal and State regulations (e.g., ORC § 1521.23) may mitigate the likelihood of substantial drawdown of surface waters in the CIAA. The BLM will include COAs for proper disposal of wastewater into lease terms if there is a possibility of adverse effects on aquatic wildlife and mussel species. This would include restricting brine use on roads near mussel streams or during low-flow events when pollutants would be more concentrated or requiring wastewater be trucked away from sensitive watersheds. These measures would help reduce the Proposed Action's contribution to cumulative water quality effects and associated effects on aquatic wildlife, including mussel species.

Construction of well sites and other infrastructure on private and State land could also result in the removal of wetlands, riparian habitat, or other aquatic habitat important for the overall function of aquatic ecosystems. However, as described in Appendix E (*Legal and Regulatory Authorities*), the State of Ohio requires a variety of standards and requirements as part of the State permitting process including identifying all springs, wetlands, and other surface-water

features as part of the permit package and requiring a well site visit by the ODNR as part of the permit process that can result in the identification of specific terms and conditions to protect wetlands and other aquatic habitat that would be attached to permits.

Climate change may also contribute to cumulative impacts on aquatic wildlife due to more severe or frequent floods in some places, increased fire risk that can increase sedimentation and erosion, and changes in temperature and climate patterns that affect aquatic wildlife and their habitat. As warmer temperatures cause more water to evaporate from the land and oceans, changes in the intensity and frequency of heavy precipitation events may in turn affect the intensity and frequency of flooding (IPCC 2021). Increased streamflow events from flooding and extreme weather would increase sedimentation into mussel streams, degrading habitat and affecting survivorship, especially of younger mussels. Prolonged droughts would reduce available water and strand mussels or cause unfavorable water conditions that would affect survivorship.

Climate change can also exacerbate potential impacts of oil and gas development as roads, berms, and stormwater management features may be unable to handle the effects of more extreme weather events such as increased flood severity and frequency and more frequent landslides that would increase sedimentation and associated cumulative impacts on water resources and aquatic wildlife. Climate change can also alter natural stream temperatures, flows, seasonal patterns of precipitation, and salinity levels. Water temperature and flow are key variables in maintaining riverine biota and, if altered, can affect the distribution and ecology of freshwater mussels and other aquatic wildlife.

Development of private surface to access Federal minerals would also increase the potential for spills and contamination, resulting in cumulative impacts in combination with other sources of contamination that may occur within the Analysis Area from point sources such as wastewater treatment plants and from nonpoint sources such as runoff from agricultural areas or pesticides used to control invasive and nonnative species.

Table 3- summarizes the effects determination for the species considered in the Aquatics Analysis Area. The effects determination assumes all required AMMs are implemented. If AMMs cannot be applied to surface development on Federal land, then additional coordination and consultation may be required with the USFWS.

Table 3-21. Effects Determination Summary – Aquatic Wildlife Species

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	DETERMINATION
<i>Aquatic Wildlife Species</i>			
Clubshell mussel	<i>Pleurobema clava</i>	Endangered	may affect, not likely to adversely affect
Fanshell mussel	<i>Cyprogenia stegaria</i>	Endangered	may affect, not likely to adversely affect
Northern riffleshell mussel	<i>Epioblasma rangiana</i>	Endangered	may affect, not likely to adversely affect
Pink mucket mussel	<i>Lampsilis abrupta</i>	Endangered	may affect, not likely to adversely affect

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	DETERMINATION
Longsolid mussel	<i>Fusconaia subrotunda</i>	Threatened	may affect, not likely to adversely affect
Purple cat's paw mussel	<i>Epioblasma obliquata</i>	Endangered	may affect, not likely to adversely affect
Round hickorynut mussel	<i>Obovaria subrotunda</i>	Threatened	may affect, not likely to adversely affect
Salamander mussel	<i>Simpsonaias ambigua</i>	Proposed Endangered	not likely to jeopardize
Sheepnose mussel	<i>Plethobasus cyphus</i>	Endangered	may affect, not likely to adversely affect
Snuffbox mussel	<i>Epioblasma triquetra</i>	Endangered	may affect, not likely to adversely affect
Eastern hellbender	<i>(Cryptobranchus alleganiensis alleganiensis)</i>	Proposed Endangered	not likely to jeopardize
Rabbitsfoot mussel	<i>Quadrula cylindrica</i>	Threatened	may affect, not likely to adversely affect

3.8. Terrestrial Wildlife

Issue 6: How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing impact terrestrial wildlife species in the region, including Indiana bat, northern long-eared bat, and tricolored bat?

3.8.1. Affected Environment

The affected environment for terrestrial wildlife, including the Indiana bat and other threatened or endangered species, is analyzed in Section 3.3 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference.

Since publication of the 2016 EA, several changes have occurred to the list of Federally protected species. The northern long-eared bat (*Myotis septentrionalis*) was Federally listed as endangered as of March 31, 2023 (USFWS 2022b). The tricolored bat (*Perimyotis subflavus*), not analyzed in the 2016 EA, was proposed for listing as endangered on September 14, 2022 (USFWS 2022c) and may occur in the Action Area. The American burying beetle (*Nicrophorus americanus*) was downgraded from endangered to threatened in 2020 and was not listed in the USFWS Information for Planning and Consultation report because no populations have been identified in the Analysis Area (USFWS 2023; USFS 2022). The monarch butterfly (*Danaus plexippus*) was proposed for listing as threatened on December 12, 2024 (DOI 2024a). The updated list of threatened and endangered terrestrial species with potential to occur in the Action Area is shown in Table 3-.

Table 3-22. Potential Federally Protected Terrestrial Species in the Action Area

SPECIES	STATUS	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Bats			
Indiana Bat (<i>Myotis sodalis</i>)	FE	Hibernates primarily in caves and mines. Maternity sites generally are behind loose bark of large-diameter dead or dying trees with sun exposure. Foraging habitats include riparian areas, upland forests, ponds, and fields.	Habitat for the species is found throughout the WNF and it is thought to occur year-round, but numbers are very low. There are three documented occurrences in the Action Area (USFWS 2024f). There are no hibernacula documented in the Marietta Unit of the WNF. The species has experienced population declines from white-nose syndrome.
Northern Long-Eared Bat (<i>Myotis septentrionalis</i>)	FE	Hibernates primarily in caves and mines. Maternity sites generally are behind loose bark of dead or dying trees or in tree cavities while foraging habitats include forests, along forest edges, over forest clearings, and occasionally over ponds.	Suitable summer habitat available across the WNF, including roost trees identified. There are no hibernacula documented in the Marietta Unit of the WNF, but reproductive females were captured in pre-WNS-population-crash summer mistnet surveys in 2004 and 2014 (TRC 2004, 2014). There have been multiple captures outside the proclamation boundary but within the Terrestrial Action Area.
Tricolored Bat (<i>Perimyotis subflavus</i>)	PE	Hibernates primarily in caves or mines. Maternity colonies utilize open-sided human-made structures such as under porch roofs or in live or dead leaf clusters in tree canopies. Most foraging occurs in riparian areas.	Suitable summer habitat available across the WNF. There are no hibernacula documented in the Marietta Unit of the WNF, but reproductive females were captured in pre-WNS-population-crash summer mistnet surveys in 2004 and 2014 (TRC 2004, 2014). There have been at least 17 sites where this species has been detected in the Terrestrial Action Area with other detections just outside the Terrestrial Action Area.
Insects			
Monarch Butterfly (<i>Danaus plexippus</i>)	PT	Likely to occur where milkweed (required for egg-laying) or a diversity of flowering plants are found.	Species is common throughout Ohio and the WNF during the summer months. Populations are experiencing nationwide decline.

SPECIES	STATUS	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Birds			
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	BGPA, MBTA	Forested areas with large trees adjacent to waterbodies. Frequently hunts over water; can also be found in other habitats. <i>Addressed in 2016 EA</i>	The species is common throughout Ohio.

Source: eBird 2023; USFWS 2021b, 2022b, 2022c, 2023, 2024f; USFS 2022.

¹ The 2016 EA indicated that the Indiana Bat was present and well documented in the Action Area. However, upon further investigation during the preparation of this EA, the BLM, USFS, and USFWS have determined that the statement was in error in the 2016 EA and current evidence suggests there have only been three documented occurrences in the Marietta Unit of the WNF.

BGPA = Bald and Golden Eagle Protection Act; C = Federal candidate; FE = Federally listed as endangered; MBTA = Migratory Bird Treaty Act; PE = proposed for listing as endangered; PT = proposed for listing as threatened; WNS = white-nose syndrome

The Marietta Unit supports habitat for the Indiana bat, and the species is thought to occur year-round on the WNF (BLM 2016). The Marietta Unit, however, was not subject to underground mining, nor does it support any karst habitat, that is, eroded subsurface limestone promoting ridges and fissures and sinkholes; therefore, it is not expected that any bat hibernacula would be impacted by potential drilling. Known fall swarming sites in abandoned mines in the Athens Unit or Iron-ton District would not be impacted given their distance from the Action Area. Northern long-eared bat populations have experienced severe declines over recent decades from white-nose syndrome (WNS) and populations across the WNF have declined precipitously (USFS 2020a). Tricolored bat populations have experienced declines from WNS, and populations across the WNF have declined precipitously (USFS 2020a). Tricolored bat was not analyzed in the 2016 because it was not Federally proposed as endangered until September 2022.

Monarchs are a widespread species in North America and have been petitioned for listing because of severe declines in population numbers that resulted from the use of pesticides, loss of habitat and native milkweed (*Asclepias syriaca* L.) plants, and global environmental change (USFS 2020a). On December 10, 2024, the USFWS proposed listing the monarch butterfly as a threatened species under the ESA.

The USFWS utilizes the BA regarding potential impacts on Federally listed species and which would include required AMMs to be considered and applied in APD approvals. Agency coordination with the USFWS to date has resulted in identification of AMMs designed to avoid and minimize potential impacts on Federally listed bat species and are incorporated into the Proposed Action (see Section 2.6.1.1 in Appendix G, of this EA).

Table 3- presents the 2024 Regional Forester Sensitive Wildlife Species List in the Action Area along with their typical habitat association and potential to occur. Since publication of the 2016 EA, seven new bird species and one new bat species have been added to the list (USFS 2024). The new species are similar to those analyzed in the 2016 EA. The potential effects for the new species are within the scope of the original analysis as well as the scope of the current analysis for Federally listed species.

Table 3-23. Regional Forester Sensitive Terrestrial Species in the Action Area

SPECIES	RETAINED OR ADDED SINCE 2016 EA	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Birds			
Eastern Whip-poor-will (<i>Antrostomus vociferus</i>)	Added	Associated with forested landscapes. Prefers dry deciduous and mixed coniferous-deciduous with little or no underbrush or regular disturbances.	Moderate. Occurs in all three units of the WNF, with official State surveys documenting the species in the Athens and Ironton Units.
Ruffed Grouse (<i>Bonasa umbellus</i>)	Added	Relies on a diversity of forest age classes.	Moderate. Rare in the WNF, but in recent years, while still low, the Marietta Unit has the most recorded activity.
Northern Bobwhite (<i>Colinus virginianus</i>)	Added	Inhabits a wide variety of vegetation types, particularly early-forest successional stages of mixed-hardwood forests occurring in habitat mosaics, including woody edge habitats.	Low. Extensive range that includes Ohio, but no populations known from the Marietta Unit.
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	Added	Prefers open deciduous woodlands (especially oak), including riparian forest, rural farmland with scattered trees, parkland, or mature forest with sufficient canopy openings and snags.	Moderate. Extensive range that includes Ohio but it may be relatively less common in the Marietta Unit compared to western and northern Ohio.
Prairie Warbler (<i>Setophaga discolor</i>)	Added	Uses shrub-sapling habitats, reclaimed grasslands, and early successional forest.	High. Extensive range that includes all of Ohio.
Eastern Meadowlark (<i>Sturnella magna</i>)	Added	Grasslands such as lightly grazed pastures, hayfields, fallow fields, reclaimed strip-mine grasslands, and roadsides within agricultural landscapes.	High. Extensive range that includes all of Ohio.
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	Added	Medium to large, dry upland grass habitats such as hayfields, lightly grazed pastures, and reclaimed surface mines.	Moderate. Extensive range that includes Ohio but it may be relatively less common in the Marietta Unit where surface mining was not common; however, species is common in suitable habitat.

SPECIES	RETAINED OR ADDED SINCE 2016 EA	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Henslow's Sparrow (<i>Centronyx henslowii</i>)	Retained	Large grasslands with minimal woody invasion, including reclaimed surface mines and some hay or fallow fields, depending on management regimes	Moderate. Extensive range that includes Ohio but it may be relatively less common in the Marietta Unit where surface mining was not common; however, species is common in suitable habitat.
Cerulean Warbler (<i>Setophaga cerulea</i>)	Retained	Large tracts of open to semi-open mature mixed oak forest with a heterogeneous canopy layer.	High. Extensive range that includes Ohio, especially the eastern half where densities are highest and the species is widespread.
Mammals			
Hoary Bat (<i>Lasiurus cinereus</i>)	Added	Mature forest, often in areas with scattered trees or at the edges of clearings.	High. Extensive range that includes all of Ohio.
Little Brown Bat (<i>Myotis lucifugus</i>)	Retained	Mature forest, often near buildings or barns for roosting and lakes and streams for foraging; underground habitats in winter.	Moderate. Extensive range that includes all of Ohio but was decimated by white-nose syndrome. It is yet unclear how well-distributed they are after substantial declines, but survivors do exist and are expected to occur in the Marietta Unit.
Reptiles and Amphibians			
Timber Rattlesnake (<i>Crotalus horridus</i>)	Retained	Den: rock outcrops; summer: mixed deciduous or coniferous forests with closed canopy, heavy leaf litter and little herbaceous cover, and a few rocks or fallen trees.	Low. Extensive range that includes Ohio, but no populations known from the Marietta Unit.
Northern Metalmark (<i>Calephelis borealis</i>)	Retained	In open habitat, such as roadsides that have dappled sunlight; larval host plant, <i>Packera obovata</i> (formerly <i>Senecio obovatus</i>), round-leaved ragwort, must be present along with adult nectar food sources such as <i>Rudbeckia hirta</i> , black-eyed susan, and <i>Asclepias tuberosa</i> , butterfly weed	Moderate. Considered well-distributed across southeastern Ohio but no known populations in the Marietta Unit; however, little dedicated survey work has occurred.

SPECIES	RETAINED OR ADDED SINCE 2016 EA	HABITAT ASSOCIATION	POTENTIAL TO OCCUR
Appalachian Grizzled Skipper (<i>Pyrgus wyandot</i>)	Retained	Disturbed openings in mature oak forests where host plant <i>Potentilla canadensis</i> , Canada cinquefoil grows, including open hillsides, disturbed ridgetops, powerline cuts, and roadsides; especially drier south-facing sites	Low. Extremely rare in Ohio; no known populations from the Marietta Unit.

Sources: eBird 2023; USFWS 2021b, 2022b, 2022c, 2023; USFS 2022, 2024.

3.8.2. Environmental Impacts

Potential impacts on terrestrial wildlife from all activities in the oil and gas program are analyzed in Section 4.3 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference. New and relevant information is needed to support this EA because of changes to the list of Federally protected species and RFSS and the analysis of terrestrial wildlife management in the 2016 EA did not consider the projections in the 2020 RFDS (Appendix D) and, as noted in *CBD*, did not capture the full range of impacts that would result from horizontal drilling with hydraulic fracturing. Additionally, the 2020 *CBD* decision (Appendix A) found that the analysis of impacts on the Indiana Bat in the 2016 EA was deficient.

3.8.2.1. Impacts of Alternative A – No-Action Alternative

Under the No-Action Alternative, the BLM would not offer Federal minerals in the Marietta Unit for oil and gas leasing, including the parcels requested in currently pending EOIs and all other Federal minerals in the Marietta Unit and would rescind any leasing decisions that were supported, for NEPA-compliance purposes, by the 2016 EA. Therefore, the No-Action Alternative would not result in any substantive change to the estimated impacts on terrestrial wildlife from those analyzed under the No-Action Alternative in Section 4.3 of the 2016 EA (BLM 2016).

3.8.2.2. Impacts of Alternative B – Proposed Action

During site-specific development, some impacts on terrestrial wildlife are expected to result from surface-disturbance and associated habitat removal, habitat fragmentation, increased edge effects, increased potential for take resulting from wildlife-vehicle collisions, exposure of wildlife to contaminants from water impoundments and other sources, and disturbance from noise and human presence. Depending on when pad and well development occur, vegetation removal and disturbance could negatively impact courtship and reproduction for wildlife species. During site-specific development, other impacts are expected to result from habitat fragmentation (although limited at the scale of disturbance in an otherwise heavily forested landscape) and decreased availability and quality of food and water sources as a result of water withdrawals.

Direct loss of habitat is caused when habitat-supporting resources, such as vegetation, soil, cover, structure, or food sources, are removed. Habitat loss can be temporary if areas are restored and operations discontinued, although wildlife would be displaced during this time and suitable habitat may take many years to regrow. Individuals and young that are unable to flee may be killed during habitat removal. Additionally, horizontal wells require more heavy-truck trips and passenger vehicle trips compared to vertical wells (Table 3-2). Increased vehicle trips introduce more opportunity for incidental wildlife take as a result of wildlife-vehicle collisions. These incidental take events may ultimately impact terrestrial wildlife population numbers.

APD approval is expected to result in some loss of terrestrial habitat through surface disturbance and the placement of both short-term and long-term facilities and infrastructure such as well pads, roads, pipelines, and other development. Suitable habitat for terrestrial species has not been specifically delineated in the WNF and at this time specific development locations are not known so it is not possible to quantify impacts on particular terrestrial species and their suitable habitat from surface disturbance at this stage. Initial surface disturbance associated with the Proposed Action is estimated to be up to 1,015 acres, or 2.5 percent of the Action Area. This estimate represents an unlikely scenario where all 81 wells are developed at the same time, with no surface disturbance offset by interim reclamation. The 2020 RFDS (Appendix D) projects that, reasonably, two horizontal well pads would be developed per year, impacting up to 0.01 percent of the Action Area. Interim reclamation would reduce some surface disturbance from year to year and following interim reclamation and prior to final reclamation, maximum long-term surface disturbance would impact 0.004 percent of the Action Area per year. The long-term surface disturbance (disturbance that persists for 20 to 30 years) for 29 well pads is predicted to be, at most, 0.05 percent of the Action Area. Surface disturbance associated with the Proposed Action is therefore projected to result in minimal impacts on terrestrial habitats. While overall impacts are expected to be minimal, there may be localized impacts on terrestrial wildlife due to habitat fragmentation and increased exposure and changes in vegetative communities and habitat quality and quantity along the edge of cleared areas (i.e., edge effects). Creation of an abrupt transition between two adjacent ecosystems (or an edge) causes changes in local biotic and abiotic conditions that can negatively affect wildlife and their habitat, increase the potential for predation compared to interior forest environments, and increase the potential for establishment of invasive species along edge areas that can reduce the quality and quantity of wildlife habitat and forage.

The RFDS predicts that well pads would accommodate multiple wells with up to two well pads developed per year that contain two to three horizontal wells. In contrast to vertical drilling where there is typically a larger number of single-well pads required to effectively extract oil and gas resources, multi-well pads allow effective extraction of oil and gas resources from a single larger pad. In general, this results in a development pattern of a fewer number of larger well pads across the landscape, compared to vertical drilling where there are more well pads spread across the landscape. Thus, horizontal drilling typically results in less habitat fragmentation than vertical drilling depending on the size of the well pads, the location of the well pads in relation to wildlife habitat and movement corridors, and other factors.

Increased vehicle trips and workers in operation at drilling sites can also increase the risk for transport of invasive, nonnative vegetation to areas, especially if native vegetation has been damaged or lost through surface disturbance (see Section 3.5, *Vegetation and Rare Plants*).

Nonnative vegetation may outcompete native vegetation that acts as a food source for terrestrial wildlife species. Terrestrial wildlife may also be impacted by increases in visual elements, such as light or physical structures, as well as by noise that may cause stress or reduce prey sources and habitat. If disturbance occurs during the spring and early summer breeding or nesting season, then breeding behavior and territorial defense of birds may also be impacted by noise, visual changes, or other sources of stress (Bötsch et al. 2017).

Additionally, horizontal wells require an estimated nineteen to twenty-seven Mgal of water per well, as compared to only 44,000 to 85,000 gallons per vertical well (Table 3-2). This additional use of water for hydraulic fracturing and horizontal well drilling may impact terrestrial wildlife species by reducing availability of water sources and reducing insect production during rare and extreme low-flow events (see Section 3.6.2, *Water Resources – Environmental Impacts*).

BLM's Section 6 lease term (BLM 2023) requires that all adverse impacts on biological resources and land be minimized. If in the conduct of operations threatened or endangered species or substantial unanticipated environmental impacts are observed, the lessee must immediately contact the BLM (BLM 2023). Further, the lessee must cease any operations that would result in the destruction of such species (BLM 2023). Additionally, the act of processing an APD is a Federal action that requires ESA Section 7 consultation and NEPA compliance. Therefore, processing of an APD may require site-specific surveys within habitat for Federally listed wildlife and RFSS on both private and Federal land. Although the BLM does not have the authority to enter the non-Federal lands without the landowner's consent, the BLM may deny the APD if the inability to access the surface prevents the BLM from meeting its obligations under ESA. If listed species are recorded or potential habitat is identified during these surveys, further consultation with the USFWS may be required. Additional design features, COAs, and BMPs would be applied to each approved APD, as appropriate, to minimize impacts on other terrestrial wildlife species.

In order to reduce the area of surface disturbance remaining after construction on NFS surface lands and private lands, USFS and the BLM would also require well operators to reclaim all disturbed areas as soon as possible in order to reduce the area of surface disturbance remaining after construction and to reduce long-term impacts on wildlife from the presence and impacts associated with construction-related disturbance areas and corridors (e.g., increased runoff). As part of the APD process, the BLM would invite private surface owners to participate in the onsite and final reclamation inspections and would take into consideration the needs of the surface owner when reviewing the APD and reclamation plans and when approving final abandonment and reclamation.

In addition, the AMMs for bats that are included as part of the Proposed Action described in Appendix G, Section 2.6.1.1 of this EA, and summarized below under the impacts on the bat species, would reduce potential impacts on terrestrial wildlife and their habitat, especially the measures that minimize the clearing/cutting of mature trees, limit the annual removal of forest habitat, and the requirements for a closed system for produced water that would minimize wildlife exposure to contaminated water sources.

Impacts on the Endangered Indiana Bat, the Endangered Northern Long-Eared Bat, and the Proposed for Listing Tricolored Bat

Populations of the three bat species may be affected through loss of habitat including up to 1,015 acres of short-term surface disturbance during well construction and development and up to 285 acres of long-term surface disturbance during well production. Suitable habitat for the bat species has not been delineated in the Action Area and specific development locations are not known at this stage so it is not possible to quantify impacts on bat suitable habitat. However, if all surface disturbance were to occur in suitable habitat, the total habitat loss would only account for 2.5 percent of the Action Area during well development and 0.7 percent of the Action Area during well production and after interim reclamation of the site. A variety of AMMs have been identified for the protection of bat species (see below and Appendix G) and would be applied as appropriate to approvals of APDs. As a result, the Proposed Action is expected to have negligible impacts on bat habitat in the Action Area.

Impacts during drilling-site construction could also include loss of unknown roost trees, short-term impacts to bats from noise or human presence, and alteration of foraging habitat (USFS 2006a). Loss of roost trees can have implications for reproductive females (USFS 2006a). Bats typically form maternity colonies in trees known as maternity trees where groups of females rear their young together. If a maternity tree were removed during the maternity period, when flightless young are potentially present, then young bats would be killed due to their inability to fly away. The three bat species are known to prey extensively on aquatic insects. Increased water withdrawals for hydraulic fracturing would affect or reduce insect production. Indiana bats may be forced to expend more energy searching for food, impacting individual fitness rather than causing population-level impacts.

The AMMs for bats that are included as part of the Proposed Action described in Appendix G, Section 2.6.1.1 of this EA would reduce potential impacts on Federally listed and proposed bat species, including:

- Require seasonal clearing/cutting (from October 1 to March 31) of all trees greater than 3 inches diameter at breast height (DBH).
- Prohibit clearing/cutting of mature trees (not including scrub/shrub/saplings less than 5 inches DBH) to 10 acres or less for each new Federal project including well pads, laydown yards, pipelines, access roads, etc. (i.e., choose non-wooded locations or already-disturbed areas for development). If greater than 10 acres of clearing is necessary, then additional conditions, in coordination with USFWS, may apply.
- Require a closed system for the containment of produced water from drilling and all applicable local, State, and Federal regulations apply for the appropriate disposal of produced water.
- Restrict tree clearing near potential bat hibernacula. Prohibit tree clearing/cutting and construction of well pads within ¼ mile of a hibernaculum. Limit tree clearing/cutting to November 15 to March 15 in areas located between ¼ mile and 5 miles of a hibernaculum.

- Restrict the cumulative removal of forest habitat to no more than 105 acres of deciduous forest (trees greater than 5 inches DBH) annually and 1,015 acres total over the 55-year term of the consultation.
- Restrict activities that may create vibrations or increase noise levels at a hibernaculum when bats may be using them. Prohibit these activities from October 1 to March 31 within 0.5 miles of identified hibernaculum, or at any distance throughout the year that would threaten the structural integrity of an occupied hibernaculum. Such activities may include blasting, pile driving, hydraulic drilling, and similar geotechnical activities.
- For any known Indiana, northern long-eared, or tricolored bat roost trees, prohibit year-round removal of the roost and any tree within 150 feet until the roost is deemed unsuitable in coordination with FWS. Additionally, for known maternity roosts, establish a 0.25-mile roost area buffer centered on the original roost location. Tree cutting and removal will also be prohibited year-round within the established buffer, until such time that FWS agrees it is no longer an occupied roost area, or sufficient alternate avoidance and minimization measures to protect the colony can be applied in coordination with FWS prior to approval of the APD.

In addition, lease stipulations and notifications from the Forest Plan would reduce potential impacts on NFS lands such as requirements that trees with suitable Indiana bat maternity-roost characteristics only being removed during the hibernation period (outside of the summer maternity season). Refer to Appendix F for additional information.

Due to the limited amount of surface disturbance associated with the Proposed Action and application of the avoidance, minimization, and protection measures described above, potential impacts on the three bat species are anticipated to be minimal. If potential impacts are identified during APD permitting additional resource protection measures would be applied to avoid and minimize potential impacts on the bat species.

Impacts on the Monarch Butterfly

The monarch butterfly may be impacted through loss of habitat including up to 1,015 acres of surface disturbance during well construction and development and up to 285 acres of long-term surface disturbance during the productive life of wells. Suitable habitat for the monarch butterfly has not been delineated in the Action Area and specific development locations are not known at this stage so it is not possible to quantify impacts on monarch butterfly suitable habitat. However, if all surface disturbance were to occur in suitable habitat, the total habitat loss would only account for 2.5 percent of the Action Area during well development and 0.7 percent of the Action Area during well production and after interim reclamation of the site. As a result, the Proposed Action is expected to have negligible impacts on monarch butterfly habitat in the Action Area.

Actual impacts of drilling and other development activities on the monarch butterfly would be further assessed at the APD stage through additional environmental review and ESA Section 7 consultation when specific development plans are known, but maximum potential surface

disturbance and habitat loss would be similar to that discussed above and limited on an annual basis by the AMMs in Appendix G, Section 2.6.1.3 of this EA.

Applying the monarch AMMs (see Appendix G, Section 2.6.1.3), 2006 Forest Plan standards/guidelines (for APDs on NFS lands), and other measures as conditions of APD approval would help retain monarch habitat, minimize surface disturbance impacts, and encourage monarch preferred habitat during revegetation efforts. The AMMs to protect the monarch include:

- In appropriate habitat locations, milkweed and other monarch preferred forb species will be included in the seed mix for habitat restoration or creation to provide for monarch butterfly larval habitat during early successional stages, or as directed by the USFWS.
- Prohibit mowing monarch habitat from March 15 to August 31 when monarchs are breeding and avoid mowing of blooming habitat September 1 to October 31 when large numbers of monarchs are migrating.
- Prohibit the use of terrestrial pesticides or herbicides in and within 100 feet of monarch habitat from March 15 to October 30.

Impacts on Bald Eagle

Bald eagles may be impacted through loss of habitat including up to 1,015 acres of surface disturbance during well construction and development and up to 285 acres of long-term surface disturbance during the productive life of wells. Bald eagles have seen population rebounds after experiencing severe declines in the 1950s and 1960s. Although the bald eagle is no longer a Federally listed species, it is protected through the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.

The AMMs for bats that are included as part of the Proposed Action described in Appendix G, Section 2.6.1.1 of this EA, and summarized above under the impacts on the bat species, would reduce potential impacts on bald eagles and their habitat, especially the measures that minimize the clearing/cutting of mature tree and that limit annual removal of forest habitat that would help retain potential bald eagle habitat and the requirements for a closed system for produced water that limits bald eagle exposure to contaminated water sources. Site-specific review during the APD process is a Federal action requiring compliance with ESA, the Bald and Eagle Protection Act, the Migratory Bird Treaty Act, and for any proposed development on NFS lands the protection measures from the Forest Plan (see Appendix F). Design features, COAs, and BMPs would be applied to each approved APD as necessary to avoid and minimize impacts on the species.

Application of the measures described above would be effective in reducing the potential for impacts on terrestrial wildlife. During the Stage 3 environmental review of APDs, the BLM would further assess the effectiveness of measures carried forward in the Decision Record for the lease action based on the site-specific development proposals and associated impacts. If site-specific impacts are identified during the Stage 3 environmental review of APDs, the BLM would consider and apply additional COAs and monitoring measures to effectively avoid, minimize, and reduce potential impacts on terrestrial wildlife. Application of site-specific

measures based on individual APDs would be effective at further avoiding, minimizing, and reducing impacts on terrestrial wildlife.

3.8.3. Cumulative Impacts

The CIAA for terrestrial wildlife encompasses the Marietta Unit of the WNF and a 4.5-mile buffer in both Ohio and West Virginia. Beyond this buffer, the projected oil and gas facilities would be unlikely to impact wildlife resources. Historical activities, current ongoing projects, and reasonably foreseeable future actions that would result in impacts on terrestrial wildlife in the CIAA are summarized in Appendix H (*Past, Present, and Reasonably Foreseeable Future Actions*). Cumulative impacts on terrestrial wildlife associated with the Proposed Action would result from increased surface disturbance and human activity in the WNF when considered in conjunction with ongoing and future projects in the CIAA.

At this time, a variety of specific, planned, and completed USFS projects on NFS lands within the Action Area have the potential to contribute to cumulative impacts in combination with the Proposed Action (see Appendix H, Section 1.2). Most of the USFS land management projects (excluding special uses and minerals) involve habitat manipulation rather than habitat loss and are typically small-scale, geographically and temporally scattered, and subject to Forest Plan standards and guidelines as well as AMMs and other project-specific design criteria that all reduce direct, indirect, and cumulative impacts. Existing and future oil and gas development on private land is expected to be the largest contributor to cumulative terrestrial wildlife impacts in the CIAA, especially under the scenario where operators who are awarded leases proceed with private surface development prior to submitting an APD to the BLM to access Federal minerals. There are 21,598 oil and gas-related wells that have been permitted or constructed in the CIAA as of August 2024, with 86 percent of those wells located on private land as depicted on Figure H-2 in Appendix H (*Past, Present, and Reasonably Foreseeable Future Actions*). As of 2022, there were an estimated 53,491 acres of developed land/existing disturbance within the CIAA (Figure H-3), which accounts for approximately 9.8 percent of the total acreage within the CIAA (LANDFIRE 2022). The Proposed Action would result in an incremental increase in surface disturbance, with 1,015 acres projected in the short term during well development and 285 acres in the long term during well production (BLM 2020). As a result, the total cumulative surface disturbance in the CIAA, including the Proposed Action, is estimated to be 54,506 acres in the short term and 53,776 acres in the long term, which represents an increase of 2.7 percent of cumulative disturbance in the short term and an increase of 1.3 percent in the long term. This cumulative disturbance has and would continue to affect vegetation and rare plants due to removal and clearing of vegetation, increased mortality of individual plants, increased exposure and changes in vegetative conditions along the edge of cleared areas (i.e., *edge effects*), increased risk of establishment and spread of invasive plant species and noxious weeds, and other types of effects similar to those described in Section 3.5.2, *Vegetation and Rare Plants – Environmental Impacts*.

The cumulative disturbance has and would continue to affect terrestrial wildlife and their habitat due to habitat removal, habitat fragmentation, increased edge effects, increased potential for wildlife deaths from wildlife-vehicle collisions, exposure of wildlife to contaminants from water impoundments and other sources, and disturbance from noise and human presence. The potential for these cumulative impacts is expected to be more pronounced under the scenario where operators who are awarded leases proceed with private surface development prior to submitting

an APD to the BLM to access Federal minerals because surface disturbance and other development that would affect wildlife would occur prior to the APD process where the BLM has the authority to require AMMs and resource protection measures as COAs accompanying APD approvals. However, under this scenario, operators would still be required to comply with the State of Ohio regulations and standards to minimize potential impacts on natural resources, including terrestrial wildlife, as described in Appendix E (*Legal and Regulatory Authorities*).

Surface water withdrawals from the CIAA are likely to increase as more wells are permitted in the CIAA. As discussed in Section 3.6.2, *Water Resources – Environmental Impacts*, streamflow reductions related to reasonably foreseeable development of the leases that may be issued under the Proposed Action are expected to result in a minor reduction (from 0.32 percent to 0.46 percent) in surface-water availability, based on the Little Muskingum River case. However, withdrawals during rare (less than 10 percent of the time), extreme, low-flow events would reduce the quality and quantity of water used by terrestrial wildlife as drinking sources as well as affect insect production for species such as the Indiana bat. Implementation of Forest Plan stipulations (Appendix F) and compliance with Federal and State regulations (e.g., ORC § 1521.23) may assist in avoiding substantial drawdown of surface waters in the CIAA, as described in Sections 3.6.2.2, 3.6.3.2, and 3.7.3. However, increased mineral extraction on private lands would lead to cumulative impacts on wildlife and their habitats if future withdrawals do not trigger the need for a consumptive use permit under ORC Section 1521.23.

3.8.3.1. Cumulative Impacts on Listed Bat Species

Existing threats to the Indiana bat, the northern long-eared bat, and the tricolored bat include habitat loss and fragmentation, white-nose syndrome, human disturbance, pollution from historical and existing mining and oil and gas developments, and climate change trends such as increased drought, more severe/extreme precipitation events, and wildfires.

WNS is the greatest threat to the persistence of Indiana bat, northern long-eared bat, and tricolored bat and would continue to be so into the future until effective containment and treatments are developed or species adapt and become resilient. The Proposed Action does not have any activities that would contribute to effects from WNS and, therefore, would not contribute to cumulative WNS impacts.

Existing and future oil and gas development on private land is expected to be the largest contributor to cumulative impacts on listed bat species in the CIAA, especially under the scenario where operators who are awarded leases proceed with private surface development prior to submitting an APD to the BLM to access Federal minerals. Cumulative surface disturbance and removal of habitat would cumulatively decrease suitable bat habitat in the CIAA.

As noted above, the total cumulative surface disturbance in the CIAA, including the Proposed Action, is estimated to be 54,506 acres in the short term and 53,776 acres in the long term, which represents an increase of 2.7 percent of cumulative disturbance in the short term and an increase of 1.3 percent in the long term.

Prior to the boom in horizontal drilling and hydraulic fracturing in the late 2000s, there were an estimated 47,319 acres of developed land/disturbance within the CIAA in 2001 (LANDFIRE 2001). As such, estimated developed land/surface disturbance has increased approximately 13

percent between 2001 and 2022 in the CIAA, primarily resulting from increased oil and gas development and development of roads. Based on the developed land data, it is difficult to discern how much of the cumulative surface disturbance has been associated with removal or clearing of tree/forest canopy cover that may provide habitat to bats; however, it is reasonable to assume that the cumulative surface disturbance presented above has removed bat habitat in the CIAA. Cumulative changes to forest structure and cumulative loss of forest cover affect listed bats that rely on forest habitats for roosting, pup-rearing, and foraging during the summer. However, due to the abundant suitable forested habitat in the CIAA, and because suitable forest habitat is generally not a limiting factor for Federally protected bats, the Proposed Action would minimally contribute to cumulative impacts on Federally protected bats.

In most cases, activities on local and private lands receive little oversight from Federal agencies, as there is no Federal nexus to trigger Federal permitting and oversight; as such, the bat AMMs described in Appendix G, Section 2.6.1.1 of this EA, applicable standards and guidelines, lease stipulations, and other Federal protection measures would likely not be applied. Construction and operation on private land without application of Federal protection measures could result in impacts on bat species from removal of unknown occupied roost trees that, depending on the season, could result in the death of flightless pups or other individuals unable to flee in time. Such activities would also remove a portion of a bat or maternity colony's home range or key foraging habitat, resulting in unexpected energy demands and fragmentation of roost networks (Silvis et al. 2014, 2015). Over time, such undocumented and unknown losses may contribute to cumulative impacts on local bat populations. In addition, due to the declines in bat populations from WNS, mortality of, and injury to individual bats from removing or disturbing essential bat habitat features (i.e., maternity roosts, hibernacula) during sensitive periods would cumulatively affect bat recovery.

Future oil and gas development on private land is expected to continue and expand as demand for energy rises. Tree clearing and surface disturbance associated with oil and gas development on private lands would have the same effects as described above for oil and gas leasing for Federal minerals but without the oversight of the BLM requiring COAs and AMMs to protect resources and species to access Federal mineral estates. Similarly, if operators develop private surface prior to submittal of APDs, there is potential to remove suitable habitat and directly harm or kill ESA-protected bat species before they apply for an APD from the BLM. For example, if an operator previously developed a surface well pad on private land to access private minerals and then secures a Federal mineral lease and proposes an APD to develop that lease using the same well pad, the BLM would only be assessing the "down-hole" impacts of accessing the Federal minerals. In this case, COAs, AMMs, and other resource protection measures for listed species may not have been applied because the surface disturbance occurred prior to Federal agency involvement.

Increased mineral extraction on private and state lands would contribute to adverse effects on bat species and their habitat if future water withdrawals do not trigger the need for a consumptive use permit under ORC Section 1521.23. Surface-water withdrawals in the area are likely to increase over time as more oil and gas wells are permitted, and other activities (i.e., agricultural, residential developments) occur that require water withdrawal. Withdrawals during extreme, low-flow events would reduce the quality and quantity of freshwater used by bat species as drinking sources and affect insect production for bat prey. As part of APDs, operators are

required to identify the source and volume of water that would be used to drill, complete, and operate wells. During Stage 3 environmental review of APDs and the Tier 2 consultation, if the BLM or USFWS determines that proposed water withdrawals have potential to affect ESA-listed species, the BLM would include COAs on the permit that would avoid and minimize identified impacts. For example, the BLM can limit the extent and timing of water withdrawals as part of a COA for the APD based on drought conditions or low-flow conditions to protect water quality, water quantity, aquatic habitat, and Federally listed species.

Oil and gas operators and development on private land are also subject to the ESA and required by law to follow protective measures or development alternatives should any endangered species be known to inhabit or be found inhabiting a potential development site (16 USC 1531-44) and all operators on private land are subject to Section 9 of the ESA that makes it illegal to harass, hunt, shoot, capture, trap, kill, collect, wound, or harm (i.e., “take”) any ESA-listed species or to pursue/attempt any of these activities. It would have been up to operators on private lands to contact the USFWS to request and follow technical assistance under Section 9 of the ESA (16 USC 1538) and any resulting effects of their actions would have been outside of BLM or USFS control; as such, the surface activities may contribute to cumulative impacts. If it is apparent that private surface disturbance and development prior to submittal of APDs has resulted in removal of suitable bat habitat that has (1) likely resulted in adverse effects on ESA-protected bat species, (2) is directly interconnected to development of Federal mineral leases under this Proposed Action (i.e., creation of a new well pad), and (3) would otherwise not have occurred, the BLM may choose to not approve an APD or require additional mitigation as COAs to offset adverse cumulative impacts.

The State of Ohio has a variety of regulatory requirements and standards intended to minimize potential impacts on natural resources, including Federally protected species, from development on private surface, as described in Appendix E (*Legal and Regulatory Authorities*). As part of the State of Ohio permitting process, the ODNR-DOGRM would conduct a site review meeting at proposed well sites on private land. At the site review meeting, the ODNR-DOGRM may conduct a physical review of the proposed well site, discuss the application, identify items that are necessary to ensure compliance with State regulations, identify site-specific terms and conditions that may be attached to a permit that approves an application to construct a well site, and identify site-specific terms and conditions that may be attached to a permit to drill a well, such as BMPs identified in the ODNR’s *Best Management Practices for Oil and Gas Well Site Construction* (ODNR 2013). For example, during the ODNR-DOGRM site review meeting, if it is determined that suitable bat habitat exists or if hibernacula or roosts are present at or near the proposed well site, the ODNR-DOGRM may require specific terms and conditions as part of the permit to minimize impacts on Federally listed bat species and their habitat. In addition, the ODNR has indicated that oil and gas operators regularly take steps to avoid violating the ESA including conducting bat surveys and restricting their tree-cutting to winter (ODNR 2024c).

Climate change has the potential to contribute to cumulative impacts on bat species. Climate change effects that alter precipitation regimes and increase drought also contribute to decreases in available water and changes in aquatic habitat that would cumulatively affect bat prey species with an aquatic life stage. Temperate zone bats may be more sensitive than many other groups of mammals to climate change because their reproductive cycles and success, hibernation patterns, and migration are closely linked to temperature (Loeb and Winters 2012). Bats may be

particularly impacted by drought and extreme weather events because most insectivorous bats must drink to maintain water balance, and water needs increase considerably during pregnancy and lactation. Thus, severe droughts, particularly when coupled with unusually cold or hot temperatures, may have impacts on bat reproductive success. Additionally, insect populations often decline during drought resulting in increased foraging costs and decreased annual survival for bats (Loeb and Winters 2012).

Table 3- summarizes the effects determination for the species considered in the Terrestrial Analysis Area. The effects determination assumes all required AMMs are implemented. If AMMs cannot be applied to surface development on Federal land then additional coordination and consultation may be required with the USFWS.

Table 3-24. Effects Determination Summary – Terrestrial Wildlife Species

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	DETERMINATION
<i>Animals</i>			
Indiana bat	<i>Myotis sodalis</i>	Endangered	may affect, not likely to adversely affect
Northern long-eared bat	<i>Myotis septentrionalis</i>	Endangered	may affect, not likely to adversely affect
Tricolored bat	<i>Perimyotis subflavus</i>	Proposed Endangered	may affect, not likely to adversely affect
Monarch butterfly	<i>Danaus plexippus</i>	Proposed Threatened	not likely to jeopardize

3.9. Transportation

Issue 7: How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing impact transportation in the region?

3.9.1. Affected Environment

The affected environment for transportation is analyzed in Section 3.9 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference.

3.9.2. Environmental Impacts

Potential impacts on transportation from activities in the oil and gas program are analyzed in Section 4.9 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference. New and relevant information is needed to support this EA because the analysis of transportation management in the 2016 EA did not consider the projections in the 2020 RFDS (Appendix D) and, as noted in CBD, did not capture the full range of impacts that would result from horizontal drilling with hydraulic fracturing.

3.9.2.1. Impacts of Alternative A – No-Action Alternative

Under the No-Action Alternative, the BLM would not offer Federal minerals in the Marietta Unit for oil and gas leasing, including the parcels requested in currently pending EOIs and all other Federal minerals in the Marietta Unit and would rescind any leasing decisions that were supported, for NEPA-compliance purposes, by the 2016 EA. Therefore, the No-Action Alternative would not result in any substantive change to the estimated impacts on transportation from those analyzed under the No-Action Alternative in Section 4.9 of the 2016 EA (BLM 2016).

3.9.2.2. Impacts of Alternative B – Proposed Action

The increased level of development associated with horizontal drilling using high-volume hydraulic fracturing rather than vertical drilling, as described in the 2020 RFDS, would likely increase the amount of new access roads needed to support those wells and well pads compared to the 2016 EA. These roads would be used for oil and gas development and would also be utilized by the BLM, private landowners, and other entities.

Horizontal drilling and hydraulic fracturing would also increase heavy-truck (defined as four or more axles) traffic on surrounding roadways as compared to vertical drilling because of increased amounts of drilling and fracturing materials being transported to wellhead and disposal facilities (Patterson and Maloney 2016). A 2015 report prepared by the Colorado Department of Transportation (CDOT 2015) compiled truck-trip estimates for vertical and horizontal drilling from a variety of independent studies and industry feedback (Table 3-). For vertical well drilling, two EIS studies were obtained from western Wyoming and the Marcellus Shale region of New York. Studies obtained for horizontal drilling estimates were conducted by the National Park Service, NTC Consultants, Utah Department of Transportation, North Dakota State University, and Economic Advisors, Inc. For this study, vertically drilled and hydraulically fractured wells were compared to horizontally drilled and hydraulically fractured wells. The Colorado Department of Transportation's truck trip estimates are summarized in Table 3- below.

Table 3-25. Average Truck Trip Generation Estimates for Vertical and Horizontal Drilling Techniques

DEVELOPMENT PHASE	VERTICAL WELL TRUCK TRIPS (1 PAD, 1 WELL)	HORIZONTAL WELL TRUCK TRIPS (1 PAD, 1 WELL)	HORIZONTAL WELL TRUCK TRIPS (1 PAD, 3 WELLS)
Construction			
Pad and Road Construction	63	87	87
Drilling Rig	66	67	67
Drilling			
Drilling Fluid and Materials	45	79	316

DEVELOPMENT PHASE	VERTICAL WELL TRUCK TRIPS (1 PAD, 1 WELL)	HORIZONTAL WELL TRUCK TRIPS (1 PAD, 1 WELL)	HORIZONTAL WELL TRUCK TRIPS (1 PAD, 3 WELLS)
Drilling Equipment (e.g., casing, drill pipe)	59	65	260
Completion Rig	22	33	33
Completion Fluid and Minerals	24	32	128
Completion Equipment (e.g., pipe, wellhead)	8	13	13
Completion			
Fracturing Equipment (e.g., pump, trucks, tanks)	147	250	250
Fracture Water	246	923	3,692
Fracture Sand	15	84	336
Flowback Water Disposal	103	308	1,232
Totals	798	1,941	6,414

Source: CDOT 2015.

On average, 798 truck trips are needed for construction of one well pad with a single vertical well that is hydraulically fractured; 1,941 trips are needed for construction of one well pad with a single horizontal well that is hydraulically fractured; and 6,414 trips are needed for construction of one well pad with three horizontal wells that are hydraulically fractured (Table 3-). Horizontal drilling and hydraulic fracturing is therefore anticipated to require more than double the truck trips for construction of one well pad with a single well, and approximately eight times the truck trips for construction of one well pad with three wells (CDOT 2015). Furthermore, when considering a vertically drilled well that is not hydraulically fractured, approximately 287 trips are needed for construction of one well pad with one vertical well (Table 3-). The 2020 RFDS (Appendix D) assumed that up to two wells pads with two to three producing wells on each pad would be developed in the Action Area per year (BLM 2020); therefore, a substantial increase in heavy truck traffic would result from horizontal drilling using high-volume hydraulic fracturing compared to vertical drilling. This increase in traffic would lead to impacts on the WNF transportation system, such as increased congestion and potential risk for roadway accidents (Patterson and Maloney 2016).

Increased heavy-truck traffic required for horizontal well development has also been documented to increase the expected rate of road deterioration (Quiroga et al. 2012; Gannett Fleming Freight Solutions 2011). Roads and bridges are designed and constructed based on projected traffic frequency and weight. Interstate highways are constructed to withstand higher volumes of traffic, including heavy-truck traffic and heavier loads than local roads. Therefore, local roads are more

susceptible to deterioration as a result of increased heavy truck traffic due to developing horizontal wells using high-volume hydraulic fracturing (Patterson and Maloney 2016). In Texas, 1 year of heavy-truck traffic associated with the development of 100 new wells reduced the design life of a typical rural road by 40 percent (Quiroga et al. 2012).

Per ORC Section 1509.06(A)(11)(b), ODNR requires that all applications for a horizontal well permit include a road use maintenance agreement (RUMA) between the operator and local jurisdiction concerning maintenance and safe use of the local roads, streets, and highways. If a RUMA is not included, the operator must provide a form attesting that they attempted in good faith to enter into an agreement under division (A)(11)(b), but that no agreement was executed (ORC § 1509.06). RUMAs require operators to outline which roads are expected to be used for hauling and document existing conditions of those roads prior to construction. After completion of each well, an engineer from the local jurisdiction typically inspects the haul roads for damage done during the well-construction period including damage to road base, culverts, bridges, ditches, guardrails, signs, or other road appurtenances. A list of damages is provided to the operator, who is required to make the necessary repairs based on local jurisdiction and Ohio Department of Transportation specifications.

Although implementation of RUMAs would help reduce impacts associated with road deterioration, increased unconventional drilling and hydraulic fracturing projected in the 2020 RFDS (Appendix D) would lead to transportation impacts. Deteriorating roadways would further intensify congestion and risk for roadway accidents throughout the Action Area.

In general, the transportation-related measures presented in Appendix F are presumed to be effective at reducing potential impacts on transportation, including placing load limits on roads susceptible to damage (Appendix F, Reference Number GFW-TRANS-5) and requiring travel only on WNF roads at Maintenance Levels 2 to 5 (Appendix F, Reference Number GFW-TRANS-7). During the Stage 3 environmental review of site-specific APDs, the BLM would further assess proposed transportation routes, proposed types and volumes of vehicles, and other potential impacts on transportation based on individual development proposals and would apply appropriate COAs to avoid, minimize, and reduce impacts on the transportation network, traffic, and roads in the area.

3.9.3. Cumulative Impacts

The CIAA for transportation encompasses the Marietta Unit of the WNF and a 4.5-mile buffer into Ohio and West Virginia. Beyond this buffer, the projected oil and gas facilities would be unlikely to impact transportation in the WNF, unless produced water or other products were trucked to sites outside the 4.5-mile buffer for disposal, or water is trucked in from sources outside of the CIAA; however, specific locations for disposal would not be known until APDs are received. Historical activities, current ongoing projects, and reasonably foreseeable future actions that would result in transportation impacts in the CIAA are outlined in Appendix H (*Past, Present, and Reasonably Foreseeable Future Actions*).

Ongoing and future oil and gas development and other reasonably foreseeable actions would contribute to cumulative impacts in the CIAA from increased heavy-truck traffic, expansion of the road network, and road deterioration. In addition to discrete USFS projects throughout the Marietta Unit, existing and future oil and gas development on private land is expected to be the

largest contributor to cumulative transportation impacts in the CIAA. There are 21,598 oil and gas-related wells that have been permitted or constructed in the CIAA as of August 2024, with 86 percent of those wells located on private land as depicted on Figure H-2 in Appendix H (*Past, Present, and Reasonably Foreseeable Future Actions*). Although it is difficult to predict the level of traffic associated with existing wells since they are at various stages of development, increased truck traffic resulting from the Proposed Action may exacerbate existing transportation issues in the CIAA. These impacts would result in cumulative impacts on the transportation system, such as increased congestion and potential risk for roadway accidents.

3.10. Socioeconomics and Local Economics

Pursuant to Executive Order 14154, *Unleashing American Energy* (Jan. 20, 2025) and the Presidential Memorandum entitled *Ending Illegal Discrimination and Restoring Merit-Based Opportunity* (Jan. 21, 2025), the analysis of environmental justice impacts is no longer required.¹⁰ This EA therefore does not consider these impacts, even though they were analyzed and published in the Draft Supplemental EA (March 2024) and these impacts were raised in public comments. BLM has modified Issue 8 from the version appearing in the Draft Supplemental EA to remove discussion of environmental justice impacts and to read as follows:

Issue 8: How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing impact socioeconomics and local economic conditions and communities in the region?

3.10.1. Affected Environment

The Analysis Area for socioeconomics and local economics has been updated since the publication of the 2016 EA (BLM 2016) to include all populations within the watershed boundary. This ensures socioeconomic effects are analyzed for populations in this area. For the socioeconomic evaluation, the scale of analysis is the nine counties intersected by the Analysis Area, as shown on Figure . This includes Monroe County, Washington County, Noble County, Belmont County, Ritchie County, Wetzel County, Tyler County, Pleasants County, and Wood County, in two states (Ohio and West Virginia).

Additionally, the 2016 EA used 2010 decennial U.S. Census Bureau (Census) data, as well as 2016 data from the Appalachian Regional Commission (ARC). For this EA, all data tables have been updated with the most recent and available Census data for the Analysis Area (U.S. Census Bureau 2020, 2022a, 2022b, 2022c, 2022d).

¹⁰ Executive Order 14154, *Unleashing American Energy* (Jan. 20, 2025), and a Presidential Memorandum, *Ending Illegal Discrimination and Restoring Merit-Based Opportunity* (Jan. 21, 2025), require the Department to strictly adhere to the National Environmental Policy Act (NEPA), 42 USC §§ 4321 *et seq.* Further, such Order and Memorandum repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023), requiring consideration of environmental justice impacts. Because Executive Orders 12898 and 14096 have been repealed, complying with such Orders is a legal impossibility. The BLM verifies that it has complied with the requirements of NEPA, including CEQ's 2020 NEPA regulations, the Department's regulations and procedures implementing NEPA at 43 CFR Part 46, Part 516 of the Departmental Manual, and BLM's NEPA Handbook H-1790-1. consistent with the President's January 2025 Order and Memorandum.

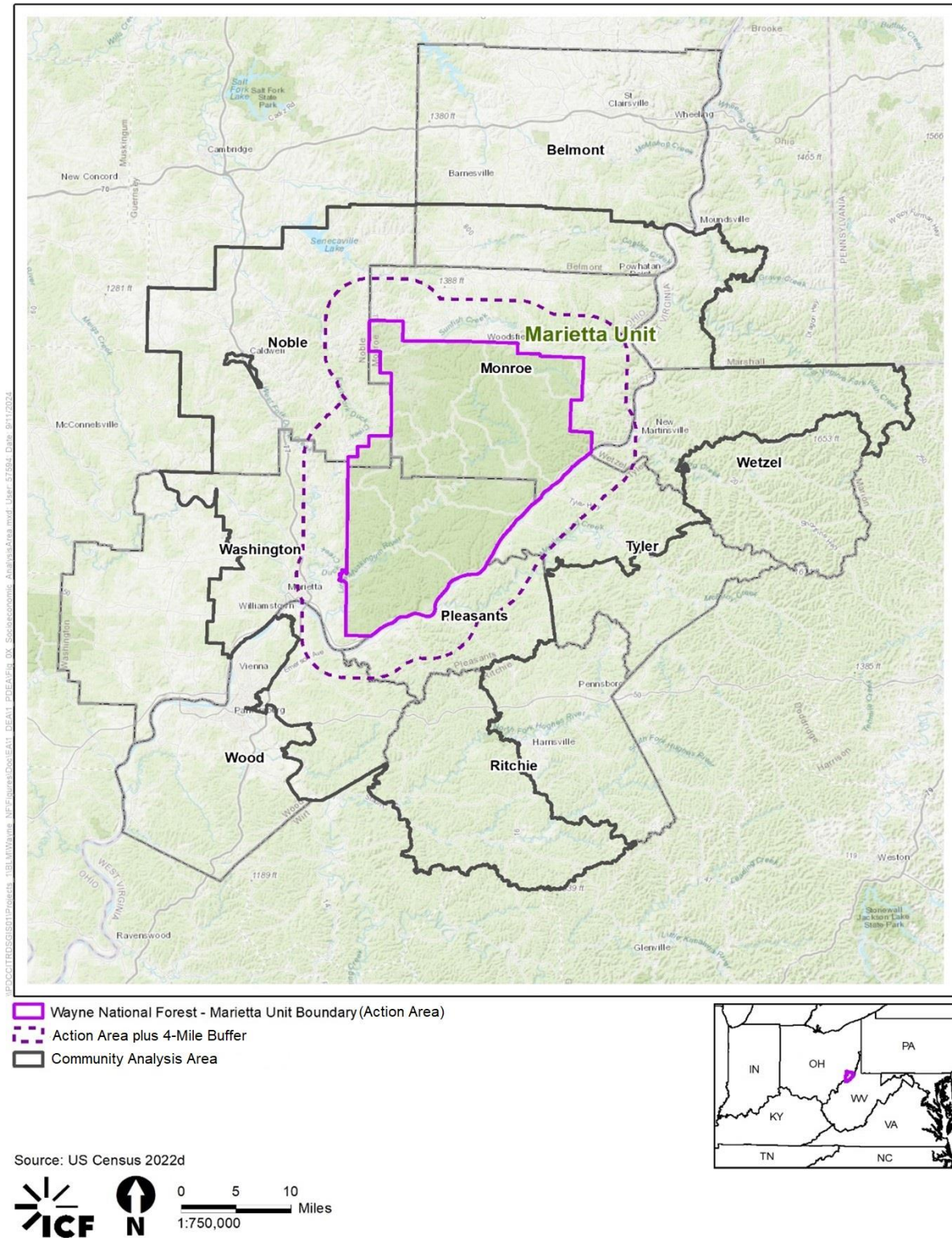


Figure 13. Socioeconomics and Local Economics Analysis Area for the Proposed Action

3.10.1.1. Population

Southeastern Ohio and the adjacent portion of West Virginia are largely rural, with Marietta being the largest city. Based on Census projections between the 2010 and 2022 American Community Survey, the population in Ohio increased by 2.28 percent and the population in West Virginia decreased by 2.60 percent (see Table 3-). Of the nine counties in the Analysis Area, all experienced population decreases. Noble County, Ohio, experienced the smallest population decrease of 2.86 percent and Ritchie County, West Virginia, experienced the greatest population decrease of 19.09 percent.

Table 3-26. Population in Southeastern Ohio and West Virginia

AREA	2010	2022	DIFFERENCE IN POPULATION FROM 2010–2022
United States	303,965,272	331,097,593	8.93%
States			
Ohio	11,512,431	11,774,683	2.28%
West Virginia	1,840,802	1,792,967	-2.60%
Counties			
Belmont County, Ohio	70,403	66,554	-5.47%
Monroe County, Ohio	14,751	13,401	-9.15%
Noble County, Ohio	14,634	14,216	-2.86%
Pleasants County, West Virginia	7,664	7,622	-0.55%
Ritchie County, West Virginia	10,514	8,507	-19.09%
Tyler County, West Virginia	9,339	8,336	-10.74%
Washington County, Ohio	62,066	59,639	-3.91%
Wetzel County, West Virginia	16,697	14,431	-13.57%
Wood County, West Virginia	86,731	84,272	-2.84%

Source: U.S. Census Bureau 2010, 2022a.

3.10.1.2. Employment and Income

Several data sources were used to assess the economic characteristics within the Analysis Area; these sources include the ARC, Headwaters Economics BLM Socioeconomic Profiles Tool, and data from the Census.

ARC is a regional economic development agency that seeks to build community capacity and strengthen economic growth in the 420 counties of the 13 Appalachian states. The counties

considered in this EA analysis are within the purview of ARC, which ranks the Appalachian counties on a continuum, ranging from “attainment” to “distressed” using unemployment, per-capita income, and poverty data. These rankings are defined as follows.

- **Attainment:** Ranking among the nation’s top 10 percent
- **Competitive:** Ranking in the top quartile, but not in the top 10 percent
- **Transitional:** Ranking in the middle two quartiles
- **At-Risk:** Ranking in the bottom quartile, but not in the bottom 10 percent
- **Distressed:** Ranking in the bottom 10 percent

Table 3- lists the economic rankings of the counties in the Analysis Area since 2010 (ARC 2023). As shown in Table 3-, only Ritchie and Tyler Counties in West Virginia are currently ranked as “at-risk,” and Noble and Monroe Counties in Ohio and Wetzel County in West Virginia are currently ranked as “distressed.”

Table 3-27. Economic Status as Ranked by the Appalachian Regional Commission

FISCAL YEAR	BELMONT COUNTY, OH	NOBLE COUNTY, OH	MONROE COUNTY, OH	WASHINGTON COUNTY, OH	PLEASANTS COUNTY, WV	RITCHIE COUNTY, WV	TYLER COUNTY, WV	WETZEL COUNTY, WV	WOOD COUNTY, WV
2010	Transitional	At-Risk	Distressed	Transitional	Transitional	At-Risk	At-Risk	At-Risk	Transitional
2011	Transitional	At-Risk	At-Risk	Transitional	Transitional	At-Risk	At-Risk	At-Risk	Transitional
2012	Transitional	Distressed	At-Risk	Transitional	Transitional	Transitional	At-Risk	At-Risk	Transitional
2013	Transitional	Distressed	At-Risk	Transitional	Transitional	Transitional	At-Risk	At-Risk	Transitional
2014	Transitional	Distressed	At-Risk	Transitional	At-Risk	Transitional	At-Risk	Transitional	Transitional
2015	Transitional	At-Risk	Transitional	Transitional	Transitional	Transitional	At-Risk	At-Risk	Transitional
2016	Transitional	At-Risk	At-Risk	Transitional	Transitional	Transitional	At-Risk	At-Risk	Transitional
2017	Transitional	Transitional	At-Risk	Transitional	Transitional	Transitional	At-Risk	At-Risk	Transitional
2018	Transitional	Transitional	At-Risk	Transitional	Transitional	At-Risk	At-Risk	At-Risk	Transitional
2019	Transitional	Transitional	Distressed	Transitional	Transitional	At-Risk	At-Risk	Distressed	Transitional
2020	Transitional	At-Risk	Distressed	Transitional	At-Risk	At-Risk	At-Risk	Distressed	Transitional
2021	Transitional	Distressed	Distressed	Transitional	Transitional	At-Risk	At-Risk	Distressed	Transitional
2022	Transitional	Distressed	Distressed	Transitional	Transitional	At-Risk	At-Risk	Distressed	Transitional

Source: ARC 2023.
OH = Ohio; WV = West Virginia

The Headwaters Economics BLM Socioeconomic Profiles Tool provides interactive socioeconomic data and reports on lands managed by the BLM (Headwaters Economics 2023). Particularly in rural areas, high-wage jobs in industries like oil and gas, mining, and manufacturing play a vital role in local economies despite employing fewer people (Headwaters Economics 2023). Data on wages in the Analysis Area show that the mining industry, including oil and gas, pay more, on average, than jobs associated with most other sectors.

As shown in Table 3-, the mining sector had an average annual wage of \$87,940 in 2023, significantly higher than the overall average private sector wage of \$51,868 and exceeding wages in every other industry aside from the Federal government (\$88,366 average wage). When compared to other sectors, such as manufacturing (9.8 percent of total employment) and construction (5.3 percent of total employment), the mining sector (2.6 percent of total employment) employs fewer people but offers higher compensation, demonstrating its role in supporting household incomes in the region (Headwaters Economics 2023; U.S. Department of Labor 2024).

The Analysis Area experienced a loss of over 9,000 jobs across all sectors in 2022 relative to 2001 employment levels. This corresponds to a population decline, as detailed in Section 3.10.1.1. Sectors showed mixed trends: health care added almost 2,000 jobs, a 13 percent increase, while construction and manufacturing experienced job declines of 16 and 43 percent, respectively. The mining sector, including oil and gas extraction, saw total jobs increase over 70 percent in 2022 relative to 2001. 3.10.1.1

Table 3-28. Wages and Jobs by Industry, in 2023 dollars

EMPLOYMENT AND WAGES IN ANALYSIS AREA	AVERAGE ANNUAL WAGES (1)	% OF TOTAL EMPLOYMENT(1)
Total	\$52,696	--
Private	\$51,868	82.7%
Non-Services Related	\$74,340	17.8%
Natural Resources and Mining	\$84,885	2.7%
Agriculture, forestry, fishing & hunting	\$34,852	0.2%
Mining (incl. fossil fuels)	\$87,940	2.6%
Construction	\$64,549	5.3%
Manufacturing (Incl. Forest products)	\$76,703	9.8%
Services Related	\$45,776	65.4%
Trade, Transportation, and Utilities	\$44,100	21.2%
Information	\$53,104	0.9%
Financial Activities	\$57,875	3.6%
Professional and Business Services	\$61,426	7.3%
Education and Health Services	\$56,585	18.1%
Leisure and Hospitality	\$20,242	11.4%
Other Services	\$33,481	2.8%
Unclassified	\$55,900	0.0%
Government	\$56,649	17.3%
Federal Government	\$88,366	3.0%
State Government	\$57,947	2.9%
Local Government	\$47,837	11.4%

Sources: Headwaters Economics 2023; (1) U.S. Department of Labor 2024

Additionally, Census data indicate that the median household income for the nine counties ranged from \$48,973 (Ritchie County, West Virginia) to \$59,666 (Pleasants County, West Virginia) as shown in Table 3-. All nine counties had a lower median household income than the U.S. average. The BLM defines *low-income communities* as a set of individuals in the same area or sharing the same experiences whose income is less than or equal to twice (200 percent) the Federal poverty level (FPL) (BLM 2022b). The percentage of individuals below the 200-percent FPL ranged from 31.2 percent (Tyler County, West Virginia) to 43.2 percent (Ritchie County, West Virginia) (Table 3-). Low-income percentages for the counties in Ohio are higher than the state average of 29.6 percent, with individual counties ranging from 32.5 percent in Noble County to 38.0 percent in Monroe County. Poverty levels for the counties in West Virginia are comparable to the state average of 36.7 percent, with individual counties ranging from 31.2 percent in Tyler County to 43.2 percent in Ritchie County. All the counties had higher poverty levels than the U.S. average of 28.8 percent.

Table 3-29. Median Household Income in Southeastern Ohio and West Virginia

AREA	MEDIAN HOUSEHOLD INCOME
United States	\$75,149
Ohio	\$66,990
West Virginia	\$55,217
Belmont County, OH	\$56,943
Monroe County, OH	\$55,381
Noble County, OH	\$51,547
Washington County, OH	\$59,053
Pleasants County, WV	\$59,666
Ritchie County, WV	\$48,973
Tyler County, WV	\$59,167
Wetzel County, WV	\$50,715
Wood County, WV	\$54,350

Source: U.S. Census Bureau 2022b.

OH = Ohio; WV = West Virginia

Table 3-30. Poverty Levels in Southeastern Ohio and West Virginia

AREA	INDIVIDUALS WITH INCOME BELOW 200 PERCENT OF THE FEDERAL POVERTY LEVEL
United States	28.8%
Ohio	29.6%
West Virginia	36.7%
Belmont County, OH	33.3%
Monroe County, OH	38.0%
Noble County, OH	32.5%
Washington County, OH	33.0%
Pleasants County, WV	32.2%

AREA	INDIVIDUALS WITH INCOME BELOW 200 PERCENT OF THE FEDERAL POVERTY LEVEL
Ritchie County, WV	43.2%
Tyler County, WV	31.2%
Wetzel County, WV	41.7%
Wood County, WV	35.7%

Source: U.S. Census Bureau 2022c.
OH = Ohio; WV = West Virginia

3.10.1.3. Public Health and Safety

The affected environment for public health and safety is analyzed in Section 3.8 of the 2016 EA (BLM 2016) and that analysis is incorporated here by reference. Refer to Section 3.8 of the 2016 EA.

In addition to health concerns identified in Sections 3.3 and 3.6 of this EA, populations in southeastern Ohio and the adjacent portion of West Virginia are above average for some environmental burden, health, climate, and critical service indicators. The Community Report within the Analysis Area identifies that environmental burden indices related to air quality, traffic proximity, Risk Management Program/hazardous waste facility proximity, and underground storage tanks are below the 50th percentile as compared to the state. Notably, the area is in the 74th percentile for wastewater discharge, the 99th percentile for drinking water non-compliance, the 86th percentile for heart disease, the 76th percentile for cancer, the 80th percentile for disabilities, and the 95th percentile for flood risk (USEPA 2023b). Key existing indicators for the counties in the Analysis Area are summarized in Table 3- (air quality), Table 3- (hazardous waste), and Table 3- (traffic). These vulnerabilities provide additional context for the potential impacts associated with the Proposed Action.

Table 3-31. Air Quality Indicator Summary of Analysis Area Counties

AREA	PM _{2.5} (MG/M ³)	PM _{2.5} PERCENTILE IN THE US	O ₃ (PPB)	O ₃ PERCENTILE IN THE US	DIESEL PARTICULATE MATTER (MG/M ³)	DIESEL PARTICULATE MATTER PERCENTILE IN THE U.S.
Belmont County, Ohio	7.29	24 th	59.7	47 th	0.058	11 th
Monroe County, Ohio	7.12	21 st	57.4	34 th	0.054	9 th
Noble County, Ohio	7.32	25 th	56.7	31 st	0.063	13 th
Washington County, Ohio	7.54	30 th	56.9	32 nd	0.072	17 th
Pleasants County, West Virginia	7.09	20 th	57	32 nd	0.045	6 th
Ritchie County, West Virginia	6.81	15 th	52.2	7 th	0.042	5 th
Tyler County, West Virginia	6.98	18 th	57	32 nd	0.043	6 th

AREA	PM _{2.5} (MG/M ³)	PM _{2.5} PERCENTILE IN THE US	O ₃ (PPB)	O ₃ PERCENTILE IN THE US	DIESEL PARTICULATE MATTER (MG/M ³)	DIESEL PARTICULATE MATTER PERCENTILE IN THE U.S.
Wetzel County, West Virginia	6.75	14 th	56	28 th	0.042	5 th
Wood County, West Virginia	7.47	29 th	56.2	29 th	0.089	24 th

Source: USEPA 2023b

mg/m³ = milligrams per cubic meter; ppb = parts per billion

Table 3-32. Hazardous Waste Indicator Summary of Analysis Area Counties

AREA	HAZARDOUS WASTE PROXIMITY VALUE (FACILITY COUNT/KM DISTANCE)	HAZARDOUS WASTE PROXIMITY PERCENTILE IN THE U.S.	UNDERGROUND STORAGE TANK VALUE (COUNT/KM ²)	UNDERGROUND STORAGE TANK PERCENTILE IN THE U.S.
Belmont County, Ohio	0	0	0.03	29 th
Monroe County, Ohio	0	0	0.22	37 th
Noble County, Ohio	0.25	25 th	0.05	31 st
Washington County, Ohio	0.91	43 rd	0.24	38 th
Pleasants County, West Virginia	0.3	27 th	0	0
Ritchie County, West Virginia	0.17	21 st	0.63	46 th
Tyler County, West Virginia	0	0	0.38	42 nd
Wetzel County, West Virginia	0.16	21 st	0.02	28 th
Wood County, West Virginia	0.05	15 th	1.1	53 rd

Source: USEPA 2023b.

km = kilometer; km² = square kilometer

Table 3-33. Traffic Indicator Summary of Analysis Area Counties

AREA	TRAFFIC PROXIMITY (DAILY TRAFFIC COUNT/DISTANCE TO ROAD)	TRAFFIC PROXIMITY PERCENTILE IN THE U.S.
Belmont County, Ohio	53,000	12 th
Monroe County, Ohio	0	0
Noble County, Ohio	35,000	10 th
Washington County, Ohio	83,000	16 th

AREA	TRAFFIC PROXIMITY (DAILY TRAFFIC COUNT/DISTANCE TO ROAD)	TRAFFIC PROXIMITY PERCENTILE IN THE U.S.
Pleasants County, West Virginia	21,000	7 th
Ritchie County, West Virginia	8,500	4 th
Tyler County, West Virginia	1,100	1 st
Wetzel County, West Virginia	880	1 st
Wood County, West Virginia	280,000	30 th

Source: USEPA 2023b.

3.10.2. Environmental Impacts

Potential impacts on socioeconomics and local economic conditions from all activities in the oil and gas program were analyzed in Section 4.15 of the 2016 EA (BLM 2016) and impacts on public health and safety were analyzed in Section 4.8. Those analyses are incorporated here by reference. The following analysis considers new and relevant information needed to support this EA, because the analysis of potential impacts on socioeconomics and local economic conditions and public health and safety in the 2016 EA did not consider the projections in the 2020 RFDS (Appendix D) and, as noted in *CBD*, did not capture the full range of impacts that would result from horizontal drilling with hydraulic fracturing.

3.10.2.1. Impacts of Alternative A – No-Action Alternative

Under the No-Action Alternative, the BLM would not offer Federal minerals in the Marietta Unit for oil and gas leasing, including the parcels requested in currently pending EOIs and all other Federal minerals in the Marietta Unit and would rescind any leasing decisions that were supported, for NEPA-compliance purposes, by the 2016 EA. Therefore, the No-Action Alternative would not result in any substantive change to the estimated impacts on socioeconomics and local economic conditions from those impacts analyzed under the No-Action Alternative in Sections 4.8 and 4.15 of the 2016 EA (BLM 2016).

3.10.2.2. Impacts of Alternative B – Proposed Action

Minimal impacts on socioeconomics and local economic conditions would result from various aspects of oil and gas development including increased emissions (Section 3.3, *Air Resources*), increased heavy-truck traffic and light pollution (Section 3.9, *Transportation*), increased potential for surface water and groundwater contamination (Section 3.6, *Water Resources*), and increases in employment.

The Proposed Action would result in increased emissions during well development and production of up to 29 well pads and 81 wells in the Analysis Area. This increase in development and the relatively low emissions associated with development and production would not be expected to notably affect socioeconomics and local economic conditions. See Table 3- for specific air quality indicators in the Analysis Area counties and Section 3.3.2, *Air Resources*, for a detailed analysis of impacts on air quality.

An increase in traffic would add more transportation-related pollution to the area, increasing the risk for negative health impacts and increasing demands on maintaining roads and road conditions. As shown in Table 3-, traffic proximity varies widely across the counties; however,

all counties have a low traffic proximity relative to the U.S. This suggests that the Analysis Area is at low risk for impacts due to traffic increases.

Surface disturbance near hazardous waste facilities can pose major groundwater risks to the general public if the facilities leak or if underground storage tanks are punctured through activities like drilling. Table 3- shows that hazardous waste proximity is minimal across most counties, with Belmont, Monroe, and Tyler Counties having proximity values of 0. However, if surface activities do disturb underground storage tanks, there is a potential for contamination that may affect public health and safety if not properly mitigated.

As detailed in Section 3.6, *Water Resources*, issuing leases under the Proposed Action is unlikely to affect drinking water, and no compounding impacts are anticipated. Refer to Section 3.6, *Water Resources*, for a more in-depth analysis of potential impacts on water as a result of the Proposed Action.

According to the 2020 RFDS, 29 well pads for horizontal drilling are projected to be constructed to support up to 81 unconventional wells within the Action Area between 2020 and 2034 (Appendix D, p. 2). Workforce estimates in Table 3-2 indicate that up to five workers would be required for constructing each of the 29 proposed well pads during the construction phase and up to 12 workers would be required to drill each well. The very short-term nature of this construction work (4-10 days per pad or well; Table 3-2) would be captured in sector job estimates as average annual jobs. Based on the workforce estimates in Table 3-2, construction of the RFDS projection would support between 1-2 average annual jobs throughout the 15-year 2020 RFDS duration. Jobs in operation and production of oil and gas on these well pads would accrue over the 15-year period of the 2020 RFDS projection resulting in up to 435 jobs (15 workers for each of the 29 well pads) at the end of this period (Table 3-2).¹¹

These workforce increases would provide temporary economic impacts, such as increased demand for housing, food, and services, potentially bolstering local economies. However, they would also introduce challenges, including increased strain on infrastructure, housing availability, and community services, particularly in communities that house workers. Additionally, as noted in the 2016 EA analysis, a significant proportion of these jobs may be filled by transient workers due to the limited availability of a locally qualified workforce in southeastern Ohio and northwestern West Virginia.

Further analysis at the APD stage would evaluate the specific locations of development and workforce requirements, enabling a more precise assessment of socioeconomic and local economic impacts, particularly on housing, infrastructure, and community services. This analysis would also consider the extent to which local communities may benefit from job creation and from increased revenues, royalties, and taxes.

Required health and safety measures per Federal and State regulations would further reduce potential impacts. In accordance with ORC Chapter 1509 and OAC Chapter 1501, a permit

¹¹ The analysis of workforce increases assumes that separate workers would be utilized for construction and drilling of each of the 29 well pads and each of the 81 wells. As such, the estimated workforce increases may overestimate the workforce increases because the same crews may be utilized to construct, drill, and operate multiple well pads/wells.

would be required whenever an operator planned to drill, deepen, reopen, plug back, convert, or plug a well. ODNR-DOGRM would oversee this process through notification and requirements found in the ORC and OAC. Additionally, ODNR-DOGRM considers restoration measures prior to authorization of any gas or oil operations. Compliance with these measures is secured via bonding.

OEPA's Division of Air Pollution Control requires a Permit-to-Install and Operate, which includes requirements such as emission limits, operating restrictions, monitoring requirements, and reporting requirements. This permit would address emissions associated with internal-combustion engines, generators, dehydration systems, storage tanks, and flaring use in oil and gas operations. ORC 3745.50 requires reporting any amount of petroleum that causes a film/sheen on top of a waterway or any spill/release to the environment of 25 gallons or more (when not contained on the spiller's property). Reporting is also encouraged if the spill amount is unknown. Emergency Planning and Community Right-to-Know is a Federal reporting requirement that may apply to oil and gas operators that store hazardous chemicals on site and would assist in early detection of contaminated waterways that may impact local water sources.

During the Stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on socioeconomics and local economic conditions based on specific locations of proposed development, proposed workforce, where workers would come from, capital expenditures on projects, potential environmental impacts, and other factors. If potential impacts on socioeconomics and local economic conditions are identified during the Stage 3 environmental review of APDs, the BLM would consider and apply appropriate COAs and monitoring measures to avoid, minimize, and reduce potential impacts.

3.10.3. Cumulative Impacts

The CIAA for socioeconomics and local economics encompasses the nine counties that intersect the Marietta Unit of the WNF. This includes nine counties (Monroe County, Washington County, Noble County, Belmont County, Ritchie County, Wetzel County, Tyler County, Pleasants County, and Wood County) in two states (Ohio and West Virginia). Socioeconomics and local economic conditions in the CIAA have been impacted and continue to be impacted by historic and ongoing oil and gas development in the area as well as other development activities including road construction, construction of residential and commercial buildings, expansion of community services, and other activities.

The Proposed Action would incrementally contribute to cumulative socioeconomics and local economic impacts through the development and production of 29 well pads and 81 wells and associated increased emissions (Section 3.3, *Air Resources*), increased heavy-truck traffic and light pollution (Section 3.9, *Transportation*), increased potential for surface water and groundwater contamination (Section 3.6, *Water Resources*), and increases in workforce.

Reasonably foreseeable actions that may contribute to cumulative impacts on socioeconomics and local economic conditions include other ongoing oil and gas development in the area, future timber-harvest operations, mining operations, and development on private inholdings within or surrounding the CIAA. In addition, climate change and associated impacts such as increased drought, flooding, change in temperatures, changes in water quality and quantity, and increased health risks can contribute to cumulative impacts on socioeconomics and local economic

conditions. In most cases, vulnerability to climate change impacts is determined by a community's ability to anticipate, cope with, resist, and recover from the impact of major weather events and other impacts of climate change (Shonkoff et al. 2011).

CHAPTER 4. CONSULTATION, COORDINATION, AND LIST OF PREPARERS

4.1. Agency and Tribal Consultations

4.1.1. National Historic Preservation Act and Tribal Consultation

The BLM has conducted (?) required consultation with the Ohio State Historic Preservation Office (SHPO) and Native American Tribes. The BLM received a response from the Ohio SHPO dated May 2, 2023, concurring with the BLM's determination that leasing Federal mineral rights within the WNF would result in No Adverse Effects on Historic Properties and that it looks forward to additional coordination and consultation when site-specific Section 106 reviews are conducted at the APD stage of development. Further consultation would occur at the APD phase, prior to commencement of ground-disturbing activities.

The BLM sent certified letters to 16 Federally recognized Native American Tribes who have a known connection to the area, notifying them of the Proposed Action and asking them to identify any concerns with respect to the Proposed Action. The following tribes were contacted.

- Delaware Tribe of Indians
- Delaware Nation
- Shawnee Tribe
- Eastern Shawnee Tribe of Oklahoma
- Absentee Shawnee Tribe of Indians
- Wyandotte Nation
- Peoria Tribe of Indians of Oklahoma
- The Miami Tribe of Oklahoma
- The Osage Nation
- Citizen Potawatomi Nation
- Forest County Potawatomi Community of Wisconsin
- Hannahville Indian Community
- Ottawa Tribe of Oklahoma
- Peoria Tribe of Indians of Oklahoma
- Prairie Band Potawatomi Nation
- Seneca–Cayuga Tribe of Oklahoma
- Turtle Mountain Band of Chippewa

To date, the BLM has received two responses, from the Shawnee Tribe (May 12, 2023) and the Eastern Shawnee Tribe of Oklahoma (May 26, 2023), indicating no concerns with the Proposed Action at this time but requesting additional consultation during oil and gas development phases or in the event archaeological materials are encountered during construction.

The BLM also hosted information sessions regarding the oil and gas leasing process on the WNF on May 30 and June 1, 2023. Tribal Historic Preservation Officers or staff from six Tribal nations attended, including the Delaware Tribe of Indians, the Osage Nation, the Miami Tribe of Oklahoma, the Forest County Potawatomi Community of Wisconsin, the Peoria Tribe of Indians of Oklahoma, and the Absentee Shawnee Tribe of Indians. During these sessions, the BLM, USFS, and Tribes discussed potential sensitive site types that may occur in the Action Area and ways to facilitate early coordination and consultation for pre-construction surveys and site-

specific Section 106 reviews at the APD stage of development. Consultation will be ongoing throughout the implementation stages of oil and gas development.

4.1.2. Endangered Species Act Section 7 Consultation

The BLM and USFS is consulting with the USFWS under ESA Section 7 with respect to Federally listed species and conferences for proposed and candidate species. The BLM prepared a BA (Appendix G) to analyze impacts on Federally listed plant, aquatic, and terrestrial species that are anticipated to occur in the Analysis Area. The USFWS utilizes the BA regarding potential impacts on the species and AMMs to be considered and applied in APD approvals. They include measures for Federally protected bats, mussels, amphibians, and plants that have potential to occur in the Analysis Area. These measures may be further refined as consultation with USFWS continues as part of the ESA consultation process.

When the BLM analyzes individual projects at the APD stage and pursuant to the Forest Plan, the BLM is responsible for reinitiating consultation and providing USFWS with additional information; this process is called *Tier 2 consultation*. During the site-specific APD permitting process, the BLM will conduct additional Section 7 consultation with the USFWS based on the specific elements of development proposals. Section 7 consultation during the APD process could result in COAs for APDs to address potential impacts on Federally listed species.

4.2. Public Involvement

As part of the 2016 EA, the BLM conducted scoping to solicit input from the public and interested agencies about the nature and extent of issues and impacts on be addressed. In November 2015, prior to publication of the 2016 EA in April 2016, the BLM held three public meetings and solicited input from the public and interested agencies. A detailed description of the public scoping performed is included in Section 1.7.5 of the 2016 EA.

On March 20, 2024, the BLM released the Draft Supplemental EA for public review and comment for a 45-day comment period. In response to several requests, the BLM extended the comment period for an additional 10 days with comments due by the end of day on May 17, 2024. The Draft Supplemental EA was available for review and comment on the project ePlanning website at: <https://eplanning.blm.gov/eplanning-ui/project/2024234/510>.

During the public comment period, the BLM hosted two virtual public meetings on April 8 and April 9, 2024, where the BLM presented the Draft Supplemental EA and the public had an opportunity to learn more about the Draft Supplemental EA and ask questions of the agency team. The BLM created and distributed flyers announcing the public meetings in Marietta and Caldwell, Ohio. Flyers were posted in 13 public locations in Marietta and four in Caldwell, including grocery stores, community centers, and churches.

During the public comment period on the Draft Supplemental EA, the BLM received 264 individual substantive comments. Appendix J (*Draft Supplemental EA Public Comments and BLM Responses*) presents the substantive comments received during the comment period and agency responses to those comments.

Because the general scope and purpose of this EA is the same as for the 2016 EA, additional public scoping was not conducted beyond these efforts.

4.3. List of Preparers

The BLM, USFS, and a contractor team prepared this EA. Table 4-1 identifies the staff who contributed to preparation of this EA and their roles.

Table 4-1. List of Preparers

NAME	ROLE
<i>U.S. Department of the Interior, Bureau of Land Management</i>	
Dominique Wood	Assistant District Manager (Acting) – Resources
Connor Murphy	Assistant District Manager (Acting) – Resources
Kurt Wadzinski	Project Manager, Planning and Environmental Coordinator
Stephanie Carman	District Manager, Senior Advisor
Pamela Mathis	District Manager, Senior Advisor
Lindy Nelson	Assistant District Manager, Resources; Program Manager
Mitchell Owens	Assistant District Manager, Resources
Oksana Rollins	Contracting Officer
Danielle Donkersloot	Contracting Officer Representative/Natural Resource Specialist
Donna Charleston	Planning and Environmental Specialist
Wesley Willoughby	Archaeologist
Nicole Carter	Natural Resource Specialist
Brad Klingsheim	Natural Resource Specialist
Fred Holzel	Geologist
Derek Strohl	Assistant District Manager, Minerals
Martha Malik	Public Affairs Specialist
Carlie Swa	Public Affairs Specialist
Scott Jackson	Public Affairs Specialist
<i>U.S. Department of Agriculture, Forest Service</i>	
Rachel Reed	WNF Environmental Coordinator
Lee Stewart	WNF Forest Supervisor
Jason Reed	WNF Athens District Ranger
Mathias Wallace	WNF Ironton District Ranger
Dawn McCarthy	WNF Operations Staff Officer
Katrina Schultes	WNF Forest Wildlife Biologist
Autumn Coffey	WNF Forest Botanist
Andy Tremayne	WNF Forest Archaeologist
Shane Flickinger	WNF Hydrologist (Acting)
Brad Tait	Regional Office, Assistant Director, Air, Water, Lands, Soils, and Minerals
Theresa Bodus	Regional Office Minerals and Geology Program Manager
Kim Walton	Regional Office Minerals and Geology Program Manager (Acting)
Eric Wirz	Regional Office Minerals and Geology Program Manager (Acting)

NAME	ROLE
Troy Thompson	Regional Office Hydrogeologist
Sheela Johnson	Regional Office Hydrologist
Alexia Prosperi	Regional Office Air Resource Specialist
Tasha Hernandez	Regional Office Environmental Coordinator
William Dienst	Wayne Natural Resources Staff Officer
Chris Yeager	Wayne Marietta Unit Manager
Kyle Brooks	Public Affairs Officer
Jasmine Facun	Public Affairs Officer
Leah Anderson	Regional Strategic Communications Program Manager
<i>Contractor Team (ICF)</i>	
John Priecko	Project Manager
Libby Fortin	Deputy Project Manager
Samantha Jones	Project Coordinator
Tatum Hastings	Project Coordinator
David Ernst	Air Quality
Katie Wilson	Biological Resources
Abby Potts	Biological Resources
Brad Stein	Geographic Information Systems
Dave McKenzie	Geographic Information Systems
Tamar Love Grande	Editor and Publications Specialist
Saadia Byram	Editor and Publications Specialist

Appendix A – CBD Decision Court Orders

**UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF OHIO
EASTERN DIVISION**

Center for Biological Diversity, *et al.*,

Plaintiffs,

v.

Case No. 2:17-cv-372

U.S. Forest Service, *et al.*,

**Judge Michael H. Watson
Magistrate Judge Jolson**

Defendants.

OPINION AND ORDER

Four non-profit organizations, the Center for Biological Diversity (“the Center”), Heartwood, Ohio Environmental Council (“OEC”), and the Sierra Club (together, “Plaintiffs”) move for summary judgment under the Administrative Procedure Act, 5 U.S.C. § 551 *et seq.* (“APA”) against the United States Forest Service (“USFS”), the United States Bureau of Land Management (“BLM”), the United States Fish and Wildlife Service (“FWS”), Vicki Christiansen in her official capacity as Chief of USFS, William Perry Pendley in his official capacity as acting director of BLM, and Aurelia Skipwith in her official capacity as director of FWS (together, “Defendants”).¹ Pls.’ Mot. for Summ. J., ECF No. 83. Defendants oppose Plaintiffs’ motion and move for summary judgment. ECF No. 92. American Petroleum Institute (“API”), Independent Petroleum Association of America (“IPAA”), and Eclipse Resources I, LP (“Eclipse”) have entered the

¹ Pursuant to Federal Rule of Civil Procedure 25(d), the Court substitutes the names of the public officials sued in their official capacities.

action as Intervenor Defendants (collectively, “Intervenors”). See ECF Nos. 52, 71. Intervenors echo Defendants’ motion for summary judgment and move independently for the same. Eclipse Mot. for Summ. J., ECF No. 97; API & IPAA Mots. for Summ. J., ECF No. 99.

Additionally, Plaintiffs move for judicial notice, ECF No. 84, and the American Forestry Resource Counsel and Ohio Forestry Associate Inc. (“Amici”) move for leave to file an Amicus Curiae Brief. ECF No. 94. Both motions are opposed.

I. LEGAL BACKGROUND²

A. Oil and Gas Leasing in the National Forest System Lands

1. Governing Law

The Mineral Leasing Act of 1920 (the “MLA”), 30 U.S.C. § 181, *et seq.*, established a permit and leasing system that granted the Secretary of the Interior broad discretion in deciding whether to lease particular federal lands. The Federal Onshore Oil and Gas Leasing Reform Act of 1987, 30 U.S.C. § 226(g)–(h) (“FOOGLRA”), which amends the MLA, divides leasing responsibility between the Secretary of the Interior, acting through BLM, and the Secretary of Agriculture, acting through USFS. See 30 U.S.C. § 226(h)–(n); 43 C.F.R. § 3101.7–2(a). Generally, USFS manages the surface of the forest lands, and BLM manages the subsurface of the lands. 30 U.S.C. § 226(g). While BLM has

² The Court incorporates, as relevant, the Legal Background Section from its previous Opinion and Order on Plaintiffs’ Mot. to Compel. See ECF No. 78.

ultimate authority over leasing, it may not issue a lease on forest lands over USFS's objection. 43 C.F.R. § 3101.7–2(c). Prior to issuing a lease on federal land, BLM and USFS must verify that the activity approved by the lease complies with the National Environmental Policy Act ("NEPA"), NEPA's implementing regulations at 43 C.F.R. §§ 1500–08, and USFS policies and procedures. 36 C.F.R. § 228.102(a).

NEPA "has twin aims." *Balt. Gas & Elec. Co. v. NRDC*, 462 U.S. 87, 97 (1983). It obliges an agency "to consider every significant aspect of the environmental impact of a proposed action" and to "inform the public that it has indeed considered environmental concerns in its decisionmaking process." *Id.* "NEPA serves procedural rather than substantive goals, and is not a 'results-driven' statute." *Latin Ams. for Soc. and Econ. Dev. v. Adm'r of Fed. Highway Admin.*, 756 F.3d 447, 462 (6th Cir. 2014). As a result, "[e]ven agency action with adverse environmental effects can be NEPA-compliant so long as the agency has considered those effects and determined that competing policy values outweigh those costs." *Id.* (quoting *Kentuckians for the Commonwealth v. U.S. Army Corps of Eng'rs*, 746 F.3d 698, 706 (6th Cir. 2014)); see also *Balt. Gas & Elec. Co.*, 462 U.S. at 97 ("Congress in enacting NEPA . . . did not require agencies to elevate environmental concerns over other appropriate considerations."). At bottom, NEPA's procedural requirements exist to ensure that decisions to lease are "fully informed and well-considered." *Latin Ams. for*

Soc. and Econ. Dev., 756 F.3d at 462 (quoting *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 558 (1978)).

Under NEPA's procedural requirements, whenever a federal agency endeavors to take "major . . . action[] significantly affecting the quality of the human environment"—which may include opening up federal lands for oil and gas leasing—the agency must first generate a "detailed statement" reviewing the environmental impacts of the proposed action and alternatives to that action. 42 U.S.C. § 4332(C).³ This statement is referred to as an environmental impact statement ("EIS"), and it constitutes a "NEPA document." Developing the EIS fulfills NEPA's procedural guarantee of informed decision-making because it compels the agency producing the EIS to take a "hard look at environmental consequences" stemming from its actions. *Ky. Riverkeeper, Inc. v. Rowlette*, 714 F.3d 402, 407 (6th Cir. 2013).

"To spare agencies the hardship of conducting exhaustive review of every" proposed significant federal action, however, federal regulations allow the acting

³ Specifically, the statute requires the agency to consider:

- (i) the environmental impact of the proposed action,
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
- (iii) alternatives to the proposed action,
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Id.

agency “to first prepare a less burdensome environmental assessment [(“EA”)] as a method for determining whether a proposal need[s] an [EIS].” *Id.* at 407–08; 40 C.F.R. § 1501.4(a)–(c). If, after preparing an EA, the agency determines that no EIS is required, the agency must issue a Finding of No Significant Impact, which “briefly present[s] the reasons why an action . . . will not have a significant effect on the human environment and” thus does not require an EIS. 40 C.F.R. §§ 1501.4(e), 1508.13.

Finally, an agency must prepare supplements to a draft or final EIS if the agency “makes substantial changes in the proposed action that are relevant to environmental concerns” or if “[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.” 40 C.F.R. § 1502.9(c)(1). The agency may also prepare a supplement at any time that it “determines that the purposes of [NEPA] will be furthered by doing so.” *Id.* § 1502.9(c)(2).

2. *The Leasing Process*

The leasing process consists of a complex series of procedures during which USFS and BLM share responsibility for ensuring that the leasing decision and subsequently issued permits to drill comply with NEPA, NEPA’s implementing regulations, and USFS’s Forest Plan. See *Wy. Outdoor Council v. Bosworth*, 284 F. Supp. 2d 81, 83 (D.D.C. 2003) (outlining the process in detail). In 2006, USFS and BLM entered into a memorandum of understanding that further clarifies their shared responsibilities.

At the first step of the leasing process, after conducting a NEPA analysis, USFS determines which forest lands it will make administratively available to BLM for leasing. 36 C.F.R. § 228.102(c). The responsibility then shifts to BLM to determine, out of all forest land USFS made administratively available for leasing, which specific parcels BLM will designate for leasing. 36 C.F.R. § 228.102(d). Once BLM does so, it submits, for USFS's approval and consent, a proposal to lease specific parcels. Before consenting, USFS must verify that the leasing of those specific lands "has been adequately addressed in a NEPA document and is consistent with the Forest land and resource management plan." *Id.* § 228.102(e)(1). Additional environmental analysis must be performed if USFS determines that the leasing has not been adequately addressed or if significant new information or circumstances requires further analysis. *Id.* USFS also verifies that BLM's leasing proposal includes all required stipulations. *Id.* If these conditions are met, USFS may consent to BLM's leasing proposal. Finally, the process shifts back to BLM to offer the specific land for oil and gas leasing through a lease sale and awards leases to the "highest qualified bidder." 43 C.F.R. §§ 3924.5, 3925.10.

3. Approval of Drilling Operations on Leased Land

Before a lessee commences drilling operations or other surface-disturbing activities on leased land, the lessee must submit an application for permit to drill ("APD") for each planned well site on the parcel. 43 C.F.R. § 3126.3–1(c). The APD includes a surface use plan of operation ("SUPO") describing the proposed

drilling program and addressing environmental hazards caused by the drilling and efforts to mitigate those hazards. *Id.* § 3162.1–1(c), (d), (e). USFS reviews the SUPO for compliance with NEPA and its implementing regulations as well as USFS policies and procedures. 36 C.F.R. § 228.107(a). USFS may approve the SUPO as submitted, approve it subject to specified conditions, or disapprove it. *Id.* § 228.107(b)(2). USFS then gives public notice of its decision on the SUPO and forwards the decision to BLM. *Id.* § 228.107(c), (d). BLM may approve the APD only after USFS approves the SUPO included therein. 30 U. S.C. § 226(g); 43 C.F.R. § 3162.3–1(h). Finally, even after the APD is approved, the lessee must supplement the SUPO if it seeks to conduct additional surface-disturbing operations on a particular well site that were not previously accounted for in the plan. 36 C.F.R. § 228.106(d).

B. The Endangered Species Act

The Endangered Species Act (“ESA”), 16 U.S.C. §§ 1531, *et seq.* also has bearing on what federal forest lands USFS and BLM may approve for oil and gas leasing. The ESA “is comprehensive legislation for the preservation of endangered species.” *Bosworth*, 284 F. Supp. 2d at 83–84 (citing *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 180 (1978)). It requires the Secretary of the Interior, acting through the FWS to list the fish, wildlife, or plant species that it determines are endangered or threatened. *Id.* at 84; 16 U.S.C. § 1533(a).

The ESA comes into play whenever USFS determines to make forest lands administratively available for leasing and whenever BLM later designates

specific lands from all those administratively available that BLM plans to offer at a lease sale. The relevant agency (the “acting agency”) must ensure that its leasing decision “is not likely to jeopardize the continued existence of” a listed species or destroy or adversely modify a species’ critical habitat. 16 U.S.C. § 1536(a)(2).

If the acting agency concludes that its planned leasing may jeopardize a listed species or its critical habitat, then the acting agency must engage in formal consultation with FWS. 50 C.F.R. § 402.14(a). At the conclusion of the formal consultation, FWS issues a biological opinion in which FWS discusses in detail the effects of the proposed action on the listed species or critical habitats. *Id.* 402.14(g)–(h). If FWS concludes that the action will jeopardize the continued existence of a listed species or critical habitat, then “the biological opinion must set forth ‘reasonable and prudent alternatives’ aimed at avoiding such consequences.” *Bosworth*, 284 F. Supp. 2d at 84 (quoting 50 C.F.R. § 402.12(h)(3)).

If, on the other hand, the acting agency concludes that its leasing decision is unlikely to jeopardize a listed species or critical habitat, then it may engage in informal consultation with FWS to verify whether FWS concurs. 50 C.F.R. §§ 402.12(k), 402.13. If FWS agrees with the acting agency’s non-jeopardy determination, then no formal consultation is required, and “the consultation process is terminated” 50 C.F.R. §§ 402.12(b), 402.13(a).

Even after consultation terminates, however, whenever “new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered,” “[r]einitiation of formal consultation is required and shall be requested by the [acting] agency or by [FWS].” 50 C.F.R. § 402.16.

II. FACTUAL AND PROCEDURAL BACKGROUND

The following facts are taken from Plaintiffs’ Amended Complaint, ECF No. 24, and the Defendants’ administrative records.

A. The Wayne National Forest and the Marietta Unit

The Wayne National Forest (“WNF” or “the Forest”), located in the foothills of the Appalachian Mountains in southeast Ohio, is Ohio’s only national forest. Unlike other national forests, the Forest is a patchwork of private and federal land, with most of the land within its administrative boundary being privately owned. Nearly 240,000 of the Forest’s over 800,000 acres of land is owned and managed by USFS. Approximately 98,858 acres of that federal land are underlain by federally-owned minerals. FS-5534.

Three non-contiguous units—Athens, Ironton, and Marietta—comprise the Wayne National Forest. The Marietta Unit is the easternmost unit and the unit at issue here. It contains approximately 268,000 acres of private and federal lands, of which over three-fourths is privately owned.

B. USFS's 2006 EIS and Forest Plan

In 2006, after more than four years of planning and analysis, USFS approved a Final Revised Land and Resource Management Plan ("2006 Forest Plan" or "Plan"), which guides the management of the Wayne National Forest, and an accompanying EIS ("2006 EIS"). USFS relied on a 2004 Reasonably Foreseeable Development Scenario ("RFDS") created by BLM that projected the total surface disturbance of new oil and gas wells in Wayne National Forest to create the 2006 Forest Plan and EIS. Neither the 2006 Forest Plan, the EIS, or the 2004 RFDS considered effects of horizontal drilling and hydraulic fracturing methods, because those methods did not appear to be economically feasible at the time, rather, they only considered conventional vertical drilling.

Before finalizing its 2006 Forest Plan and 2006 EIS, USFS received substantial public input, as required by NEPA: it held public meetings, developed a draft plan and draft EIS, received feedback on those drafts through public open houses, and responded to over 1,300 public comments on the drafts. Additionally, USFS engaged in formal consultation with FWS. The consultation focused on the 2006 Forest Plan's effect on the endangered Indiana bat and running buffalo clover. USFS engaged in informal consultation on other species believed to be present in the area, but USFS and FWS concurred that the activities incorporated in the 2006 Forest Plan was not likely to adversely affect those species.

On November 22, 2005, at the end of the formal consultation, FWS issued a biological opinion in which it concluded that allowing surface occupancy for oil and gas leases was not likely to jeopardize the Indiana bat and running buffalo clover or critical habitats present in the Wayne National Forest. Specifically, FWS determined that USFS's no-surface-occupancy restriction on 13% of the WNF, incorporated into USFS's proposed 2006 Forest Plan and 2006 EIS, was sufficient to protect scenic, recreational, and wildlife areas and that the 2006 Forest Plan contained sufficiently protective standards and guidelines for the remaining development sites.

In the final 2006 EIS, USFS announced that it would continue to make "all federally owned oil and gas rights within the Forest . . . administratively available for oil and gas leasing," and that it would subsequently review and authorize BLM to lease specific lands within the Forest. The EIS allowed surface occupancy on only 13% of the Wayne National Forest, but on up to 96% of the federal land in the Marietta Unit.

C. Horizontal Drilling and Hydraulic Fracturing Overview

Beneath the Forest lies primarily Marcellus and Utica shale—a geological formation thousands of feet below ground that contains oil and gas in its porous rock. FS-3744; BLM-1387–88; 29003–04. When the 2006 Forest Plan and 2006 EIS were prepared, there were no economically viable methods of accessing the oil and gas in the shale. See BLM-1387. The combination of hydraulic fracturing

and horizontal drilling, however, made access and retrieval of oil and gas in the shale profitable.⁴ *Id.*

The horizontal drilling process involves first drilling down then drilling horizontally for lengths up to, and over, a mile. BLM-29005; FS-3853–54, 5180. After drilling, the shale formation is then stimulated by a process called hydraulic fracturing, colloquially known as “fracking,” which involves injecting millions of gallons of liquid at a high pressure, to release the oil and gas trapped in the shale rocks.⁵ BLM-29004; 29006; FS-4244; 5094. To aid in the recovery of oil and gas, “hydrofrac fluids are treated with proprietary chemicals to increase the viscosity to a gel-like consistency that enables the transport of a *proppant*, usually sand, into the fracture to keep it open after the pressure is released.” BLM-29006. Compared to a “typical hydrofrac fluid” that contains less than .5% by volume of chemical additives, the 3 million gallons of liquid needed for hydraulic fracturing results in “about 15,000 gallons of chemicals in the waste.” BLM-29006. Wastewater treatment of such fluid can be difficult and expensive given the sheer volume of liquid required, not to mention that the shale formation often contributes its own materials to the mixture such as: brines containing

⁴ Hydraulic fracturing is not a new technique and has been used “in conventional vertical wells in Ohio for many years.” FS-5544. The “new” innovation is the combination of the two methods.

⁵ The combination of the two methods generally produces approximately 4 million cubic feet of gas per day. BLM- 29005. Meanwhile, the estimates for vertical wells considered in the 2006 EIS were much less. See FS-9565 (“[M]ost wells within the WNF are classified as ‘stripper’ wells, which produce small volumes of oil, gas, or both with equally small volumes of brine as a waste product. The average stripper gas well in Ohio produces 7.4 Mcf [or thousands of cubic feet] per well each day[.]”).

sodium, chloride, bromide, arsenic, barium, other heavy metals, and radionuclides that would exceed drinking water standards. BLM-29007.

Although fracking is technically term for only half of the process at issue here, the Court will primarily refer to the combination of horizontal drilling and hydraulic fracturing as “fracking” for ease of reference.

D. Subsequent Information Bearing on the 2006 Forest Plan and 2006 EIS

In November 2011, public concern over fracking led USFS to request that BLM review and update the projections contained in its 2004 RFDS, on which the 2006 Forest Plan and 2006 EIS relied. BLM concluded that USFS’s 2006 Forest Plan and 2006 EIS did not require updating because current and anticipated surface disturbance, including that caused by fracking, fell below the 2006 forecast. After receiving this information from BLM, USFS conferred with FWS about whether to reinitiate ESA consultations, but both agencies agreed that further consultation was unnecessary.

In January 2012, USFS issued a Supplemental Information Report (“2012 SIR”), which determined that the environmental effects caused by horizontal drilling and fracking fell within the surface-disturbance limits analyzed in the 2006 EIS and accounted for in the 2006 Forest Plan. Consequently, USFS concluded that it was not required to conduct additional NEPA analysis on the effects of these oil and gas extraction methods.

E. Oil and Gas Leasing in the Marietta Unit

In accordance with the 2006 Forest Plan and 2006 EIS which made available all federally owned minerals in WNF for leasing, in 2015, BLM proposed to lease up to 40,000 acres of federally owned minerals on specific parcels of the Marietta Unit of the Wayne National Forest. BLM prepared an EA to analyze the effect of its leasing proposal. In April 2016, BLM issued its draft EA for public comment.

On June 15, 2016, USFS consented to BLM's lease sale of approximately 2,718.58 acres of federal land in the Marietta Unit.

In October 2016, BLM issued a final EA and Finding of No Significant Impact ("2016 FONSI") (thus concluding that no additional NEPA analysis was required) for its 40,000-acre leasing proposal.

The Center for Biological Diversity appealed that decision to the Interior Board of Land Appeals ("IBLA") but dismissed the appeal after IBLA denied its request for a stay of the decision. In December 2016, BLM offered approximately 719 acres, spread over 17 parcels, for sale, and in March 2017, BLM offered an additional 1,147.10 acres, spread over 20 parcels, for sale. All Plaintiffs in this action appealed both sale decisions to IBLA but subsequently withdrew the appeals after their requested stay was denied.

F. This Action

Plaintiffs instituted this action on May 5, 2017. In their Amended Complaint, Plaintiffs bring claims against USFS for (1) violating NEPA and the

APA by consenting to BLM's leasing proposals without conducting additional NEPA analysis (specifically, without preparing a supplemental EIS), and (2) violating the ESA for failing to consult or complete consultation with FWS prior to consenting to BLM's leasing proposals. They also bring claims against BLM for (1) violating NEPA by preparing an "unlawful" EA and FONSI instead of preparing an EIS prior to making its leasing decisions, and (2) violating the ESA for failing to consult or complete consultation with FWS prior to making its leasing decisions. Finally, Plaintiffs allege that USFS, BLM, and FWS violated the ESA by failing to reinitiate consultation regarding the conclusions reached in FWS's 2005 biological opinion, because new species were designated by FWS as threatened or endangered after USFS issued its 2006 Forest Plan and EIS.

Defendants lodged their administrative records with the Court, and the Court denied supplementation of said records. See Op. and Order, ECF No. 78. All parties now move for summary judgment on the administrative records.

III. STANDARD OF REVIEW

Because NEPA does not provide a private right of action, the Court reviews challenged agency action under the APA. *Utah Envtl. Cong. v. Russell*, 518 F.3d 817, 823 (10th Cir. 2008).

"Judicial review of NEPA compliance is limited in scope." *Nat'l Ass'n of Home Builders v. Defs. of Wildlife*, 551 U.S. 644, 658 (2009). The Court's role in reviewing the administrative record is to "ensure that the agency has adequately considered and disclosed the environmental impacts of its actions and that its

decision is not arbitrary or capricious.” *Ky. Riverkeeper, Inc.*, 714 F.3d at 407 (quoting *Balt. Gas & Elec. Co.*, 462 U.S. at 97–98).

An agency decision is arbitrary and capricious if:

the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.

Meister v. U.S. Dep’t of Agric., 623 F.3d 363, 371 (6th Cir. 2013) (internal citation omitted).

Put another way, “[t]he duty of a court reviewing agency action under the ‘arbitrary or capricious’ standard is to ascertain whether the agency examined the relevant data and articulated a rational connection between the facts found and the decision made.” *Citizens’ Comm. to Save Our Canyons v. Krueger*, 513 F.3d 1169, 1176 (10th Cir. 2008) (internal citation and quotation marks omitted).

“When reviewing an agency’s factual determinations, the Court ‘ask[s] only whether the agency took a ‘hard look’ at information relevant to the decision.”

High Country Conservation Advocates v. United States Forest Serv., 333 F. Supp. 3d 1107, 1119 (D. Colo 2018).

IV. DISCUSSION

A. Whether BLM and USFS were permitted to defer analysis of fracking impacts until the APD stage

Plaintiffs argue that USFS and BLM should have taken a hard look at the impacts of fracking *prior to* issuing the leases in order to properly consider the

cumulative effects of fracking and assess all available alternatives. Defendants refute this and contend that Plaintiffs are trying to require the agencies to perform site-specific NEPA review despite their discretion to defer analysis of specific environmental impacts until later in the leasing process.⁶ Specifically, although Plaintiffs want Defendants to review the specific environmental impacts at the leasing stage, Defendants contend that it is entirely appropriate to defer analysis of “site-specific” environmental effects until the APD stage of the process. Defendants acknowledge, however, whether the Agencies can defer NEPA analysis until the APD stage is one of first impression for the Sixth Circuit. Defs.’ MSJ 2, ECF No. 92. Thus, the Court must analyze this question first, before addressing Plaintiffs substantive issues with the 2012 SIR and 2016 EA.

As touched upon earlier, BLM employs a three-step process for oil and gas leasing:

[Step 1] “At the earliest and broadest level of decision-making, the [BLM] develops land use plans--often referred to as resource management plans” *Pennaco Energy, Inc. v. U.S. Dep’t of Interior*, 377 F.3d 1147, 1151 (10th Cir. 2004); see also 43 U.S.C. § 1712(a).

[Step 2] Next, BLM issues a lease for the use of particular land.⁷

⁶ Defendants and Intervenor raise substantially similar arguments throughout their briefing, so the Court will address and refer to the combined arguments as Defendants’ arguments. The Court will only address Intervenor’s arguments that are separate and distinct from Defendants.

⁷ If the land is managed by USFS, it must authorize or consent to the leasing. See 36 C.F.R. § 228.102(e).

[Step 3] The lessee may then apply for a permit to drill, and BLM will decide whether to grant it. § 1712(e); *Pennaco Energy*, 377 F.3d at 1151-52, 43 C.F.R. §§ 1610.5-3, 3162.3-1(c).⁸

N.M. ex rel. Richardson v. BLM, 565 F.3d 683, 716 (10th Cir. 2009).

NEPA also permits an agency to “tier” reviews, in that an agency can incorporate by reference previous, and usually broader, NEPA reviews and focus more narrowly on a specific issue. See *San Juan Alliance v. Stiles*, 654 F.3d 1038, 1054 (10th Cir. 2011) (citing 40 C.F.R. § 1508.28).

Here, Defendants argue that the 2006 Forest Plan and 2006 EIS already performed an in-depth analysis of federal mineral availability and environmental impacts of leasing those minerals, and that the agencies relied on the 2006 EIS to conclude that fracking effects were sufficiently addressed in that NEPA analysis. Defs.’ MSJ 13, ECF No. 92. Thus, Defendants argue, any more extensive site-specific analysis of fracking impacts can be deferred until the APD phase, when it will be required to prepare another NEPA review. Defendants’ deferral argument is not a novel defense for Agency Defendants to invoke. It has been raised in various forms throughout oil and gas litigation. See e.g. *Sierra Club v. Peterson*, 717 F.2d 1409, 1415 (D.C. Cir. 1983); *Pennaco Energy, Inc. v. U.S. Dep’t of Interior*, 377 F.3d 1147, 1151 (10th Cir. 2004); *Richardson*, 565 F.3d at 717–18 (finding no bright-line rule for when an agency can defer site-specific analysis to the APD stage); *WildEarth Guardians v. Zinke*, 368 F. Supp.

⁸ Similarly, if the land is managed by USFS, the lessee must submit a surface use plan of operations along with the APD. 30 U.S.C. § 226(g).

3d 41, 64–65 (D. D.C. 2019) (rejecting Defendants’ argument that it can defer certain environmental impact analyses until the APD stage). In particular, Defendants here rely heavily on the Tenth Circuit Court of Appeals’ decision in *Park County Resources Council, Inc. v. U.S. Department of Agriculture* to support their argument that agencies can defer analysis until the APD stage because “oil and gas lease, by itself, does not cause a change in the physical environment,” so until an agency knows the specific impacts contained in an APD, a NEPA review is not possible. 817 F.2d 609, 622–24 (1987).

Plaintiffs dispute that *Park County* controls and point to *Pennaco* to support their argument that the reasonably foreseeable impacts of leasing activities must be addressed at the decision-to-lease stage. 377 F.3d at 1160.

These parties are also not the first to argue, respectively, that *Park County* or *Pennaco* control on the deferral issue. Similar arguments were raised in *Richardson*, and the Tenth Circuit engaged in a detailed comparison of the *Pennaco* and *Park County* to determine when, and more importantly in what context, tiering applies. The Tenth Circuit explained that:

This court first addressed the tiering of impacts analysis in the oil and gas leasing context in *Park County Resource Council, Inc. v. U.S. Department of Agriculture*, 817 F.2d 609 (10th Cir. 1987), *overruled in part on other grounds by Village of Los Ranchos*, 956 F.2d 970. In that case, BLM had prepared an “extensive” EA before issuing leases, concluded that leasing would have no immediate environmental impacts, and issued a FONSI concluding that an EIS was unnecessary at that stage. *Id.* at 612. Reviewing the decision to issue a FONSI rather than an EIS, we noted that no exploratory drilling had occurred in the entire plan area at the time the lease was issued, *id.* at 613, and there was no evidence that full field development was

likely to occur, *id.* at 623. . . . We concluded that preparation of both plan-level and site-specific environmental impacts analysis was permissibly deferred until after leasing

We next had occasion to consider tiering in the oil and gas context in *Pennaco Energy*. In that case, BLM issued leases for coal bed methane (“CBM”) extraction on public lands in Wyoming. 377 F.3d at 1152. A plan-level EIS for the area failed to address the possibility of CBM development, and a later EIS was prepared only after the leasing stage, and thus “did not consider whether leases should have been issued in the first place.” *Id.* Because the issuance of leases gave lessees a right to surface use, the failure to analyze CBM development impacts before the leasing stage foreclosed NEPA analysis from affecting the agency's decision. *Id.* at 1160. Accordingly, we held that in the circumstances of that case, an EIS assessing the specific effects of coal bed methane was required before the leasing stage. As in *Park County*, the operative inquiry was simply whether all foreseeable impacts of leasing had been taken into account before leasing could proceed. Unlike in *Park County*, in *Pennaco Energy* the answer was “no.”

Richardson, 565 F.3d at 716–17.

Richardson also clarified that there was no “bright line rule that site-specific analysis may wait until the APD stage[.]” rather, “the operative inquiry was simply whether all foreseeable impacts of leasing had been taken into account before leasing could proceed.” *Id.* at 717.

Richardson instructs that the first question to ask when determining if an assessment can be deferred is whether the lease would constitute “an irretrievable commitment of resources.” *Id.* at 718 (finding that issuance of an oil and gas lease without an no surface occupancy (“NSO”) stipulation was an irretrievable commitment); see also *Connor v. Burford*, 836 F.2d 1521,1527 (9th Cir. 1988) (finding that “an EIS must be prepared before any irreversible and

irretrievable commitment of resources”); *Peterson*, 717 F.2d at 1414 (“The appropriate time for preparing an EIS is *prior* to a decision, when the decisionmaker retains a maximum range of options.” (citation omitted)).

Next, if the Court finds that the decision to lease would constitute an irretrievable commitment of resources, then the second question is whether any environmental impacts were reasonably foreseeable at the leasing stage.

1. Is the decision to lease an irretrievable and irrevocable commitment of resources?

As to first question, Defendants state that in this case, and unlike in *Pennaco*, USFS can approve, modify, or deny a surface use plan of operations or withdraw its consent to lease if it believes additional environmental analysis is warranted. Defs.’ MSJ 15, ECF No. 92 (citing 36 C.F.R. § 228.102(e)(1)). Defendants concede that the leases at issue are non-NSO leases⁹ but argue that

⁹ The 2006 Forest Plan EIS discussed NSO stipulations:

Under all alternatives, approximately 104,955 acres of federally owned minerals are currently available for oil and gas leasing subject to applicable restrictions, referred to as stipulations and notifications. The most restrictive stipulation addressed in the FEIS is the No Surface Occupancy (NSO) stipulation. NSO prohibits use or occupancy of the land surface for oil and gas exploration and development. Under Alternative E Modified, NSO applies to 17,260 of the available acres. Time limitation stipulations, controlled surface use stipulations and lease notifications apply to the remaining 87,695 acres.

The 2006 Forest Plan stipulates no surface occupancy on 13% of the Forest, compared to the 1988 Plan, which prohibits surface occupancy on 12% of the Forest. I have selected the alternative that will allow surface occupancy on 96% of the Marietta Unit, which is the area of the Forest that has the highest potential for continued oil and gas development. The 1988 Plan allowed surface occupancy on 82% of the Marietta Unit.

those are not an irretrievable commitment of resources because the lessee must still submit an APD and surface use plan of operations (“SUPO”) are before it can use the surface. Defs.’ Reply 5, ECF Nol. 107. Thus, they argue that there is no “significant impact” yet to the environment.

But Defendants fail to reassure the Court that the decision to lease in this case is not an irretrievable commitment of resources. Defendants provide no evidence that, if a site-specific NEPA review at the APD phase indicated more serious environmental impacts than initially expected, they could *revoke* altogether a lessee’s right to the minerals or prohibit any disturbance or use of the land.

Similarly, the Court is not convinced by Defendants’ argument that the significance of an action does not occur and cannot be determined until there are actual physical impacts. Defendants argue that “the act of leasing does not have any ground-disturbing effects,” and thus, no actual environmental impacts. Defs.’ MSJ 14, ECF No. 92. Rather, they argue that only once the lessee submits an APD and a SUPO are BLM and USFS required to conduct site-specific reviews, because only then will the leases cause a change to the physical environment. *Id.* (citing BLM-1515, 1521; FS-5536). But the problem with Defendants’ argument is that the regulatory language does not ask the agencies to review whether any surface disturbance will occur by its action; rather, the agencies are

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tasked with determining whether the proposed action will have “any irreversible and irretrievable commitments of resources[.]” 42 U.S.C. § 4332(C)(v). As such, the lack of immediate physical disturbance cannot equate to “no irretrievable commitments of resources.”

Under similar circumstances, other courts have found that an irreversible and irretrievable commitment of resources occurs at the decision-to-lease stage. *See S. Utah Wilderness All. v. Palma*, 707 F.3d 1143, 1159 (10th Cir. 2013) (“issuance of the [mineral] lease represents the irreversible and irretrievable commitment of public resources for private use.”); *Richardson*, 565 F.3d at 718 (“issuing an oil and gas lease without an NSO stipulation constitutes such a commitment.”); *Pit River Tribe v. United States Forest Serv.*, 469 F.3d 768, 782–83 (9th Cir. 2006) (finding that leases that did not allow the government to preclude oil and gas activities all together were an irretrievable commitment of resources); *Conner*, 848 F.2d at 1451 (“In sum, the sale of a non-NSO oil or gas lease constitutes the ‘point of commitment[.]’ [A]fter the lease is sold the government no longer has the ability to prohibit potentially significant inroads on the environment [thus], unless surface-disturbing activities may be absolutely precluded, the government must complete an EIS before it makes an irretrievable commitment of resources by selling non-NSO leases.”); and *Peterson*, 717 F.2d at 1413 (finding that once land was leased without NSO stipulations, “the Department no longer has the authority to *preclude* surface disturbing activities even if the environmental impact of such activity is

significant” and that once that decision is made at the leasing stage, it “is the point at which the environmental impacts of such activities must be evaluated.”).¹⁰

In sum, the Court finds an important distinction exists between the ability to restrict or limit an action and the ability to prohibit or revoke an action altogether. *C.f. Peterson*, 717 F.2d at 1415 (An agency “may delay preparation of an EIS provided that it reserves both the authority to *preclude* all activities pending submission of site-specific proposals and the authority to *prevent* proposed activities if the environmental consequences are unacceptable.”). Indeed, after a lessee obtains rights to the minerals, it has “the right to use so much of the lease lands as necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold.” 43 C.F.R. § 3101.1-2. Thus, revocation or denial of the project after a lease is issued would impede on the lessee’s rights as a leaseholder. *See Pit River*, 469 F.3d at 783. But waiting to evaluate the environmental impacts of a decision until after the “no action alternative” is off the table would circumvent the very purposes of NEPA, which is “insuring that federal agencies infuse in project planning a thorough consideration of environmental values” including “to consider seriously the ‘no action’ alternative

¹⁰ Given that both *Palma* and *New Mexico*, decided in 2013 and 2009 respectively, explicitly state that non-NSO leases equate to an irretrievable commitment of resources, the Court rejects Defendants’ argument that Plaintiffs’ incorrectly rely on cases predating the Federal Onshore Oil and Gas Leasing Reform Act of 1987, 30 U.S.C. § 226(g), such as *Peterson* or *Conner*, for the same proposition. *See* Defs.’ Reply 6–7, ECF No. 107.

before approving a project with significant environmental effects.” *Conner*, 848 F.2d at 1451.

Moreover, the regulations support NEPA review at the leasing stage. For example, 36 C.F.R. § 228.102(e)(1) states that: “at such time as specific lands are *being considered for leasing*,” USFS shall review the decision, including verifying that the leasing of specific lands has been adequately addressed in the NEPA document. 36 C.F.R. § 228.102(e) and (e)(1) (emphasis added). But if USFS finds that “NEPA has not been adequately addressed, or if there is significant new information or circumstances as defined by 40 CFR 1502.9 requiring further environmental analysis, additional environment analysis shall be done before a leasing decision for specific lands will be made. [Likewise] [i]f there is inconsistency with the Forest land and resource management plan, no authorization for leasing shall be given unless the plan is amended or revised.” 26 C.F.R. § 228.102(e)(1). Nowhere does this regulation hold that USFS can withdraw consent at the APD stage, and Defendants do not contend otherwise. Further, all parties agree that USFS can only withdraw its consent to lease at the decision-to-lease step. Thus, this regulation supports Plaintiffs’ proposition that the appropriate time to consider the environmental impacts of the decision is prior to the APD step when there is an irretrievable commitment of resources.

Accordingly, the Court finds that BLM’s decision to lease, and USFS’s consent thereto, *are* decisions to irrevocably commit resources, because only the

manner and method of accessing those committed resources can be regulated at the APD stage.

2. Were the impacts of fracking reasonably foreseeable?

Next, the Court must determine whether the impacts of fracking were reasonably foreseeable. The Court will address specific, potentially foreseeable impacts in subsequent sections of this opinion, but finds the impacts of fracking were reasonably foreseeable at the time such that USFS and BLM had the ability to examine them at the leasing stage.

“In determining what effects are ‘reasonably foreseeable, an agency must engage in ‘reasonable forecasting and speculation,’ with *reasonable* being the operative word. . . . [t]he agency need not foresee the unforeseeable, but by the same token neither can it avoid drafting an impact statement simply because describing the environmental effects of and alternatives to particular agency action involves some degree of forecasting.” *WildEarth*, 368 F. Supp. 3d at 67 (citations and quotations omitted). “An effect is considered reasonably foreseeable if it is ‘sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision.’” *Wilderness Workshop v. United States BLM*, 342 F. Supp. 3d 1145, 1155 (D. Colo 2018) (citation omitted).

The Court first notes that the parties talk past each other as to the scope of review that Plaintiffs’ seek. Defendants characterize Plaintiffs’ argument as requiring the Agencies to “examine all site-specific impacts at the leasing or

Forest Plan stage.” Defs.’ MSJ 13,15, ECF No. 92. Defendants use “site-specific” to refer to more granular, individual parcels for lease. Plaintiffs contend Defendants mischaracterize their argument because they are not seeking parcel-specific review. Instead, they argue the crux of their argument is that Defendants “*underestimated or entirely ignored* specific foreseeable and *aggregate forest-wide* consequences” of fracking. Pls.’ Reply 1, ECF No. 105.

To the extent Plaintiffs are requesting the Court require parcel-by-parcel environmental impact assessments at the leasing stage, the Court agrees with Defendants that such a review is not required at the leasing stage. See *WildEarth*, 368 F. Supp. 3d at 66–67 (collecting cases for that proposition). However, this does not absolve Defendants from examining reasonably foreseeable environmental impacts of leasing the aggregate of parcels at issue, in this case approximately 40,000 acres.

Here, the Court finds the environmental impacts of leasing the land for fracking, as a whole, were reasonably foreseeable. Notably, Defendants *did* foresee some impacts and were able to extrapolate from them. See e.g. FS-5641 (May 2012 letter from BLM to USFS comparing vertical and horizontal drilling).¹¹ In particular, BLM estimated the number of wells per well pad reasonably expected with fracking, as well as how many well-pads each Unit could accommodate. FS-5641–43. Moreover, USFS and BLM were aware of

¹¹ The Court will address the substance of these conclusions later in the Opinion and Order.

other forests reviewing the impacts of fracking, in which USFS projected pipeline disturbances from horizontal well development. See FS-9–20; FS-48–49.

Likewise, Ohio’s Department of Natural Resources (“ODNR”) issued its recommendations for oil and gas activities on state lands in January 2012, which specifically discussed estimated sizes for well pads, FS-2656, and water storage (estimating that fracking requires 2-6 million gallons water, stored close to the well-site and requires “substantial resources” and noting that “one million gallons of water is equivalent to 3.069 acre feet or 133,685.24 cubic feet”).

Similarly, given that substantial oil and gas development had already occurred on private, adjacent lands in the WNF, the likelihood that these federal lands would be developed for fracking was reasonably foreseeable. See BLM-1388–89 (“ODNR reported that 15,707,339 barrels of oil and 651,193,106 million cubic feet of gas were produced from Ohio’s horizontal shale wells in the first nine months of 2015”); see *also* FS-3815, 26–29; FS-3833 (noting possible productive shale areas could be up to 10,000,000 acres; 200 shale wells estimated drilled in 2012; also estimating 6 acres per well pad and access road for a total of 20,772 acres for access roads and well pads). This information also distinguishes Defendants’ primary case, *Park County*, where the proposed action was much more speculative. See *also* FONSI, BLM-1755 (noting that there were over 50 “expressions of interest” in leasing federal minerals on approximately 18,000 acres in the Marietta Unit).

Defendants argue that “the reasonably foreseeable impacts can only be meaningfully examined when there is a concrete site-specific proposal in the form of a submitted APD.” Defs.’ Reply 5, ECF No. 107. But this argument is unpersuasive. See *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1072 (9th Cir. 2002) (“An agency may not avoid an obligation to analyze in an EIS environmental consequences that foreseeably arise from an RMP merely by saying that the consequences are unclear or will be analyzed later when an [Environmental Assessment] is prepared for a site-specific program proposed pursuant to the RMP . . . NEPA is not designed to postpone analysis of an environmental consequence to the last possible moment.”). But Defendants’ argument that any environmental impacts will be considered at the APD stage is not particularly reassuring given that USFS and BLM will compare the APD and SUPO against the current 2006 Forest Plan, in which fracking was not even considered. And, more importantly, at the APD stage, the “No Action Alternative” is no longer on the table with respect to the non-NSO leases. Finally, by finding that the Agencies *can be* required to conduct a NEPA analysis at the leasing stage—if there is an irrevocable commitment of resources and reasonably foreseeable environmental impacts—does *not* mean that Defendants will be required to create an EIS at every decision to lease. See *Ctr. for Biological Diversity v. United States BLM*, No. 3:17-CV-553, 2019 U.S. Dist. LEXIS 137955, at *6 (D. Nev. Aug. 15, 2019) (finding that “NEPA does not require BLM to create an EIS whenever it issues non-NSO oil and gas leases. It only requires that BLM

assess all reasonably foreseeable impacts of issuing such leases prior to issuing those leases because once those leases are issued, BLM no longer has the authority to preclude all surface disturbing activity.”); *see also WildEarth*, 368 F. Supp. at 53 (“At the leasing stage an EIS may be required, but is not mandated by regulation.”). Thus, Defendants’ concern over the cost of potentially completing multiple EIS iterations is diminished.

In sum, the Court finds that the examples from the record about specific impacts, either already experienced in Ohio on state or private lands, or known to USFS and BLM from other forest plans in the area, demonstrate that both the impacts of fracking on federal lands, and the likelihood of it actually occurring, were reasonably foreseeable. *See Richardson*, 565 F.3d at 718 (finding it reasonably foreseeable when “[c]onsiderable exploration ha[d] already occurred on parcels adjacent to the [parcel at issue], and a natural gas supply [was] known to exist beneath these parcels.”). Defendants’ decision not to conduct further review, in large part, was based on the assumption that there was no significant impact at the leasing stage because no surface disturbing activities in furtherance of fracking would occur. *See* Defs.’ MSJ 14, ECF No. 92. But this Court joins other courts in finding that this conclusion “fell short of NEPA’s requirements with respect to leases lacking NSO stipulations. . . . because at the leasing stage ‘the [agency] made an irrevocable commitment to allow *some* surface-disturbing activities,’ and it was therefore required to analyze those

activities before it could no longer preclude them.” *WildEarth*, 368 F. Supp. 3d at 65 (referencing *Peterson, Conner, and Richardson*).

B. USFS’s and BLM’s “hard look” at forest clearing activities

Having concluded that Defendants were required to perform a NEPA analysis at the leasing stage, the Court considers whether, in this case, Defendants took the requisite “hard look” at the impacts of fracking, and whether their decision to not engage in further NEPA analysis was arbitrary and capricious. Plaintiffs first argue that Defendants did not adequately consider the surface area disturbance impacts that fracking would have in the WNF.

1. NEPA Framework

As mentioned above, an agency must prepare an EIS whenever it endeavors to take “major . . . action[] significantly affecting the quality of the human environment,” 42 U.S.C. § 4332(C), which this Court finds could include opening up of federal lands for oil and gas leasing. Here, the Agencies complied with that initial requirement at step one of the oil and gas leasing process by preparing the 2006 Forest Plan and 2006 Forest Plan EIS which addressed oil and gas leasing in WNF. The 2006 Forest Plan and EIS decided to make available all federal minerals for oil and gas leasing. See Record of Decision, FS-10361.

Although an EIS does not stay relevant forever, a reviewing court must also be mindful that preparing an EIS is a time consuming and expensive process. That is why an agency can first prepare an EA to determine if it needs

to prepare an EIS. See 40 C.F.R. § 1501.4(a)–(c). An EA, also a NEPA document, is “a concise public document . . . that serves to . . . [b]riefly provide sufficient evidence and analysis for determining” the effect of the proposed action on the environment and “whether to prepare an [EIS] . . .” 40 C.F.R. § 1508.9(a). It includes some of the same content as an EIS—such as a “discussion[] of the need for the proposal, of alternatives . . . [and] of the environmental impacts of the proposed action and alternatives”—but does not require the same depth of analysis as an EIS. *Id.* § 1508.9(b); see *Anglers of the Au Sable v. U.S. Forest Serv.*, 565 F. Supp. 2d 812, 824 (E.D. Mich. 2008) (“An EA is a concise document that allows agencies to consider the environmental concerns associated with a proposed project while conserving agency resources for those projects in which a full EIS is required.”).

But, “[a]lthough the discussion may be ‘brief,’ the Court must still determine whether an EA took a ‘hard look’ at the environmental consequences of the proposed action.” *Mont. Wilderness Ass’n v. Fry*, 310 F. Supp. 2d 1127, 1144 (D. Mont. 2004) (internal citation omitted). If the agency concludes in the EA that no EIS is required, it issues a FONSI summarizing its reasons. 40 C.F.R. §§ 1501.4(e), 1508.13. Conversely, “[i]f the EA establishe[s] that the agency’s action ‘may have a significant effect upon the . . . environment, an EIS must be prepared.’” *Fry*, 310 F. Supp. 2d at 1144 (quoting *Found. for N. Am. Wild Sheep v. United States Dep’t of Agric.*, 681 F.2d 1172, 1178 (9th Cir 1982)).

Reviewing courts employ a “rule of reason” to determine whether an agency took the required “hard look” at environmental impacts. *See Friends of the Capital Crescent Trail v. Fed. Transit Admin.*, 877 F.3d 1051, 1058 (D.C. Cir. 2017) (“Consistent with a ‘rule of reason,’ an agency need not supplement an EIS every time new information comes to light after the EIS is finalized; rather, the need for supplementation ‘turns on the value of the new information to the still pending decisionmaking process.’” (quoting *Marsh v. Oregon Nat’l Res. Council*, 490 U.S. 360, 374 (1989))). The “hard look” requirement applies to EAs as well as EISs. *WildEarth*, 368 F. Supp. 3d at 53.

Whether the agency employed a reasoned-decision-making process is key. “NEPA does not require that an agency discuss every impact in great detail; it simply requires a reasoned evaluation of the relevant factors.” *Forest Guardians v. United States Forest Serv.*, 495 F.3d 1162, 1172 (10th Cir. 2007). And, although agency decisions are entitled to deference, and “an agency must have discretion to rely on the reasonable opinions of its own qualified experts,” when reviewing a decision not to supplement an EIS, “courts should not automatically defer to the agency . . . without carefully reviewing the record and satisfying themselves that the agency has made a reasoned decision based on its evaluation of the significance—or lack of significance—of the new information.” *Friends of the Capital Crescent Trail*, 877 F.3d at 1059 (quoting, in part, *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971)).

2. Relevant documents at issue

In 2006, USFS prepared and finalized an EIS and Forest Plan for WNF. FS-5528. The 2006 Forest Plan “made all federally-owned minerals administratively available to be leased . . . based on projections for oil and gas activity finding that fracking was ‘still not yet economically feasible’[.]” 2012 SIR, FS-5528 (citing Record of Decision, p. 14 and EIS, Appendix G). Thus, in USFS’s own words, the 2006 decision to make all federal minerals available for leasing did not consider the environmental impacts of fracking.

The RFDS contained in the 2006 EIS projected that a total of 272 acres in the Athens, Marietta, and Ironton Units would be disturbed by conventional oil and gas drilling activity before reclamation, 135 acres of which would be in the Marietta Unit. FS-10244. The types of surface disturbances considered from conventional oil and gas activities in the 2006 RFDS for each Unit included: access roads, road construction, well pad construction, and turnaround/production facility activities to service the wells. See Appendix G to 2006 EIS, FS10255, FS10257, FS10259.

In 2012, USFS asked BLM to review the continued viability of the 2006 RFDS, after the public raised concerns about the effects of fracking on the WNF. FS-5641. BLM concluded in a three-page letter, dated May 3, 2012 (“May 2012 Letter”), that the estimated surface disturbances projected for oil and gas activities would not change with the introduction of fracking to WNF because total surface disturbance would still be “well within the levels forecast in the 2006

RFDS.” FS-5643. Specifically, BLM reiterated that the 2006 RFDS projected a total surface area disturbance of 272 acres in the entire WNF for conventional, vertical drilling. For horizontal drilling, BLM estimated that the Marietta Unit could have up to ten horizontal drilling sites, the Athens Unit up to three, and the Ironton Unit none. FS-5641–42. It further estimated that each well pad site would require approximately 3–5.5 acres. Table 2, FS-5642.¹² The May 2012 letter further noted that the only significant differences between vertical and horizontal drilling were the size of each well pad and the volume of water used by each method. FS-5642. BLM acknowledged that the horizontal well pads would be larger than vertical well pads but reasoned that because “up to 8 wells can be drilled off of a single pad [fracking] actually reduces the level of surface disturbance associated with well pads, roads and pipelines.” FS-5642. BLM found it “difficult to estimate road and pipeline acreages” but nevertheless found that “it is reasonable to assume that fewer well pads would result in less road and pipeline disturbance.” FS-5642. BLM concluded that:

while a change in technology has now made horizontal drilling in portions of the WNF economically viable, the level of on-the-ground activity that has occurred and is yet anticipated, including any horizontal drilling operations, is still well within the levels forecast in the 2006 RFDS. Therefore, the 2006 RFDS is still applicable and does not need to be revised.

¹² Extrapolating from those to estimations, the maximum estimated surface area disturbance from horizontal well pad sites would be 71.5 acres (13x5.5).

FS-5643. The May 2012 Letter is devoid of citations or references to support any of its reasoning or conclusions.

The 2012 SIR was prepared specifically to address public concerns over fracking. See FS-5530–32. USFS’s 2012 SIR relied almost exclusively on that May 2012 Letter to find the 2006 RFDS’s projections for total surface area disturbance for conventional drilling was unchanged by the addition of fracking. In the 2012 SIR, USFS compared vertical and horizontal well pad sites by acreage, (Table 8), and remaining affected road acreage, (Table 9). FS5577–78. It viewed the 272-acre estimate as a “upper limits of projected outputs” for the Forest Plan. FS5577. The 2012 SIR concluded, it appears based only on the 2006 EIS Appendix G’s RFDS and BLM’s May 2012 letter, that “[t]otal surface disturbance acres of anticipated activity will not increase above those acres described within Appendix G.” FS5578.

Finally, BLM’s 2016 EA explained that the surface disturbance estimation of 135 acres for the Marietta Unit encompassed “all acreage potentially affected by oil and gas activities, including road construction, well pad construction, construction of turnaround/production facility areas, pipelines, and other related activities.” BLM-1355. It went on to summarize its findings for horizontal wells, noting that “the surface disturbance projected for 10 horizontal well pads is approximately 55 acres, substantially less than [the total surface area disturbance that] was initially projected under the 2006 RFDS.” BLM-1355.

Thereafter, BLM issued its 2016 FONSI, concluding that:

First, the amount of surface disturbance projected on the WNF with the use of high-volume, horizontal fracturing technology is within the amount of surface disturbance analyzed in the 2006 Forest Plan Final EIS. Second, the regulations enforced by the BLM and Ohio Department of Natural Resources (ODNR) and measures prescribed by the 2006 Forest Plan reduce impacts from land clearing and other activities that may impact wildlife habitat and populations. Post-lease actions/authorizations (e.g. APDs, rights of way), could be encumbered by further restrictions on a case-by-case basis, as required through project-specific NEPA analysis or other environmental review. The use of BMPs, SOPs, and lease stipulations, as well as potential conditions of approval at the APD stage, would lessen the potential for significant cumulative effects.

2016 FONSI, BLM-1758.

In other words, BLM concluded that the advent of fracking in WNF was not a significant impact and did not require preparation of an EIS because the 2006 Forest Plan sufficiently accounted for oil and gas activities generally, and the fracking impacts did not exceed the projected surface disturbance in the WNF.

3. USFS failed to take a “hard look” at surface disturbing activities

Plaintiffs contend that USFS’s conclusion in its 2012 SIR that the 2006 Forest Plan and EIS adequately addressed the impacts of fracking was arbitrary and capricious because it did not analyze or consider the full scope of forest clearing activities, including construction of pipelines, water impoundments, and staging areas. Pls’ MSJ 18, ECF No. 83.

“When new information comes to light the agency must consider it, evaluate it, and make a reasoned determination whether it is of such significance as to require [an SEIS].” *Friends of the Clearwater v. Dombek*, 222 F.3d 552,

558 (9th Cir. 2000). One mechanism by which agencies determine whether additional NEPA analysis is required is through SIRs. SIRs are not expressly provided for by NEPA and are not mentioned in the Counsel on Environmental Quality's ("CEQ") regulations implementing NEPA. *See Idaho Sporting Cong., Inc. v. Alexander*, 222 F.3d 562, 566 (9th Cir. 2000). But, "courts have upheld agency use of SIRs and similar procedures for the purposes of determining whether new information or changed circumstances required the preparation of a supplemental EA or EIS." *Id.* However, if an agency determines that an action or new information is significant, a SIR does not suffice—an SEIS must be prepared. *Id.*

Plaintiffs point to USFS employee statements indicating that USFS's decision to not prepare a supplement EIS could be different if the total surface disturbance acreage was greater than what was considered in the 2006 Forest Plan and 2006 EIS. See 2012 SIR, FS-5591 (noting that fracking might "create effects that are not covered under the current [2006] Forest Plan and associated planning documents . . . if the total acreage likely to be impacted is greater than what was analyzed (i.e. cumulative effects) [or] . . . if the activities have effects that are markedly different than what was considered during the Forest Plan development."); see also Letter from Anne Carey, Forest Supervisor, FS-5725 (finding that based on BLM's estimates and the actual disturbances to-date accounting for less than half of the projected acreage under the 2006 Forest Plan, concludes that "[i]t is unlikely that, for the foreseeable future, drilling

disturbance will exceed the acreage envisioned in the existing analysis. This is important, since the biological documents for the Forest Plan . . . considered the effects of oil and gas activities on wildlife and plant resources up to the projected acres.”).

Plaintiffs further argue that, contrary to the assumption that the total surface area will not exceed the limits in the 2006 Forest Plan and 2006 EIS, there is record evidence which contradicts that conclusion. For example, Plaintiffs point out that Defendants were aware that horizontal drilling required larger gathering pipelines in 2012 because at the same time USFS was preparing its 2012 SIR for WNF, it was also reviewing projected pipeline disturbances from horizontal well development for other forests, which did provide estimates for pipeline and access road disturbances. Pls.’ MSJ 22, ECF No. 83; citing FS-9 (projecting 13.5 acres of forest clearing in Monogahela “for access roads and pipelines” for each horizontal well cite) and FS-48–49 (projecting an estimated 12.34 acres of pipeline-related disturbance per producing well pad in 2011 for Virginia’s George Washington National Forest). BLM and USFS also acknowledge that fracking requires exponentially greater quantities of water than conventional vertical drilling, yet they failed to consider or explain why the increased surface disturbance caused by water impoundments and staging areas potentially associated with a higher water usage would not exceed the 2006 Forest Plan EIS projections for total surface area disturbance.

See Pls.' Mot. 22, ECF No. 83 (citing FS-5531); *see a/so* Table 2, BLM May 2012 Letter, FS-5642 (comparing water usage between vertical and horizontal drilling).

Likewise, the record indicates that USFS was aware in January 2012 of ODNR's specific surface area disturbance projections for fracking activities in the surrounding areas. ODNR issued recommendations for horizontal drilling on state lands, which specifically discussed estimated sizes for well pads, FS-2656 (estimating 3.5–7 acres per well pad, with up to 12 individual wells, and an estimated drainage area of more than 640 acres), and water storage. FS-2659 (estimating that fracking requires 2-6 million gallons water, stored close to the well-site and requires "substantial resources"; noting that "one million gallons of water is equivalent to 3.069 acre feet or 133,685.24 cubic feet"; which results in "the means and location of water storage ha[ving] a significant impact on the amount of land utilized for oil and/or gas development."); *see a/so* BLM-1388–89 ("ODNR reported that 15,707,339 barrels of oil and 651,193,106 million cubic feet of gas were produced from Ohio's horizontal shale wells in the first nine months of 2015;" noting that at that time there were "493 active federal wells" in the WNF); *see a/so* FS-3815, 26–29; FS-3833 (noting possible productive shale areas could be up to 10,000,000 acres; 200 shale wells estimated drilled in 2012; also estimating 6 acres per well pad and access road for a total of 20,772 acres for access roads and well pads).

Finally, even assuming that the total surface area will not exceed the total estimated surface area disturbance projected in the 2006 RFDC, USFS cannot

simply say that the 2006 Forest Plan EIS and 2004 RFDS covered all oil and gas activities, without grappling with the different impacts potentially posed by fracking. See *Los Padres ForestWatch v. United States BLM*, No. CV-15-4378, 2016 U.S. Dist. LEXIS 138782, at **34–35 (C.D. Cal. Sept. 6, 2016) (“Defendants argue that its analysis of the environmental impact of fracking is subsumed under its analysis of the impact of *all* oil and gas development. . . . [b]ut a “hard look” at the environmental impacts of fracking necessarily requires the Bureau to address the unique risks and concerns associated with fracking. . . . [which] involves risks and concerns that were not addressed by the PRMP/FEIS’ general analysis of oil and drilling development in the area.” (internal citations omitted)); cf. *Richardson*, 565 F.3d at 705–76 (rejecting agency’s argument that any impacts or changes to surface area disturbance would only differ in degree, not kind, so no further analysis was necessary).

Here, the record reflects that USFS had information at its disposal in 2012 to review when determining the surface area disturbances posed by fracking. But instead of doing so, it relied primarily on BLM’s May 2012 Letter, which lacked support for its conclusions. Thus, the Court finds that USFS did not engage in reasoned analysis because it did not consider all reasonably foreseeable impacts of fracking, despite having information available to them for consideration, and acknowledging that an increase in total surface area disturbance could require an EIS.

4. BLM failed to take a “hard look” at surface disturbing activities

Similarly, Plaintiffs argue that BLM failed to take the requisite “hard look” at the impacts of fracking when it prepared its 2016 EA and issued a FONSI.

An agency can prepare an EA “if the agency’s proposed action neither is categorically excluded from the requirement to produce an EIS nor would clearly require the production of an EIS. See [40 C.F.R. §] 1501.4(a)-(b). The EA is to be a ‘concise public document’ that ‘[b]riefly provide[s] sufficient evidence and analysis for determining whether to prepare an [EIS].’ § 1508.9(a).” *Dep’t of Transp. v. Public Citizen*, 541 U.S. 752, 757–78 (2004).

Just as is required for an EIS, “the EA must take a ‘hard look’ at the environmental consequences of the proposed action . . . including its direct, indirect, and cumulative effects.” *WildEarth Guardians*, 368 F. Supp. 3d at 53 (internal citations omitted). An EA’s analysis is insufficient “if it includes ‘virtually no references to any material in support of or in opposition to its conclusions.’” Conclusions drawn in an EA ‘must be supported by some quantified or detailed information, and the underlying environmental data relied upon to support the expert conclusions must be made available to the public’ to allow for informed public comment on the project.” *Friends of Congaree Swamp v. FHA*, No. 3:06-cv-02538, 2008 U.S. Dist. LEXIS 77563, at **9–10 (D. S.C. Sept. 30, 2008) (internal citations omitted).

“[A]n agency’s decision to issue a FONSI and not prepare an EIS . . . is a factual determination which implicates agency expertise.” *Biodiversity*

Conservation Alliance v. U.S. Forest Serv., 765 F.3d 1264, 1267 (10th Cir. 2014).

But, [i]n order for a factual determination to survive review under the arbitrary and capricious standard, an agency must ‘examine[] the relevant data and articulate[] a rational connection between the facts found and the decision made.’”

Richardson, 565 F.3d at 713 (quoting *Citizens’ Comm. to Save Our Canyons v. Krueger*, 513 F.3d 1169, 1176 (10th Cir. 2008)).

Again, Defendants rely heavily on the fact that CEQ regulations allow for them to “tier” reviews, meaning in the sort of multi-stage process at play here, an agency can incorporate previous analyses if the prior, broader EIS fully analyzed the issue later under review. 40 C.F.R. §§ 1502.20; 1508.28. “[H]owever, ‘[t]o the extent that any relevant analysis in the broader [earlier] NEPA document is not sufficiently comprehensive or adequate to support further decisions, the tier[ed] NEPA document must explain this and provide any necessary analysis.’” *Id.* (quoting 40 C.F.R. § 46.140(b)).

In this case BLM’s 2016 EA relies heavily on the 2012 SIR’s determinations that fracking would not exceed the estimated 135 acres of surface disturbance in the Marietta Unit, which in turn is based only on BLM’s May 2012 Letter that lacks any “quantified or detailed information” underlying its conclusions.

Indeed, BLM’s 2016 EA analysis of whether the 2006 RFDS was still applicable, even with the change of fracking, almost entirely relies on USFS’s 2012 SIR:

For the Marietta unit, the 2006 RFDS projected up to 110 vertical well pads (2006 Forest Plan EIS, p. G-1), and the 2012 SIR projected 10 horizontal well pads (SIR, p. 3). The 2012 SIR was issued because horizontal wells were becoming more of the standard approach to mineral development on private surface in the area. The surface disturbance projected for 10 horizontal well pads is approximately 55 acres, substantially less than what was initially projected under the 2006 RFDS. As shown in Table 2-1, approximately 10 acres have already been disturbed from oil and gas development in the Marietta Unit; therefore, the remaining acreage of surface disturbance that could occur within the Marietta Unit that is analyzed in this EA, is approximately 70 acres. Of those 70 acres, approximately 40 acres of disturbance would persist for the long term, until final reclamation is completed. This disturbance is still well within the projected disturbance of the RFDS from the 2006 Forest Plan EIS.

2016 EA, BLM-1355. The EA then estimates that approximately two acres will be affected by road construction, and notes that, if the wells are productive, “additional land may be affected by pipeline construction.” BLM-1356–57.

From this, Defendants argue that “the records show that the impacts from horizontal drilling are within the scope of the earlier analyses.” Def. MSJ 16, ECF No. 92. They also acknowledge that horizontal well pads are larger than vertical well pads but reiterate that overall, because each horizontal well pad site can contain up to eight wells, it reduces the number of overall well pads sites required.

Plaintiffs argue that the 2016 EA improperly limited its calculation of foreseeable fracking disturbances to just well pads and access roads, thereby failing to acknowledge the full scope of foreseeable surface disturbing activities.

For example, Plaintiffs cite to Table 2.1 in BLM's 2016 EA, which states that according to the 2006 RFDS, the total initial acres of surface area in the

Marietta Unit likely to be disturbed by oil and gas drilling before reclamation to be 135 acres. BLM-1355. It then arrives at a “net surface disturbance below 2006 RFDS” of 70 acres by adding together the 2012 SIR projected disturbance from horizontal well pads only (55 acres) and acres disturbed to-date from oil and gas activities (10 acres) and subtracting that total (65 acres) from the 135 acres. See Table 2.1, BLM-1355.

Table 2.1. Potential Disturbance in the Marietta Unit Projected by the RFDS

	2006 RFDS projection of acres disturbed	2012 SIR forecast of acres disturbed by horizontal wells	Acres disturbed to date from oil and gas development	Net surface disturbance below 2006 RFDS
Total initial acres of surface disturbed by oil and gas drilling before reclamation	135	55	10	70 $(135-65) = 70$
Total acres of surface needed to support long term production (i.e. remaining	59	13.8	5	40.2 $(59-18.8) = 40.2$

BLM-1355.¹³

The problem is that the 55 acre-projection for horizontal wells encompasses *only* surface disturbance from horizontal well pads, whereas the 2006 RFDS’s 135-acre estimation included *all* acreage potentially affected by oil and gas development caused by vertical drilling. BLM-1355. As Plaintiffs point out, fracking will contribute more than just an increased well pad size—there are other different, associated surface disturbances that will likely occur, such as larger gathering lines, staging areas, and water impoundment facilities, that were

¹³ The completed phrase for the bottom left category reads in full: (i.e. remaining disturbance after reclamation). The Table carries over into the next page only to complete that phrase. See BLM-1356.

not accounted for in either the BLM's 2016 EA or the 2012 SIR. Nor is it clear from BLM's May 2012 Letter, USFS's 2012 SIR, or BLM's 2016 EA that the same type of surface disturbances associated with conventional vertical drilling would be analogous to fracking. Thus, the Court cannot conclude that BLM engaged in a reasoned decision process when it determined that fracking would cause surface disturbance on only 55 acres because BLM considered in that calculation the surface disturbance caused by well-pads and nothing else.

Likewise, Defendants cannot argue that such information was unavailable, and thus not foreseeable, at the time BLM prepared its 2016 EA. In 2016, there was evidence in the record that greater surface disturbance was likely to occur with fracking activities than estimated in the 2006 Forest Plan and USFS's 2012 SIR, which Plaintiffs raised in the comment period for the 2016 EA. Pls.' MSJ 24, ECF No. 83. BLM's response to the public comment concerning surface area disturbance was: "Since the exact design details are not known at the leasing stage, it is not possible to know exactly what supporting infrastructure would be needed if development occurs in the future, other than acknowledging that additional surface disturbance could occur (as identified in the EA) . . . further detailed NEPA analysis would be conducted at the Application for Permit to Drill (APD) stage." BLM-1511. Such a response, when information from other sources is attainable and presented to BLM, is insufficient.¹⁴ See *Los Padres*

¹⁴ For example, BLM concludes, without any support, that "there is already a well-developed pipeline infrastructure in place which should minimize the need for lengthy

ForestWatch v. United States BLM, No. CV-15-4378, 2016 U.S. Dist. LEXIS 138782, at **35–36 (Cen. D. Cal. Sept. 6, 2016) (an agency “may not avoid an obligation to analyze in an EIS environmental consequences that foreseeably arise from a[] [Resource Management Plan] merely by saying that the consequences are unclear or will be analyzed later when an [environmental assessment] is prepared for a site-specific program proposed pursuant to the RMP. . . . [u]ncertainty about which specific parcels and wells will employ fracking in the future does not obviate the necessity to evaluate the cumulative environmental consequences to the Bureau’s decision to open or maintain . . . federal land . . . to oil and gas activities.” (internal citations omitted) (emphasis removed))). Indeed, there is evidence in the record that demonstrates that BLM *can* and *does* routinely estimate surface disturbances. To not do so when there was reasonably foreseeable impacts from fracking was arbitrary and capricious.

gather lines to service new wells.” FS-5632. But such conclusion is contrary to record information, albeit record information submitted primarily by various organizational Plaintiffs, that demonstrate that gathering pipelines for fracking and conventional vertical drilling cannot be interchanged. See FS-2966–67. Plaintiffs move for the Court to take judicial notice of the fracking pipeline perimeter, but the Court need not rule on that motion to arrive at the conclusion that BLM did not consider the appropriate scope that fracking pipelines might have in WNF. Thus, the Court **DENIES** Plaintiffs’ motion, ECF No. 84, as moot. Moreover, even if Plaintiffs’ argument is primarily from their own comments in the 2016 EA’s comment period, Defendants do not argue that Plaintiffs estimates are false, argue that the same pipelines can be used for both conventional and fracking activities, or provide citation to where they otherwise addressed the comment in their Final EA. Finally, the Court is not tasked with weighing whether Plaintiffs’ assertion is true or accurate. Rather, its tasked with reviewing whether the agencies adequately considered the record evidence. And here, the failure to reasonably consider whether the drilling methods would require different pipelines, once presented with the issue, is not a sufficient review.

C. Impacts¹⁵ on Private Land

Plaintiffs next argue that Defendants failed to appreciate and adequately analyze the indirect and cumulative effects, enabled through federal leasing, that fracking on private lands in the Forest would have, even though Defendants were aware of the impacts of fracking on adjacent or nearby private lands and the impacts were reasonably foreseeable. Defendants contend that they adequately considered the effects of fracking on private land, to the extent they were required to do so.

An agency must consider all foreseeable direct, indirect, and cumulative impacts of its decision. *Sierra Forest Legacy v. Sherman*, 646 F.3d 1161, 1180 (9th Cir. 2011). In evaluating an agency's environmental impact analysis, courts must be cognizant that "[t]here are natural limits to the amount of forecasting that can be done . . . and agencies are required only to make a reasonable, good faith, objective presentation of those impacts sufficient to foster public participation and informed decision making." *High Country Conservation Advocates*, 52 F. Supp. 3d at 1188 (quoting *Colo. Env't Coal. v. Domebeck*, 185 F.3d 1162, 1177 (10th Cir. 1999) (further citations omitted)).

In this case, Plaintiffs generally argue that Defendants should have considered fracking impacts on private land—indirect and cumulative. Plaintiffs

¹⁵ The parties and the caselaw use "impacts" and "effects" interchangeably. The Court will endeavor to use "impacts" unless quoting. But effects and impacts are synonymous in meaning. See 40 C.F.R. § 1508.8.

point specifically to Defendants' failure to analyze the impacts on (1) the Little Muskingum River and (2) the Indiana Bat.

1. Indirect Impacts

Plaintiffs argues that many indirect impacts from private land fracking activities were not considered. Although USFS's 2012 SIR did not consider the impacts of leasing on private lands, BLM has discussed the potential impacts, noting in its 2016 EA that:

Given the highly fragmented nature of land ownership in the Marietta Unit, a well pad on one parcel, federal or private, may be serviced by roads, pipelines, tank batteries, and other infrastructure on other parcels in other ownerships. Second, an operator may use directional drilling to locate a pad on a parcel not directly above the bottom hole location for various reasons, thus enabling federal minerals to be accessed from outside the federal surface.

BLM-1427. BLM also acknowledged that "indirect effects may include development of oil and gas resources on non-federal lands." BLM-1452.

Defendants do not dispute that the 2006 Forest Plan EIS "limited its consideration of direct and indirect effects to National Forest System land," Defs.' MSJ 20, ECF No. 92 (citing FS-9574), but they contend that they are neither required to analyze the indirect impacts because leasing federal land for fracking is not an indirect impact to private land, and even if it was, there is no requirement to discuss indirect impacts in a "distinct section" of the EIS. Defs.' MSJ 22, ECF No. 92.

Indirect impacts are “caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.” 40 C.F.R.

§ 1508.8(b). These effects include: “growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.” *Id.* “Effects are reasonably foreseeable if they are sufficiently likely to occur that a person of ordinary prudence would take [them] into account in reaching a decision.” *Sierra Club v. FERC*, 867 F.3d 1357, 1371 (D.C. Cir. 2017) (citation omitted).

Defendants argue that most of Plaintiffs’ indirect impacts arguments are foreclosed by the Supreme Court’s decision in *Department of Transportation v. Public Citizen*. 541 U.S. 752 (2004). The question before the Supreme Court in *Public Citizen* was whether NEPA and the Clean Air Act required the Federal Motor Carrier Safety Administration (“FMCSA”) to evaluate the environmental effects of vehicles traveling across the Mexican border when undergoing its NEPA review. *Id.* at 756. FMCSA’s EA concluded that any change in volume of Mexican trucks and buses would not be due to its proposed resolution, but rather due to other political decisions outside of FMCSA’s control (in this case the North American Free Trade Agreement); and thus, not an “indirect effect” from the issuance of its regulations. *Id.* at 761. The Court of Appeals disagreed and remanded back to the agency for preparation of an EIS. *Id.* at 763. But the Supreme Court reversed, holding that “NEPA requires ‘a reasonably close causal

relationship' between the environmental effect and the alleged cause . . .” akin to proximate cause. *Id.* at 767 (internal citation omitted). Thus, the Court reasoned that “[s]ince FMCSA ha[d] no ability categorically to prevent the cross-border operations of Mexican motor carriers,” or “the power to act on whatever information might be contained in an EIS[,]” analyzing the environmental effects of Mexican trucks would not fulfill NEPA’s “twin aims.” *Id.* at 768. Defendants argue that this case is similar in that USFS and BLM have no control over what oil and gas activities occur on private land; therefore, Plaintiffs cannot show that the Agencies’ decision to lease proximately causes effects (in this case increased fracking) on private lands. Defs.’ MSJ 22, ECF No. 92.

Plaintiffs argue *Public Citizen* does not control because here, and unlike in that case, the Agencies have some control over whether to issue leases on federal lands, which in turn will impact whether private land development increases, given the patchwork of private and federal lands interspersed throughout the WNF. Pls.’ Reply 17, ECF No. 105. Plaintiffs contend that BLM was aware that there would be development on private lands because of federal leasing. See BLM-1360 (rejecting the “No Action Alternative”—which would have prohibited surface occupancy on federal land—because that “alternative would unnecessarily constrain oil and gas occupancy, especially in this highly fragmented landscape, where the ability to cross federal land may be critical to enabling an operator to develop.”). Plaintiffs further argue that lack of control does not relieve Defendants from disclosing possible effects. *Id.* at 16. But, if it

is true that Defendants do not have the ability to control what development occurs on private land,¹⁶ i.e. through regulations or stipulations, then it would seem that *Public Citizen* precludes Plaintiffs' argument here, because Defendants would be powerless to act on any information in an EIS about private indirect effects.

Accordingly, the Court agrees with Defendants and finds that *Public Citizen* ultimately controls here. Even if BLM's decision and USFS's approval to lease federal lands will perpetuate growth on private lands, neither agency will have the ability to control the development or other activities on private land. Thus, the Court finds that it was not arbitrary and capricious for BLM and USFS to not consider the indirect effects leasing federal lands would have on private land.

2. Cumulative Impacts

Plaintiffs' discussion of impacts to private lands primarily focused on whether development on private land can be an "indirect impact" of leasing federal land, but the Court will address whether Defendants adequately considered cumulative impacts caused by private land fracking to the extent Plaintiffs developed that additional argument.

¹⁶ Plaintiffs and Defendants agree on one scenario when Defendants would have some input or control over what happens on private land—if a lessee uses private land to access federal minerals in some way. The Court agrees with Defendants that this is the applicable scenario where deferral until the APD stage makes sense; because only when specific parcels are being leased will Defendants know whether such uses will occur. See Defs.' MSJ 21–22, ECF No. 92; Pls.' Reply 16–17, ECF No. 105.

The regulations define cumulative impacts as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.”

40 C.F.R. § 1508.7. “Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” *Id.*

“Consideration of cumulative impacts requires some quantified or detailed information’ that results in a ‘useful analysis,’ even when the agency is preparing an EA and not an EIS . . . ‘[g]eneral statements about possible effects and some risk do not constitute a hard look absent justification regarding why more definitive information could not be provided.’” *Ctr. For Env’t’l Law & Policy v. United States Bureau of Reclamation*, 655 F.3d 1000, 1007 (9th Cir. 2011) (quoting *Kern*, 284 F.3d at 1075).

A meaningful cumulative impact analysis must identify five things: (1) the area in which the effects of the proposed project will be felt; (2) the impacts that are expected in that area from the proposed project; (3) other actions—past, present, and proposed, and reasonably foreseeable—that have had or are expected to have impacts in the same area; (4) the impacts or expected impacts from these other actions; and (5) the overall impact that can be expected if the individual impacts are allowed to accumulate.

San Juan Citizens All. v. Stiles, 654 F.3d 1038, 1056 (10th Cir. 2011).

Here, the record reflects that because WNF is a patchwork of parcels with different owners—federal, state, and private—there is a strong likelihood that “a

single wellbore is likely to extend through a patchwork of parcels with different owners of the surface and subsurface minerals, especially as Shale drilling often involves drilling horizontally through areas extending more than a mile.” Pls.’ MSJ 26, ECF No. 83 (citing BLM-29005); *see also* BLM-1360. Thus, Plaintiffs argue that the cumulative impacts of both private and federal fracking are important considerations that were not fully addressed in either the 2012 SIR or the 2016 EA.

The 2006 Forest Plan and 2006 EIS did not consider any cumulative impacts of fracking on private lands as it found that method not viable at that time. FS-10248. Likewise, the 2012 SIR did not consider the cumulative impacts of fracking on private land. *See* FS-5530 (noting that well site estimates “do[] not include private surface lands located within the proclamation boundary.”). Thus, to the extent BLM’s 2016 EA “tiered” to the 2012 SIR and the 2006 Forest Plan and EIS for cumulative effects of oil and gas leasing, such reliance would be misplaced. Moreover, the lack of discussion elsewhere may trigger a heightened discussion in the EA. *See Kern*, 284 F.3d at 1078 (“If, as is the case here, there is no analysis in the EIS, the scope of the required analysis in the EA is correspondingly increased.”).

Defendants contend that the cumulative impacts analysis in BLM’s EA sufficiently discussed cumulative impacts from surrounding private lands in the Forest. Defs.’ MSJ 20, ECF No. 92. BLM stated in its EA that it considered the cumulative impacts of the Marietta Unit and its surrounding area. BLM-1451.

Section 4.16 of the EA discussed cumulative impacts of fracking on: air; plant and animal habitat and populations; water resources and water quality; soil geology and mineral resources; wastes, public health and safety; transportation; recreation and land use; noise; cultural resources and Native American concerns; visual resources and scenic quality; and socioeconomics. See BLM-1451–64.

As an initial matter, Plaintiffs seem to be arguing that Defendants failed to adequately consider *all* cumulative impacts, see Pls.’ MSJ 28, 30, ECF No. 83, but the Court finds that Plaintiffs failed to adequately develop this argument as to all categories, especially because they often fail to distinguish between their indirect or cumulative impact arguments in their briefing. Instead, the Court will limit its focus on the two private land cumulative impacts sufficiently briefed by Plaintiffs—the Little Muskingum River and Indiana Bat.

a. Little Muskingum River

Plaintiffs argue that Defendants overlooked the potential for significant water depletion from the Little Muskingum River. There is no dispute that fracking requires extensive amounts of water—upwards of millions of gallons. See FS-4245; BLM-1436. The record is also clear that the 2006 Forest Plan EIS did not consider that amount of water usage.

The 2012 SIR noted that “no agency (federal or state) [] regulates water withdrawal from streams and rivers in the State of Ohio.” FS-5556. Instead, it explained that water usage is governed by the “reasonable use doctrine” in Ohio.

FS-5556 (citing O.R.C. 1521.17). But it further explained that reasonable use does not govern oil and gas activities; rather, agreements between landowners and mineral owners must be made. FS-5556–57. Despite these acknowledgements, the 2012 SIR concluded that, with respect to groundwater depletion:

No additional analysis or protections are needed at the Forest Plan level. While the 3.5 – 4 million gallons required for horizontal operations represent a change from the conventional well operations, the level of effect is not anticipated to increase. By using the existing measures in the Forest Plan, *supported by Ohio reasonable use doctrine*, there is no increased effect to groundwater due to depletion, since at the site specific level the WNF will be able to control withdrawals and limit them to periods when water is plentiful.

FS-5557.

USFS made an almost identical conclusion with respect to surface water depletion, relying on the Forest Plan's existing measures and Ohio's reasonable use doctrine to conclude that despite the millions of gallons of additional water required for fracking and not considered in the 2006 Forest Plan and EIS, "the level of effect is not anticipated to increase." FS-5568–69.

Setting aside for a moment the inconsistency as to whether Ohio's reasonable use doctrine aided in water conservation, the USFS's regional office comments support the Court's ultimate conclusion that the 2012 SIR did not actually conduct a reasoned review.

A USFS Regional Office review of an internal draft of the 2012 SIR's water resource overview is rife with comments pointing out how flimsy the 2012 SIR's,

and in turn the 2006 EIS's, water resource review was. For example, when explaining that the Forest Hydrologist considered "a vast amount of information related to oil and gas fracturing activities" the reviewer noted that, "Sounds like the analysis in the Plan EIS was not adequate Remember, this is an evaluation of the adequacy of the Plan EIS, so all the extra work is NOT a plus." FS-3525.¹⁷ Meaning, the fact that the hydrologist had to consider vast amounts of information leads to the conclusion that the 2006 Forest Plan and EIS did not sufficiently account for the issue of fracking. The water resource overview draft also discussed how Ohio handled fracking developments, including that Ohio enacted additional measures to address the impacts of fracking. To which the commentator noted: "So the State found that it needed to change its requirements after 2006. That DOES NOT support an argument that the Plan EIS and Plan requirements are still adequate." FS-3526. But instead of addressing the potential flaws raised by the comments, USFS removed the paragraphs at issue from the final 2012 SIR and replaced them with general language indicating that Ohio's laws adequately protect water usage or included large block quotes from the 2006 Forest Plan EIS. See FS-5550.

Indeed, as the USFS commentator pointed out, "a lot of the material in the groundwater and surface water effects section is a restatement of standards, regulations, etc. rather than an actual effects analysis." FS-3545. The Court

¹⁷ This language was changed to "pertinent information" instead of "vast" in the final 2012 SIR. See FS-5544.

could not have said it better. As is highlighted by the USFS reviewer's comments, what is lacking from USFS's review are the actual effects of the increased water needs for fracking in the Forest. What we have is basically a regurgitation of the 2006 EIS's water plan discussion for conventional drilling, but there is no analysis or reasoned discussion of how, or whether, the vast amounts of water needed for fracking will pose different environmental risks. Thus, it is apparent that the direct impacts of water depletion from fracking, let alone the cumulative impacts, have not been rationally and reasonably considered by USFS in the 2012 SIR. The Court finds that the 2006 Forest Plan and EIS did not sufficiently address the new and different impacts of fracking on water usage, particularly how fracking would affect the Little Muskingum River. The 2012 SIR's cursory and conclusory review of the cumulative impacts on water depletion in the Forest from fracking did not cure the deficiency.

Similarly, BLM's 2016 EA fails to adequately consider the cumulative impacts of fracking on federal and private land would have on the Little Muskingum River. BLM's 2016 EA noted that "there is likely not enough surface water in the Marietta Unit for water to be withdrawn and used so [fracking] water would either need to be brought into the area or potentially withdrawn from the Ohio River, although a local waterway may be used if it is determined to be an appropriate water source." BLM-1436–37. Plaintiffs argue that the only feasible local waterway would be the Little Muskingum River and that the depletion effects were foreseeable at the time that BLM prepared its EA. Pls.' Reply 22,

ECF No. 105. Defendants do not dispute that the Little Muskingum River is likely to be used or considered, but they argue that just because BLM did not mention it by name does not mean that its analysis was inadequate. Regardless of whether BLM mentioned the river by name, there is no discussion or analysis of how local waterways will likely be affected by the potential withdrawal of millions of gallons of water from both private and federal lands. The record indicates that the Little Muskingum River is located within the Marietta Unit, see BLM-1474, fed by smaller streams in the area. BLM-1390. The EA also noted that, as of 2015, there were a total of 790 active wells in the WNF, but it does not indicate whether those wells are for conventional drilling, fracking, or a combination of both. BLM-1452.¹⁸ There is also no discussion of how that number of wells on private lands would impact the Little Muskingum River or other local waterways, other than to acknowledge that “despite the potential for cumulative effects to water resources, reclamation and other stipulations and best management practices, as described earlier in this EA, would help minimize the potential for significant adverse cumulative effects.” BLM-1459. That conclusory justification is meaningless when the record is devoid of any analysis or discussion of how the Little Muskingum River would be impacted by fracking activities in the WNF. The EA relied on the 2006 Forest Plan EIS mitigation efforts, which did not consider the

¹⁸ Elsewhere in Section 3.4.2, the EA does note that “15,707,339 barrels of oil and 651,193,106 million cubic feet (Mcf) of gas were produced from Ohio’s horizontal shale wells in the first nine months of 2015.” BLM-1388.

impacts of fracking. Accordingly, failure to meaningfully discuss the cumulative impacts on the Little Muskingum River was arbitrary and capricious.

b. Indiana Bat

Plaintiffs argue that by looking only at the impacts of federal land clearing activities, Defendants ignored the potential for destruction of Indiana Bat foraging areas, male roosting trees, and summer maternal roosting trees. Pls.' MSJ 32, ECF No. 83. Plaintiffs further argue that Defendants' reliance on FWS's 2005 Biological Opinion ("2005 BiOp"), in both the 2012 SIR and 2016 EA, is insufficient because the 2005 BiOp only considered potential habitat loss on federal land. *Id.* (citing FS-10079–81; BLM-1431). Defendants argue that Plaintiffs are merely speculating as to harm. They contend that "surveys have never documented the Indiana bat on the Marietta Unit." Defs.' MSJ 26, ECF No. 92 (citing FS-7404–05). However, that argument contradicts the EA, which noted that the Indiana bat "is well-documented on all units of the WNF and is present year-round." BLM-1379.

The EA's discussion of the oil and gas impacts on the Indiana Bat is as follows:

The Forest Service determined that oil and gas activities are likely to adversely affect Indiana bat (2006 Forest Plan Final EIS, p. F1-58). However, the USFWS determined that the 2006 Forest Plan's activities are ***not likely to jeopardize the Indiana bat's continued existence*** (BO, p. 75), and potential negative impacts to individual bats are not expected to have measurable negative impacts on colonies or discrete populations. Based on this finding, the USFWS

issued an incidental take permit that applies to activities conducted pursuant to the 2006 Forest Plan, including oil and gas activities.

BLM-1431 (emphasis in original).

The problem with reliance on the 2005 BiOp is that just like the 2006 Forest Plan, the BiOp did not consider the impacts of fracking, only conventional vertical drilling oil and gas activities.

Elsewhere the 2016 EA acknowledges generally that there would “likely be an increase in habitat fragmentation and creation of edge habitat, particularly in areas where oil and gas development may be more concentrated.” BLM-1457. But it concludes that despite this potential for increased effects, “reclamation and other stipulations and best management practices, as described earlier in this EA, would help to minimize the potential for significant adverse cumulative effects.” BLM-1457. Once again, this is a conclusion without record support. The reason for this is a combination of USFS and BLM's failure to adequately address the likely surface disturbance and reliance on the 2005 BiOp and 2006 Forest Plan and EIS, none of which considered the impacts of fracking at all. The Court cannot conclude that impacts of fracking on the Indiana Bat were reasonably considered when the only supporting document—the 2005 BiOp—did not consider it at all, and the total surface disturbances, which impacts their habitats, was not adequately addressed.

Relatedly, Plaintiffs contend that USFS and BLM violated the ESA, and FWS violated the APA, when they failed to reinitiate consultation under Section 7

of the ESA for the Indiana Bat. At this time, given the lack of record evidence one way or another regarding the cumulative impacts on the Indiana Bat, especially without knowing the surface area disturbance on federal land or the cumulative effects generally, the Court cannot conclude that FWS failed to act on information that may impact the Indiana Bat. Accordingly, Plaintiffs' claims as under the ESA are **DENIED**. However, to the extent that an actual cumulative impacts analysis, coupled with another analysis of the total surface area likely to be disturbed are completed, the Court does not find that as a matter of law Defendants can wait until the APD phase to evaluate the potential harm to the Indiana Bat.¹⁹

D. Air Quality

Plaintiffs next contend that the 2006 Forest Plan and EIS provide “no quantification of criteria pollutant²⁰ emissions from vertical wells or analysis of their overall contribution to air quality degradation in the region presented” and that subsequent agency documents fail to address the issue in the context of fracking. Pls.’ MSJ 37, ECF No. 83; see *also* 2006 Forest Plan EIS, “Air Quality,” FS-9338–40. Defendants argue that the agencies considered the effects that oil

¹⁹ Because the Court does not address the merits of Plaintiffs’ ESA claim, the Court **DENIES** the motion for leave to file an Amicus brief, as it only addressed whether FWS was required to re-initiate consultation. ECF No. 94.

²⁰ The EPA established National Ambient Air Quality Standards (“NAAQS”) to protect the public health and the environment. The EPA has also established acceptable concentrations for six pollutants in the outdoor air: carbon monoxide, ground-level ozone, lead, nitrogen dioxide, particulate matter, and sulfur dioxide (“criteria pollutants”). 2006 Forest Plan EIS, FS-9338.

and gas leasing would have on air quality “to the extent practical for their respective decisions at this stage of leasing.” Defs.’ MSJ 30, ECF No. 92. Essentially, Defendants again revert to their standby argument that leasing itself would have no direct impacts on air quality; thus, any specific analysis will be conducted at the APD stage. *Id.* But the Court has already rejected that argument. Separately, Defendants point to BLM’s 2016 EA discussion in Section 4.2.1, where BLM noted that “at the leasing stage, there is a degree of speculation and uncertainty with regard to the amount of air emissions (and GHGs) that could occur since specific design details are not yet known.” 2016 EA, BLM-1412.

The 2006 Forest Plan EIS’s discussion of “Air Quality and the Environmental Consequences” noted that of the twelve counties in southeastern Ohio USFS manages in the WNF, all but one is considered “in attainment,” FS-9338, which means the air quality is cleaner than permissible levels is classified as an “attainment” area. Conversely, not being “in attainment” means that “the level of [the criteria pollutants] in the air over the Forest is below the ambient air quality standards set by EPA.” FS-9338. However, the 2006 Forest Plan EIS also acknowledges that WNF “has some of the highest levels of air pollution in the nation.” FS-9338. Nevertheless, the 2006 Forest Plan and EIS focused primarily on air quality impacts from wildfires and prescribed burns, not from oil and gas extraction. See FS-9339.

1. USFS's Review

USFS's 2012 SIR acknowledged that fracking activities could lead to more pollutants in the air but concluded that:

Because of the low level of horizontal well activity projected to take place for the remainder of the first ten years of Forest Plan implementation (13 well sites) the EIS remains valid in that effects to air quality would be negligible. No other protections at the Forest Plan level are needed, since the Ohio EPA has the jurisdiction to regulate air quality and emissions[.]

2012 SIR, FS-5602.

In support of their argument that the USFS's review was arbitrary, Plaintiffs cite to an USFS regional office critique of the "air quality" section. The reviewer recommended removing some language that essentially described what regulatory authorities and guidelines applied to air quality and noted that the rest of the air quality section "sa[id] nothing substantive about effects. What is needed is a comparison of emissions disclosed in the Plan EIS and those expected from [fracking]." But it does not appear that the drafters implemented the regional officer's feedback because the final 2012 SIR does not add any meaningful comparisons.²¹

²¹ Nor do Defendants point to any specific, qualitative or quantitative scientific analysis of air quality in the 2006 Forest Plan or 2006 EIS as it relates to oil and gas activities, despite conventional vertical drilling being considered as part of the 2006 Forest Plan and 2006 EIS.

The Court finds that the 2012 SIR's conclusory statement is insufficient to qualify as a hard look. Moreover, USFS cannot tier its review to the 2006 EIS if the air quality impacts of oil and gas leasing were not analyzed in that document.

2. BLM's review

BLM's 2016 EA provides more analysis of the air quality in WNF. See BLM-1361–73. BLM's 2016 EA included a section on foreseeable GHG emissions, relying in large part on the scientific paper, *Life cycle greenhouse gas emissions of Marcellus shale gas*, Jiang et al., 2011. The paper included the following relevant assumptions—"5 acres for wellpad disturbance, approximately 6 wells per well pad (per the 2006 RFDS), approximately 25 years for the lifetime of a well, and use of [fracking]." BLM-1417. Plaintiffs do not dispute that BLM adequately considered GHG emissions, and instead argue that BLM's ability to conduct a quantitative, predictive analysis of GHG emissions demonstrates that their failure to do so on other criteria pollutants was arbitrary and capricious. Plaintiffs also reiterate that delay until the APD phase would "circumvent considerations of cumulative air quality impacts of Forest-wide horizontal well development." Pls.' Reply 27, ECF No. 105. Defendants respond that they quantified GHG emissions because CEQ directed the agencies to do so (at the time) but that Plaintiffs point to no similar requirement for other air pollutants. Defs.' Reply 16–17, ECF No. 107.

Plaintiffs do rely on a 2011 Memorandum of Understanding ("2011 MOU") among the U.S. Departments of Agriculture, the Interior, and the EPA, which

requires the Lead Agency, as “early as possible in its planning process,” to “identify the reasonably foreseeable number of oil or gas wells that can be expressed as a range, expected to be located within the planning area . . . [and] prepare an Emissions Inventory of criteria pollutants.” 2011 MOU, BLM-45479–80. Defendants counter that the 2011 MOU requires analysis only “where air quality or AQRVs are issues warranting NEPA analysis.” Defendants point to BLM’s EA which discussed air quality and other NAAQS criteria pollutants and determined that all parts of the Marietta Unit were in attainment. See 2016 EA, BLM-1361–68. Thus, because the Marietta Unit was in attainment, Defendants argue that BLM was not required to analyze NAAQs impacts further at the leasing phase.

Plaintiffs rely on *Colorado Environmental Coalition v. Salazar*, 875 F. Supp. 2d 1233, 1256–59 (D. Colo. 2012) (“CEC”) to refute Defendants’ air quality deferral argument. In that case, the plaintiffs alleged that BLM failed to take a hard look when it concluded that the proposed plan would not result in any unconsidered cumulative effects on air quality. *Id.* at 1257. The district court agreed, finding BLM’s proffered reasons unpersuasive, in part, because BLM was able to estimate certain air quality effects but failed to explain why it could not estimate others, and that BLM’s reliance on the lack of ozone violations in the past “[was] of no significance when the purpose of the EIS is to attempt to predict” future environmental effects. *Id.* at 1257. Defendants argue that this case is distinguishable because, unlike in *CEC*, there is no contradictory

evidence to show that BLM's reasons were unsupportable. Defs.' MSJ 32, ECF No. 92. But the Court finds CEC's broader principle helpful. Just like in that case, here, BLM is trying to convince the Court, and perhaps the public, to trust them that they looked at the relevant data and determined that because all of Marietta Unit is "in attainment" now, there is no need to do further analysis. The problem with that is two-fold. First, like in *CEC*, the fact that an area is currently within the permissible air quality limits does not necessarily mean that it will be in attainment in the future, there must be a focus on future estimations as well. Second, if the agency does not show its work, the Court cannot evaluate whether its decision was reasonable. Yes, the Court must defer to scientific methods chosen by the agencies. But "deference must be earned." *Meister*, 623 F.3d at 374. A conclusion that the current estimates cannot be made at the leasing stage, despite the ability to provide estimates for GHGs, is inconsistent. Moreover, at least one case on which Defendants rely, *San Juan Citizens Alliance v. United States BLM*, 326 F. Supp. 3d 1227 (D. N.M. 2018), actually supports this Court's conclusion. In *San Juan Citizens*, the district court found BLM did take a sufficiently hard look at the air quality impacts of the proposed action when it tiered its review to a previous EIS that specifically analyzed emissions under a maximum development scenario number of wells for all six criteria pollutants. *Id.* at 1251. But here, there is no previous analysis on which BLM can rely. Similarly, *Amigos Bravos v. United States BLM*, 2011 WL7701433, at *13 (D. N.M. Aug. 3, 2011) is also distinguishable in that BLM in

that case tiered to a previous NEPA document that had analyzed the NAAQS in some detail. *See id.* at ** 4, 11, 13–14; *c.f. Save Our Cumberland Mountains v. Kempthorne*, 453 F.3d 334, 339–40 (6th Cir. 2006) (finding the EA satisfied NEPA when it “discussed at length the environmental effects” and cited to “numerous studies”).

Finally, the Court is once again not convinced of the underlying premise of Defendants’ main argument—that further analysis can wait until the APD phase. “NEPA is not designed to postpone analysis of an environmental consequence to the last possible moment. Rather, it is designed to require such analysis as soon as it can reasonably be done.” *Los Padres ForestWatch*, 2016 U.S. Dist. LEXIS 138782 at *36 (quoting *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1246 n.9 (9th Cir. 1984)). Without some quantification of the NAAQS associated with the 2006 Forest Plan, quantification of the NAAQS expected from foreseeable fracking activities, or some quantification or analysis of NAAQS in any other agency documents Defendants rely on, the Court cannot determine whether Defendants’ argument that fracking will not exceed attainment or have different environmental impacts from those associated with vertical drilling is a rational and reasonable one. *See Gov’t of the Province of Manitoba v. Norton*, 398 F. Supp. 2d 41, 66 (D. D.C. 2005) (“Federal agencies must comply with the procedural requirements of NEPA and reach reasoned decisions on issues of environmental concern. Because disclosure of information critical to decision-making is a primary function of NEPA, an agency cannot be allowed to avoid

producing a thorough EIS by ignoring a possible, but unexplored, environmental issue in the EA.”). Accordingly, the Court finds that USFS’s and BLM’s failure to analyze the foreseeable impacts on the air quality from fracking activities was arbitrary and capricious.

E. Whether an EIS is required

Finally, Plaintiffs argue that BLM and USFS not only failed to take a hard look but also failed to prepare an EIS and SEIS, respectively.

“An EIS must be prepared if substantial questions are raised as to whether a project may cause significant degradation of some human environmental factor.” *Ocean Advocates v. United States Army Corps. of Eng’rs*, 402 F.3d 846, 865 (9th Cir. 2005). An agency should assess the significance of an impact by considering both context and intensity. See 40 C.F.R. § 1508.27. “Context” requires the significance of an action be analyzed from different perspectives, including “society as a whole (human, national), the affected region, the affected interests, and the locality.” 40 C.F.R. § 1508.27(a). The “intensity” of an impact relates to “the severity of the impact” and requires consideration of ten factors, the following four of which are raised here:

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

40 C.F.R. § 1508.27(b).

Here, Plaintiffs argue that these four intensity factors are met and require preparation of an EIS and/or SEIS.²² The Court is not convinced. Although the Court has found that BLM and USFS failed to take sufficiently hard looks at certain aspects of fracking, it also is not finding as a matter of law that fracking *is* a significant action requiring preparation of an EIS. Rather, the Court will give BLM and USFS the opportunity to take the requisite hard look first and, after doing so, proceed accordingly.

F. Conclusion

At bottom, “NEPA does not permit an agency to remain oblivious to differing environmental impacts, or hide these from the public, simply because it understands the general type of impact likely to occur.” *Richardson*, 565 F.3d at 707. Here, USFS and BLM demonstrated a disregard for the different types of impacts caused by fracking in the Forest. The agencies made decisions premised on a faulty foundation: that the 2006 Forest Plan’s and 2006 EIS’s

²² Plaintiffs acknowledge that USFS and BLM can adopt each other’s EIS. See Pls.’ MSJ 39, ECF No. 83 (citing 40 C.F.R. § 1506.3). Thus preparation of one may negate the responsibility for the other to be prepared.

consideration of vertical drilling sufficiently accounted for the impacts of fracking. Each iteration of agency review built upon that faulty foundation—the 2016 EA relied on the 2012 SIR, which relied on a 2012 BLM Letter, which relied on the 2006 Forest Plan and 2006 EIS—but neither USFS nor BLM stopped to take that “hard look” that was required of them. Specifically, the Court finds that at the decision-to-lease phase, USFS and BLM failed to take a hard look at the impacts of fracking in the WNF, including: (1) surface area disturbance, (2) cumulative impacts on the Indiana Bat and the Little Muskingum River, and (3) impacts on air quality.

G. Remedy

Understandably, Intervenor’s arguments center on the appropriate remedy for this case. Plaintiffs seek vacatur of the leases, but Intervenor argues that vacatur constitutes a request for permanent injunctive relief and that Plaintiffs cannot meet the high burden such a request requires. Assn.’s MSJ 20, ECF No. 99; Eclipse MSJ 6–7. Plaintiffs dispute that the permanent injunction standard applies but request bifurcated briefing on the remedies in the event the Court finds that it does. Pls.’ Resp. 32, ECF No. 105. Although Intervenor disagrees that bifurcation is necessary, Defendants agree with Plaintiffs that additional briefing on remedies would be helpful, especially given that a proper remedy could vary depending on the outcome of the underlying case. Defs.’ Reply 20,

ECF No. 107. The Court agrees that additional briefing on remedies is the most prudent course of action to take. Accordingly,

- 1) Plaintiffs shall file their briefing on remedies within **thirty-five days** of the date of this Order.
- 2) Defendants and Intervenorors shall file their responses within **twenty-eight days** thereafter.
- 3) Plaintiffs may file one comprehensive reply within **fourteen days** of the last-filed response.

All briefing shall address what standard applies and the applicability or inapplicability of other remedies. The parties should also discuss a range of remedies appropriate for this case, meaning options that fall somewhere between complete vacatur or remand. Finally, each brief **shall not exceed twenty pages**.

V. CONCLUSION

For the reasons addressed above, Plaintiffs' motion for summary judgment is **GRANTED in part and DENIED in part**; similarly, Defendants' and Intervenorors' motions for summary judgment are **GRANTED in PART and DENIED in part**. The Clerk shall terminate all pending motions in this case.

IT IS SO ORDERED.


MICHAEL H. WATSON, JUDGE
UNITED STATES DISTRICT COURT

**UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF OHIO
EASTERN DIVISION**

FILED
RICHARD W. NAGEL
CLERK OF COURT

2021 MAR -8 PM 4: 25

U.S. DISTRICT COURT
SOUTHERN DIST. OHIO
EAST. DIV. COLUMBUS

Center for Biological Diversity, et al.,

Plaintiffs,

v.

Case No. 2:17-cv-372

U.S. Forest Service, et al.,

Judge Michael H. Watson

Magistrate Judge Jolson

Defendants.

OPINION AND ORDER

This Court previously found that Defendants United States Forest Service (“USFS”) and Bureau of Land Management (“BLM,” together “Agency Defendants”) violated the National Environmental Policy Act (“NEPA”) when they failed to take the requisite “hard look” at the impacts of fracking in Wayne National Forest (“WNF”) prior to deciding to grant leases. ECF No. 110.

Specifically, this Court found that:

[A]t the decision-to-lease phase, USFS and BLM failed to take a hard look at the impacts of fracking in the WNF, including: (1) surface area disturbance, (2) cumulative impacts on the Indiana Bat and the Little Muskingum River, and (3) impacts on air quality.

Id. at 71.

The Court instructed the parties¹ to brief which remedies other than complete vacatur or mere remand were available and the appropriate test or

¹ Plaintiffs are four non-profit organizations: the Center for Biological Diversity (“the Center”), Heartwood, Ohio Environmental Council (“OEC”), and the Sierra Club (together, “Plaintiffs”). Intervenor Defendants are American Petroleum Institute (“API”)

standard to apply. *Id.* at 71–72. Pursuant to that Opinion, the parties filed supplemental briefing as to the appropriate remedy.²

I. BACKGROUND

The Court adopts and incorporates the facts and procedural history as discussed in its previous Opinion and Order, ECF No. 110. Any additional facts relevant to remedies will be addressed in the analysis below.

II. ANALYSIS

A. Whether to Apply *Allied-Signal*

The parties disagree as to the appropriate test to apply. Plaintiffs argue that under the Administrative Procedure Act (“APA”) and Sixth Circuit precedent, the Court *must* vacate agency actions that violated NEPA. Pls.’ Br. 3, ECF No. 111 (citing 5 U.S.C. § 706(2)(A) and *Ky. Riverkeeper, Inc. v. Rowlette*, 714 F.3d 402, 407, 411 (6th Cir. 2013)); *see also Dine Citizens Against Ruining Our Env’t v. Bernhardt*, 923 F.3d 831 (10th Cir. 2019) (“Vacatur of agency action is a common, and often appropriate form of injunctive relief granted by district courts.” (internal citation omitted)).

and Independent Petroleum Association of America (“IPAA,” together, “Intervenor Associations”), as well as Eclipse Resources I, LP (“Eclipse”), who has since undergone a name change, but will nevertheless still be referred to as Eclipse in this Opinion and Order. See ECF No. 113.

² Intervenor Associations filed two separate but identical briefs. Compare ECF Nos. 112 and 114. For efficiency’s sake, the Court will refer to their arguments jointly as “Intervenor Associations” and cite only ECF No. 112.

Agency Defendants and Eclipse acknowledge that the default is to set aside unlawful agency actions, but they, along with Intervenor Associations, argue that this Court should adopt the vacatur exception test established in *Allied-Signal v. United States Nuclear Regulatory Comm’n*, 988 F.2d 146, 150–51 (D.C. Cir. 1993), which permits remand without vacatur.³ *Allied-Signal* held that “[a]n inadequately supported rule . . . need not necessarily be vacated.” *Id.* at 150. Instead, the court can employ a two-factor balancing test which looks at “the seriousness of the order’s deficiencies (and thus the extent of doubt whether the agency chose correctly) and the disruptive consequences of an interim change that may itself be changed” to determine whether vacatur is appropriate. *Id.* at 150–51 (internal citation omitted). Neither factor is dispositive; rather, the “resolution of the question turns on the Court’s assessment of the overall equities and practicality of the alternatives.” *Shands Jacksonville Med. Ctr. v. Burwell*, 139 F. Supp. 3d 240, 270 (D.D.C. 2015) (collecting cases).

Here, no party disputes that the “ordinary practice” in situations like this is “to vacate unlawful agency action.” *Standing Rock Sioux Tribe v. U.S. Army Corps. of Eng’rs*, 985 F.3d 1032, 1050–51 (D.D.C. 2021). But the Court agrees with Intervenor Associations’, Eclipse’s, and Agency Defendants’ arguments that

³ The Intervenor Associations also argue that Plaintiffs’ requested relief is akin to seeking a permanent injunction and that Plaintiffs have failed to meet their burden under that standard. However, they fail to explain how the *Allied-Signal* factors fit into the permanent injunction framework, and because all parties address Plaintiffs’ arguments within the scope of *Allied-Signal*, the Court will likewise do so.

Plaintiffs overstate the binding nature of *Kentucky Riverkeepers* regarding mandatory vacatur. Although the Sixth Circuit Court of Appeals did invalidate a permit pursuant to § 706(2)(A), it did not dictate vacatur as the only permissible outcome. See 714 F.3d at 413.

Instead, this Court looks to the guidance of many other courts that have considered the value of implementing the *Allied-Signal* test when determining an appropriate remedy and finds it is likewise instructive in this case. See e.g. *Black Warrior Riverkeeper, Inc. v. U.S. Army Corps of Eng'rs*, 781 F.3d 1271, 1290 (11th Cir. 2015) (noting most other courts agree that the “remedy of remand without vacatur is within a reviewing court’s equity powers under the APA” and applying the *Allied-Signal* test); *Eclipse Resp. 9*, ECF No. 113 (collecting cases that have adopted the *Allied-Signal* test); see also *Terry v. Tyson Farms, Inc.*, 604 F.3d 272, 278 (6th Cir. 2010) (“[W]hile we recognize that we are not bound by the law of other Circuits, this court has also routinely looked to the majority position of other Circuits in resolving undecided issues of law.”). Although not dispositive of the issue, the Court is persuaded by the fact that most courts to examine the issue have likewise adopted the *Allied-Signal* test. Moreover, Plaintiffs do not point to any caselaw outright rejecting *Allied-Signal* or the Court’s ability to fashion an equitable remedy narrower than vacatur. Accordingly, while recognizing that the default is vacatur, the Court will employ the *Allied-Signal* test to determine whether, in equity, complete vacatur is the most appropriate remedy.

Finally, under *Allied-Signal*, courts have found that the burden is on the party opposing vacatur “to show that compelling equities demand anything less than vacatur.” *W. Watersheds Project v. Zinke*, 441 F. Supp. 3d 1042, 1083 (D. Idaho 2020). Thus, the Court places the burden on Defendants to prove that vacatur is an inappropriate remedy.

B. Application of *Allied-Signal*

Intervenor Associations, Eclipse, and Agency Defendants argue that vacatur is a drastic remedy, and that, in this case, a simple remand to the Agency Defendants to undergo the requisite “hard look” would be sufficient. Plaintiffs argue that the opposing parties are trying to make the exception the rule, and that, regardless, even under *Allied-Signal*, vacatur of the challenged decisions and corresponding leases is most in line with NEPA’s overarching goal of meaningfully evaluating environmental impacts and alternatives *before* action is taken. Pls.’ Br. 5–6, ECF No. 111.

1. Seriousness of the deficiencies

The parties first disagree as to the seriousness of the deficiencies. Intervenor Associations, Eclipse, and Agency Defendants all contend that the inadequacies highlighted by the Court’s previous Opinion and Order can be cured on remand. They further argue that in cases where the NEPA analysis was inadequate, as opposed to completely missing, remand without vacatur is the proper course of action because it is likely the NEPA violations can be corrected upon remand. See Eclipse Resp. 13–14, ECF No. 113; Agency Defs.’

Resp. 10, ECF No. 12; Int. Ass'n Resp. 7, ECF No. 112. Indeed, BLM's representative avers that he believes the deficiencies outlined by the Court can be cured by additional NEPA analysis on remand. See Bobo Decl. ¶ 7, ECF No. 115-1.

Plaintiffs argue the seriousness of the defect "should be measured by the effect the error has in contravening the purposes of the statute[s] in question," rather than assessing the seriousness based on the likelihood of curing defects on remand. Pls.' Br. 12, ECF No. 111 (quoting *W. Watersheds Project*, 441 F. Supp. 3d at 1083 (further citations omitted)). In Plaintiffs' view, because the purposes of NEPA require the agencies to fully consider the environmental impacts of fracking before deciding to lease parcels, vacatur of the leases is the only way to permit full and fair consideration of alternatives on remand. Pls.' Br. 14, ECF No. 111. Absent vacatur, Plaintiffs caution remanding with the leases remaining in place "could result in a *pro forma* exercise in support of a predetermined outcome." *Id.* at 6 (quotations and citation omitted).

The Court agrees with Plaintiffs that the purposes of NEPA were contravened when the Agencies failed to take the requisite "hard look" at certain impacts of fracking in WNF. The Court is also mindful of Plaintiffs' concern that keeping the leases in place on remand risks the Agency review becoming an exercise in futility with a predetermined outcome. However, the Court likewise acknowledges that this is not a situation in which the Agencies completely abandoned their duties under NEPA. Instead, the Court must consider the risks

vacatur poses to Agency Defendants and Intervenor, especially when there is a strong possibility that a properly supported NEPA review could reach the same result as before.

Thus, despite the serious concerns the Court has with some of the Agencies' review, the Court finds there is "a serious possibility that the [agency] will be able to substantiate its decision on remand" such that this factor weighs against complete vacatur." See *Standing Rock Sioux Tribe v. U.S. Army Corps of Eng'rs*, 282 F. Supp. 3d 91, 98 (D.D.C. 2017); *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 84 (D.D.C. 2019) (applying *Allied-Signal* and declining to vacate leases because "BLM's NEPA violation consists merely of a failure to fully discuss the environmental effects of those lease sales; nothing in the record indicates that on remand the agency will necessarily fail to justify its decisions to issue EAs or FONSI's.").

2. Disruptive consequences of vacatur

Intervenor Associations, Eclipse, and Agency Defendants likewise emphasize the economic impacts of vacatur and the practical difficulties of unwinding agency actions. Plaintiffs acknowledge that some disruption might occur but argue the purely economic consequences are insignificant and can be remedied with a refund. Pls.' Br. 15, ECF No. 111.

Intervenor Associations, Eclipse, and Agency Defendants first argue that the economic harms of vacatur would be disruptive and far reaching. Eclipse highlights the economic harms it might face, including loss of oil and gas

exploration investments of approximately \$41,400,000 in WNF and surrounding privately owned areas. Rucker Decl. ¶¶ 9,12, 18, 20, ECF No. 113-1. Eclipse avers that it has taken steps, including partially drilling two wells and commenced well-site construction activities for eight other wells, such that a mere refund of its lease purchase would be insufficient. *See id.* at ¶ 20. Eclipse also argues the Court must consider not just the lessees' losses but also the future losses to leaseholders, private landowners adjacent to WNF, and the surrounding community at large. Eclipse Resp. 16–17, ECF No. 113.

Both Eclipse and Agency Defendants likewise highlight the economic losses to federal, state, and local governments if the leases must be refunded. Specifically, Agency Defendants indicate almost half of the payments BLM received went to the State of Ohio, which in turn, uses that money to fund schools, roads, and bridges. Bobo Decl. ¶¶ 6 ,8, ECF No. 115-1. Thus, refunding the leases, they argue, would result in an economic loss for the surrounding Ohio communities as well. *See e.g. Mont. Wilderness Ass'n v. Fry*, 408 F. Supp. 2d 1032, 1034 (D. Mont. 2006) (considering greater impacts to community).

Intervenor Associations echo many of the above arguments and point to not only the lessees' lost investments in bids and towards exploration, but also the fact that their bids have been unsealed, thereby revealing the lessees' bidding strategies to competitors, and in turn, harming their prospective chances of winning bids in the future and undermining trust in the greater bidding process.

Second, Intervenor Associations, Eclipse, and Agency Defendants argue that the practical difficulties of implementing vacatur would be equally disruptive. Agency Defendants contend that it is not as simple as just issuing checks for a refund. Instead, vacating the lease sales, returning funds, and rescinding the applications for permit to drill (“APD”) would require them to go through the administrative process to cancel the leases, update the land and minerals record system, and process refunds, thereby diverting time and valuable resources away from other environmental programs. Bobo Decl. ¶ 8, ECF No. 115-1. Moreover, because almost half of the funds went to the state, it will be that much more difficult and time consuming to fully refund the leases. *Id.* Finally, Agency Defendants argue vacatur risks them exerting all this effort despite the possibility that once the requisite “hard look” is taken, the outcome could still be same. Agency Defendants would then have to go through the entire bidding process again, resulting in duplicative and wasted efforts.

Plaintiffs argue economic harms alone are not enough to prevent vacatur. See Pls.’ Br. 16, ECF No. 111; Eclipse Resp. 15, ECF No. 113 (both citing *WildEarth Guardians*, 368 F. Supp. 3d at 84 n.35 (indicating that vacatur based on economic harms alone would be insufficient because “the risk of economic harm from procedural delay and industrial inconvenience is the nature of doing business, especially in an area fraught with bureaucracy and litigation”)). Plaintiffs contend any economic losses cannot be wholly unexpected as all parties were aware of the public concern and opposition to the leasing decisions.

Pls.' Br. 16–17, ECF No. 111. Moreover, Plaintiffs argue that because most of the wells have not been drilled yet, the prospect of future economic losses is speculative at best. *Id.* at 18.

Plaintiffs rely on *W. Watersheds Project* to support their argument that vacatur of leases is not very disruptive. 441 F. Supp. 3d at 1083–84. But as Agency Defendants point out, that vacatur decision was subsequently stayed pending appeal. There is of course a difference between a stay pending appeal and a stay pending remand, but the Court acknowledges Agency Defendants' overall point that some economic harm is concrete, and perhaps irreversible, if vacatur is ordered.

Vacatur always has consequences, and the exception should not supplant the general rule. Nevertheless, the Court finds that the equitable considerations in this case warrant remand without vacatur.

III. CONCLUSION

This decision to remand without vacatur, however, does not mean that all other activities can continue. As the parties acknowledge, there is a spectrum between complete vacatur and mere remand, and the Court has discretion to work within those parameters to craft an equitable remedy under the circumstances. See *WildEarth Guardians*, 368 F. Supp. 3d at 85 (issuing a remedy falling within this spectrum); *Mont. Wilderness Ass'n*, 408 F. Supp. 2d at 1038 (keeping leases intact while enjoining surface disturbing activities on oil and

gas leases pending subsequent NEPA analysis). Accordingly, the Court does the following:

1. **REMANDS** BLM's 2016 EA and corresponding FONSI and USFS's consent to lease to undergo revised NEPA analysis;
2. **ENJOINS** BLM from issuing any new APDs for development of leases at issue and raised in Plaintiffs' Complaint during the pendency of the NEPA review on remand;
3. **ENJOINS** water withdrawal from the Little Muskingum River for any drilling that is occurring pursuant to the already approved APD on the leased parcels; and
4. **ENJOINS** any further surface disturbing activities on the leased parcels pending a decision on remand.

This Order shall remain in effect until Agency Defendants complete their NEPA analysis in accordance with this Court's previous Opinion and Order, ECF No. 110. The Clerk is **DIRECTED** to enter final judgment and close this case.

IT IS SO ORDERED.


MICHAEL H. WATSON, JUDGE
UNITED STATES DISTRICT COURT

Existing Leases that are either being Litigated or Remanded Under the CBD Decision Court Order

LEASE ID	LEASE ACRES	LEASE SALE
OHES058186	47	Dec. 2016
OHES058187	79.15	Dec. 2016
OHES058188	30.03	Dec. 2016
OHES058190	78.25	Dec. 2016
OHES058191	40.00	Dec. 2016
OHES058198	22.14	Dec. 2016
OHES058199	30.64	Dec. 2016
OHES058200	0.86	Dec. 2016
OHES058201	73.25	Dec. 2016
OHES058202	2.53	Dec. 2016
OHES058203	40.08	Dec. 2016
OHES058204	40.00	Dec. 2016
OHES058205	40.00	Dec. 2016
OHES058213	56.00	Dec. 2016
OHES058215	58.14	Dec. 2016
OHES058216	40.24	Dec. 2016
OHES058217	1.17	Dec. 2016
OHES058226	5.00	Mar. 2017
OHES058227	10.00	Mar. 2017
OHES058228	26.66	Mar. 2017
OHES058229	81.05	Mar. 2017
OHES058230	40.52	Mar. 2017
OHES058231	25.00	Mar. 2017
OHES058232	36.78	Mar. 2017
OHES058233	115.22	Mar. 2017
OHES058234	80.00	Mar. 2017
OHES058235	80.00	Mar. 2017
OHES058236	40.13	Mar. 2017
OHES058237	80.26	Mar. 2017
OHES058240	57.46	Mar. 2017
OHES058249	15.12	Mar. 2017
OHES058251	157.44	Mar. 2017
OHES058252	10.16	Mar. 2017
OHES058254	60.00	Mar. 2017
OHES058256	28.00	Mar. 2017
OHES058257	158.62	Mar. 2017
OHES058296	39.68	Sep. 2017
OHES058298	97.72	Sep. 2017
OHES058299	4.16	Sep. 2017
OHES058308	94.72	Dec. 2017
OHES058309	40.13	Dec. 2017
OHES058310	50.16	Dec. 2017
OHES058311	115.34	Dec. 2017
OHES058312	49.71	Dec. 2017
OHES059251	39.65	Mar. 2018

OHES059252	305.84	Mar. 2018
OHES059388	40.06	Dec. 2018
OHES059389	35.00	Dec. 2018
OHES059478	70.90	Sep. 2019
OHES059479	95.67	Sep. 2019
OHES059480	81.34	Sep. 2019
OHES059481	1.25	Sep. 2019
OHES059482	60.34	Sep. 2019
OHES059483	42.25	Sep. 2019
OHES059484	9.21	Sep. 2019
OHES059485	6.25	Sep. 2019
OHES059486	53.44	Sep. 2019
OHES059487	11.50	Sep. 2019
OHES059488	17.50	Sep. 2019
OHES059489	45.87	Sep. 2019
OHES059490	39.85	Sep. 2019
OHES059491	119.565	Sep. 2019
OHES059520	81.47	Dec. 2019
OHES059521	54.56	Dec. 2019
OHES059522	50.00	Dec. 2019

Appendix B – References

APPENDIX B

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Appendix C – Issues not Considered in Detail in this Environmental Assessment

APPENDIX C:
Issues not Considered in Detail in this Environmental Assessment

ISSUE STATEMENT	RATIONALE FOR NOT FURTHER DISCUSSING IN DETAIL IN THE EA*
Soil Resources <i>How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing impact soils in the region?</i>	The act of offering, selling, and issuing federal oil and gas leases does not impact soils; however, soils could be affected by reasonably foreseeable development of leases. Soil impacts resulting from future development of leases and associated surface disturbance include exacerbating processes like erosion, displacement, and compaction, which can reduce soil quantity and quality with resultant impacts on vegetative communities and their composition. Impacts to soil would generally be proportional to the amount of new surface disturbance (increased disturbance would result in a proportionate increase in adverse impacts to soils). The potential impacts to soil resources from horizontal drilling with high-volume hydraulic fracturing could be increased over those analyzed in the 2016 EA due to increased surface disturbance. However, initial surface disturbance associated with reasonably foreseeable development of leases is estimated to be up to 998 acres, or 0.2 percent of the Action Area (BLM 2020). This estimate represents an unlikely scenario where all 81 wells are developed at the same time, with surface disturbance not yet offset by interim reclamation. The 2020 RFDS (BLM 2020) projects a more likely scenario where about two horizontal well pads would be developed per year over the RFDS's 15-year development period, impacting up to 0.01 percent of the Action Area (70 acres). Interim reclamation would reduce some surface disturbance from year to year; following interim reclamation and prior to final reclamation, maximum long-term surface disturbance would impact 0.004 percent of the Action Area (20 acres) per year. By the end of the RFDS's projected 15-year development period, the long-term surface disturbance for 29 well pads is predicted to be up to 285 acres or 0.05 percent of the Action Area, or 285 acres (BLM 2020). Additional impacts from future development of issued leases may include the potential for accelerated erosion following well-pad or access-road construction on slopes or other unstable geography. Soils exceeding 40-percent slopes are present across approximately 17 percent of the Action Area and these locations would be most susceptible to accelerated erosion rates. However, there are a variety of existing requirements, stipulations, notifications, and other protection measures in place that would avoid and limit potential impacts to soils from reasonably foreseeable development. For example, forest-wide

ISSUE STATEMENT	RATIONALE FOR NOT FURTHER DISCUSSING IN DETAIL IN THE EA*
	standards in the Forest Plan (USFS 2006a) allow for oil and gas development on steep slopes (35- to 55-percent grade) only on a case-by-case basis (Appendix F, Reference #SFW-MIN-11) and with implementation of appropriate mitigation measures and NSO stipulations may be imposed on slopes greater than 55-percent grade (Appendix F, Reference #SFW-MIN-10). Site-specific permitting of APDs would include an analysis of potential impacts to soils based on specific development locations and additional protection measure could be applied as COAs to the APDs to reduce impacts to soils. In addition, reclamation would be implemented for all surface-disturbing activities in accordance with the BLM policies, such as the Gold Book, which requires restoration of the character and productivity of the land and water following operations. Given the application of resource protection measures for soils, the relatively negligible increase in surface disturbance in relation to the size of the Action Area, and the existing and developed nature of the Action Area (see Appendix H of the Supplemental EA), reasonably foreseeable development of the leases is not expected to notably impact soils beyond the analysis that was conducted in the 2016 EA and is not expected to notably affect long-term soil function following reclamation.
Cultural Resources <i>How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing affect cultural resources in the region, including Native American religious concerns?</i>	All parcels in the Marietta Unit of the WNF have the potential to contain surface and buried archaeological materials or be in an area where development could affect the setting of known or unknown historic sites, and/or Traditional Cultural Properties. The action of offering, selling, and issuing federal oil and gas leases does not in itself impact cultural resources. Reasonably foreseeable development of the leases could result in impacts on cultural resources from surface disturbance associated with the construction of well pads, regional gathering/production facilities, roads, pipelines, and other infrastructure. The potential impacts to cultural resources from horizontal drilling with high-volume hydraulic fracturing could be increased over those analyzed in the 2016 EA due to increased surface disturbance, increased development activities, and increased effects on the visual and auditory environment from horizontal drilling compared to vertical drilling. However, there are a variety of existing requirements, stipulations, notifications, and other protection measures in place that would avoid and limit potential impacts to cultural resources. The application of lease terms, cultural resource lease stipulations and the cultural resource lease notifications, as well as standards set for mineral development by the 2006 Forest Plan provides protection to cultural and heritage

ISSUE STATEMENT	RATIONALE FOR NOT FURTHER DISCUSSING IN DETAIL IN THE EA*
	resources, traditional cultural properties, and historic trails (see Appendix F in this Supplemental EA). Generally, an on-the-ground cultural inventory will be required as part of the APD permitting process before new surface disturbance occurs and all historic and archaeological sites that are eligible for listing in the National Register of Historic Places would be either avoided by the undertaking, have adverse effects to sites minimized or mitigated, or have the information in the sites extracted through archaeological data recovery (Notification 1; Appendix F). The BLM will not approve any surface-disturbing activities that may affect such properties or resources until it completes its obligations associated with the stipulations that are applied to each respective APD as well as applicable requirements of the National Historic Preservation Act and any other authorities. The BLM may require modification to exploration or development proposals to protect such properties or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated. As such, while potential impacts to cultural resources from horizontal drilling with high-volume hydraulic fracturing could be minimally increased compared to vertical drilling, there are a variety of existing requirements in place to minimize and avoid potential impacts. As such, the Proposed action and reasonably foreseeable development of the leases is not expected to notably impact cultural resources beyond the analysis that was conducted in the 2016 EA and this resource is not carried forward for further detailed analysis in the Supplemental EA.
Visual Resources <i>How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing affect visual resources and scenic qualities of the region</i>	The types of equipment required for horizontal drilling would be substantially similar in visual appearance as the types of equipment needed for vertical drilling, including comparable drilling-rig heights and night lighting of the well sites and rig masts. Drilling equipment would remain on the landscape for a relatively short duration, with vertically drilled wells requiring approximately three days and horizontally drilled wells requiring approximately five days. Despite the general similarity of equipment needed for vertical and horizontal drilling, the 2020 RFDS (BLM 2020) projects 19 more horizontal well pads than the 10 previously analyzed in the 2016 EA. Therefore, more drilling equipment would be visible in the landscape of the Action Area. The majority of well pads would also support horizontal drilling, which disturbs up to 35 acres more surface in the short term and up to 10 acres more surface in the long term than vertical drill pads, with

ISSUE STATEMENT	RATIONALE FOR NOT FURTHER DISCUSSING IN DETAIL IN THE EA*
	corresponding increases in visual impacts. However, the total surface disturbance estimated in the 2020 RFDS would include up to 998 acres in the short-term (0.2 percent of the Action Area) and up to 228 acres in the long term (0.05 percent of the Action Area). The Forest Plan includes a variety of stipulations and notifications that would be applied to permits to reduce visual impacts including Stipulation #11 related to visual mitigation at the APD stage and forest-wide guidelines GFW-SM-21, GFW-SM-23, GFW-SM-24, GFW-SM-25, and GFW-SM-64 that would reduce visual impacts from lighting by using techniques such as directional lighting, tilting, and light fixture shields. In addition, the Forest Plan and the Gold Book include a variety of measures that would support reclamation and would reduce long-term visual impacts on the scenic landscape. Given the relatively minimal increase in surface disturbance associated with reasonably foreseeable development of the leases in relation to the size of the Action Area, the existing developed nature of the Action Area, the short-term nature of well pad construction and development, and the resource protection measures associated with visual resources, visual resources will not be notably impacted beyond the analysis conducted in the 2016 EA and this resource is not carried forward for further detailed analysis in the Supplemental EA.
Recreation <i>How would increases in surface disturbance and use of horizontal drilling with high-volume hydraulic fracturing affect recreation in the region?</i>	The potential impacts to recreation from horizontal drilling with high-volume hydraulic fracturing could be increased over those analyzed in the 2016 EA due to increased surface disturbance, increased development activities, and increased effects on the visual and auditory environment from horizontal drilling compared to vertical drilling. Although surface disturbance would increase slightly under a scenario of horizontal drilling with high-volume hydraulic fracturing, the total short-term disturbance would only account for 2.5 percent of the total Action Area and total long-term disturbance would only account for 0.05 percent of the Action Area. Furthermore, the Forest Plan includes a variety of stipulations and notifications that would be applied to permits to reduce impacts to recreation including placing an NSO stipulation within designated areas to protect special management units (e.g., developed recreation areas, trails and associated trailheads, water supply facilities, administrative sites, other recreation areas) (Appendix F, SFW-MIN-9 [Stipulations 1–5]). See Appendix F for a detailed list of potential forest-wide standards, guidelines, and recommendations that would be

Appendix C, Issues not Considered in Detail in this Environmental Assessment

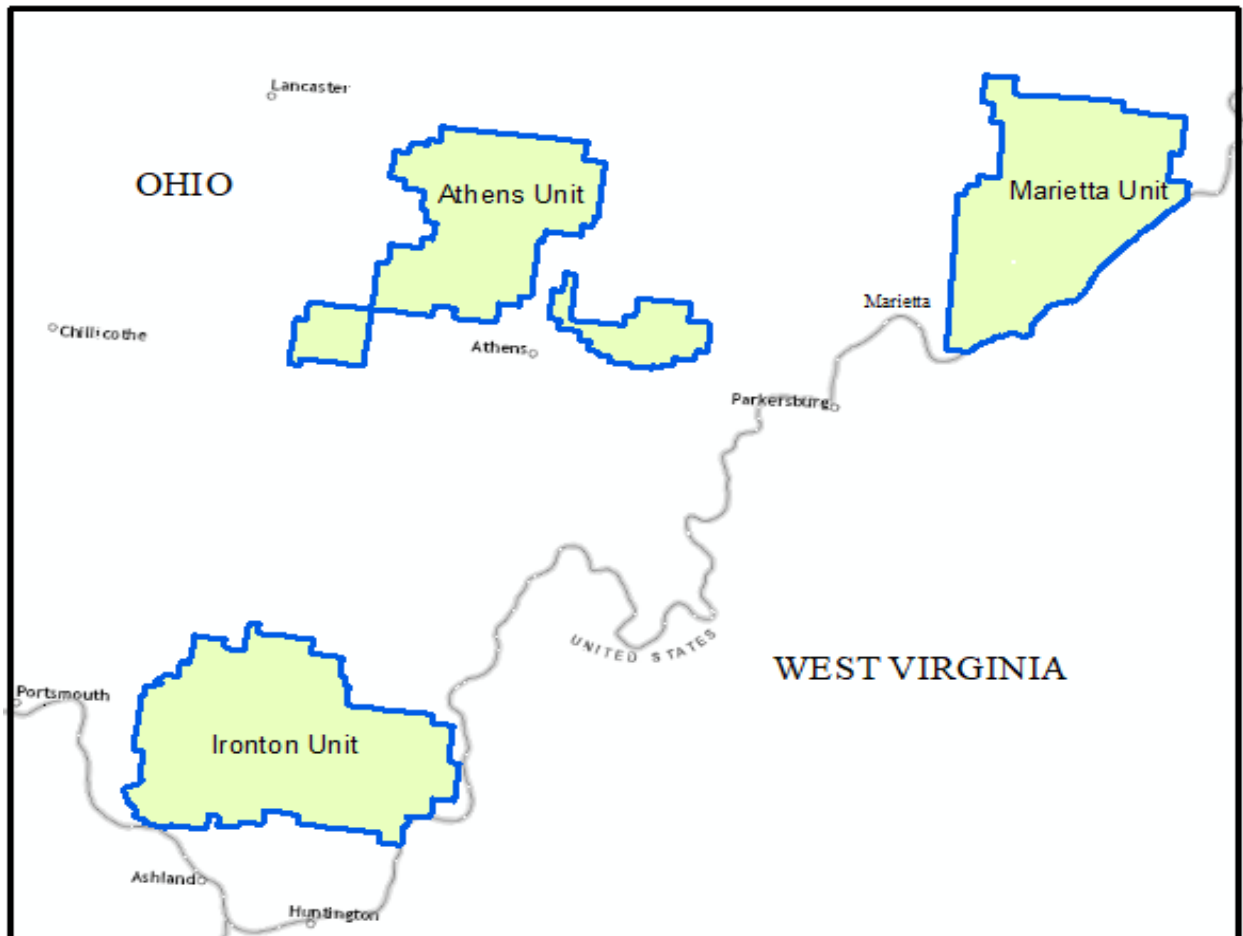
ISSUE STATEMENT	RATIONALE FOR NOT FURTHER DISCUSSING IN DETAIL IN THE EA*
	applied to APDs on NFS lands to reduce impacts to recreation, as appropriate. Given the relatively minimal increase in surface disturbance associated with reasonably foreseeable development of the leases in relation to the size of the Action Area, the existing developed nature of the Action Area, the short-term nature of well pad construction and development, and the resource protection measures associated with recreation, recreation will not be notably impacted beyond the analysis conducted in the 2016 EA and this resource is not carried forward for further detailed analysis in the Supplemental EA.

* Supporting documentation for these statements are included in the project record.

Appendix D – Reasonably Foreseeable Development Scenario



Reasonably Foreseeable Development Scenario For Oil and Gas Activities



WAYNE NATIONAL FOREST

Prepared By:

**U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NORTHEASTERN STATES DISTRICT OFFICE**

Milwaukee, Wisconsin
626 East Wisconsin Avenue, Suite 200
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JULY 28, 2020

The Bureau of Land Management is responsible for the stewardship of our public lands. It is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times. Management is based on the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology. These resources include air, fish and wildlife, minerals, paleontological relics, recreation, rangelands, scenic scientific and cultural values, timber, water, and wilderness.

**Reasonably Foreseeable Development Scenario
For Oil and Gas Activities**

2020 - 2034

WAYNE NATIONAL FOREST

Prepared By:



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July 28, 2020

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TABLE OF CONTENTS

1.0 SUMMARY	1
2.0 INTRODUCTION.....	3
2.1 Background	3
2.1.1 Surface Ownership	3
2.1.2 Mineral Ownership	4
3.0 DESCRIPTION OF GEOLOGY.....	4
3.1 Physiographic Setting.....	5
3.2 Geologic Setting	5
3.3 Stratigraphy and Structure.....	5
3.4 Petroleum Geology of the WNF (reservoirs, traps, source rocks, seals, hydrocarbon generation and migration)	6
4.0 PAST AND PRESENT OIL AND GAS EXPLORATION ACTIVITY.....	8
4.1 Surface Exploration.....	8
4.2 Geophysical Exploration	8
4.3 Exploratory Drilling	8
4.4 New Field and Reservoir Discoveries.....	10
5.0 PAST AND PRESENT OIL AND GAS DEVELOPMENT ACTIVITY	11
5.1 Leasing Activity	11
5.2 Well Spacing Requirements	12
5.3 Drilling Activity	13
5.4 Drilling Practices	16
5.5 Drilling and Completion Costs.....	17
5.6 Production Statistics.....	17
5.7 Oil and Natural Gas Characteristics	19
5.7.1 Natural Gas.....	19
5.7.2 Crude Oil	19
5.7.3 Coal Bed Methane	20
5.8 Oil and Gas Prices	20
5.9 Gas Storage Fields.....	20
6.0 OIL AND GAS OCCURRENCE POTENTIAL.....	21
6.1 Existing Oil and Gas Production.....	21
6.2 Oil and Gas Exploration and Production.....	21
6.3 Natural Gas Production	22
6.4 Crude Oil Production	22
6.5 Potential Oil and Gas Production Outlook.....	22
6.6 Conflicts with Other Mineral Development.....	23
7.0 OIL AND GAS DEVELOPMENT POTENTIAL	24
7.1 Relative Oil and Gas Development Potential.....	24
7.2 Oil and Gas Development Potential on Federal Land.....	25

8.0	RFDS BASELINE SCENARIO ASSUMPTIONS AND DISCUSSION	25
8.1	Discussion of Determining Oil and Gas Resource Potential	30
8.2	Methodology for Predicting Future Oil and Gas Exploration and Development Activity	30
8.3	Relating the Potential for Resource Occurrence to Potential for Activity	31
9.0	SURFACE DISTURBANCE DUE TO OIL AND GAS ACTIVITY ON ALL LANDS	31
9.1	Surface Disturbances	32
9.1.1	Well Spacing	32
9.1.2	Well Pads	31
9.1.3	Well Pad Access	31
9.1.4	Surface Brine Disposal	31
9.2	Typical Oil and Gas Operations	31
9.2.1	Drilling Operations	31
9.2.1.1	Conventional Drilling.....	34
9.2.1.2	Unconventional Drilling	34
9.2.2	Production Operations.....	34
9.2.3	Abandonment and Final Reclamation	31
9.3	Production History and Life Expectancy of Producing Fields.....	32
9.3.1	Development Forecast for the Athens Unit	33
9.3.2	Development Forecast for the Ironton Unit.....	33
9.3.3	Development Forecast for the Marietta Unit.....	34
9.4	Gas Storage Potential	35
10.0	WNF ECONOMIC PROJECTION FOR OIL AND NATURAL GAS DEVELOPMENT	35
11.0	PREPARERS.....	39
12.0	REFERENCES.....	40

TABLE OF FIGURES

Table 1:	Exploratory Drilling from 2006 to 2018	9
Table 2:	State of Ohio Spacing Requirements	12
Table 3:	Drilling and Well Completions from 2006 to 2018 in Counties of the WNF	14
Table 4:	Drilling and Well Completions from 2006 to 2019 in WNF	15
Table 5:	2006 and 2018 Oil and Gas Production	18
Table 6:	Ohio Oil and Gas Prices 2006 and 2018	20
Table 7:	Surface and Subsurface Mining in the WNF	23
Table 8:	Forecast of proposed wells.....	36

TABLE OF GRAPHS

Graph 1:	Total Oil and Gas Production for the State of Ohio (2009 - 2018).....	18
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1.0 SUMMARY

A Reasonably Foreseeable Development Scenario (RFDS) is a modeled projection (scenario) of oil and gas exploration, development, production and reclamation activity for a defined area and specified period. The RFDS projects a baseline scenario of activity assuming all potentially productive areas can be open under standard lease terms and conditions, except those areas designated as closed to leasing by law, regulation, or executive order. An RFDS is not a prediction of activity; it is a possible reasonable scenario of activity under a specified set of assumptions. The RFDS is a technical report presenting a baseline scenario of unconstrained activity based on geology, resource occurrence potential, past and current leasing, exploration and development activity, and engineering technology, with consideration of economics and physical limitations on access to resources. A RFDS is not a decision and does not establish or imply any limits or restrictions on development.

A RFDS is typically developed using a reasonable, technical and scientific estimate of possible oil and gas activity based on the best available information and data at the time of the study. A RFDS may be used for evaluating existing land management plans and/or leasing decisions in order to make informed determinations about any need (or not) for updating and/or revising a management plan and/or leasing decision. A RFDS facilitates determination and analysis of potential effects that discretionary management decisions may have on the development of oil and gas resources, provides technical information necessary for identifying and analyzing potential direct, indirect, and cumulative effects of a proposed leasing action (leasing availability determination), provides information necessary for identification and analysis of alternatives to a proposed leasing action (leasing availability determination). A RFDS facilitates informed decisions on the management of oil and gas resources balanced with management of other resources and provides documentation of technical information in the administrative record of any analysis for which it is used.

In 2018, the United States Forest Service (USFS) announced plans to revise the 2006 Land and Resource Management Plan for the Wayne National Forest (WNF) including a revision of the current Oil and Gas Leasing Analysis. In accordance with a June 4, 2019 USFS request, the Bureau of Land Management Northeastern State District prepared this RFDS for the WNF Land and Resource Management Plan revision.

The proclamation boundary of the WNF is comprised of three separate administrative units located within 12 counties of southeast Ohio: the Athens Unit, the Ironton Unit and the Marietta Unit. These three administrative units comprise two Ranger Districts: the Athens Ranger District (Athens and Marietta administrative units) and the Ironton Ranger District. WNF Federal land acquisitions are intermixed with small communities, roadways and public state-held lands. Of the approximately 855,532 acres within the WNF proclamation boundary approximately 244,265 acres of surface estate, about 29 percent, is owned by the U.S. Forest Service. While most surface land acquisition by the USFS includes the mineral estate, some lands are acquired without the underlying minerals or the minerals are held by a private party for a period of time before reverting to Federal minerals. These later mineral reversions result in an increase in Federal mineral acres over time. Currently there are approximately 172,157 acres of Federal minerals within the WNF proclamation boundary.

The RFDS analysis considered all lands (Federal and non-Federal) within the WNF proclamation boundary and a four-mile buffer zone surrounding Federal lands. This document was prepared during 2019 and early 2020 and the 15 years being analyzed for future potential development is 2020 to 2034. Currently drilling is more prevalent on private lands than Federal lands and Federal minerals are likely to be accessed in the subsurface through private minerals. A four-mile buffer zone around Federal minerals considers potential development of Federal minerals through private minerals. Four miles was selected given a recently drilled

well with almost four miles of horizontal drilling. Included within the buffer zone are two parcels (an approximately one-acre parcel and 180-acre parcel) that were once included and are now beyond the WNF proclamation boundary but, are still considered part of the WNF. The buffer zone accounts for possible unconventional wells (conventional wells are vertically drilled and unconventional wells are drilled vertically and then extend horizontal at target depth) drilled from beyond the WNF but extending into Federal mineral within the proclamation boundary in the subsurface. Potential wells drilled within the buffer zone but that would not impact Federal minerals in the WNF proclamation boundary were beyond the scope of this RFDS. Over the next 15 years, up to 81 wells and up to 29 well pads are projected for the WNF based on resource occurrence potential and assuming minimal constraints on drilling. All wells are projected to be primarily gas wells, many of which would also produce some oil. No oil-only wells are projected in the WNF. Most of these wells are projected to be unconventional drilled gas wells from non-Federal surface pads. The Marietta Unit is projected to receive a majority of drilling interest. Total new surface disturbance is projected to be 171 to 998 acres (including well pads, access roads and pipelines) or about 0.020% to 0.117% of the approximately 855,532 acres within the WNF Proclamation Boundary. Total new longer term (post construction phase) surface disturbance is projected to be approximately 86 to 285 acres (well pads including access after interim reclamation) or about 0.010% to 0.033% of total acres within the WNF Proclamation Boundary. Longer-term disturbance is disturbance that would exist until associated wells are plugged and abandoned in accordance with applicable regulations.

2.0 INTRODUCTION

The Bureau of Land Management (BLM) Northeastern State District (NSD), located in Milwaukee, Wisconsin, has jurisdiction over 20 northeastern states including Ohio. The NSD's principal activities include fluid and solid minerals management.

In 2018, the USFS announced plans to revise its 2006 Plan for the Wayne National Forest (WNF, USFS, 2006). In accord with a 2007 BLM and USFS Memorandum of Understanding (BLM MOU WO3002006-07) and in response to a June 4, 2019 USFS request, the NSD prepared this Reasonably Foreseeable Development Scenario (RFDS) for the revised WNF Land and Resource Management Plan.

This RFDS is intended to support a revised WNF Management Plan and Leasing Analysis and examines oil and gas activities within the WNF Proclamation Boundary for the next 15 years.

Previous RFDS documents including a 2003 WNF RFDS (BLM, 2003) and a 2012 RFDS for Ohio (BLM, 2011) were reviewed for this document. The criteria and methods of analysis used in this RFDS are based on BLM guidance documents, *Policy for Reasonably Foreseeable Development Scenario (RFDS) for Oil and Gas (BLM WO IM No. 2004-089)* and *Planning for Fluid Minerals Supplemental Program Guidance (BLM Handbook H-1624-1)*.

2.1 Background

The Wayne National Forest is in southeastern Ohio. The WNF was established in 1934 as part of a reforestation program. Acquisition of previously lumbered, farmed and mined lands for the WNF began in 1935. The WNF's Proclamation Boundary was set in 1951. The proclamation boundary of the WNF is comprised of three separate administrative units encompassing parts of 12 counties: the Athens Unit, the Ironton Unit and the Marietta Unit. These three administrative units comprise two Ranger Districts: the Athens Ranger District (Athens and Marietta administrative units) and the Ironton Ranger District (Appendix A). Of the approximately 855,532 acres within the Wayne Proclamation Boundary, approximately 244,265 acres, or about 29 percent, are National Forest System lands owned by the U.S. Forest Service (Giannamore, 2019). The National Forest System lands overlie oil and gas resources and are intermixed with small communities, roadways and public county, or state-held lands.

2.1.1 Surface Ownership

Surface ownership within the WNF proclamation boundary is a mixture of Federal and non-Federal (i.e., private ownership, county/township ownership, or state ownership). Federal-owned surface in the WNF is primarily acquired lands, with little public domain lands. Acquired lands were privately owned land acquired by the Federal government. Public domain lands are lands that have always been owned by the United States or the thirteen original colonies. The approximately 244,265 acres of WNF Federal surface includes only a single 40-acre parcel of public domain land. The USFS has discretion over surface disturbing activities on Federal surface overlying the Federal mineral estate (as stipulated in the WNF land management plan); however, it is limited in its ability to control mineral development when development occurs on a Federal surface estate over a non-Federal mineral estate. These limits are described in the U.S. Department of Agriculture, Forest Service Rules of 1911, 1937 and 1963 as well as severance deeds for outstanding and reserved rights and existing lease terms and conditions for private acquired wells.

2.1.2 Mineral Ownership

USFS land acquisitions included underlying mineral estates when possible. Mineral estate ownership within the WNF Proclamation Boundary is either Federal or non-Federal. Presently, of the 244,265 surface acres managed by the USFS, approximately 70percent (172,157 acres) of the underlying mineral estate is Federal-owned and approximately 30 percent (73,278 acres) is non-Federally owned. The 172,157 acres of WNF Federal minerals are all acquired minerals, except for one 40-acre public domain parcel. Federal Minerals acreages does not differentiate between minerals owned entirely or in part by the United States.

Some mineral estate acquisitions conveyed only specific minerals in the underlying estate to the USFS, while other USFS acquisitions provided for delayed mineral conveyance to the United States, in whole or part, until a negotiated length of time had elapsed. These delayed conveyance mineral estates are called mineral reservations. The percentages of mineral ownership in the WNF will change over time as some conveyed minerals revert from non-Federal to Federal ownership and as new mineral estates are acquired by the USFS. For this RFDS's 15-year timeframe, approximately 16,912 additional acres of mineral estate will revert to Federal ownership between January 1, 2020 and December 31, 2034. Reverted minerals will increase the underlying mineral estate over the next 15 years from approximately 70 percent to approximately 80 percent.

An oil and gas lease is a legal instrument that conveys a right to explore, develop and produce oil and/or gas on a specified tract of land. Oil and gas leases may have other terms, royalty rates, and conditions negotiated between the mineral estate holder and the lessee. Federal oil and gas leases may be grouped with other leases and mineral owners in agreements to comply with state spacing requirements or to efficiently explore, develop and produce oil and/or gas resources. As of January 1, 2020, approximately 38,985 acres of Federal minerals are committed under 268 leases and 23 agreements according to the BLM's Legacy Rehost 2000 (LR2000, 2019) database on August 9, 2019 and updated on March 20, 2020 (LR2000, 2020).

Federal-owned minerals include mineral estates that are either unencumbered or partially to 100% encumbered with non-Federal mineral leases (commonly referred to as Private Acquired or PAQ leases). Since there are no required Federal reporting requirements on private mineral leases, the terms and/or status of some private mineral leases within the WNF are unknown (leases may be active, inactive or expired). Additionally, some reverted mineral estates may be subject to existing private oil and gas leases that are not currently be known to the BLM. BLM's 2019 analysis determined an additional 6,785 acres of reverted mineral estates having oil and gas wells with either active or unknown status and potentially committed to an existing oil and gas lease. Until the status of these wells is confirmed, it is difficult to accurately determine the total number of reverted federal mineral estates under private lease. Assuming the additional 6,785 acres of reverted mineral estates having oil and gas wells with either active or unknown status are committed to existing oil and gas leases, then possibly as much as 126,387 acres (about 73%) of Federal minerals within the WNF are currently not leased but may become available for lease in the future.

3.0 DESCRIPTION OF GEOLOGY

The description of the area's geology set out below includes an examination of general physiographic setting, geologic setting and subsurface stratigraphy and structure. It also includes an examination of the area's

“petroleum geology,” including reservoirs, traps, source rocks, seals, hydrocarbon generation and migration, and selected oil and gas plays.

3.1 Physiographic Setting

According to the Ohio Division of Geological Survey (ODGS), Ohio is located within three physiographic provinces: the Appalachian Plateau located in the eastern half of the state which includes all three WNF units, the Central Lowland Plateau located in the western half of the state, and the Interior Lowland Plateau located in the southwestern portion of the state (ODGS, 1998). Based on glacial extent during the Pleistocene Epoch, the Appalachian Plateau is split into the Glaciated Allegheny Plateaus Section and the Allegheny Plateaus (unglaciated) Section. The WNF is located near the western margin of the Appalachian Plateau Province and within the Allegheny Plateaus.

The Allegheny Plateau was relatively untouched by glaciers during the ice age. The elevation of the Allegheny Plateau varies from approximately 490 feet up to 1,400 feet. Topographic relief is high, usually 300 feet or more in some areas, especially those in the vicinity of the Ohio River, with as much as 800 feet in relief. When not exposed at the surface, bedrock is overlain mainly by colluvium and some Pleistocene age clay and consists of sandstone, siltstone, shale, and economically important Pennsylvanian-age coal. In this highly dissected plateau, are remnants of a Pleistocene-age Teays River drainage system (ODGS, 1998).

3.2 Geologic Setting

Geology in southeast Ohio in the area of the WNF includes rocks of the Precambrian, Paleozoic, Mesozoic and Cenozoic ages. Precambrian igneous (red granite) and metamorphic (red granitic gneiss) rocks of the Grenville Province are the oldest and deepest rocks in southeastern Ohio. These igneous and metamorphic rocks are relatively flat. During the Paleozoic, marine transgression and regression in the area of the WNF deposited sands, silts, muds and limy muds which predominantly lithified into interlayered limestones (and dolomites), sandstones and shales. Later Paleozoic deposits included evaporates and organic-rich muds and silts. Southeastern Ohio was above sea level during the Mesozoic and Cenozoic Ages and erosion was prevalent. The topography of the WNF may be characterized as an unglaciated, hilly landscape, deeply dissected by well-developed watershed drainages of the Ohio River.

3.3 Stratigraphy and Structure

The stratigraphy of southeast Ohio, in the area of the WNF, is flat lying or gently dipping (less than 5 percent toward the southeast) sedimentary rock. The oldest exposed rocks in Ohio are a sequence of alternating shale and limestone beds deposited during the Ordovician Period (ODGS, 2006). Ohio geology, in general, consist of widespread deposition of dolomite with smaller amounts of shale during the Silurian Period. Carbonate rocks were the dominant rock type deposited in the Early and Middle Devonian, while clastic rocks dominated in the later part of the period. During the Mississippian Period, mainly shale and sandstone were deposited. From the Cambrian Period through the Mississippian Period, all of Ohio’s bedrock had a marine origin except for some rocks in the Early Devonian Period, which had an eolian origin. During the Pennsylvanian Period, the Ohio area began shifting from a marine depositional environment to a terrestrial depositional environment. The Pennsylvanian Period included marine, deltaic, and continental sedimentary strata, and by the Permian Period the depositional environment was entirely terrestrial. Ohio has been subject to at least 3 periods of glaciation that covered as much as three quarters of its surface area (ODGS, 2005). Other than these glacial deposits and postglacial Quaternary sediments, there is no record of any other Cenozoic or Mesozoic Era deposits in Ohio (Coogan, 1996).

Surface geology of the Athens and Ironton Units consist of sedimentary rocks dating to the Pennsylvanian and Mississippian Periods. Pennsylvanian and Mississippian Period rocks are mainly marine, limestone, mudstone, shale, siltstone, sandstone and economic beds of coal. Surface geology of the Marietta Unit consists of Permian and Pennsylvanian Period sedimentary rocks and economic coal beds. The Dunkard Group, consisting of non-marine interlayered sandstone, siltstone, shale, limestone and coal, is located in a portion of the Marietta Unit and is the state's youngest sedimentary strata; it is considered to be from the Permian Period, but has not yet been assigned an exact age because of its unique fossil assemblage.

Geologic units in Ohio have been affected by regional structural features, including the Michigan and Appalachian Basins, and the Findlay and Cincinnati Arches located between those two basins (ODGS, 2006). The WNF units are in the Appalachian Basin. Periods of tectonic subsidence within these basins have produced broadly arching structures commonly seen in Ohio's bedrock. Structurally, Ohio has several local, high-angle faults and a four-and-one-half-mile diameter circle of deformed rock known as the Serpent Mound Impact Structure. The gently dipping (less than 5 percent toward the southeast) Early Ordovician to Permian Period rock layers are the only known major structural feature within the Athens and Ironton Units (ODGS, 2006). However, within the Marietta Unit a major structural feature is a north-south trending Burning Springs Anticline, which has smaller features on its flanks. No large faulting is known in the area, although small faults do occur.

3.4 Petroleum Geology of the WNF (reservoirs, traps, source rocks, seals, hydrocarbon generation and migration)

In petroleum geology and exploration, the term "play" refers to a regional group of oil fields or prospects controlled by similar geological parameters. These parameters include specific geologic formations or strata, source rock, structures, traps, seals, tectonic history, reservoir rock type and thermal maturity. The term play may also be used to describe a specific stratigraphic or structural geologic setting and its associated hydrocarbons. Organic-rich marine shale sequences are major source beds of oil and gas in the Appalachian Basin. A younger sequence, Middle Devonian to Early Mississippian in age, is extensive beneath the Appalachian Plateaus from New York to Alabama. An older sequence, Middle to early Late Ordovician in age, is extensive beneath the Appalachian Plateaus from New York to Alabama but more developed in the northern portion of the basin and the Valley and Ridge Province. Other potential source beds of oil and gas exist in the area of the WNF. These potential source beds include other organic-rich (kerogen) marine shales (such as the Utica) and coal beds (USGS, 1993). Many of these source beds may also be reservoir beds. Oil and gas migration from source beds into porous fracture zones and structural traps may have resulted from thrust faulting during the Alleghany Orogeny. Initially, natural gas will show a high content of condensate (wet gas), but with increased temperature the hydrocarbon would convert to light hydrocarbons (dry gas). Shale plays in the eastern portion of the Marietta Unit contain predominantly dry gas while the central and western portions of the Marietta Unit, Athens Unit and Ironton Units contain more wet gas.

Major oil and gas plays in the Appalachian Basin, identified by the United States Geological Survey in a 1993 bulletin, include an Upper Devonian sandstone play, Lower Devonian Oriskany play, Lower Silurian sandstone play, Ordovician carbonate shelf play, Upper Cambrian and Lower Ordovician Knox carbonate shelf play and the Rome trough play (USGS, 1993). The Rome Trough play does not extend into Ohio. Since this bulletin was published two additional major oil and gas plays have become prominent in Ohio: the Marcellus play and the Utica play. Major oil and gas plays within the WNF Proclamation Boundary include the Berea Sandstone, Ohio Shale (Upper Devonian sandstone play), Clinton-Medina Sandstone (Lower Silurian sandstone play), Marcellus Shale and Point Pleasant Formation/Utica Shale (Ordovician carbonate shelf play). Other known oil and/or gas-producing zones (ODGS, 1990) in the area of the WNF include:

- “Goose Run Sand” within the Pennsylvanian Monongahela Group, Upper Sewickley Sandstone
- “1st Cow Run” within the Pennsylvanian Conemaugh Group, Cow Run Sandstone
- “2nd Cow Run” within the Pennsylvanian Allegheny Group, Upper Freeport Sandstone
- “Macksburg 500 feet” within the Pennsylvanian Allegheny Group, Clarion Sandstone
- “Macksburg 700 feet” within the Pennsylvanian Pottsville Group, Homewood Sandstone
- “Salt Sand” within the Pennsylvanian Pottsville Group, Massillon Sandstone
- “Big Injun” within the Mississippian Cuyahoga Formation, Black Hand Sandstone
- “Squaw Sand” within the Mississippian Cuyahoga Formation
- “Weir Sand” within the Mississippian Cuyahoga Formation, Buena Vista Sandstone
- “Coffee Shale” within the Mississippian Sunbury Shale Formation
- “1st Berea” within the Mississippian Berea Sandstone Formation
- “Gantz” within the Devonian Ohio Shale Formation, Chagrin Shale
- “Gordon” within the Devonian Ohio Shale Formation, Chagrin Shale
- “Big Cinnamon” within the Devonian Ohio Shale Formation, Huron Shale
- Unnamed zone within the Devonian Oriskany Sandstone Formation
- Unnamed zone within the Silurian Salina Group, Bass Island Dolomite Formation
- “Newburg” within the Silurian Niagara Group, Lockport Dolomite Formation
- “Clinton” within the Silurian Albion Group, Grimsy Sandstone
- “Medina” within the Silurian Albion Group, Whirlpool Sandstone
- Ohio Shale
- Unnamed zone within the Ordovician Trenton Limestone Formation
- Unnamed zone within the Ordovician Black River Limestone Formation
- “Gull River” within the Ordovician Black River Limestone Formation
- “St. Peter Sand” within the Ordovician Wells Creek Formation
- “Rose Run Sand” within the Cambrian-Ordovician Knox Dolomite Formation
- “Beekmantown” Dolomite
- “Trenton-Black River” Limestone
- “Mt. Simon” Sandstone
- “Buell” Run
- “Keener” Sand
- “Queenston” Shale
- “Maxton” Sand
- “Maxville” Limestone
- “Trempealeau” within the Cambrian-Ordovician Knox Dolomite Formation

In the last approximately 14 years (2006 to 2019) oil and gas exploration targets within counties of the WNF include: Ohio Shale, Berea Sandstone, Clinton Sandstone, Rose Run Sandstone and Beekmantown Dolomite (counties of the Athens Unit), Berea and Cow Run Formation (counties of the Ironton Unit), Ohio Shale, Berea Sandstone, Cow Run Formation, Point Pleasant/Utica Shale and Marcellus Shale (counties of the Marietta Unit). In the last five years the Marcellus Shale, the interlayered limestone and shale of the Point Pleasant Formation/Utica Shale and the Berea Sandstone have become targets through unconventional (horizontal) drilling techniques.

In addition, there are shallow secondary production zones, particularly in the Marietta Unit, that offer operators a chance to complete a producing well even if they fail to find commercial quantities of oil and gas in one of the major targets. Also, there continues to be a possibility for commercial potential in the deeper formations such as the Beekmantown Dolomite and the Rose Run Sandstone. Drilling in the

WNF has generated enough geologic data to suggest there is potential for occurrence of hydrocarbons virtually everywhere within the WNF Proclamation Boundary.

4.0 PAST AND PRESENT OIL AND GAS EXPLORATION ACTIVITY

Oil and gas exploration includes surface and subsurface activities. Surface activities include mapping geologic features and evidence of surface hydrocarbon seepages, such as oil floating in springs, tar pits, and the presence of natural gas odors. Subsurface exploration activities include geophysical methods and exploratory drilling. Surface activities, geophysical methods and exploratory drilling occur in the first phases of mineral development and are used to obtain detailed geologic information to increase the likelihood of drilling a commercially favorable well.

4.1 Surface Exploration

Past and present surface exploration methods include mapping rocks, soils and structural features, such as faults and folds to identify possible hydrocarbon reservoir rocks and structural traps. Mapped surface geologic features are extrapolated to determine possible subsurface geologic features that may contain hydrocarbons. Past surface mapping in the area of the WNF was limited by soil and vegetation to areas of exposed rock, typically in drainages. In more recent times, construction of roads and railroads have exposed additional rocks and structures for analysis.

In the area of the WNF and southeast Ohio, hydrocarbons historically were sometimes observed floating on water bodies or shallow water wells. In 1814, oil in a well was discovered for the first time by a saltwater well driller in Noble County (Ohio Oil and Gas Association, n.d.). Natural gas was also noted in some springs and is recognized in place names, such as nearby Burning Springs, West Virginia. Recently, chemical analytical methods have been used to detect dissolved traces of naturally occurring gas and hydrocarbons in water samples. Surface exploration methods typically do not require permits, so it is difficult to estimate how much surface exploration is currently occurring in the WNF.

4.2 Geophysical Exploration

Geophysical exploration includes gravity, magnetism and seismographic methods. Gravimeters detect differences in gravitational force of various rock types. Magnetometers and gradiometers measure magnetic fields and resistivity meters measure subsurface electrical resistivity. Seismography uses induced sound waves or vibrations to map underground rock and structures. Minimal or no geophysical exploration is expected in the Marietta unit given local geologic conditions and available data from a long history of oil and gas development in the area. There is a greater potential for geophysical exploration occurring in the less explored Athens and Iron-ton Unit; however, the USFS reported no permits (the USFS require a special use permit for geophysical exploration) for oil and gas geophysical exploration of WNF Federal surface have been issued in the last 10 years (Bodus, 2019). It is not known if geophysical exploration occurred or is occurring on non-Federal surfaces in the WNF.

4.3 Exploratory Drilling

Exploratory drilling is employed to confirm target zones and identify possible impediments to well drilling and completion. Exploratory drilling often utilizes rock coring to analyze basic formation data such as permeability, porosity, total organic content, fracture density and reservoir-related parameters. Exploratory

drilling is classified typically as “wildcat drilling”, meaning they are drilled in an area of no known pool or reservoir. The Ohio Department of Natural Resources (ODNR) typically refers to exploration drilling they permit as either deeper pool wildcats, wildcats or outposts. ODNR annually summarizes wells drilled in Ohio by county. Although current exploration is primarily occurring within the eastern third of the state, commercial quantities of hydrocarbons have been found in 76 of 88 counties in Ohio (OOGA, n.d.). Exploratory drilling information for the previous 13 years is provided in Table 1.

Table 1: Exploratory Drilling from 2006 to 2018

EXPLORATORY WELLS DRILLED IN COUNTIES OF THE WAYNE NATIONAL FOREST 2006-2018														
	2006		2007		2008		2009		2010		2011		2012	
P = Produced hydrocarbons D = dry well	P	D	P	D	P	D	P	D	P	D	P	D	P	D
Athens					1									1
Gallia					9									
Hocking											1			
Jackson					2									
Lawrence		1	1											
Monroe	1		2		4		2		2		1		8	
Morgan													3	2
Noble	1	1	1		2	2	7		1				10	
Perry		2			1			1						
Scioto														
Vinton														
Washington	4	2	7		4	2		1			2			
Total State of Ohio Exploratory Wells	45		53		75		49		38		80		163	
Total WNF Counties Exploratory Wells	6	6	11		23	4	9	2	3	0	4	0	21	3
WNF Counties Exploratory Well Success	50%		100%		85%		82%		100%		100%		88%	

EXPLORATORY WELLS DRILLED IN COUNTIES OF THE WAYNE NATIONAL FOREST 2006-2018												
	2013		2014		2015		2016		2017		2018	
P = Produced hydrocarbons D = dry well	P	D	P	D	P	D	P	D	P	D	P	D
Athens												
Gallia												
Hocking												1
Jackson												
Lawrence												

Monroe	14		15		15		12		15		4	
Morgan	5		2									
Noble	6		6		5		3					
Perry			2		2		1			1		
Scioto												
Vinton												
Washington	3		1		2		2					
Total Ohio Exploratory Wells	153		100		90		58		64		28	
Total WNF Counties Exploratory Wells	28	0	26	0	24	0	18	0	15	1	4	1
WNF Counties Exploratory Well Success	100%		100%		100%		100%		94%		80%	
Note: ODNR lists total wells by county. Wells counted are within the county but might not have been drilled within the Wayne National Forest Proclamation Boundary. ODNR has on occasion revised data after an Annual Report has been issued. ODNR well numbers in this table are based on data presented in ODNR’s Annual Reports and do not include possible subsequent ODNR revisions.												

In 2006, exploratory drilling in the Clinton Sandstone (56%), Trempealeau Dolomite (16%) and Ohio Shale (11%) accounted for approximately 83% of all exploratory wells drilled in Ohio. In 2018, the Ohio Shale and Clinton Sandstone were not major exploration targets. In 2018, exploratory drilling in the Point Pleasant (39%), Trempealeau Limestone (25%) and Rose Run (25%) accounted for 89% of all exploratory wells drilled in Ohio.

In 2006, exploratory drilling in the counties of the WNF mostly targeted the Clinton Sandstone, Ohio Shale as well as the Berea Sandstone. In 2018, exploratory drilling in the counties of the WNF mostly targeted the Point Pleasant Formation/Utica Shale. Other recent oil and gas targets in Ohio included the Trenton-Black River, Rose Run, Trempealeau and Mt. Simon, not necessarily all occurring in all three WNF units.

According to available ODNR records, in 2006 a total of 765 oil and gas wells were completed in Ohio of which 45 were exploratory wells. Of the 45 exploratory wells, 17 were dry holes. In 2018 a total of 297 oil and gas wells were completed in Ohio of which 18 were exploratory wells. Of the 18 exploratory wells, 10 were dry holes. Four of the 2018 exploratory wells were drilled in Monroe County targeting the Point Pleasant Formation/Utica Shale. The 2018 exploratory well numbers reflect a general downward trend from a high of 163 exploratory wells drilled in 2012 due in part to overall lower oil and gas prices. Overall success of exploratory wells in counties associated with the WNF over the last thirteen years has ranged from 80% to 100% successful.

4.4 New Field and Reservoir Discoveries

The most recent new fields and reservoir discoveries in Ohio, including parts of the WNF, in the last 10 to 15 years include the Marcellus Shale and Point Pleasant Formation/Utica Shale. While these units have historically been known to contain appreciable volumes of natural gas and oil, advancements in unconventional drilling technologies have made these units productive targets. The Marcellus Shale extends through parts of extreme western Maryland, New York, Ohio, Pennsylvania, western Virginia, and West

Virginia. The Marcellus Shale is found in the eastern part of Ohio and is generally less than 50 feet thick. Depth to the Marcellus is approximately 2,000 feet in northern Ohio and deepens to approximately 7,000 feet in southern Ohio (Penn State, 2010). Marcellus Shale production ranges from a dry gas which is high in methane to a wet gas with higher percentages of ethane content.

The Point Pleasant/Utica Shale extends through parts of New York, Pennsylvania, West Virginia, and Ohio. The Utica Shale is found throughout the eastern half of Ohio and varies in thickness from approximately 85 feet to over 300 feet. Depth to the Utica Shale is approximately 3,500 feet in central Ohio and deepens to approximately 10,000 feet in easternmost Ohio (Wickstrom, et al., 2012).

5.0 PAST AND PRESENT OIL AND GAS DEVELOPMENT ACTIVITY

This section describes historic and current oil and gas development activity in Ohio based on information provided by both public and private sources. Information includes leasing activity, well spacing requirements, drilling and completion statistics by county, drilling practices, production statistics, oil and gas characteristics, oil and gas prices, operational costs (drilling, completion, gathering and transmission), conflicts with other mineral development, and gas storage fields.

Ohio's first well drilled to produce petroleum was completed in Trumbull County in 1859 (ODGS, 2004). Since then, the oil and gas industry in Ohio evolved along a typical "boom or bust" cycle (Ohio Oil and Gas Association, n.d.). Since 1860, more than 220,000 productive oil and gas wells have been drilled in Ohio and production from these wells is over 1 billion barrels (Bbbls) of oil and 9 trillion cubic feet (Tcf) of natural gas (ODGS, 2004). More than 60,000 wells are still active in Ohio and most of these are referred to as marginal or stripper wells because they produce less than 10 barrels (bbls) of oil or 60,000 cubic feet of natural gas per day.

5.1 Leasing Activity

A Federal oil and gas lease is a legal contract that grants exclusive rights to the lessee to develop federally owned oil and gas resources but does not authorize surface-disturbing activities or obligate the lessee to drill a well on the parcel in the future. Should a parcel be leased and a detailed plan for oil and gas development on the parcel be identified, the BLM and Forest Service would conduct additional site-specific environmental analysis and any required consultations, prior to any ground disturbing activities. The site-specific analysis would occur at the Application for Permit to Drill stage. The USFS would not be involved with further analysis if a proposed development plan involves privately held surface not administered by the USFS,

Under the Mineral Leasing Act, the BLM must conduct lease sales quarterly when eligible parcels are available for lease. The BLM generally issues two types of leases for oil and gas exploration and development of Federal minerals, competitive and noncompetitive. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 requires that all public lands available for oil and gas leasing be offered first by competitive leasing. The BLM may issue a noncompetitive lease only after offering a parcel competitively at auction and not receiving a bid. The 1992 Energy Policy Act also allows the BLM to issue noncompetitive leases on mineral reversion parcels if certain production criteria apply.

Leasing parcels involving non-Federal minerals are negotiated between a mineral owner and a producer. Neither the BLM, USFS nor the ODNR get involved in contractual leasing between private landowners and producers. Accordingly, while it is recognized that oil and gas leases on private minerals exist within the WNF, it is not feasible for the BLM to attempt to quantify or characterize private leases within the WNF.

Given recent shale play activities, it would be reasonable to assume more private leases presently exist in the Marietta Unit than either the Athens Unit or the Ironton Unit. In the eastern portion of the Marietta Unit, where a number of unconventional wells exist and more are planned, it is reasonable to assume that many private mineral owners have entered into oil and/or gas leases.

Since 2006, the BLM has issued one lease (39.00 acres) in the Athens Unit, fourteen leases (9,432.66 acres) in the Ironton Unit, and 64 leases (4,953.00 acres) in the Marietta Unit. Six of the Marietta Unit leases were issued when previously acquired mineral rights reverted to the United States and had existing private leases. Five of these 79 leases, all located in the Marietta Unit, have been developed for oil and gas production. These 79 leases totaled approximately 14,425 acres of the 244,265 acres within the WNF, or about 5.9% of the total acres. None of the wells on the above mentioned five leases were installed on Federal surface and only include Federal mineral at depth and associated with unconventional wells.

5.2 Well Spacing Requirements

The State of Ohio has rules governing the location of wells, or "spacing" requirements. Ohio well spacing requirements for oil and gas wells drilled are subject to the rules and regulations of Ohio as stated in the Ohio Administrative Code, Division of Mineral Resources Management – Oil and Gas, Chapter 1501:9-1-04, Spacing and setback requirements of oil and gas wells. Minimum unit size is based on depth of the producing formation and the smallest unit size would be 1 acre for depths up to 1000 feet (OAC 1501:9-1-04(C)(1)(a)). The shortest lateral distance between well heads is 100 feet unless an exception is granted by the Division (ORC 1509.021[I]). The wellheads of all newly drilled wells, regardless of depth, cannot be closer than 50 feet to the traveled portion of a road which is the berm of the roadway and must have a 100-foot minimum setback requirement from homes. The spacing requirements are *minimum* distances and acreages. Factors such as terrain, surface/mineral ownership issues, economics, and operator preference can contribute to the actual well spacing being greater than State minimums. A summary of Ohio well spacing requirements is shown in Table 2.

Table 2: State of Ohio Spacing Requirements

Depth to oil & gas pool up to 1,000 Feet	
Minimum acres of tract or drilling unit hosting well	1
Minimum distance between other wells in the same pool	200 feet
Minimum distance from any boundary of subject tract or drilling unit	100 feet
Depth to oil & gas pool 1,000 up to 2,000 Feet	
Minimum acres of tract or drilling unit hosting well	10
Minimum distance between other wells in the same pool	460 feet
Minimum distance from any boundary of subject tract or drilling unit	230 feet
Depth to oil & gas pool 2,000 up to 4,000 Feet	
Minimum acres of tract or drilling unit hosting well	20
Minimum distance between other wells in the same pool	600 feet
Minimum distance from any boundary of subject tract or drilling unit	300 feet
Depth to oil & gas pool over 4,000 Feet	
Minimum acres of tract or drilling unit hosting well	40
Minimum distance between other wells in the same pool	1,000 feet
Minimum distance from any boundary of subject tract or drilling unit	500 feet

The State may grant exceptions to its spacing requirements, but such exceptions must be technically justified. Exceptions can be made pursuant to OAC 1501:9-1-04(E)(2) and ODNR has granted exceptions as close as 15 feet between well heads. However, the legal spacing between the producing portions of the wells must be maintained regardless of the wellhead distance.

Within the WNF there are multiple potentially productive zones at varying depths and the potential exists for a higher density of wells due to overlapping spacing units. Two wells could be located side by side and still satisfy spacing requirements because they are completed at different depths. However, operators will seek to produce multiple formations within a single wellbore whenever possible rather than incur the expense of drilling another well.

The majority of the foreseeable drilling targets within the WNF are the Point Pleasant/Utica formations, Marcellus Shale and Clinton sandstone in the Marietta Unit. Depths to the Marcellus may be as shallow as 1,800 feet and depths to the Point Pleasant/Utica formations may be between 3,000 and 9,000 feet. Accordingly, most new wells will be drilled on a minimum density of one well pad per 20 acres (target less than 4,000 feet) or 40 acres (targets greater than 4,000 feet). Drilling to the Clinton sandstone in the Marietta Unit, which lies over 4,000 feet deep also requires a minimum density of one well for every 40 acres. In the western two units, that is, Athens and Ironton, there may be some shallow well potential, but nothing anticipated less than 1,000 feet. Wells that produce between 1,001 feet and 2,000 feet require 10 acres. From 2,001 feet to 4,000 feet the requirement is 20 acres and anything over 4,000 feet needs at least 40 acres per drilling unit (Opritz, 2019).

5.3 Drilling Activity

Drilling activities typically include well pad and access construction, well installation and well stimulation prior to well production or a well being plugged and abandoned if dry. Rotary and cable tool drilling rigs are used to drill conventional or directional/unconventional wells. Conventional wells are vertically drilled wells. Unconventional wells are drilled vertically to a target formation depth and then drilled horizontally within that target formation. Currently in Ohio unconventional wells are being drilled primarily for natural gas in shale formations. Well pads typically contain multiple wells, especially when unconventional wells are drilled. Advancements in technology have resulted in more unconventional wells being drilled in the WNF, especially the eastern third of the Marietta Unit. Depending on the intended target, drilling can be classified as exploratory (wildcat), infilling, stratigraphic test, solution mining, gas storage or injection wells. Well stimulation predominately is hydraulic fracturing, although other stimulation techniques, such as acidification, may also be employed depending on the target being drilled.

The Ohio Department of Natural Resources, Division of Oil and Gas Resource Management (ODNR-OGRM) is responsible for non-federal gas and oil permitting and compliance in the state. In 2006, the state issued 1,239 new drilling permits, of which 952 wells (77%) were drilled (ODNR, 2007). In 2018, the state issued 388 new drilling permits and 30 reissued permits, of which 297 wells (71%) were drilled (ODNR, 2019c). Between 2006 and 2018, a low of 347 wells and a high of 1,428 wells were permitted with between 62% and 77% of the permitted wells drilled (ODNR, 2007 – 2016; 2019a-c). Wells drilled in the counties of the WNF are shown in Table 3.

For the three units of the WNF, from 2006 to 2012, most wells drilled were conventional wells. Since 2012 the number of unconventional wells being drilled has increased with all known new wells in the Marietta Unit being unconventional wells. The unconventional wells targeted the Point Pleasant Formation/Utica Shale and to lesser degree the Marcellus.

Table 3: Drilling and Well Completions from 2006 to 2018 in Counties of the WNF

DEVELOPMENT WELLS DRILLED IN COUNTIES OF THE WAYNE NATIONAL FOREST 2006-2018														
	2006		2007		2008		2009		2010		2011		2012	
P = Produced D = dry well	P	D	P	D	P	D	P	D	P	D	P	D	P	D
Athens	14		15		10		3		1		4		2	
Gallia							1							
Hocking			4		1								2	
Jackson			1											
Lawrence		1	1						4					
Monroe	55	1	76		64		22		16		15		23	
Morgan	6		20		22		6		5		2		1	
Noble	27		21		21		19		7				36	
Perry	24	2	21		13	1	3	1	1	2	2	1	2	
Scioto														
Vinton			1										1	
Washington	14		19		10		4		11				4	
Total Ohio Development Wells	720		818		748		391		319		285		374	
Total WNF Counties Development Wells	140	4	179	0	141	1	58	1	45	2	23	1	71	0
WNF Counties Development Well Success	97%		100%		99%		98%		96%		96%		100%	

DEVELOPMENT WELLS DRILLED IN COUNTIES OF THE WAYNE NATIONAL FOREST 2006-2018												
	2013		2014		2015		2016		2017		2018	
P = Produced D = dry well	P	D	P	D	P	D	P	D	P	D	P	D
Athens	1		1									
Gallia												
Hocking											1	
Jackson												
Lawrence												
Monroe	14		56		47		38		52		60	
Morgan	6		4	1								
Noble	37		54		20		21		16		5	
Perry	3		1							1		
Scioto												
Vinton												
Washington	3		14		1							
Total Ohio Development Wells	490		615		368		190		289		269	

Total WNF Counties Development Wells	64		130	1	68		59		68	1	66	
WNF Counties Development Well Success	100%		99%		100%		100%		98%		100%	
Note: ODNR lists total wells by county. Wells counted might not have been drilled within the Wayne National Forest Proclamation Boundary. ODNR has on occasion revised data after an Annual Report has been issued. ODNR well numbers in this table are based on data presented in ODNR’s Annual Reports and do not include possible subsequent ODNR revisions.												

Table 4: Drilling and Well Completions from 2006 to 2019 in WNF

WELLS DRILLED IN THE WAYNE NATIONAL FOREST PROCLAMATION BOUNDARY 2006-2019										
	2006		2007		2008		2009		2010	
V = Vertical/Conventional H= Horizontal/Unconventional	V	H	V	H	V	H	V	H	V	H
Athens			4		3		1		3	
Gallia										
Hocking			1							
Jackson										
Lawrence									4	
Monroe	65		62		57		20		18	
Morgan										
Noble										
Perry	4		2		3		1		1	
Scioto										
Vinton										
Washington	15		8		6		1		3	
Total Wells Drilled in the WNF	84		77		69		23		29	
Total Wells Drilled on Federal Surface	1		4		3		0		3	
Total Wells Drilled on Non-Federal Surface	83		73		66		23		26	

WELLS DRILLED IN THE WAYNE NATIONAL FOREST PROCLAMATION BOUNDARY 2006-2019										
	2011		2012		2013		2014		2015	
V = Vertical/Conventional H= Horizontal/Unconventional	V	H	V	H	V	H	V	H	V	H
Athens	1				1					
Gallia										
Hocking	1		1							
Jackson										
Lawrence										
Monroe	11		19	3	4	12	3	8		17
Morgan										
Noble										

Perry			2		1				
Scioto									
Vinton									
Washington			1		2		2		2
Total Wells Drilled in the WNF	13		26		20		13		19
Total Wells Drilled on Federal Surface			2		2				
Total Wells Drilled on Non-Federal Surface	13		24		18		13		19

WELLS DRILLED IN THE WAYNE NATIONAL FOREST PROCLAMATION BOUNDARY 2006-2019									
	2016		2017		2018		2019		
V = Vertical/Conventional H= Horizontal/Unconventional	V	H	V	H	V	H	V	H	
Athens									2
Gallia									
Hocking									
Jackson									
Lawrence									
Monroe		17		14	1	15			8
Morgan									
Noble									
Perry									
Scioto									
Vinton									
Washington									
Total Wells Drilled in the WNF	17		14		16		10		
Total Wells Drilled on Federal Surface									2
Total Wells Drilled on Non-Federal Surface	17		14		16		8		

5.4 Drilling Practices

After applicable leases and permit are obtained, access roads and a drilling pad are constructed. Typical drilling practices include installing conductor casing, surface casing, intermediate casing, production casing, production tubing and, in some cases, liner. The largest diameter casing, the conductor casing may be installed to depths up to 100 feet and prevents unconsolidated soil and broken rock from collapsing the well. Surface casing, installed within the conductor, is installed to a depth below known ground water and provides support to a blowout preventor. Intermediate casing is installed within the surface casing and length varies depending on well conditions. Intermediate casing isolate potential trouble areas such as lost circulation zones, unstable rock strata and high-pressured strata. Production casing is installed within the intermediate casing and isolates a production stratum from non-production strata. Cement fills the annular space between each type of casing. Production tubing is installed within the production casing to transport oil and/or gas to the surface. Liners are casings that do not extend to the surface as with other casing types. After drilling, a well is stimulated by various techniques that may include hydraulic fracturing, to enable oil and natural gas in the production strata to be produced (OOGA, 2013).

Oil and gas drilling in southeastern Ohio is typically performed either by a cable tool drilling rig or a rotary tool drilling rig. Conventional drilling can be performed by cable tool or rotary drilling rigs. Cable tool drilling rigs use an impact tool or bit to crush rock at the bottom of the hole. Rock fragments are removed to advance the hole. In 2018, six wells in Ohio (none in the WNF) reportedly were drilled utilizing cable tool drilling rigs. Depths of these wells ranged from approximately 690 feet to 3,453 feet (ODNR, 2019c).

Unconventional drilling traditionally uses rotary drilling rigs but, may employ cable tool drilling rigs in the initial vertical portion of the well. Drilling operations for traditional oil and gas reservoirs utilize a variety of techniques including air drilling and circulating water-based or oil-based mud techniques. With the recent focus in southeastern Ohio on the Point Pleasant Formation/Utica Shale gas reservoir, unconventional drilling methods and advancements in hydraulic fracturing techniques have allowed increased access to productive reservoirs. The initial vertical segment in these wells is drilled with the traditional air or water-based drilling techniques and the unconventional lateral is drilled with an oil-based drilling mud system. In one Point Pleasant Formation unconventional well a total well length of approximately 30,676 feet (vertical depth of 10,314 feet) was drilled in Monroe County, Ohio (ODNR, 2019c). This nearly four-mile long lateral was considered when developing a four-mile buffer around the WNF Federals surfaces for analysis purposes.

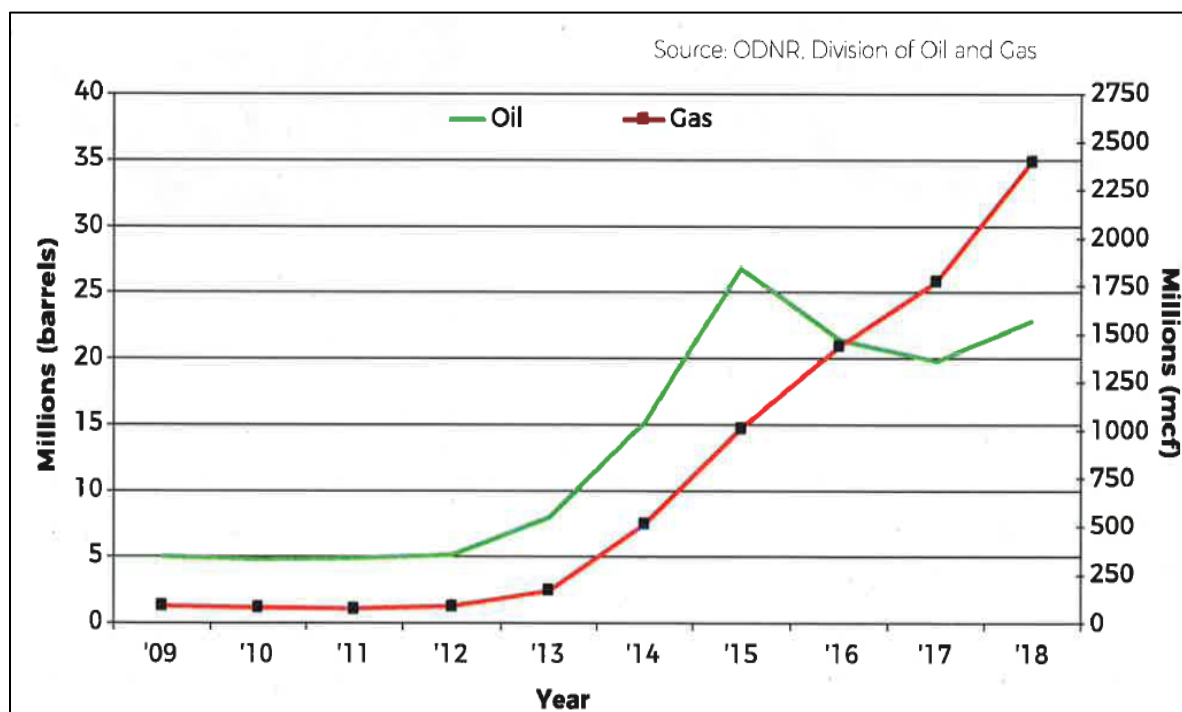
5.5 Drilling and Completion Costs

Drilling costs and well completion costs vary considerably by depth, reservoir, and completion practice for the specific reservoir to be produced and are determined relative to drilling, completion, and total well cost estimates. In 2018, average drilling cost per foot for an unconventional well was \$1,127 and cost per foot for a conventional well was \$125 (FTI, 2019). The cost for Marcellus Shale and Point Pleasant Formation/Utica Shale gas wells are higher than conventional vertical wells because of the increased costs associated with depth (1,800 feet to 3,000 feet and deeper) and the unconventional drilling techniques and multiple fracture stimulation treatments (hydraulic fracturing) performed on these wells. The installation cost of a typical unconventional Point Pleasant Formation/Utica Shale well is between 12-15 million dollars. The installation cost of a typical conventional Berea Sandstone well is between 0.5-1 million dollars.

5.6 Production Statistics

Oil and gas production statistics are currently available from the ODNR-OGRM through 2018 (latest available data). Considering the time since the 2006 Forest Plan, in 2006, the total volume of oil produced in Ohio was 5,422,194 barrels (one barrel is 42 U.S. gallons). The total volume of Ohio natural gas produced in 2006 was 86,315,100 million cubic feet (MMcf). In 2018, the total volume of oil produced in Ohio was 22,795,481 barrels. The total volume of natural gas produced in Ohio was 2,398,386,763 Mcf. Since 2009 oil and gas production has increased as shown in Figure 1 below. Although not shown in Graph 1, Oil and natural gas volumes produced between 2006 and 2008 are similar to 2009 production levels.

Graph 1: Total Oil and Gas Production for the State of Ohio (2009 - 2018)



Source: ODNR, 2018

ODNR oil and gas production statistics are well-based; however, the ODNR data may be separated by county and provide a general estimate of total county oil and gas production for each of the three WNF units. Based on combined 2006 data, wells located in the counties of the Athens Unit (Athens, Hocking, Morgan, Perry and Vinton) produced a total of 364,527 barrels oil and 86,098 Mcf of natural gas from approximately 4,612 wells. In 2018 these same counties produced a total of 10,159 barrels oil and 1,588,991 Mcf of natural gas from approximately 4,855 wells. Based on combined 2006 data, wells located in the counties of the Ironton Unit (Gallia, Jackson, Lawrence and Scioto) produced a total of 38,810 barrels oil and 760,826 Mcf of natural gas from approximately 738 wells. In 2018, these same counties produced a total of 31,282 barrels oil and 387,822 Mcf of natural gas from approximately 980 wells. Based on combined 2006 data, wells located in the counties of the Marietta Unit (Monroe, Noble and Washington) produced a total of 180,152 barrels oil and 6,213,725 Mcf of natural gas from approximately 7,343 wells. In 2018, these same counties produced a total of 1,526,365 barrels oil and 419,749,267 Mcf of natural gas from approximately 10,414 wells. These results are summarized below in Table 5.

Table 5: 2006 and 2018 Oil and Gas Production

	Athens Unit	Ironton Unit	Marietta Unit
2006			
Number of wells	4,612	738	7,343
Oil Production (bbls)	364,527	38,810	180,152
Gas Production (Mcf)	86,098	760,826	6,213,725
2018			
Number of wells	4,855	980	10,414
Oil Production (bbls)	10,159	31,282	1,526,365
Gas Production (Mcf)	1,588,991	387,822	419,749,267

Source: (ODNR, 2019)

Since 2006, oil production decreased in counties comprising the Athens and Ironton Units and increased in the counties comprising the Marietta Unit of the WNF. Gas production since 2006 increased in the Athens and Marietta Units and decreased in the Ironton unit. The total number of wells increased in counties included in all three units. The increase of unconventional wells drilled into the Point Pleasant and Utica Formations contributed greatly to the increase in natural gas production. The Marcellus Shale Play has produced a marked increase in leasing activities since 2003 when Range Resources Corporation drilled the first economically producing well in the shale unit using unconventional drilling and hydraulic fracturing techniques similar to those used in the development of wells in the Barnett Shale Formation of Texas. Prior to the initial Marcellus well activities and the increase in natural gas prices from 2003-05, the standard deal for lease agreements in unexplored areas of Ohio, Pennsylvania, and West Virginia had been about \$25/acre for 5 years with a 12.5% royalty. In recent years, leases in some of the “hot spots” were in excess of \$6,000/acre for 5 years with royalties as high as 20% (Wickstrom, et al. 2012).

5.7 Oil and Natural Gas Characteristics

5.7.1 Natural Gas

Natural gas is classified as conventional or unconventional natural gas based in part on the type of rock in which it occurs and on the method of production. Conventional natural gas is generally characterized as natural gas that migrates upward until impeded by a trap rock and accumulates in a permeable and/or porous rock reservoir. Conventional natural gas is often associated with oil and/or water. Conventional natural gas is often produced initially by reservoir pressure and later, as reservoir pressure decreases, by pumping.

Unconventional natural gas is associated with natural gas that occurs in shale and similar less permeable and/or porous rocks. Unconventional natural gas is often produced by drilling and hydraulic fracturing of the producing zone to induce porosity. Unconventional natural gas can be characterized as dry or wet. Dry natural gas is essentially methane with minor concentrations of condensable hydrocarbons. Wet natural gas is shale-derived gas that contains significant concentrations of condensable hydrocarbons such as butane and propane.

Natural gas recovered from fields in Ohio ranges from a “wet” gas, which contains some of the heavier fluid hydrocarbons in the northwest quarter of the state, to a “dry” gas with little or no condensate that is found toward the east, particularly the gas from the Marcellus Shale and Point Pleasant/Utica Shale. Most shale gas production is low in hydrogen sulfide (H_2S), and less than 1,120 British thermal units (Btu) per cubic foot. The Marcellus Shale gas production from the western and southern portions of the play ranges from 1,150 to 1,350 Btu per cubic foot at the wellhead and has an ethane content of up to 18% after processing.

5.7.2 Crude Oil

Crude oil is generally characterized by the oil’s gravity, sulfur content and the presence or absence of any contaminants, including nitrogen, that may ultimately affect or limit the use of that crude oil in refinery operations. Crude oils are generally termed light or heavy crudes based on the American Petroleum Institute (API) gravity, and sweet or sour based on the sulfur content. A light crude oil is generally one with an API gravity over 40°, while very heavy crude oils will typically have an API gravity of 20° or less. The higher the API gravity is, the lower the density of the crude oil. In the area of the WNF the Berea Sandstone is seen to have API gravity of 38°, Ohio Shale (Upper Devonian Sandstone play) approximately 44°, Clinton-Medina Sandstone (Lower Silurian Sandstone play) approximately 43.5°, and the Marcellus Shale and Point Pleasant Formation/Utica Shale (Ordovician carbonate shelf play) has API gravity above 40° (condensate from wet gas). Sulfur content is expressed as weight percent of sulfur and typically ranges from 0.1 to 5.0 weight percent. The higher the weight percent of sulfur, the sourer the crude oil is considered.

Ohio grade crude oil typically contains wax and paraffin. Ohio grade crude oil can be broken down into the following five basic fractions: gasoline, kerosene and fuel oil, gas oil, wax distillate, and cylinder stock or bottoms. The percentages of gasoline and other fuels that can be produced or distilled are relatively small. The highest percentages of products from Ohio crude oil are high quality lubricating oils and waxes. Crude oil produced in Ohio has a wide variety of API gravity ratings which vary with depth, the producing reservoir, and the geographic location.

5.7.3 Coal Bed Methane

Coal bed methane gas is considered an unconventional natural gas associated with coal formations. In the Appalachian basin, coal bed methane occurs primarily in coal beds of Pennsylvanian (Carboniferous) age. According to the U.S. Energy Information Administration (EIA), between 2006 and 2008, Ohio had a proved reserve of 1 billion cubic feet of gas derived from coal beds. However, according to EIA, the proved reserve has been 0 for 2009 and 2010, the most recent data available (EIA, 2018). The reduction to zero in the most recent data has not been explained.

5.8 Oil and Gas Prices

The average annual crude oil wellhead prices for Ohio from 2006 through 2018 are shown in the table below. The price of Ohio crude oil rose from an annual average of \$62.43 per barrel in 2006 to a peak annual average of \$95.71 per barrel in 2013. Since 2013 the price of a barrel of Ohio crude oil has decreased. ODNR reported an annual average price of \$60.14 per barrel in 2018. While ODNR has not released a 2019 Ohio crude oil average price, based on national averages the price is expected to be similar to 2018. A summary of oil and gas prices from 2006 to 2018 is shown in Table 6.

Table 6: Ohio Oil and Gas Prices 2006 and 2018

Oil and Natural Gas Prices 2006 - 2018							
	2006	2007	2008	2009	2010	2011	2012
Oil (\$/Barrel)	62.43	67.69	93.79	55.56	74.42	90.06	92.05
Gas (\$/Mcf)	7.75	7.40	9.77	4.36	4.68	4.28	2.86
	2013	2014	2015	2016	2017	2018	2019
Oil (\$/Barrel)	95.71	79.92	36.78	39.36	47.25	60.14	-
Gas (\$/Mcf)	3.51	3.78	1.96	2.36	2.80	2.92	-

(Source: ODNR, 2007-2019c)

The average annual natural gas wellhead prices for Ohio from 2006 through 2018 are shown in the table above. The price of Ohio natural gas rose from an annual average of \$7.75 Mcf in 2006 to a peak annual average of \$9.77 Mcf in 2008. Since 2008 the price of Ohio natural gas has generally decreased. ODNR reported an annual average price of \$2.92 per Mcf in 2018. While ODNR has not released a 2019 Ohio natural gas wellhead average price, based on national averages the price is expected to be similar to 2018.

5.9 Gas Storage Fields

Extracted natural gas may be temporarily stored underground in gas storage fields. Gas storage fields are typically located near consumption or production areas and may utilize depleted oil and/or gas fields, aquifer storage fields or salt cavern storage. U. S. Energy Information Administration (EIA) data indicates 24 existing

natural gas storage fields in Ohio as of 2018 (FERC, 2019). None of the storage fields are located within the WNF Proclamation Boundary. The nearest gas storage field, the Laurel Field, is located near Hocking Hills State Park approximately 2 miles northwest of the western-most extent of the Athens Unit.

6.0 OIL AND GAS OCCURRENCE POTENTIAL

The oil and gas occurrence potential describes the likelihood of hydrocarbon-containing rocks within the WNF Proclamation Boundary.

6.1 Existing Oil and Gas Production

Ohio's first commercial petroleum well was completed in Trumbull County in 1859, shortly after the first well drilled in the United States that intentionally targeted oil was drilled near Titusville, Pennsylvania. The first major oil and gas discovery in Ohio was the Lima-Indiana oil and gas fields in 1884. Since 1860, more than 220,000 oil and gas wells have been drilled in the state. Oil and gas has been produced from all but 11 of 88 counties in Ohio (BLM, 2011). All 12 counties included in the WNF, but not necessarily within the WNF proclamation boundary, have had oil and gas production. Currently, oil and natural gas production are concentrated in the eastern half of Ohio (ODNR, 2019d). Recent Marcellus and Utica Shale discoveries and new drilling permit applications also follow this trend.

6.2 Oil and Gas Exploration and Production

Various oil and natural gas plays have been identified in Ohio since the noted Trumbull County well was drilled. From 2006 to 2018, the total number of oil and gas wells drilled annually in Ohio fluctuated from a maximum of 1,089 to a minimum of 248 wells. Only during 2007 and 2008 did wells drilled exceed 1,000 wells per year and all other years below 750 wells drilled. In 2018, a total of 297 oil and gas wells were drilled in the state. Wells drilled into the Utica/Point Pleasant formation accounted for 248 of the 297 wells. By 2018, there were over 65,000 active oil and gas wells in Ohio (ODNR, 2019c).

According to a January 2020 review of BLM's Automated Fluid Mineral Support System (AFMSS), there are 22 producing natural gas and 53 producing oil wells in the Athens Unit that include all or some Federal minerals, in addition to shut in or plugged wells. These are conventional wells producing from the Berea or Clinton Formations, which typically predate United States government acquisition of the minerals. AFMSS identifies five producing conventional gas wells in the Ironton Unit, all developed in the Clinton Formation. The Marietta Unit has 239 producing conventional gas wells and 152 conventional producing oil wells, in addition to shut in or plugged wells, in AFMSS. These AFMSS-listed wells are developed in several different formations, but the Berea, Ohio Shale and Clinton-Medina Formations comprise a majority (AFMSS, 2020).

Based upon recent exploration and production information, the greatest potential for oil and gas production is within the eastern Ohio counties including the WNF. As of 2019, all WNF units had producing oil or gas wells. The potential for the expansion of natural gas production in the Marcellus Shale exists in all three WNF units. The potential for the expansion of oil and natural gas production in the Utica/Point Pleasant formation exists in the Marietta and Athens units. Drilling of conventional oil and gas wells has fluctuated over the last decade based on the price of oil. Unconventional drilling for oil and natural gas in the Marcellus and Utica/Point Pleasant Formations increased between 2013 and 2018 and is expected to increase over the next fifteen years.

6.3 Natural Gas Production

Natural gas is found mainly in the eastern half of Ohio with additional fields in the northwest corner of the state (BLM, 2011). Natural gas production in 2006 was 86,315 million cubic feet and remained relatively unchanged through 2012. Gas production since 2013 has increased as a result of unconventional drilling in the Marcellus and Utica/Point Pleasant Formations. Natural gas production in the state of Ohio in 2018 was 2,398 billion cubic feet. Continued development of the Marcellus Shale (since 2006) and Point Pleasant Formation/Utica Shale (since 2010) Formations are expected to increase annual production rates for the foreseeable future in Ohio and the WNF.

6.4 Crude Oil Production

Crude oil is produced mainly in the eastern half of Ohio. Oil production in 2006 was 5,422,000 barrels of crude oil. Oil production was relatively unchanged from 2006 through 2012 and then increased from 2012 to 2015, where it peaked before a decline. The increase in oil production between 2012 and 2015 was influenced by an increase in unconventional wells producing from the Marcellus and the Utica/Point Pleasant Formations. Since 2017, crude oil production has slowly increased in Ohio with 22,795,481 barrels of oil produced in 2018 (ODNR, 2019c). Continued development of the Marcellus and Point Pleasant/Utica Formations should increase annual production rates for the foreseeable future in Ohio and the WNF.

6.5 Potential Oil and Gas Production Outlook

In 1993, the U.S. Geological Survey (USGS) completed an assessment of undiscovered oil and gas potential in the Appalachian Basin Province, which includes Ohio (USGS, 1993). The assessment estimated a mean of 70.2 trillion cubic feet of natural gas, a mean of 54 million barrels of oil, and a mean of 872 million barrels of total natural gas liquids. Approximately 94% of the undiscovered natural gas resource appears continuous and is found in the Utica-Lower Paleozoic play, the Devonian Shale-Middle to Upper Paleozoic play and the Carboniferous Coal-Bed Gas. The remaining 6% of undiscovered natural gas would be from conventional wells and gas accumulations. (USGS, 1993). Since this assessment, the USGS has completed additional assessments of undiscovered continuous oil and gas resources in the Marcellus and Point Pleasant/Utica Formations. The USGS estimated undiscovered, technically recoverable continuous resources of 96.5 trillion cubic feet of gas in the Marcellus Formation (USGS, 2019b). The USGS estimated undiscovered, technically recoverable continuous resources of 1.8 billion barrels of oil and 117.2 trillion cubic feet of gas in the Point Pleasant/Utica Formations (USGS, 2019b). While these quantities reflect the entire extent of these formations and not just within the WNF units, they show a potential for future development of oil and gas deposits within these shales in the WNF.

The potential for future development of oil and gas deposits within Ohio are closely tied to price trends. Crude oil production increased from 2006 through 2013 as prices generally rose from \$62.43 per barrel to \$95.71 per barrel. Crude oil production decreased from 2014 through 2016 as prices decreased from \$79.92 per barrel to \$39.36 per barrel. Crude oil prices increased in 2017 to \$47.25 per barrel and in 2018 to \$60.14 per barrel (ODNR 2019). Natural gas production increased from 2006 through 2018 (most current data from ODNR) although prices decreased from \$7.75 per million cubic feet to \$2.92 per million cubic feet. Increased production appears to have depressed the natural gas prices, but the greatly increased production made producing gas still profitable. (ODNR 2019a). It should be noted that some producing gas wells have been temporarily shut in or are producing at below maximum capacity levels while natural gas prices are low.

There is some potential for continued exploration and development in the Clinton Sandstone in Ohio and the WNF which has been the target of most new wells drilled in the state over the last decade. Historically,

development of this reservoir has depended upon drilling and recovery techniques and continued development of these techniques may sustain the Clinton Sandstone as an economic reservoir. The greatest potential for development is in the Marcellus and Point Pleasant/Utica Shale plays. Marcellus development began in Ohio in 2006 and continued to increase until the Point Pleasant/Utica Shale, a thicker unit, became a preferred target for unconventional wells. Marcellus development continues though not at the level of Point Pleasant/Utica Shale development. Utica Shale development began in the state in 2010 and already includes 16 wells drilled with another 35 well permits issued. The trend for exploration and production from the Marcellus Shale and Point Pleasant/Utica Shale is to utilize multi-well pads, new unconventional drilling techniques, and new multi-stage well stimulation techniques (hydraulic fracturing). Development in shallower formations, such as the Clinton-Medina and Berea, that traditionally were conventional wells, are expected to follow similar trends. Based upon these developments, the focus for development over the next fifteen years would be the Marcellus and Point Pleasant/Utica Shale with some unconventional development of shallower plays.

6.6 Conflicts with Other Mineral Development

Mineral development in Ohio includes a variety of economic rock and mineral resources in addition to oil and gas. These include coal, clay, limestone/dolomite, peat, sand, gravel, and crushed rock. Other than oil and gas, coal is the prevalent mineral development in the area of the three units of the WNF. Ohio coal deposits are only located in the eastern third of the state, that includes the parts of the WNF. In 2018, 9,613,912 tons of coal, 742,357 tons of clay, 65,458,961 tons of limestone/dolomite, and 31,700,708 tons sand and gravel were produced in Ohio (ODNR, 2019). Peat production was not reported. According to the Ohio Department of Natural Resources, six abandoned underground limestone mines (totaling approximately 486 underground acres of disturbance) are located within the WNF Proclamation Boundary. All six reported mines are in the Ironton Unit, three occur under private surface, one occurs under Forest Service surface and two occur under private and Forest Service surfaces.

The top leading coal producing counties in Ohio in decreasing order are Belmont, Harrison, Tuscarawas, Athens and Jefferson. (OHC, 2019). The WNF proclamation boundary only includes parts of Athens County. There are approximately 702 known abandoned coal, clay, or limestone (limestone mines noted above) mine sites located within the WNF, the majority of which are coal mines (ODNR, 2019). Approximately 22,000 acres of Federal lands of the WNF overlies inactive underground mines, with impacts concentrated in the Athens Unit where 20,174 acres of sub-surface (or 27.83% of the unit) have been mined. Mined acres is shown below in Table 7.

Table 7: Surface and Subsurface Mining in the WNF

	Unit Acres	Mined Acres (Federal lands only)	Percent Mined (Federal lands only)	Additional Acres from Mines (of unknown extent)	Total Percent Mined
Surface Mining					
Athens Unit	72,485	9,819	13.55	1,389	15.46
Ironton Unit	107,113	9,610	8.97	143	9.10
Marietta Unit	64,667	148	0.23	0	0.23
Totals	244,265	19,577	8.01	1,532	8.64
Subsurface Mining					
Athens Unit	72,485	20,174	27.83	-	-
Ironton Unit	107,113	1,704	1.59	-	-
Marietta Unit	64,667	3	0.005	-	-
Totals	244,265	21,881	8.96	-	-

Source: (USDA Forest Service, 2019)

When oil and gas exploration and development activities overlap mining areas, conflicts may arise over the place and size of access roads, transmission lines and drill pads. In the WNF, a total of 369 conventional oil and gas wells are within the unit acre boundary of 78 of the 141 surface mining operations in the Athens Unit. A total of 14 conventional oil and gas wells are within 9 of the 89 surface mining operations in the Ironton Unit. A total of 52 conventional oil and gas wells are within the unit acre boundary of 5 of the 7 surface mining operations in the Marietta Unit. Most of the oil and gas wells identified within a boundary of surface mining activities were either plugged and abandoned prior to issuance of a mining permit or plugged and abandoned a few years after a mining permit was issued. Plugging these wells may have avoided a potential conflict between oil and gas and mining activities.

7.0 OIL AND GAS DEVELOPMENT POTENTIAL

The oil and gas development potential describes the likelihood of developing oil and natural gas within the WNF Proclamation Boundary for each of the three WNF units over a fifteen-year period. The forecast for Ohio oil and natural gas production was based upon the most recent statistics available from the EIA, the ODNR, the Department of the Interior's Office of Natural Resources Revenue (ONRR) and the 2018 Annual Energy Outlook Reference Case scenario (EIA, 2018).

7.1 Relative Oil and Gas Development Potential

Tables 1 and 3 identified exploration and production wells in WNF counties for the thirteen-year period from 2006 to 2018. Exploration wells were drilled in all twelve WNF counties, except for Scioto and Vinton counties. Monroe, Noble and Morgan counties had the most exploration wells drilled over this thirteen-year period. In the last 2 years, only Monroe and Perry Counties had exploration wells drilled. Producing wells were drilled in this same thirteen-year period in all WNF Counties, except Scioto County. Monroe, Noble and Morgan counties had the most producing wells drilled over this thirteen-year period. In the years 2017 and 2018, only Hocking, Monroe, Noble and Perry Counties had producing wells drilled.

Wellhead oil prices on the spot market averaged approximately \$60.14 per barrel in 2018. Wellhead oil prices averaged \$64 per barrel in 2019, despite continued economic sanctions on two OPEC members, supply cuts and continued unrest in the Middle East. In early May 2020, the EIA forecasted world crude oil prices would average \$34 per barrel in 2020 and \$48 per barrel in 2021 (EIA, 2020). Beginning in early 2020, a pandemic has reduced oil and gas consumption and negatively impacted oil and gas prices and activities. At this time, the long-term effects of the pandemic are not known but may last a number of years. If prices remain at, or near, the current levels, oil exploration and production in Ohio should remain similarly negatively impacted. It is forecasted that when higher consumption resumes and prices rise, oil exploration and production in Ohio would also increase. In 2018, 86% of total crude oil production came from unconventional/horizontal primarily natural gas wells on the Marcellus and Point Pleasant/Utica formations. Given the historical exploration and production data, coupled with the spatial extent of the thermal window (the zone where formation temperature does not raise above 130° Celsius) for oil producing formations within the state, no significant discoveries or major increases in production of crude oil are expected and the majority of crude oil production would continue from unconventional primary natural gas wells in the Marcellus and Point Pleasant/Utica wells (ODNR, 2019). If crude oil prices were to decline below an economic price per barrel and remain there for an extended time period, then drilling and production rates would likely be reduced.

7.2 Oil and Gas Development Potential on Federal Land

Between 2006 and 2018, a low of 347 wells and a high of 1,428 wells were permitted annually, with between 62% and 77% of the permitted wells actually drilled (ODNR, 2011 – 2016; 2019a-c). In 2018, the state issued 418 drilling permits (388 new drilling permits and 30 reissued drilling permits) of which 297 wells (71%) were actually drilled (ODNR, 2019c). Four of the 297 wells (1.35%) were drilled in Monroe County, the only WNF county to have wells drilled during 2018. None of these wells were installed on Federal surface.

For the three units of the WNF, since 2009, leases totaled approximately 12,590 acres of the 244,265 acres within the WNF, or about 5.15% of the total Federal acres. In the WNF area the industry trend from 2006 through 2019 reflects a preference for drilling from non-Federal surface and avoiding the Federal owned surface land. However, it is not out of the realm of possibility that wells may be drilled on Federal owned surface lands. This trend may change if more economically feasible private surfaces are not available, Federal oil and gas regulations change, changes to USFS surface occupancy stipulations, or increased oil and natural gas prices make Federal surface lands attractive. Leased Federal minerals are typically encountered in spacing units for unconventional wells. This trend is likely to continue given the availability of suitable non-Federal lands for installation of well pads and ancillary surface features. Given the patchwork distribution of Federal and non-Federal surfaces in the WNF, Federal surfaces that are not economically feasible to avoid may be considered for subsurface distribution pipelines if drilling and production volumes increase.

Oil and gas development potential for the three units of the WNF may be classified low, medium or high potential for the next 15 years. This classification refers only to the three units of the WNF relative to each other and not any larger regional development potential. This classification is based primarily on geology and development activity (number of wells drilled per county but not necessarily within the WNF proclamation boundary) from 2006 through 2018 (last available data). Many of the same traditional conventional well oil and gas producing targets (such as Berea Sandstone, Ohio Shale and Clinton-Medina Sandstone) occur under all or parts of the three units of the WNF. Unconventional oil and gas targets, such as the Utica/Point Pleasant and Marcellus targets are located under the Athens and Marietta Units and may extend partially under the Ironton Unit. Two hundred and twenty-one producing wells were reported drilled in counties of the Athens Unit from 2006 through 2018, Nineteen producing wells were reported drilled in counties of the Ironton Unit and 1,064 producing wells were reported drilled in counties of the Marietta Unit during this same period. The Marietta Unit is classified as a high potential for development based on current high industry interest in the Utica/Point Pleasant target, the Athens Unit is a medium potential given the geologic potential but less industry interest and the Ironton Unit is low potential for development given low industry interest.

8.0 RFDS BASELINE SCENARIO ASSUMPTIONS AND DISCUSSION

As mentioned in Section 2.0, a RFDS is a modeled scenario of anticipated oil and gas exploration, and/or development activity for a defined area and specified period, and documentation of technical information in the administrative record of any analysis for which it is used. This RFDS provides support information for an update to the 2006 Land and Resource Management Plan for the Wayne National Forest. This document was prepared during 2019 and early 2020 and the 15 years being analyzed for future potential development is 2020 to 2034.

The following summarizes the baseline scenario assumptions used by the BLM to prepare this RFDS:

- The change in Ohio's production over the forecast horizon (2020 to 2034) will mirror that of the Annual Energy Outlook Reference Case.
- New well pads, access roads and ancillary support features (pipelines, storage tanks, metering stations, etc.) may be constructed anywhere within the proclamation boundary of the three WNF units, whether surface ownership is Federal or non-Federal subject to any lease stipulations.
- Interest in obtaining leases within the WNF would continue at the same or slightly increased level of interest.
- Valid existing rights will remain in effect.
- Industry exploration and extraction of oil and gas would continue to follow a similar pattern of focus on known producing plays underlying the WNF.
- The Federal leasing process would continue relatively unchanged for the next fifteen years or until all available Federal minerals have been leased.
- Non-Federal leasing within the WNF proclamation boundary would continue relatively unchanged for the next fifteen years or until available non-Federal minerals are leased.
- Multiple unconventional wells drilled from a single well pad.
- Well pad size would comply with ODNR regulations.
- New well pads and access roads would preferentially be constructed on non-Federal surface. Construction of Federal surface well pad sites would increase only when private surface sites are no longer available.
- Existing roads and facilities would be used where possible and any additional offsite or central facilities for compressors, dehydrators/separators, and storage and metering would be constructed preferentially on private surface.
- Oil and gas exploration, development and production of potentially productive areas are open under the standard lease terms and conditions except those areas designated as closed to leasing by law, regulation, or executive order.
- Deep unconventional wells would continue being installed at a same or slightly greater rate than shallow conventional wells.
- No new regulations or restrictions to oil and gas development that have not already been implemented or are currently pending, would be implemented.
- Oil and gas prices similar to current prices would remain for a number of years and would thereafter increase to the end of the 15-year period ending in year 2034.
- Oil and gas drilling and production costs would remain stable over the next 15 years.
- Federal surface and mineral estates within the WNF would increase through USFS acquisitions and mineral reversions.

8.1 Discussion of Determining Oil and Gas Resource Potential

Publicly available descriptions of stratigraphy, structure, historic oil and gas activities, as well as relevant studies conducted in the area were used to determine oil and gas resource potential for the WNF.

8.2 Methodology for Predicting Future Oil and Gas Exploration and Development Activity

Predictions of future oil and gas exploration and development activities are determined by an area's geology, historic and present activities, economics, technological advances, access to oil and gas resources, transportation, and available processing facilities. Economics and technology may be hard to predict because

of their complex nature and potential rapid rate of change. Projections of oil and gas activities are based upon present knowledge. Future changes in global oil and gas markets, infrastructure and transportation, or technological advancements may affect future oil and gas exploration and development activities within the state.

8.3 Relating the Potential for Resource Occurrence to Potential for Activity

Projected oil and gas activity does not necessarily correlate with geologic potential for the presence of hydrocarbons. Although the geology of an area may suggest the possibility of oil and gas resources, actual exploration and development may be restricted by high exploration costs, low oil and gas prices, or difficulty accessing the area. Thus, a small area may have a high resource potential, yet have a low exploration and development potential due to accessibility. Conversely, technological advancements or an increase in oil and gas prices could result in oil and gas activities in areas regarded as having low potential for occurrence.

This RFDS assumes that all potentially productive areas are open under the standard lease terms and conditions except those areas designated as closed to leasing by law, regulation, or executive order. The projections are intended to provide the information necessary so that all potential cumulative impacts can be analyzed. The disturbance for each well is based on the typical depth of wells for an area; generally, shallow wells disturb fewer acres than deeper wells.

The study area for the WNF was defined as all WNF land including a 4-mile wide buffer zone around Federal surface lands within the WNF. Estimates for oil and gas development within the WNF Proclamation Boundary and within 4-miles from Federal surface lands are forecast.

9.0 SURFACE DISTURBANCE DUE TO OIL AND GAS ACTIVITY ON ALL LANDS

In 2018, the ODNR issued 837 permits (includes permits to convert, deepen, drill, plug back, plug and abandon, reissue and reopen) of which permits to drill oil and gas wells totaled 418 (388 new permits and 30 reissued permits). Unconventional wells accounted for 79% of all oil and gas permits. Based on all oil and gas permits issued, the recent trend for crude oil exploration and development in Ohio is the Clinton Sandstone (9% of permits), deeper formations such as the Beekmantown dolomite, Rose Run sandstone, Trempealeau dolomite (5% of permits) and the Trenton/Black River formations (3% of permits). Based on oil and gas permits issued, the recent trend for natural gas exploration and development in Ohio involves the Point Pleasant Formation/Utica shales (76% of permits) and Marcellus shale (3% of permits) (ODNR, 2019c). These relative percentages are like 2016 and 2017 oil and gas permits issued except for Berea sandstone permits instead of Trenton/Black River formations permits (ODNR, 2019b). An analysis of the data compiled in this report forecasts that, upon applying a “Reasonably and Foreseeable Development Scenario,” the Point Pleasant Formation/Utica Shale and Marcellus Shale plays for natural gas and the Clinton Sandstone, Trenton formation, Berea Sandstone and various deeper formation plays for oil should continue to dominate exploration and development activities for natural gas and crude oil over the next 10-15 years. The surface disturbance forecast presented in this section is presented as primarily conventional single-well pads for oil well drilling, and as primarily unconventional multi-well pads for natural gas drilling. The possibility for multiple conventional wells or single unconventional wells being installed on a single well pad was also considered. Surface disturbance activities should be similar regardless of actual formation being targeted.

9.1 Surface Disturbances

Estimates of anticipated surface disturbances associated with the development of oil and gas within the State of Ohio over the time period 2020 to 2034 were determined from a variety of resources, including previous oil and gas environmental assessments, recent drilling permits applications, discussion with state oil and gas personnel, discussion with a prominent operator in the WNFs, and document reviews. As previously mentioned, assumptions used to evaluate potential surface disturbance include drilling of multiple wells from a single well pad (unconventional wells), single well from a single well pad (conventional wells), well pad sizes that comply with ODNR regulations, drilling of wells from existing locations, use of existing roads and facilities (pipelines, storage tanks, metering stations, etc.) where possible, preferential installation of well pads on private surface rather than Federal surface, and preferential construction of any additional offsite or central facilities for compressors, dehydrators/separators, and storage and metering facilities on private surface.

The level of disturbance (well pad, access road, soil stockpiles, erosion-control features, guard sheds, etc.) associated with oil and gas development varies depending on the depth of the well and type of well drilled (unconventional or conventional). Conventional well pads in the area of the WNF typically contain one well. Unconventional well pads in the area of the WNF may contain one to eighteen or more wells, with three wells per well pad being common. One example of a recently permitted unconventional well pad installed on non-Federal surface but intersecting Federal minerals at depth were reviewed for surface disturbance (BLM. 2019). The Jackson pad is proposed to contain 7 unconventional wells and new surface disturbance during construction is estimated in their permit application to be approximately 18 acres. The 18 acres of disturbance consist of an 8.7 acre well pad, 1.32-acre access road and 8.03 acres of pipeline. Typically, after construction is complete most disturbed ground is regraded and seeded leaving only an access road and well pad as longer-term disturbance (for the life of the well). Proposed longer term disturbance for the site is 3.7.

9.1.1 Well Spacing

The State of Ohio has rules governing the location of wells, or "spacing" requirements. Given the availability of directional drilling techniques, it is possible for a surface location to be offset from its intended bottom hole location. The State may grant exceptions to its spacing requirements, but such exceptions are rare and must be technically justified. In addition to the above bottom hole restrictions, the wellheads of all newly drilled wells, regardless of depth, cannot be closer than 50 feet to the traveled portion of a road which is considered to be the berm of the roadway and must have a 100-foot minimum setback requirement from homes.

It is important to keep in mind that the spacing requirements are *minimum* distances and acreages. Factors such as terrain, surface/mineral ownership issues, economics, and operator preference can contribute to the actual well spacing being greater than State minimums. For example, even though the State spacing requirements for Clinton wells in Lawrence County call for a minimum drilling unit size of 20 acres, one operator in the area reports using drilling units 60 to 70 acres in size.

Within the WNF there are multiple potentially productive zones at varying depths and the potential exists for higher density of wells due to overlapping spacing units. Two wells could be located side by side and still satisfy spacing requirements because they are completed at different depths. However, operators will seek to produce multiple formations within a single wellbore whenever possible rather than incur the expense of drilling another well.

The majority of the foreseeable drilling targets within the WNF are between 2,000 to 4,000 feet deep, which means most new wells will be drilled on a minimum density of one well pad per 20 acres. In addition, there appears to be growing interest in drilling to the Clinton-Medina Formation in the Marietta

Unit, which lies at a depth greater than 4,000 feet and thus requires a minimum density of one well for every 40 acres.

9.1.2 Well Pads

Well pads provide a stable work platform for well drilling. Well pads are typically constructed using standard construction equipment, such as bulldozers, graders and scrapers to provide a level pad. Given hilly topography in the region that includes the three units of the WNF, cut and fill methods are often used. The volume of material removed depends on slope steepness and size of pad. The steeper the slope under the proposed pad, the greater volume of material that needs to be removed, used as fill and/or stockpiled for later reclamation. Soil is typically removed and stockpiled during pad construction. Typically pads for deep targeted unconventional wells or multiple wells, are larger than shallow conventional wells.

9.1.3 Well Pad Access

Well pad access is location dependent but, is typically designed to be the shortest feasible route to reduce construction and haulage costs. Well pads access are often constructed to maximize existing access roads. Access roads are typically constructed using standard construction equipment, such as bulldozers, excavators, graders and scrapers according to best management practices and safety interests. Access roads typically consist of a 14 to 20 feet wide running surface with the volume of downcast material dependent on slope. Access roads are constructed to support heavy equipment and use drainage and erosion controls such as side ditches and culverts. Depending on expected well life and surface owner agreements, access roads may be temporary or permanent.

9.1.4 Surface Brine Disposal

Conventional and unconventional drilling and development activities may produce brine solutions. Brine typically refers to naturally occurring salty water in rocks but, may be used to describe any salty water produced during oil and gas activities. Brine concentrations may vary between formations and within the same formation and volumes produced depends on specifics of the formations being drilled and length of the borehole. Unconventional drilling typically are longer boreholes and have a potential to produce more brine. Most of the brine is produced during flowback after hydraulic fracturing. In Ohio brine produced during oil and gas operations may be disposed of in one of approximately 225 deep injection wells. Three of these wells are identified within the Athens Unit, one well is identified within the Ironton Unit and five wells are identified within the Marietta Unit. None of these deep injection wells are known to occur on Federal Surface or minerals (ODNR, 2020b). Brine solutions from conventional wells may also be applied to roadways for dust suppression and deicing. The surface impact from produced brine potentially would be on treated road surfaces and possibly any adjacent drainage ditches.

9.2 Typical Oil and Gas Operations

9.2.1 Drilling Operations

Initially, heavy earth moving equipment is used to build the access road and well pad. Topsoil is stockpiled for use in reclaiming areas not needed during the production phase. Currently most drilling operations use aboveground storage tanks to store fluids (potable water, flowback water, brine, etc.). However, if aboveground storage tanks are not used, a large "reserve" pit to temporarily store drilling fluids may be dug on the well pad. Material excavated from the pit during construction is stockpiled on-site to backfill the pit when drilling is finished.

Most wells will be drilled by a rotary rig. Less commonly, wells will be drilled by a cable tool rig. Both types of rigs are powered by diesel engines. In 2017, only three cable tool rigs operated in Ohio (ODNR, 2019c) During drilling, the mast of a rotary rig extends from 80 to 100 feet in height, while a cable tool rig mast height typically extends less than 30 feet. Since drilling is a continuous operation until the total depth of the well is reached, the lights and engine noise from the rig are evident throughout the day and night. It takes a rotary rig about three to five days to drill a typical well in the WNF.

9.2.1.1 Conventional Drilling

Conventional drilling is typically used on shallower target depths, use smaller drilling rigs and typically require a smaller surface disturbance footprint. Once drilling commences activities are continuous until the well is completed or plugged and abandoned. While many variables can impact drilling time, a typical conventional well takes about three days to drill. During this time surface impacts would include travel to and from the well pad, noise and air emissions.

9.2.1.2 Unconventional Drilling

Unconventional drilling is typically used on deeper target depths, use larger drilling rigs and typically require a larger surface disturbance footprint than conventional drilling. Once drilling commences activities are continuous until the well is completed or plugged and abandoned. While many variables can impact drilling time, a typical unconventional well takes about five days to drill. During this time surface impacts would include travel to and from the well pad, noise, light and air emissions. Multiple wells may be drilled in succession increasing the number of consecutive drilling days, quantity of noise, light and air emissions occurring on the pad. Unconventional drilling is more likely to utilize hydraulic fracturing technology to stimulate or increase production after drilling operations have concluded.

The Oil and Gas Potential Analysis contained in the 1992 Amendment #8 to the WNF Plan concluded that directional or unconventional drilling would not be economically feasible in the Forest. Since the 1992 Amendment #8 WNF Plan, unconventional drilling of the Marcellus Formation and later the Point Pleasant Formations/Utica Shale has become common due to advances in technology, especially in the Marietta Unit's Monroe County.

9.2.2 Production Operations

The typical producing oil well and its associated production facility consists of one or two 100-barrel steel oil/water storage tanks surrounded by an earthen dike, a pump jack and motor to bring the oil to the surface, an electric line to run the motor, a separator (a vessel that separates the raw well stream into oil, gas, and water), and if gas is being produced with the oil, a gas meter. If an electric source is not readily available, pump jack motors can be run by natural gas drawn off the well. A typical producing gas well and its facility typically consist of an assortment of valves on the wellhead, a 100-barrel tank for produced water, a separator, and a gas meter.

Hydrocarbons are transported from the wellbore to the production equipment by means of varying lengths of 2-inch diameter pipe. Where feasible, pipelines are buried at least 24 inches below the ground surface. There may be a permanent flare to dispose of small quantities of natural gas that are not economic to sell. When natural gas can be marketed, gathering pipelines transmit the gas from the production facility to secondary collector lines and on to main transmission lines. Given the long history of gas production in the WNF, there is already a well-developed pipeline infrastructure in place which should minimize the need for lengthy gathering lines to service new wells. However, as existing infrastructure ages and degrades it will need to be repaired, replaced or additional pipelines installed. If production volumes increase greater diameter pipelines may be needed to be installed.

Water produced along with the oil and gas is generally salty, sometimes sulfurous and may contain radionuclides as well as other dissolved elements. Federal and state regulations require proper disposal of this saltwater, or brine. In 2018 most producing wells in the 12 counties that include the WNF reported no brine production. While most wells reported no brine production, some wells, primarily in the Marietta and Athens Units, reported tens to thousands of barrels of brine produced. The maximum 2018 brine volume reported from one producing well was 82,115 barrels for a well located in Monroe County. The most common method (98% of the time) of disposal in Ohio is for the brine to be trucked to a state-licensed disposal well where it is injected into underground formations already containing brine. A less common disposal method allowed in certain townships is road spreading of brine for the purpose of dust and ice control. Producing wells in the WNF typically report producing none or only small amounts of brine.

Access to the site would typically be through a locked gate located at the start of a lease access road. A company employee, called a “pumper,” regularly inspects and maintains the well and facility. Tanker trucks will pick up oil and/or brine from production tanks on a volume-determined schedule. Occasionally, producing oil and gas wells experience mechanical problems in the wellbore that require a process called a workover. A workover involves bringing a smaller service rig to the location to perform any needed service on the well. Workovers take place on the existing well pad and typically use aboveground storage tanks but may use a small pit to contain any fluids circulated from the wellbore. After the workover is complete, any fluids remaining in the pit are vacuumed out and disposed of in accordance with state requirements. The pit is then backfilled and revegetated as appropriate.

9.2.3 Abandonment and Final Reclamation

Ohio and Federal regulations require permanent abandonment of depleted producing wells to occur quickly after all oil and gas operations have ceased. If there will be an excessive interval of time between one phase of activity and another, Federal and state regulations require that the well be temporarily plugged.

If oil and gas are not found in commercial quantities, under state and Federal regulations the drilled wellbore is plugged with cement. The well pad, access roads and associated disturbed grounds are restored to original contour and all disturbed area reseeded. The operator is responsible for ensuring vegetation is satisfactorily established over the affected areas in order to stabilize the soil and prevent erosion.

Plugging and abandonment of wells installed to shallow depths and lacking encounters with geologic hazards, typically can be completed within three days on wells located in the WNF. Wells installed to deeper depths or that encounter geologic hazards typically take longer to plug and abandon. Activity at the site will entail use of a smaller truck-mounted service rig and several large trucks which will be used for the retrieval of well casing and the placement of cement plugs and hydrostatic mud in the bore hole. All horizons of hydrocarbon occurrence, unusual water flows, and freshwater zones will be sealed from the bore hole by the cement plugs. Remaining surface equipment is removed at this time. Surface restoration and reclamation should be initiated and completed within 1 year of well abandonment on Federal surface lands. Final approval of surface restoration and reclamation by the surface management agency may take up to five years.

9.3 Production History and Life Expectancy of Producing Fields

The average life expectancy of producing conventional wells within the WNF is fifteen to thirty years, and the average life expectancy of producing unconventional wells is twenty-five to forty years. Numerous examples can be given on both ends of the life expectancy spectrum, including wells that have been produced continuously since the early 1900s, on the one end, to economic wells which never produce due to legal hindrances, on the other.

Conventional wells typically produce at a relatively high rate for the first few years, and after experiencing a rapid decline in production they will continue to produce at a low rate for the remainder of a wells' lives. Production from unconventional wells typically produce at a relatively high rate for the first several months to a year and then have a long well life with a decline in production throughout its production history. Production will usually continue until operators determine that the wells will no longer produce enough hydrocarbons to pay for the day to day operating expenses.

ODNR information on well completions in the 12 counties where the WNF is located were examined for development trends that may impact Forest lands. Below, the 46-year period from 1973 to 2018 was broken up into five separate periods (the first four are a decade each) to look at timeframes that are equivalent to Forest planning periods. The results of this breakdown are as follows:

- **For the period 1973 to 1982** - A total of 1,861 wells were completed in the twelve subject counties. Of this total, 600 wells, or 32.24 percent, were completed within the WNF Proclamation Boundary. Of the wells drilled within the Forest proclamation boundary, 121 wells, or 20.17 percent, were completed on surface managed by the Forest Service.
- **For the period 1983 to 1992** - A total of 4,924 wells were completed in the twelve subject counties. Of this total, 1,073 wells, or 21.79 percent, were completed within the WNF Proclamation Boundary. Of the wells drilled within the WNF Proclamation Boundary, 213 wells, or 19.85 percent, were completed on surface managed by the Forest Service.
- **For the period 1993 to 2002** - A total of 1,180 wells were completed in the twelve subject counties. Of this total, 330 wells, or 27.97 percent, were completed within the Forest proclamation boundary. Of the wells drilled within the WNF Proclamation Boundary, 22 wells, or 6.67 percent, were completed on surface managed by the Forest Service.
- **For the period 2003 to 2012** - A total of 1,193 wells were completed in the twelve subject counties. Of this total, 500 wells, or 41.91 percent, were completed within the Forest proclamation boundary. Of the wells drilled within the WNF Proclamation Boundary, 16 wells, or 3.2 percent, were completed on surface managed by the Forest Service.
- **For the period 2013 to 2018** - A total of 574 wells were completed in the twelve subject counties. Of this total, 99 wells, or 17.25 percent, were completed within the Forest proclamation boundary. Of the wells drilled within the WNF Proclamation Boundary, 2 wells, or 2.02 percent, were completed on surface managed by the Forest Service.

This information suggests that for the past approximately 50 years, oil and gas drilling on federally owned surface has not been a development preference within the WNF Proclamation Boundary. From this, one could conclude that, if suitable non-Federal surface is available, oil and gas operators would continue preferentially developing non-Federal owned surface over Federal owned surface. As additional nonconventional wells are drilled in the WNF it is highly likely most federal minerals would be accessed in the subsurface from wells installed on non-Federal surfaces.

9.3.1 Development Forecast for the Athens Unit

The principal exploration targets of the Athens Unit are the Berea and Clinton-Medina formations. These exploration targets have been drilled using conventional methods, however it is possible that they may be drilled unconventionally in the future. The Berea is approximately 1,000 feet deep equating to a minimum drilling unit size of 1 to 10 acres per well and Clinton-Medina is less than 4,000 feet deep in the Athens Unit equating to a minimum drilling unit size of 20 acres per well. There is potential for production from formations shallower than the Berea, but to date no significant production has been established from these zones in the area. There is also potential for production deeper than the Clinton-Medina but drilling below the Clinton has been rare for the area and is not expected in the foreseeable future. The Point Pleasant/Utica Formation is an unconventional target that exist beneath the Athens Unit. At this time there are no unconventional targets being developed; however, traditionally conventional targets may become unconventional targets in the future. It is possible that technology used to install deeper unconventional wells may be used on shallower formations to increase production. It is possible that existing conventional wells may be converted into unconventional wells if an operator believe it is economically feasible. The geology underlying this unit, relative to the other two units, suggest a medium potential for development. However, based on modeling no new wells are predicted to be installed in the Athens Unit in the next 15 years. This prediction takes into consideration current natural gas and oil prices and lack of industry interest in Federal leases on this unit at this time.

In Ohio, a total 2,804 wells were plugged from 2008 to 2018. Athens, Hocking, Morgan, Perry, Vinton and Washington Counties of the Athens Unit had a total 523 wells plugged (18.6% of state total) from 2008 to 2018. While Washington County extends into both the Athens and Marietta Units, wells plugged in Washington County are included only in the Marietta Unit wells plugged number. Wells being plugged are conventional wells, since unconventional wells are not known in Athens, Hocking, Morgan, Perry or Vinton Counties. Assuming a similar rate of plugging, this report projects that 785 depleted producers would be plugged in these counties over the next 15 years. Using 0.55 acres as the average amount of net surface disturbance associated with a producing conventional well (e.g., 0.38 acres of road and 0.17 acres of well pad), plugging 785 depleted producers will result in approximately 432 acres of restored surface over fifteen years.

9.3.2 Development Forecast for the Ironton Unit

Two principal exploration targets of the Ironton Unit are the Berea Sandstone and the Clinton-Medina formations. These exploration targets have been drilled using conventional methods, however it is possible that they may be drilled unconventionally in the future. The Berea is approximately 1,600 feet deep in this unit, equating to a minimum drilling unit size of 10 acres per well, and Clinton-Medina is less than 4,000 feet deep in the in this unit, equating to a minimum drilling unit size of 20 acres per well. There is potential for production from other formations in the Ironton Unit include Ohio Shale, Queenston Formation, Buell Run Sand, Maxton Sand, Keener Sand and the 1st Cow Run, the Beekmantown, the Rose Run, and the Mt. Simon formations. The Point Pleasant/Utica Formation may extend below a part of the eastern half of the Ironton Unit. The Marcellus Shale is not known to extend beneath the Ironton Unit. At this time there are no unconventional wells being developed; however, traditionally conventional target formations may become unconventional target formations in the future. It is possible that technology used to install deeper unconventional wells may be used on shallower formations to increase production. It is possible that existing conventional wells may be converted into unconventional wells if an operator believe it is economically feasible. The geology underlying this unit, relative to the other two units, suggest a low potential for development. Based on modeling no new wells are predicted to be installed in the Ironton Unit in the next 15 years. This prediction takes into

consideration current natural gas and oil prices, the industry focus on unconventional drilling of the Point Pleasant/Utica Formation and Marcellus Shale which do not occur under the Ironton Unit, and lack of industry interest in Federal leases on this unit at this time. No new surface disturbance is anticipated

Existing surface disturbances may decrease as non-productive wells are plugged and the surface disturbance reclaimed. Gallia, Jackson, Lawrence and Scioto Counties of the Ironton Unit had a total 51 wells plugged (1.8% of state total) from 2008 to 2018. Assuming a similar rate of plugging, approximately 75 depleted producers would be plugged in these counties in the next 15 years. Using 0.55 acres as the average amount of net surface disturbance associated with a producing conventional well (e.g., 0.38 acres of road and 0.17 acres of well pad), plugging 75 depleted producers will result in approximately 41.25 acres of restored surface over fifteen years.

9.3.3 Development Forecast for the Marietta Unit

Principal exploration targets of the Marietta Unit are the Ohio Shale, Berea Sandstone, Point Pleasant Formation/Utica Shale and the Marcellus. These exploration targets have been drilled using both conventional and unconventional methods. Additional conventional targets that are potentially productive and present include the Clinton-Medina, Gordon Sand, Big Injun, Cow Run, Buell Run Sand, Maxton Sand, Keener Sand and the Maxville formations. The Point Pleasant/Utica Formation and Marcellus Shale are unconventional targets that are potentially productive exist beneath the Marietta Unit. Presently, unconventional targets are being developed in the Point Pleasant/Utica Formation and Marcellus Shale and no conventional targets are being drilled anywhere in the unit. In the next 15 years, however, traditionally conventional targets may become unconventional targets. The current prediction is 81 new wells will be installed within the Marietta Unit over the next 15 years, not necessarily on Federal surface. This prediction takes into consideration current natural gas and oil prices and the industry focus on unconventional drilling of the Point Pleasant/Utica Formation and Marcellus Shale. Eighty of the wells are predicted to be installed in Monroe County and one well is predicted to be installed in Noble County.

Monroe, Noble and Washington Counties of the Marietta Unit had a total 489 wells plugged (17.44% of state total) from 2008 to 2018. Assuming a similar rate of plugging, approximately 734 depleted producers would be plugged in the next 15 years. Using 0.55 acres as the average amount of net surface disturbance associated with a producing conventional well (e.g., 0.38 acres of road and 0.17 acres of well pad), plugging 734 depleted producers will result in approximately 404 acres of restored surface over fifteen years.

As noted, eighty-one new unconventional wells (some potentially drilled from well pads containing multiple wells) are predicted to be installed in the Marietta Unit. Some of these wells will target the Marcellus Shale, but most are projected to target the deeper Point Pleasant Formation/Utica Shale. Unconventional well pads in southeastern Ohio have ranged in disturbance acreage from 6 to 35 acres, depending on topography, access, pipelines and the number of wells proposed per pad. After initial construction of a well pad, access roads and any pipelines, most of the associated disturbance is typically regraded and seeded as interim reclamation to prevent erosion. Well pads and access disturbances remaining after interim reclamation range from 3 to 10 acres and typically remain until final reclamation (when wells plugged). Using recently installed well pads and wells it is estimated that oil and gas activity in the Marietta Unit for the planning period will result in between 171 and 998 new acres of initial disturbance and 86 to 285 acres of longer term disturbance remaining after interim reclamation and until final reclamation of the pad and access. As noted in a previous section, the land reclaimed by plugging depleted producers would offset longer term surface disturbance associated with drilling new wells.

9.4 Gas Storage Potential

The BLM has received no expressed interest in gas storage within the WNF Proclamation Boundary over the last 30 years. However, in 2019, an inquiry regarding possibly establishing a gas storage field within the Ironton Ranger District was received by the USFS, and this inquiry is still at an early stage and no application has been submitted to date (Dahl, 2020). Accordingly, it is reasonable to expect that if a proposed Ironton Ranger Unit gas storage permit application is received and approved it most likely would be constructed or completed over the course of the fifteen-year RFDS period. Since no written request has reportedly been received, it would be difficult to describe possible surface disturbances associated with a gas storage field. However, given other gas storage fields it is possible additional gas injection wells may be installed as well as access roads, piping, etc. that may or may not occur within the WNF proclamation boundary.

10.0 WNF ECONOMIC PROJECTION FOR OIL AND NATURAL GAS DEVELOPMENT

The forecast of oil and gas development on WNF used in the RFD was generated from an internal BLM spreadsheet-based model of oil and gas production. Model inputs included production and price data and forecasts from US DOE Energy Information Administration's 2019 Annual Energy Outlook (EIA, 2019) and *The Distribution of U.S. Oil and Natural Gas Wells by Production Rate (2019)* (EIA, 2019b), production statistics from Ohio wells by well vintage from DRILLINGINFO.COM, well-level exploration, development and geo-spatial data, statistics and reports from the Ohio Department of Natural Resources website, and Federal revenue and production statistics from ONRR (ONRR, 2019). These results are a forecast only based on modeling and available information at this time. The overall forecast is for a 15-year period and, while the model projected annual results, should be used as a 15-year period of time and not necessarily year by year. It is possible individual annual development levels may vary within the forecasted 15 years.

It was assumed that changes in Ohio production over the forecast horizon will mirror that of the AEO Reference Case. In 2018, Ohio represented 8.2% of total US marketed natural gas production (2.4 Tcf). The 2018 AEO US Reference Case forecasts year-over-year changes in gas production in 2020-2034 ranging from 0.4% to 4.6% and averaging 1.8% per year. For Shale Gas these statistics ranged from 1.2% to 4.6% (average 3.5%).

Forecasted production from new wells is assumed to be the difference between the overall production estimate and the production from wells existing in 2018. The production decline from existing wells was estimated using annual well-level production reports from the Ohio DNR. For example, most of these wells (95%) are expected to decline by 1% per year, while production from the wells in the top 1% is modeled to decrease by 10%. As these wells grow older their year-over-year rate of decline diminishes.

New Ohio wells – especially the natural gas wells – exhibit a rapid decline in the quantity of gas produced per year for the first several years in operation. A model representing a typical new gas well was estimated using well-level production data that was developed and used to estimate the annual production from new wells (reference ODNR, USGS). This model estimates the annual decline in production per year and an estimate of the annual improvement in well-productivity based upon technological improvements.

Based upon recent trends in Ohio oil and gas production, it is assumed that most new wells will be horizontally drilled unconventional natural gas wells.

The forecasted production from this representative new well (i.e., the modeled “typical” well) is used to estimate the total number of new wells needed to produce the difference between the state-level production

forecast and the production from existing wells. Between 2020 and 2034 this process results in an estimate of 154 to 352 new wells needed statewide per year. Note that the additional gas produced by these new wells in subsequent forecast years becomes part of the total production from existing Ohio wells in these forecast years and therefore reduces the needed new gas production (and wells) in those years.

The number of new wells forecast for WNF was estimated as being proportional to the (recent) historic percentage of gas produced per county and the percentage of each county that belonged to WNF mineral estate. Using this approach, of the counties containing WNF surface or minerals, Monroe County is the location of almost all the forecast new wells into WNF, and 1.5% of Monroe County is located on WNF.

This forecast assumes three producing wells (three wells for predictive modelling although technology may result in additional wells from a single pad) will be located on each new drilling site and one of these wells would include Federal minerals. This is the average number of wells per well pad for recently drilled gas wells in the area based on review of ODNR and AFMSS data (see section 6.2). Each new well pad is assumed to have its three wells drilled and producing in the same year as the pad is constructed. The average cost per well was estimated to be \$9.5 million in 2020 and total costs were forecast to reach \$16.5 million by 2034. These costs include pad-level costs such that total well-pad spending could be estimated by multiplying the number of expected wells per pad.

The state-level forecast for Ohio oil production follows the same process as the gas forecast. The quantity of needed new oil production each year was estimated as the difference between the state-level production forecast and the quantity of oil produced from existing wells.

Unlike the gas forecast, it is assumed that new oil production within WNF will come from oil produced from new gas wells and there will be no new oil wells located on WNF. Oil production from existing oil wells show low levels of decline from year to year new drilling and even with high GORs (gas-oil ratios) new gas wells will produce enough new oil to make up for oil production declines. Proposed oil and gas activities are shown in Table 8.

Table 8: Forecast of proposed wells

FORECASTED OIL AND GAS ACTIVITY IN THE WAYNE NATIONAL FOREST 2020-2034										
	2020		2021		2022		2023		2024	
New Wells	Gas	Oil	Gas	Oil	Gas	Oil	Gas	Oil	Gas	Oil
Athens Unit										
Athens	0	0	0	0	0	0	0	0	0	0
Hocking	0	0	0	0	0	0	0	0	0	0
Morgan	0	0	0	0	0	0	0	0	0	0
Perry	0	0	0	0	0	0	0	0	0	0
Vinton	0	0	0	0	0	0	0	0	0	0
¹ Washington	0	0	0	0	0	0	0	0	0	0
Ironton Unit										
Gallia	0	0	0	0	0	0	0	0	0	0
Jackson	0	0	0	0	0	0	0	0	0	0
Lawrence	0	0	0	0	0	0	0	0	0	0
Scioto	0	0	0	0	0	0	0	0	0	0
Marietta Unit										
Monroe	3	0	5	0	5	0	6	0	6	0
Noble	0	0	0	0	0	0	0	0	0	0
¹ Washington	0	0	0	0	0	0	0	0	0	0

Total New WNF Wells drilled	3	5	5	6	6
Total New Well Pads	1	2	2	2	2
Total Potential Initial Surface Disturbance (during construction)	6-35 acres	12-70 acres	12-70 acres	12-70 acres	12-70 acres
Total Potential Longer-Term Surface Disturbance (until wells plugged)	3-10 acres	6-20 acres	6-20 acres	6-20 acres	6-20 acres
Total Well Cost	\$ 28,555,000	\$ 49,417,813	\$ 61,695,668	\$ 64,186,631	\$66,778,166

FORECASTED OIL AND GAS ACTIVITY IN THE WAYNE NATIONAL FOREST 2020-2034										
	2025		2026		2027		2028		2029	
	Gas	Oil	Gas	Oil	Gas	Oil	Gas	Oil	Gas	Oil
Athens Unit										
Athens	0	0	0	0	0	0	0	0	0	0
Hocking	0	0	0	0	0	0	0	0	0	0
Morgan	0	0	0	0	0	0	0	0	0	0
Perry	0	0	0	0	0	0	0	0	0	0
Vinton	0	0	0	0	0	0	0	0	0	0
¹ Washington	0	0	0	0	0	0	0	0	0	0
Ironton Unit										
Gallia	0	0	0	0	0	0	0	0	0	0
Jackson	0	0	0	0	0	0	0	0	0	0
Lawrence	0	0	0	0	0	0	0	0	0	0
Scioto	0	0	0	0	0	0	0	0	0	0
Marietta Unit										
Monroe	6	0	6	0	6	0	6	0	4	0
Noble	0	0	0	0	0	0	0	0	1	0
¹ Washington	0	0	0	0	0	0	0	0	0	0
Total New WNF Wells drilled	6		6		6		6		5	
Total New Well Pads	2		2		2		2		2	
Total Potential Initial Surface Disturbance (during construction)	12-70 acres		12-70 acres		12-70 acres		12-70 acres		18-105 acres	
Total Potential Longer-Term Surface Disturbance (until wells plugged)	6-20 acres		6-20 acres		6-20 acres		6-20 acres		18-30 acres	
Total Well Cost	\$ 69,474,334		\$ 72,279,361		\$ 75,197,640		\$ 78,233,744		\$ 67,827,027	

FORECASTED OIL AND GAS ACTIVITY IN THE WAYNE NATIONAL FOREST 2020-2034										
	2030		2031		2032		2033		2034	
	Gas	Oil	Gas	Oil	Gas	Oil	Gas	Oil	Gas	Oil
Athens Unit										
Athens	0	0	0	0	0	0	0	0	0	0
Hocking	0	0	0	0	0	0	0	0	0	0
Morgan	0	0	0	0	0	0	0	0	0	0
Perry	0	0	0	0	0	0	0	0	0	0
Vinton	0	0	0	0	0	0	0	0	0	0
¹ Washington	0	0	0	0	0	0	0	0	0	0
Ironton Unit										
Gallia	0	0	0	0	0	0	0	0	0	0
Jackson	0	0	0	0	0	0	0	0	0	0
Lawrence	0	0	0	0	0	0	0	0	0	0
Scioto	0	0	0	0	0	0	0	0	0	0
Marietta Unit										
Monroe	6	0	5	0	5	0	5	0	5	0
Noble	0	0	0	0	0	0	0	0	0	0
¹ Washington	0	0	0	0	0	0	0	0	0	0
Total New WNF Wells drilled	6		5		5		5		5	
Total New Well Pads	2		2		2		2		2	
Total Potential Initial Surface Disturbance (during construction)	12-70 acres		12-70 acres		12-70 acres		12-70 acres		12-70 acres	
Total Potential Longer-Term Surface Disturbance (until wells plugged)	6-20 acres		6-20 acres		6-20 acres		6-20 acres		6-20 acres	
Total Well Cost	\$ 84,678,651		\$ 88,097,552		\$ 76,378,742		\$ 79,462,534		\$ 82,670,834	

¹ Washington County occurs in both Athens and Marietta Units. Values for Washington County are reported only in the Marietta Unit.

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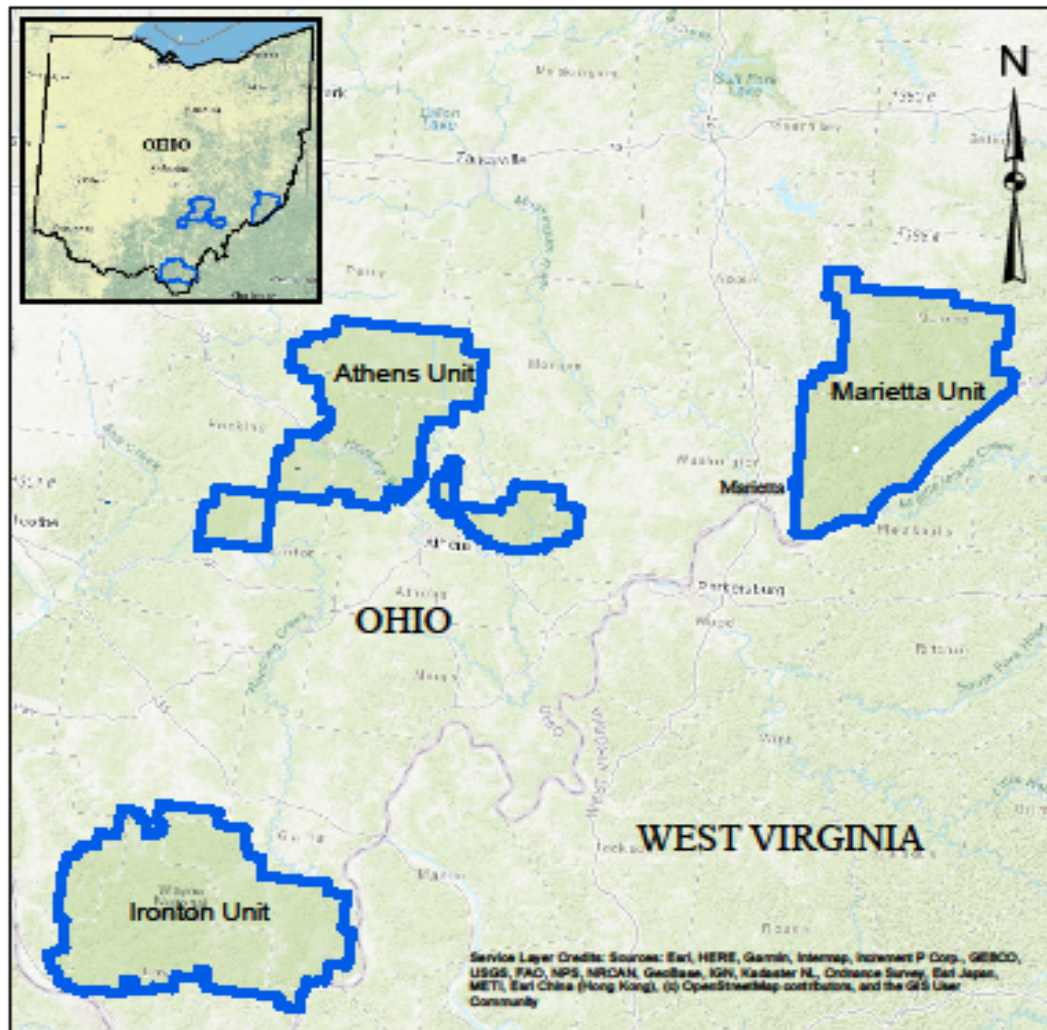
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APPENDIX A

REASONABLY FORESEEABLE DEVELOPMENT SCENERIO FOR OIL AND GAS ACTIVITIES WAYNE NATIONAL FOREST



WNF UNITS

LEGEND

 Project Boundary

0 10 20 40 Miles



Northeastern States District
Bureau of Land Management
626 E. Wisconsin Avenue, Suite 200
Milwaukee, WI 53202

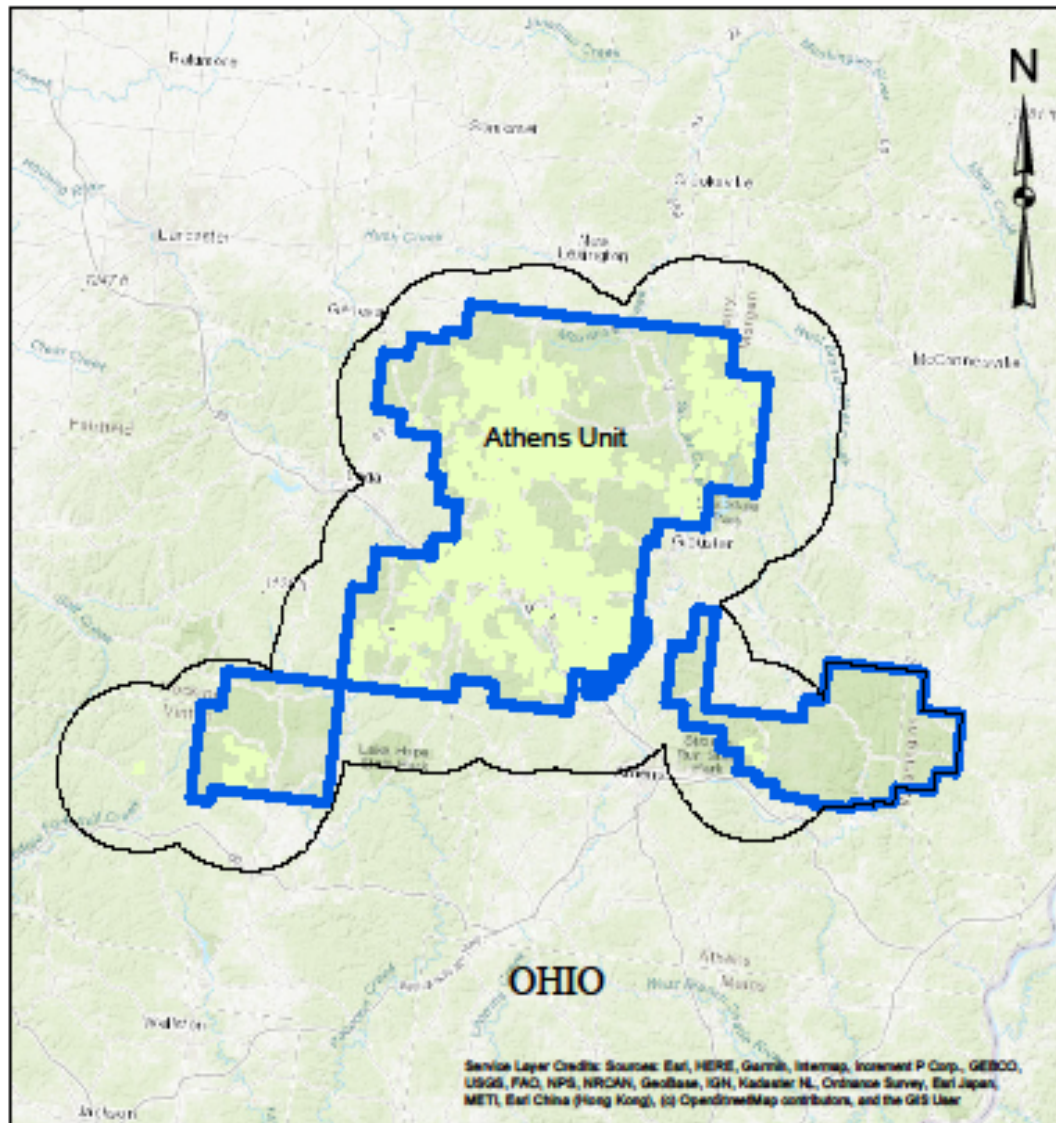
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Author: F Holzel

Date: 5/21/2020

Figure 1

REASONABLY FORESEEABLE DEVELOPMENT SCENERIO FOR OIL AND GAS ACTIVITIES WAYNE NATIONAL FOREST



ATHENS UNIT

LEGEND



Project Boundary



Federal Lands



Four Mile Zone Around
WNF Federal Lands

0 5 10 20 Miles

Northeastern States District
Bureau of Land Management
626 E. Wisconsin Avenue, Suite 200
Milwaukee, WI 53202

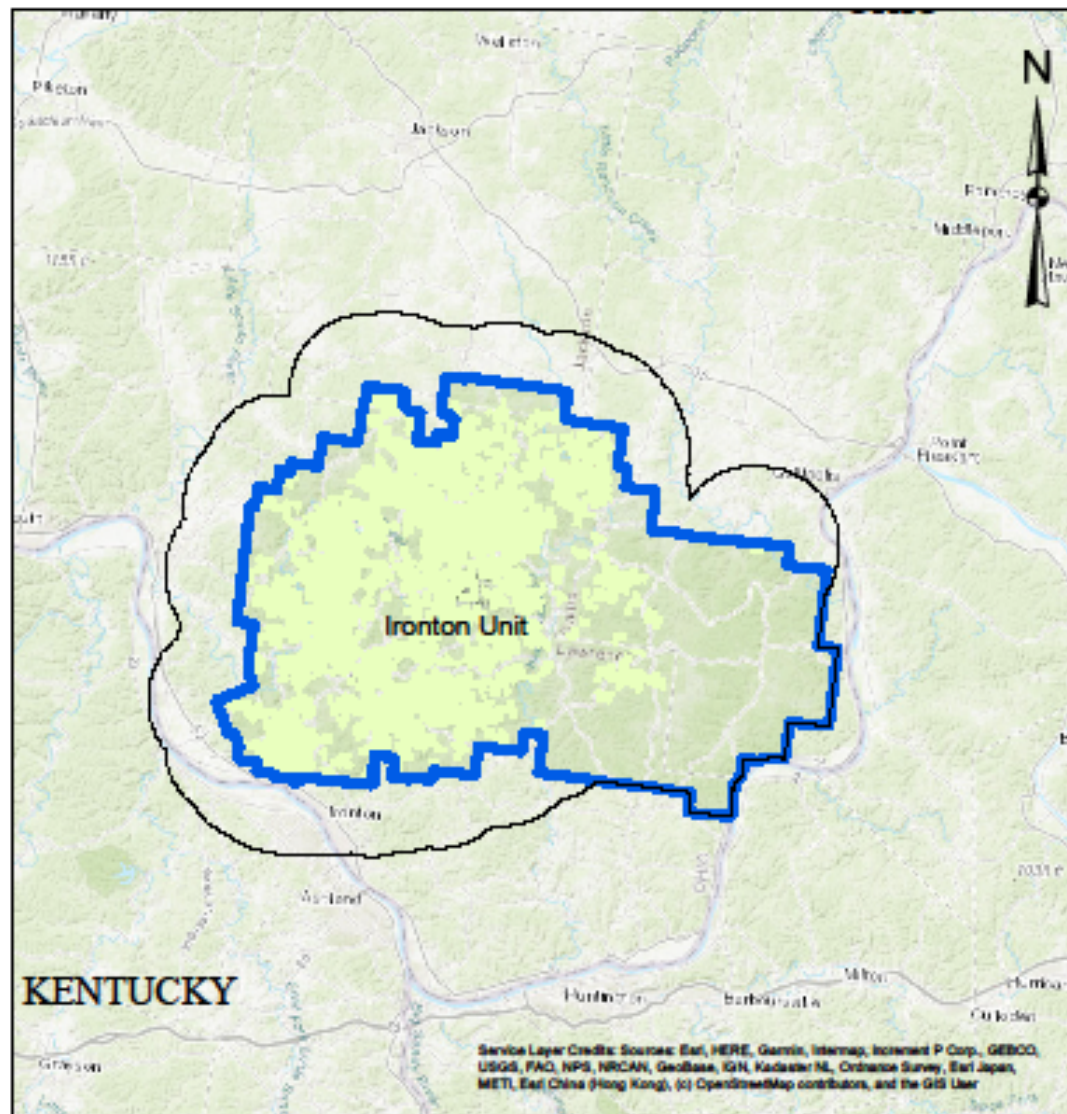
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Author: F Holzel

Date: 5/21/2020

Figure 2

REASONABLY FORESEEABLE DEVELOPMENT SCENERIO FOR OIL AND GAS ACTIVITIES WAYNE NATIONAL FOREST



IRONTON UNIT

LEGEND



Project Boundary



Federal Lands



Four Mile Zone Around
WNF Federal Lands

0 5 10 20 Miles

Northeastern States District
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Milwaukee, WI 53202

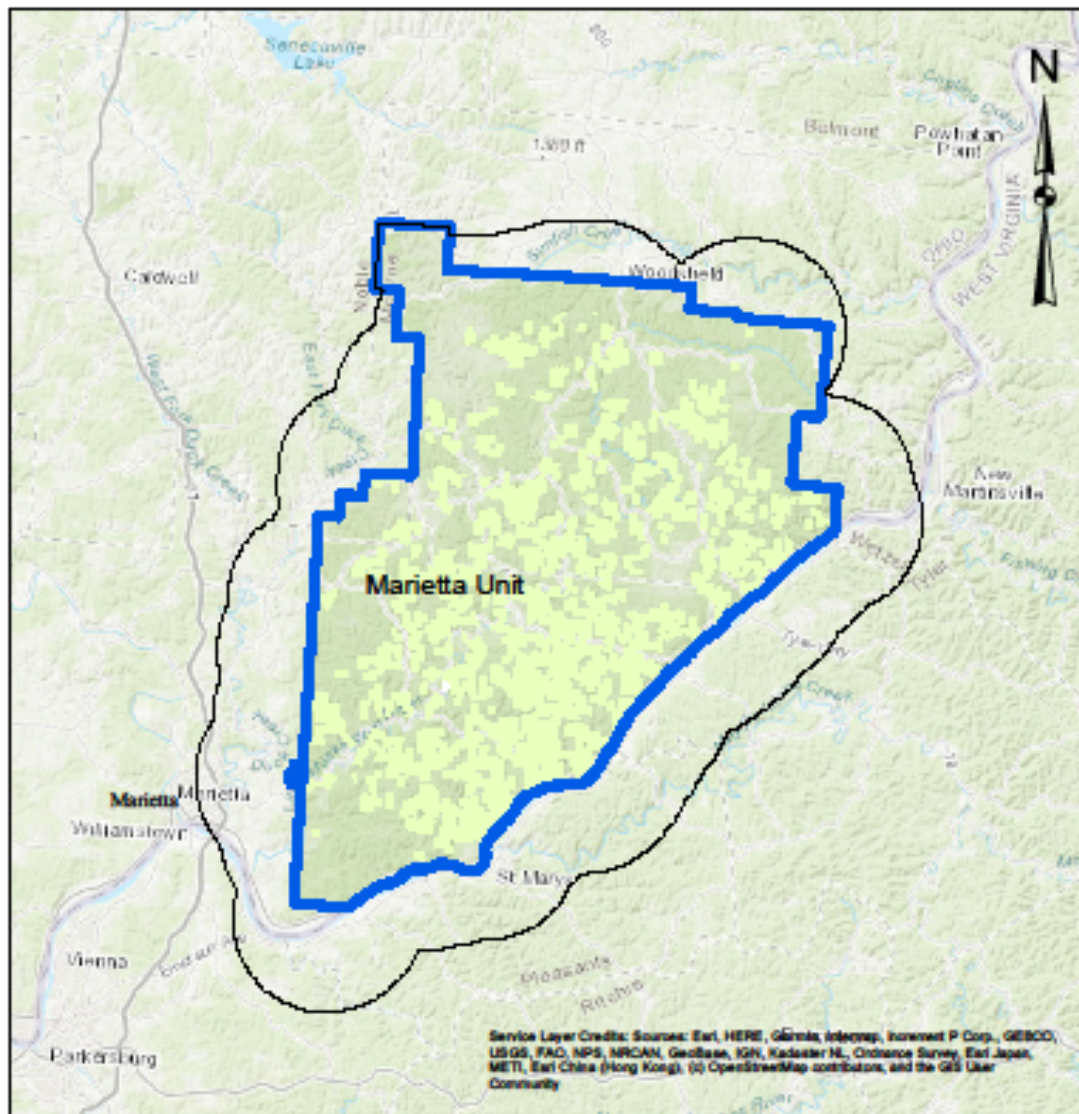
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Author: F Holzel

Date: 5/21/2020

Figure 3

REASONABLY FORESEEABLE DEVELOPMENT SCENERIO FOR OIL AND GAS ACTIVITIES WAYNE NATIONAL FOREST



MARIETTA UNIT

LEGEND



Project Boundary



Federal Lands



Four Mile Zone Around
WNF Federal Lands

0 4.5 9 18 Miles



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Milwaukee, WI 53202

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Date: 5/21/2020

Figure 4

Appendix E – Legal and Regulatory Authorities

APPENDIX E: Legal and Regulatory Authorities

1.1. Legal and Regulatory Authorities

In addressing environmental considerations of the Proposed Action, the BLM is guided by relevant statutes (and their implementing regulations) and Executive Orders that establish standards and provide guidance on environmental and natural resources management and planning. These include, but are not limited to, the following:

- NEPA (1969) and the associated CEQ regulations at 43 CFR Parts 1500–1508
- FLPMA (1976), as amended, and the associated regulations at 43 CFR Part 1600
- Mineral Leasing Act (1920), as amended and supplemented (30 USC 181)
- NHPA (1966), as amended, and the associated regulations at 36 CFR Part 800
- American Indian Religious Freedom Act
- Native American Graves Protection and Repatriation Act (1990)
- Endangered Species Act (ESA) (1973), as amended
- Clean Water Act (CWA) (1972), as amended
- Clean Air Act (CAA) (1970), as amended
- General Conformity requirements established in the CAA (*see* 42 U.S.C. § 7506)
- Federal Onshore Oil and Gas Leasing Reform Act (1987)
- Migratory Bird Treaty Act (1918)
- Resource Conservation and Recovery Act (1976) as amended
- 43 CFR 3170, Onshore Oil and Gas Operations (2023)
- EO 11988, *Floodplain Management* (1977, 42 *Federal Register* [FR] 26951)
- EO 11990, *Protection of Wetlands* (1977; 42 FR 26961)
- EO 13045, *Protection of Children from Environmental Health and Safety Risks* (1997)
- EO 13007, *Indian Sacred Sites* (1996, 61 FR 26771–26772)

In addition to the above statutes, regulations, and executive orders, the following BLM and USFS policies are applicable to oil and gas leasing.

- **Memorandum of Understanding:** Between the BLM and USFS, Concerning Oil and Gas Leasing and Operations (USFS Agreement No. 06-SU-11132428-052; BLM Memorandum of Understanding WO300-2006-07)
- **Oil and Gas Leasing:** Land Use Planning and Lease Parcel Reviews (BLM IM 2023-010)

1.1.1. Procedures and Environmental Protections Required for a Federal Minerals Lessee Applying to Drill on Non-Federal Lands

The BLM’s regulatory jurisdiction applies to federal lands and minerals and is limited in circumstances where private surface lands are used to access federal minerals. Because of this limitation, BLM activities that affect non-federal (or in the case of the WNF, private) lands must be examined to ensure that BLM does not exceed its authority. To guide drilling activities targeting federal minerals from a non-federal surface, the BLM created Permanent Instruction

Memorandum (PIM) 2018-014, *Directional Drilling into Federal Mineral Estate from Well Pads on Non-Federal Locations*. The policies and procedures from PIM 2018-014 are incorporated into this Supplemental EA and are further discussed below.

NEPA's procedural requirements do not expand or extend the BLM's authority beyond that provided in FLPMA and the Mineral Lease Act. Nonetheless, Section 6 in the BLM's standard lease form (BLM 2023) requires minimization of adverse environmental impacts. This standard term's authority is imposed on federal and non-federal surface development during the APD process by requiring completion of necessary inventories and technical studies as well as application of design features, COAs, and BMPs for approval of the application. Further, approval of an APD is a federal action or undertaking subject to the statutory requirements of NEPA, ESA, and NHPA. Thus, site-specific review, even on non-federal surface, will be performed by the BLM to ensure compliance with these federal regulations.

The BLM's process for approving APDs can be found at 43 CFR subparts 3162 and 3171. The BLM does not have the authority to enter non-federal lands without the landowner's consent. If the BLM deems surface access necessary to complete assessments and analyses required under NEPA, ESA, or NHPA, the BLM will ask the operator to provide access pursuant to its lease or other agreement with the landowner. Where operators hire consultants to complete preapproval surveys, the operator will be expected to facilitate access to the non-federal lands for the consultants. The inability to access the surface for resource surveys is not, in and of itself, sufficient reason to deny an APD, but the BLM may deny the APD if the inability to access the surface prevents the BLM from meeting its obligations under NEPA, ESA, or NHPA (BLM 2018).

BLM's inspection and enforcement authority on non-federal land includes compliance with any applicant- or operator-committed measures established by the operator and BLM in the approved APD and relied on by the BLM in completing its reviews under NEPA, ESA, and/or NHPA. If an operator fails to carry out the measures under the approved APD, the BLM may, in its discretion, take enforcement action against the operator for failure to comply with the terms of the APD (43 CFR 3163.1 and 3163.2).

Refer to PIM 2018-014 and Appendix C of the 2016 EA (BLM 2016) for additional information about federal and State regulatory requirements associated with permitting of oil and gas operations on non-federal land and Section 1.1.2, *State of Ohio Regulatory Setting* below, for additional information about Ohio's regulatory program.

In accordance with the Gold Book (BLM 2007), when development is proposed on private land to access federal minerals, operators must provide a reclamation plan to the BLM when filing the Application for Permit to Drill, to change an existing plan, or prior to abandonment if a plan is not on file with the BLM. Operators must complete reclamation on private surface to the satisfaction of the BLM in consultation with the surface owner.

If, as expected for the reasonably foreseeable development associated with the Proposed Action, development accessing federal minerals occurs on privately owned surface, then federal and State regulations exist to address potential concerns regarding contamination or spills. For example, the Onshore Oil and Gas Orders that were codified into the Code of federal Regulations (43 CFR 3170, Onshore Oil and Gas Production) provide requirements and standards for safe

drilling and well abandonment, as well as the methods and approvals necessary to dispose of produced waters associated with oil and gas operations. The Onshore Orders may be found at 43 CFR subparts 3162 and 3171.

1.1.2. State of Ohio Regulatory Setting

Any operator who seeks to drill and operate an oil and gas well in Ohio would be required to obtain a permit from the State of Ohio. The BLM's proposed action that is analyzed in the EA and includes solely activities in Ohio. The possibility that noise from drilling could disturb a bat hibernaculum up to one-half mile from a drill site, in West Virginia, does not create a nexus with the State of West Virginia, because endangered bat conservation is a federal regulatory responsibility. The State of West Virginia exercises no regulatory authority over oil and gas activities in the Wayne National Forest or in Ohio.

The State of Ohio has a variety of regulations and standards in place to regulate, permit, and oversee oil and gas development in the state, including development of surface well pads and associated infrastructure on private land. For drilling federal minerals from private land, Chapter 1509 of the Ohio Revised Code (ORC) and Chapter 1501:9 of the Ohio Administrative Code (OAC) regulate the drilling, operation, maintenance, and abandonment of oil and gas wells in the State, including the use of hydraulic fracturing. In September 2011, the State of Ohio created the Division of Oil and Gas Resources Management (DOGRM) within the Ohio Department of Natural Resources (ODNR). In accordance with the ORC, DOGRM has sole and exclusive authority to regulate the permitting, location, and spacing of oil and gas wells and production operations within the state, excepting only those activities regulated under federal laws for which oversight has been delegated to the environmental protection agency and activities regulated under sections 6111.02 to 6111.028 of the Ohio Revised Code (O.R.C § 1509.02). Section 1509.23 directs the DOGRM to regulate oil and gas wells in the State of Ohio for the protection of public health and safety or to prevent damage to natural resources.

Prior to developing a pad for horizontal well construction, an operator must submit a permit application to the ODNR-DOGRM (O.A.C § 1501:9-2-02). Under O.A.C § 1501:9-2, well sites must be designed and constructed in a manner that supports the safe drilling and production operations of one or more horizontal wells, and in a manner that protects public health and safety and minimizes damage to natural resources, including conservation of topsoil where present, by managing stormwater, protecting surface water, and minimizing soil erosion. An application submitted to ODNR for construction of a horizontal well site must be accompanied by a well site plan that includes the following components intended to protect environmental resources (O.A.C § 1501:9-2):

- Classification of soil types for the area within 100 feet of and within the proposed well site boundary.
- The location of all springs, wetlands, streams, lakes, rivers, ponds, creeks, and water wells, which may be identified using reasonably available public resources and a field review, within 100 feet of and within the proposed well site boundary.
- All flood hazard areas delineated on the “National Flood Insurance Rate Map” within 100 feet of and within the proposed well site boundary.

- Roads within the proposed well site boundary, including emergency access routes, signage to safely manage traffic flow on the site, the entrance to the well site, and any pull-off areas that may be used to manage excess traffic.
- All areas within 100 feet of and within the proposed well site boundary that are within the 5-year time of travel associated with a public drinking water supply, as delineated or endorsed under the “Source Water Assessment and Protection Program.”
- All areas within 100 feet of and within the proposed well site boundary that are within the emergency management zone of a public water system intake.
- A sediment and erosion control plan that describes procedures to minimize the discharge of construction related sediment to any area outside of the proposed well site, including soil stabilization measures, vegetation, mulch, and other means of controlling erosion, that will be used at the proposed well site. Operators are not permitted to remove erosion-control features until the ODNR certifies that the disturbed site is at least 70 percent revegetated (ODNR 2024d). The regulation provides basic reclamation standards that must be met.
- A dust control plan that is intended to control the generation and deposition of dust.
- A geotechnical report that identifies the factor of safety for bearing capacity and is intended to prevent failures of dams, berms, and other embankment features.
- A stormwater hydraulic report that describes stormwater and hydraulic control structures that must be designed to and be capable of managing a 10-year storm event.

Following submittal of an application with the required site plan components, the ODNR DOGRM conducts a site review meeting at the proposed well site. At the site review meeting, the DOGRM may conduct a physical review of the proposed well site, discuss the application, identify items that are necessary to ensure compliance with this rule, identify site-specific terms and conditions that may be attached to a permit that approves an application to construct a well site, and identify site-specific terms and conditions that may be attached to a permit to drill a horizontal well, such as Best Management Practices identified in the ODNR’s Best Management Practices for Oil and Gas Well Site Construction (ODNR 2013). If the DOGRM identifies items that are necessary to ensure the well site design and application complies with Ohio law (including protection of public health and natural resources), the DOGRM will notify the applicant of the deficient items and the applicant may submit a revised application to address the deficiencies. At any time, the ODNR may require the applicant or person to submit additional information pertaining to the design or construction of the proposed well site that the DOGRM determines is necessary for the protection of public health or safety or to prevent substantial damage to natural resources or is necessary to ensure compliance with this rule (O.A.C § 1501:9-2).

Sect 1501:9-1-04 of the OAC provides the State of Ohio standards and requirements for the location and spacing of well sites and well bores including a variety of requirements for the spacing and location of wells in relation to other existing wells and wellbores, which is intended to assess proposed well sites/well bores in relation to prevent adverse communication or among well bores.

identification of potential O&G wells in the area of a proposed HVHF operation to try to identify those that may be at risk of a frac hit and that would necessitate additional measures to reduce this risk.

Chapter 1501:9-1-08 of the OAC directs operators to apply a variety of standards for the drilling and completion of oil and gas wells to prevent inadvertent leaks, failures, and impacts on natural resources including use of drilling fluids, well-casing standards, wellbore diameters, cement standards, surface-casing standards, annular pressure-control standards, and well-construction standards.

The same regulation also provides standards for the use of drilling fluids and requires that all intervals drilled prior to reaching the underground source of drinking water protective depth shall be drilled with air, freshwater, a freshwater-based drilling fluid, or a combination of the above. Only additives suitable for drilling through potable water supplies may be used while drilling these intervals. This standard is intended to protect drinking water and other groundwater sources that may have a surface water connection.

Various sections of the ORC and OAC require operators to comply with the ODNR's *Best Management Practices for Oil and Gas Well Site Construction* (ODNR 2013). The best management practices are intended to reduce impacts on natural resources from surface disturbance, vegetation removal, sedimentation and erosion, waste disposal, construction of well sites and access roads, and other activities associated with well construction and operation. While the best management practices are generally recommendations for operators, the ODNR places considerable importance on the inclusion of the best management practices in applicable packages when permitting well pads in accordance with well permitting requirements under Chapter 1509 of the ORC and Chapter 1501:9 of the OAC.

If other federal laws are implicated, the U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers (USACE), and U.S. Environmental Protection Agency (USEPA) may be required to approve or consult regarding oil and gas operations. Refer to Appendix C of the 2016 EA (BLM 2016) for additional information about regulatory requirements and permitting of oil and gas operations on non-federal surface. Oil and gas developers are subject to the ESA and required by law to follow protective measures or development alternatives should any endangered species be known to inhabit or be found inhabiting a potential development site (16 U.S.C 1531-44) and all operators on private land are subject to Section 9 of the ESA that makes it illegal to harass, hunt, shoot, capture, trap, kill, collect, wound, or harm (i.e., "take") any ESA-listed species or to pursue/attempt any of these activities. In addition, the ODNR has indicated that oil and gas operators regularly take voluntary steps to avoid violating the ESA including regularly conducting bat surveys and restricting their tree-cutting to winter (ODNR 2024d).

ORC Chapter 1509 defines *well stimulation* as "the process of enhancing well productivity, including hydraulic fracturing operations." Requirements for well stimulation are outlined in ORC Section 1509.19, which states that:

an owner who elects to stimulate a well shall stimulate the well in a manner that will not endanger underground sources of drinking water. Not later than twenty-four hours before commencing the stimulation of a well, the owner or the owner's authorized representative shall notify an oil and gas resources inspector. If during the stimulation of a well damage to the production casing or cement occurs and results in the circulation of fluids from the annulus of the surface production casing, the owner shall immediately terminate the stimulation of the well and notify the chief of the division of oil and gas resources management. If the chief determines that the casing and the cement may be remediated in a manner that isolates the oil and gas bearing zones of the well, the chief may authorize the completion of the stimulation of the well. If the chief determines that the

stimulation of a well resulted in irreparable damage to the well, the chief shall order that the well be plugged and abandoned within thirty days of the issuance of the order. For purposes of determining the integrity of the remediation of the casing or cement of a well that was damaged during the stimulation of the well, the chief may require the owner of the well to submit cement evaluation logs, temperature surveys, pressure tests, or a combination of such logs, surveys, and tests.

ORC Section 1509.33 sets forth violations subject to civil penalties.

Ohio law also regulates water quality and quantity. Any person or company that intends to divert more than 100,000 gallons per day of surface water must secure a permit from the Ohio Division of Water Resources (ORC §1521.22). The application must state the quantity of water to be diverted, the purpose of the diversion, the life of the project for which the water is to be diverted, and such other information as the chief may require by rule. The Division of Water Resources may deny a permit if any of the following apply:

- During the life of the project for which the water is to be diverted, some or all of the water to be diverted will be needed for use within the Ohio River watershed.
- The proposed diversion would endanger the public health, safety, or welfare.
- The applicant has not demonstrated that the proposed diversion is a reasonable and beneficial use and is necessary to serve the applicant's present and future needs.
- The applicant has not demonstrated that reasonable efforts have been made to develop and conserve water resources in the importing basin and that further development of those resources would engender overriding, adverse economic, social, or environmental impacts.
- The proposed diversion is inconsistent with regional or State water resources plans.
- The proposed diversion, alone or in combination with other diversions and water losses, will have a significant adverse impact on in-stream uses or on economic or ecological aspects of water levels.

The State of Ohio put rules into effect in 2015 for horizontal well-drilling, in response to the growing prevalence of large, multi-well pads. In order to construct a pad for horizontal wells, an operator must obtain a permit from the ODNR. The application must include, among other things, scaled engineering drawings and a sediment and erosion control plan. The typical area of disturbance for a pad in eastern and southeastern Ohio, where horizontal drilling is concentrated, is within the range described in the Supplemental EA. During and after construction, all erosion and sedimentation control elements must remain in place until the ODNR certifies that the disturbed area is at least 70 percent vegetated (ODNR 2024c; OAC, Rule 1501:9-2-02 [<https://codes.ohio.gov/ohio-administrative-code/rule-1501:9-2-02>])).

In the state of Ohio, a person or operator that proposes to engage in an activity that involves the filling of an isolated wetland shall apply to the director for coverage under a general State isolated wetland permit or shall apply for an individual State isolated wetland permit, as applicable, in accordance with Sections §6111.02 to §6111.07 of the ORC. State of Ohio wetland permits are subject to a variety of review levels based on the proposed acreage of wetland fill. State of Review of wetland permits requires the submission of an acceptable wetland delineation, wetland categorization, and a mitigation proposal for the impact on the wetland (O.R.C §6111.022). Mitigation for proposed filling of wetlands may include onsite or offsite mitigation, mitigation within the same watershed, mitigation at a wetland bank, in-lieu fee mitigation, or

mitigation in a watershed that is adjacent to the watershed that is affected if there is a significant ecological reason that the mitigation location should not be limited to the watershed in which the wetland fill is located (O.R.C Section §6111.022, §6111.023, §6111.024). The level of mitigation depends on the acreage of wetlands that would be filled, subject to director approval.

The ODNR also protects Ohio's groundwater resources by regulating the disposal of brine and other wastes produced from the drilling, stimulation, and production of oil and natural gas in Ohio (Chapter 1501:9-3 of the OAC). Within the state, approximately 98 percent of all brine is disposed of by underground injection into brine-bearing or depleted oil and gas formations deep below the surface (ODNR 2024a, 2024b). The other 2 percent is spread on roads for dust and ice control and used with local government approval. There are seven Class II brine injection wells within the Marietta Unit of the WNF: five in Washington County, one in Monroe County, and one in Noble County (ODNR 2024b). In accordance with O.A.C 1501:9-3-07(G), Class II disposal well owners must file Quarterly Reports as well as Annual Reports documenting the total volume of brine or other waste substances received, the maximum injection pressure reached, the average daily injection pressure, the volume and delivery date for each shipment of brine or other waste substances, and proof of the lawful disposal of waste.

When a well owner fails to meet requirements established by law, the Division of Oil and Gas Resources Management has a variety of enforcement options to gain compliance, as described in O.R.C 1509.04. The Division generally maintains a standard operating procedure of escalating enforcement measures from informal to formal, depending upon the nature of the violation. When informal measures are unsuccessful or a violation endangers public health and safety or the owner demonstrates flagrant disregard for the law, more formal enforcement measures are used. The Division chief has the authority to issue orders or file civil or criminal enforcement actions, if necessary, to correct a violation.

Enforcement regulations found in O.R.C 1509.04 are as follows:

(A) The chief of the division of oil and gas resources management, or the chief's authorized representatives, shall enforce this chapter and the rules, terms and conditions of permits and registration certificates, and orders adopted or issued pursuant thereto, except that any peace officer, as defined in section 2935.01 of the Revised Code, may arrest for violations of this chapter involving transportation of brine by vehicle. The enforcement authority of the chief includes the authority to issue compliance notices and to enter into compliance agreements.

(B)(1) The chief or the chief's authorized representative may issue an administrative order to a person that is subject to this chapter or rules adopted under it for a violation of this chapter or rules adopted under it, terms and conditions of a permit issued under it, a registration certificate that is required under this chapter, or orders issued under this chapter.

(2)(a) If a person who is required to submit a report, test result, fee, or document by this chapter or rules adopted under it submits a request for an extension of time to submit the report, test result, fee, or document to the chief prior to the date on which the report, test result, fee, or document is due, the chief may grant an extension of not more than sixty additional days from the original date on which the report, test result, fee, or document is due.

(2)(b) If a person who is required to submit a report, test result, fee, or document by this chapter or rules adopted under it fails to submit the report, test result, fee, or document before or on the date on which it is due and the chief has not granted an extension of time under division (B)(2)(a) of this section, the chief shall make reasonable attempts to notify the person of the failure to submit the report, test result, fee, or document. If a person who receives such a notification fails to submit the report, test result, fee, or document on or before thirty days after the date on which the chief so notified the person, the chief may issue an order under division (B)(3) of this section.

(B)(3) The chief may issue an order finding that a person has committed a material and substantial violation.

(C) The chief, by order, immediately may suspend drilling, operating, or plugging activities that are related to a material and substantial violation and suspend and revoke an unused permit after finding either of the following:

(1) A person has failed to comply with an order issued under division (B)(3) of this section that is final and nonappealable.

(2) A person that has committed a material and substantial violation is causing, engaging in, or maintaining a condition or activity that the chief determines presents an imminent danger to the health or safety of the public or that results in or is likely to result in immediate substantial damage to the natural resources of this state.

(D)(1) The chief may issue an order under division (C) of this section without prior notification if reasonable attempts to notify the person have failed or if the person is currently in material breach of a prior order, but in such an event notification shall be given as soon thereafter as practical.

(2) Not later than five days after the issuance of an order under division (C) of this section, the chief shall provide the person an opportunity to be heard and to present evidence that one of the following applies:

(a) The condition or activity does not present an imminent danger to the public health or safety or is not likely to result in immediate substantial damage to natural resources.

(b) Required records, reports, or logs have been submitted.

(3) If the chief, after considering evidence presented by the person under division (D)(2)(a) of this section, determines that the activities do not present such a threat or that the required records, reports, or logs have been submitted under division (D)(2)(b) of this section, the chief shall revoke the order. The person may appeal an order to the court of common pleas of the county in which the activity that is the subject of the order is located.

(E) The chief may issue a bond forfeiture order pursuant to section 1509.071 of the Revised Code for failure to comply with a final nonappealable order issued or compliance agreement entered into under this section.

(F) The chief may notify drilling contractors, transporters, service companies, or other similar entities of the compliance status of a person that is subject to this chapter or rules adopted under it.

If the person fails to comply with a prior enforcement action of the chief, the chief may issue a suspension order without prior notification, but in such an event the chief shall give notice as soon thereafter as practical. Not later than five calendar days after the issuance of an order, the chief shall provide the person an opportunity to be heard and to present evidence that required records, reports, or logs have been submitted. If the chief, after considering the evidence presented by the person, determines that the requirements have been satisfied, the chief shall revoke the suspension order. The person may appeal a suspension order to the court of common pleas of the county in which the activity that is the subject of the suspension order is located.

(G) The prosecuting attorney of the county or the attorney general, upon the request of the chief, may apply to the court of common pleas in the county in which any of the provisions of this chapter or any rules, terms or conditions of a permit or registration certificate, or orders adopted or issued pursuant to this chapter are being violated for a temporary restraining order, preliminary injunction, or permanent injunction restraining any person from such violation.

Appendix F –Stipulations, Notifications, Guidelines, and Standards

APPENDIX F:
Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
GFW-AIR-1	Coordinate management activities with air quality regulatory authorities and with research activities on the impact of air pollution on Forest resources.	2006 Forest Plan, p. 45
GFW-AIR-2	Coordinate with air quality regulatory authorities and with research activities on preventative practices to control any significant air pollution emissions resulting from National Forest management activities.	2006 Forest Plan, p. 45
GFW-AIR-3	Conduct management activities (including permitted activities) in a manner that does not contribute significantly to violations of National Ambient Air Quality Standards or violations of applicable provisions in the State Implementation Plan.	2006 Forest Plan, p. 45
GFW-AIR-4	The Forest Supervisor will advise the Regional Forester on the potential effects of proposals by the State of Ohio to modify air quality standards or attainment areas and the identification of present and potential impairment of Forest resources attributable to air pollution.	2006 Forest Plan, p. 45
Notification #1	The Forest Service is responsible for ensuring the area to be disturbed is examined for cultural resources prior to allowing surface disturbing activities on lands covered by this lease. Important cultural resource values may be present on portions of a lease. Surface-disturbing activities must avoid these areas unless the authorized officer agrees to the mitigation measures. The lessee/operators may, at their discretion and cost, conduct the examination on the lands to be disturbed. This examination must be done by or under the supervision of a qualified resource specialist approved by the Forest Service. An acceptable report must be provided to the Forest Service identifying the anticipated effects of the Proposed Action on cultural resource values. If items of substantial archaeological or paleontological values are discovered during operations, or a known deposit of such items is disturbed, the lessee (or operator) will cease work in the affected area. The lessee (or operator) will then notify the Forest Service and will not resume excavation until the Forest Supervisor gives written approval.	2006 Forest Plan, p. 230
Stipulation #7	No surface occupancy (NSO) within archaeological or historical sites of known significance (see lease map). At the time of any new proposed lease developments, a Forest Service archeologist shall determine the need for any setbacks or restrictions for the protection of objects of historic or scientific interest.	2006 Forest Plan, p. 234

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
Notification #2	Any activities proposed in, or likely to affect a floodplain will be subject to: • Analysis and identification of alternate sites • Public notification and comment period • Provisions of any other Federal, state, or local laws and regulations as required under presidential Executive Order 11988, Protection of Floodplains	2006 Forest Plan, p. 231
Stipulation #16	Oil and gas activities may be allowed within that portion of a floodplain outside riparian areas. Mineral activities will be evaluated on a case-by case basis, and appropriate mitigation measures will be applied. The leaseholder and Forest Service inspector shall work together to identify locations for roads, pipelines, well pads and production facilities	2006 Forest Plan, , p. 236
Notification #4	Operators are required to comply with all public laws and Federal regulations that apply to National Forest System lands and the WNF Land and Resource Management Plan.	2006 Forest Plan, p. 231
SFW-MIN-1	Prevent or eliminate occupancy that is not reasonably incident to, or required for, legitimate mineral operations.	2006 Forest Plan, p. 46
SFW-MIN-11	Within management areas where surface occupancy is generally permitted, apply the Controlled Surface Use stipulation for new Federal leases where the following conditions occur: • Riparian areas and wetlands • Managed wildlife openings • Developed recreation sites (located outside the Developed Recreation Management Area) • Areas of land with a Scenic Integrity Objective of <i>High</i> or <i>Moderate</i> • Known locations of federally listed species • Known locations of Regional Forester sensitive species • Portions of floodplains outside riparian areas • Slopes between 35 and 55 percent	2006 Forest Plan, p. 47
SFW-MIN-12	Consider approval of plans of operation based on applicable regulations and analysis of: • Surface/subsurface resources • Any restrictions and mitigations determined by an environmental analysis • Road construction standards • Standard BLM lease stipulations • Appropriate lease-specific oil and gas notifications and stipulations	2006 Forest Plan, pp. 47-48

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
SFW-MIN-9	Apply the NSO stipulation to new Federal leases in the following Management Areas: • Future Old Forest • Developed Recreation • Timbre Ridge Lake • Special Areas • Research Natural Areas • Candidate Areas	2006 Forest Plan, p. 47
Stipulation #2	No surface occupancy within designated areas of the lease (see lease map) for the protection of natural processes or research, historical, or educational values. On NFS lands in Research Natural Area Management Areas, the Forest Service will issue leases for Federal oil and gas only with a No Surface Occupancy (NSO) stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to the Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.	2006 Forest Plan, p. 231
Stipulation #3	No surface occupancy within designated areas of the lease (see lease map) to protect natural processes or research, historical or educational values. On National Forest System lands in Special Interest Management Areas, the Forest Service will issue Federal oil and gas leases only with an NSO stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.	2006 Forest Plan, p. 231

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
Stipulation #4	No surface occupancy within designated areas of the lease (see lease map) for the protection of natural processes or research, historical or educational values. On National Forest System lands in Candidate Research Natural Management Areas, the USDA Forest Service will only issue Federal oil and gas leases that have an NSO stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.	2006 Forest Plan, p. 233
Stipulation #6	No surface occupancy within designated areas of the lease (see lease map) for the protection of the Timbre Ridge Lake Management Area. On NFS lands in the Timbre Ridge Lake Management Area, the Forest Service will issue Federal oil and gas leases only with an NSO stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.	2006 Forest Plan, p. 234
SFW-MIN-2	Require that all proposed surface-disturbing mineral activities have an approved operation and reclamation plan before the activity begins.	2006 Forest Plan, p. 46
SFW-MIN-5	The operator, as directed by Ohio EPA, is responsible for remedial action for cleanup of soil and water resources and timely repair of damaged wells, pipelines, or tanks.	2006 Forest Plan, p. 46
SFW-MIN-8	Require owners and lessees to plug oil and gas wells when production ceases. Work with cooperating agencies to plug abandoned non-producing wells without identified owners.	2006 Forest Plan, p. 47
SFW-SAFE-17	Post warnings of dangerous conditions and threats of immediate concern for the safety of Forest employees and the public	2006 Forest Plan, p. 78
SFW-SAFE-18	Issue closure orders to protect the public when clear and present dangers cannot be mitigated in a timely manner.	2006 Forest Plan, p. 78
SFW-SAFE-19	Prohibit disposal of non-Federal waste water on Federal lands.	2006 Forest Plan, p. 78

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
Stipulation #5	No surface occupancy within designated areas of the lease (see lease map) to protect special management units such as developed recreation areas, trails and associated trailheads, water supply facilities, administrative site, etc. On NFS lands within administrative sites, developed recreation areas, trails and associated trailheads, the Forest Service will issue leases for Federal oil and gas only with an NSO stipulation. The NSO designation will include a buffer zone, which will be determined in accordance with the Implementation Guide for Scenery Management. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to the Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.	2006 Forest Plan, p. 233
SFW-MIN-10	Within management areas where surface occupancy is generally permitted, apply the No Surface Occupancy stipulation for new Federal leases where the following conditions occur: • Slopes in excess of 55 percent and areas prone to mass soil movement • Areas within ¼ mile of Indiana bat hibernacula • Cultural resource sites of known significance.	2006 Forest Plan, p. 47
GFW-SM-54	Native soil should be removed and stockpiled before ground disturbance.	2006 Forest Plan, p. 61
GFW-WSH-10	Modify resource management practices according to soil characteristics and slope to protect soil productivity and minimize erosion and sedimentation. Refer to soil map unit descriptions and appropriate interpretive tables in the Wayne National Forest Soils Inventory (based on the USDA County Soil Surveys).	2006 Forest Plan, p. 15
GFW-WSH-11	Plan and implement erosion control measures for management activities that create bare mineral soil conditions. Stabilize disturbed areas based on direction in SFW-WSH-6, and GFW-WSH 7 and GFW-WSH-8.	2006 Forest Plan, p. 15

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
GFW-WSH-8	When stabilizing disturbed areas, give priority to stabilizing areas that are discharging soil into watercourses, especially in municipal and recreational impoundment watersheds. Techniques may include: • Placing straw bales in ditch lines and small drainages • Leaving berms in road embankments during construction • Constructing diversion ditches • Hand placing slash and unmerchantable logs across slopes and trails • Installing check dams and ditch lines • Excavating sediment detention basins	2006 Forest Plan, p. 15
Notification #5	The area of this lease contains a considerable amount of land with steep slopes and/or unstable soils. Accordingly, the opportunity to locate access roads, drilling sites, pipelines, storage tanks and other improvements may be extremely limited.	2006 Forest Plan, p. 232
Stipulation #17	Oil and gas activities will be allowed on slopes from 35 to 55 percent on a case-by-case basis with appropriate mitigation. New road construction and maintenance shall be planned to disturb the least amount of ground. The leaseholder and Forest Service inspector shall work together to identify locations for roads, pipelines, well pads, and production facilities.	2006 Forest Plan, p. 236
Stipulation #8	No surface occupancy on slopes in excess of 55 percent (see lease map) to protect soil and water from erosion and mass failure hazards because of steep slopes.	2006 Forest Plan, p. 234
Stipulation #9	No surface occupancy is allowed for the exploration and development of energy minerals on areas with mass soil instability, as defined by the USDA County Soil Surveys (see lease map).	2006 Forest Plan, p. 234
GFW-TES-22	Limit ground compaction to the minimum area possible during major earth disturbing activities (including, but not limited to new road and trail construction, mineral resource exploration and development, or new facilities) that occur in suitable ABB habitat within 10 air miles of known occupied ABB habitat.	2006 Forest Plan, p. 29
GFW-TES-24	In occupied ABB habitat, design new roads with the minimum safe width necessary for planned use of the road.	2006 Forest Plan, p. 29
GFW-TES-25	Within 10 air miles of known occupied ABB habitat, keep ground disturbance to a minimum during the reconstruction and maintenance of existing roads. Limit width of road, ditches, and surface materials to the minimum necessary for the planned use.	2006 Forest Plan, p. 29

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
GFW-TES-3	Establish a one quarter-mile forested buffer around all mine openings that are known Indiana bat fall swarming sites, but where actual Indiana bat hibernation has not been established. Reduce or eliminate human disturbances within the buffer. Implement vegetation management only to maintain or improve Indiana bat roosting, swarming, or foraging habitat.	2006 Forest Plan, p. 27
GFW-TES-47	Conduct surveys for running buffalo clover in suitable habitat prior to implementing ground or canopy disturbing activities.	2006 Forest Plan, p. 31
SFW-TES-10	During the non-hibernation season (April 15–September 15), do not cut, unless they are a safety hazard: • Trees of any species 6 inches dbh or more that are hollow, have major splits, or have broken tops that provide maternity habitat. • Snags 6 inches dbh or more that have Indiana bat roost tree characteristics. Consider any tree with less than 10 percent live canopy to be a snag. When removal of hazard trees is necessary in a recreation area during the non-hibernation season (e.g., developed recreation sites, access roads, trails), conduct emergence surveys at the identified hazard trees that possess the characteristics identified above, and at any hazard trees that possess large areas of loose bark providing maternity habitat.	2006 Forest Plan, p. 28
SFW-TES-2	Establish a one-quarter mile buffer around all known hibernacula. Within this one quarter mile buffer: • Prohibit new trail and road construction. • Do not conduct prescribed burning during the fall swarming period (generally mid-August to mid-October) or during the hibernation period (September 15 through April 15). • Do not permit surface occupancy for exploration or development of federally owned minerals. • Implement vegetation management only to maintain or improve Indiana bat roosting, swarming, or foraging habitat.	2006 Forest Plan, p. 27
SFW-TES-32	Protect and improve occupied Regional Forester sensitive species habitat.	2006 Forest Plan, p. 29

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
SFW-TES-33	Do not conduct vegetation management within a 50-foot radius of rock shelters, or within 50 feet of the base and 50 feet of the top (measured horizontally) of naturally occurring, large rock faces or outcrops, unless designed to enhance the site characteristics for a federally listed species or a known population of Regional Forester sensitive species. Large rock faces or outcrops are defined as rock outcrop areas 15 feet or more in height and 100 feet or more in length. These rock outcrop habitats are not limited to solid “cliffs” and may include discontinuous rock faces, if the outcrop area is predominantly rock faces.	2006 Forest Plan, pp. 29-30
SFW-TES-34	Avoid vegetation management within 50 feet of the base and 50 feet of the top of smaller rock faces (approximately 15 feet or more in height and less than 100 feet in length).	2006 Forest Plan, p. 30
SFW-FH-8	Forest contracts and permits shall include appropriate clauses for the prevention and/or treatment of nonnative invasive species.	2006 Forest Plan, p. 37
SFW-FH-11	Ensure that seed mixes or cultivated plants used for restoring disturbed areas or landscaping on NFS land do not include any species on the Forest’s NNIS list or NNIS species identified by the State of Ohio or its neighboring states (i.e., Kentucky, Pennsylvania, Michigan, Indiana, and West Virginia).	2006 Forest Plan, p. 37
GFW-FH-11	When restoring disturbed areas, prevent nonnative invasive species plant invasion or spread by using the following measures: • Use weed-free mulch and forage when available. • Use natural re-vegetation of native species for small-sized disturbances (e.g., utility rights-of-way, fire lines) where the threat of erosion and sedimentation is limited. When seeding is necessary to accomplish re-vegetation, prioritize the composition of the seed mix as follows: • Native species with local genotypes (locally adapted) • Native species with non-local genotypes (not locally adapted) • Desirable nonnative species that are non-aggressive and non-persistent (annuals) • Encourage use of locally grown/adapted native plant materials	2006 Forest Plan, p. 37
GFW-FH-12	Consider nonnative invasive species situations on adjacent lands when planning and conducting management activities.	2006 Forest Plan, pp. 37-38
Stipulation #10	No surface occupancy within ¼ mile of all known Indiana bat hibernacula.	2006 Forest Plan, p. 235

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
Stipulation #12	No cutting of snags (trees with less than 10% live canopy), shagbark or shellbark hickories, or trees that are hollow and/or have major splits or broken tops, except during the bat hibernation season (September 15 to April 15). If such trees are a safety hazard, they may be cut anytime they pose an imminent threat to human safety, but if cut in the non-hibernation season the Forest Service biologist must be notified in advance. This stipulation applies only to trees over six inches in diameter. Protect all super canopy trees or other identified congregation roost trees for bald eagles along major river corridors and lakes. Protect known nests and roosts as described in the Bald Eagle Recovery Plan, or as directed by the US Fish and Wildlife Service. Prior to any surface disturbing activities a Forest Service biologist will conduct an assessment for potential American burying beetle habitat and occurrence. Occupancy restrictions will be determined at the time of the evaluation.	2006 Forest Plan, p. 235
Stipulation #13	Controlled surface use may include setbacks or restrictions from portions of the lease to ensure protection of habitat for regional sensitive species. At the time of any new proposed lease developments, the responsible line officer shall determine the need for any setbacks or restrictions, or the need for timing-related stipulation in accordance with the aquatic and terrestrial wildlife and botanical resources standards and guidelines. The leaseholder and Forest Service inspector shall work together to identify locations for development and production facilities in order to protect the structural integrity of large old trees found on a portion of the tract.	2006 Forest Plan, p. 235
Notification #3	The Forest Service is responsible for assuring that the area to be disturbed is examined prior to allowing any surface disturbing activities on lands covered by this lease. The examination is to determine effects upon any plant or animal species listed, or proposed for listing, as Federal endangered or threatened, regional sensitive, and their habitats. If the findings of this examination determine that the operation(s) may have a detrimental effect on a species covered by the Federal Endangered Species Act, the operator's plans may be denied or restrictions added. The presence of regional sensitive species may also require some restrictions of the operation(s). The Forest Service has the responsibility to conduct the required examination. In cases where the Forest Service time frames cannot meet the needs of the lessee/operator, the lessee/operator may, at his discretion and cost, conduct the examination on the lands to be disturbed. This examination must be done by or under the supervision of a qualified resource specialist approved by the Forest Service. An acceptable report must be provided to the Forest Service identifying the anticipated effects of the proposed action on Federal endangered or threatened species, regional sensitive species, or their habitats.	2006 Forest Plan, p. 231
GFW-ARR-12	Improve existing crossings to ensure passage of aquatic organisms when maintenance and reconstruction activities are scheduled.	2006 Forest Plan, p. 18

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
GFW-ARR-29	Prohibit vegetation management or ground disturbing activities within 100 feet of perennial springs, unless the activity is designed to protect water quality of the spring or integrity of the surrounding area.	2006 Forest Plan, p. 20
GFW-ARR-5	Where earth-disturbing activities expose mineral soil, establish filter strips along waterbodies. - Filter strip width along perennial water bodies should be a minimum of 100 feet, measured horizontally from the edge of the aquatic ecosystem. - Filter strip width along intermittent water bodies should be a minimum of 75 feet, measured horizontally from the edge of the aquatic ecosystem. - Filter strip width along ephemeral water bodies should be a minimum of 50 feet, measured horizontally from the edge of the aquatic ecosystem.	2006 Forest Plan, p. 18
GFW-ARR-6	Earth-disturbing activities that expose mineral soil may occur within the filter strip only if effective sediment control measures that minimize and/or mitigate any detrimental effects are employed.	2006 Forest Plan, p. 18
GFW-ARR-8	Design stream crossings to be at right angles.	2006 Forest Plan, p. 18
GFW-ARR-9	Design and construct new permanent stream crossings (ephemeral, intermittent and perennial streams) to maintain upstream and downstream passage of aquatic and semiaquatic organisms.	2006 Forest Plan, p. 18
GFW-WSH-1	Water should not be diverted from streams, lakes, or springs when in-stream flow needs or water-level assessments indicate that diversion would adversely affect stream processes, aquatic and riparian habitats and communities, or recreation and aesthetic values.	2006 Forest Plan, p. 14
GWF-ARR-14	Avoid the use of heavy equipment in flowing streams. Alternatives may include concentric pipe (double pipe) and plowing.	2006 Forest Plan, p. 18
GWF-ARR-15	Encourage the location of pipelines at existing bridges.	2006 Forest Plan, p. 18
GWF-ARR-16	When a pipeline crosses a stream on NFS land, the following should apply: - Encourage the use of boring to locate pipeline crossings beneath Forest streams where topography, soil, and stream bottom conditions permit. - Stabilize disturbed soil and protect streamside banks as work progresses.	2006 Forest Plan, p. 18-19
SFW-ARR-10	Do not allow roads, trails, or log skidding within streambeds except at designated crossings.	2006 Forest Plan, p. 18
SFW-ARR-11	If stream crossings are removed, restore banks and channel to a natural dimension and shape.	2006 Forest Plan, p. 18

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
SFW-ARR-13	Pipelines of 9-inch diameter or larger that cross streams on NFS land must be reviewed by the Ohio Public Utilities Commission and the Federal Energy Regulatory Commission.	2006 Forest Plan, p. 18
SFW-ARR-17	Require appropriate technology on all pipelines that cross streams so that supply and flow can be shut off upon detection of a leak.	2006 Forest Plan, p. 19
SFW-ARR-7	Design mitigation measures (e.g., sizing culverts to match the drainage area) into crossings of perennial, intermittent or ephemeral streams to meet site-specific needs.	2006 Forest Plan, p. 18
SFW-MIN-3	Require that operators conduct activities and maintain equipment to prevent the discharge of oil or brine onto the ground or into surface waters.	2006 Forest Plan, p. 46
SFW-MIN-4	Upon discovery or notification of an accidental spill of crude oil or brine that discharges, or threatens to discharge, into surface waters, notify the Ohio Environmental Protection Agency Emergency Response and Special Investigations unit in Columbus.	2006 Forest Plan, p. 46
GFW-TRANS-10	New road construction should follow the design guidance provided in Appendix A of the Forest-wide Roads Analysis document.	2006 Forest Plan, p. 75
GFW-TRANS-11	Use existing roads as an alternative to construction of new roads whenever possible.	2006 Forest Plan, p. 75
GFW-TRANS-5	Place load limits on roads that are susceptible to damage.	2006 Forest Plan, p. 75
GFW-TRANS-7	Avoid co-locating motorized trails with Maintenance Level 2 to 5 roads.	2006 Forest Plan, p. 75
GFW-TRANS-8	Avoid new road construction: • Within 50 feet of OHV or pedestrian trails (except at crossings) • Within riparian areas • Within the filter strips of streams and waterways, except for infrequent crossings • On mechanically unstable soils.	2006 Forest Plan, p. 75
GFW-TRANS-9	Require permit holders to install and maintain an appropriate physical barrier on special use roads to prevent unauthorized use. If special use roads remain in place without a barrier, the permit holder must reconstruct the road to Maintenance Level 3.	2006 Forest Plan, p. 75
SFW-TRANS-4	Allow motor vehicles licensed for travel on the State and Federal highways to use National Forest System roads at Maintenance Levels 2 to 5.	2006 Forest Plan, p. 75
SFW-TRANS-6	All roads are closed to the public unless the Forest road atlas specifically lists them as Maintenance Level 2 to 5 (open to the public).	2006 Forest Plan, p. 75

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
G-DCF-VEG-2	Use even-aged timber management (thinning, shelterwood, clearcut or two-aged harvest) on approximately 25 percent of the area to perpetuate visual and vegetative diversity. Concentrate even-aged management on the periphery of the management area or on the periphery of large blocks of land targeted for uneven-aged management.	2006 Forest Plan, p. 82
GFW-TES-9	Retain all shagbark and shellbark hickory trees > 6 inches dbh, unless removal is necessary to protect human safety or to avoid adverse impacts to steep slopes, erodible soils, floodplains, or wetlands.	2006 Forest Plan, p. 27
GFW-WLF-11	In conjunction with opening development and maintenance, retain existing snags and create additional ones, unless they pose a safety hazard.	2006 Forest Plan, p. 24
GFW-WLF-6	When oil and gas well developments meet, or can be made to meet, the objectives of permanent forest openings, designate them accordingly so they may also contribute to herbaceous habitat objectives.	2006 Forest Plan, p. 24
GFW-WLF-7	Permanent forest openings should be larger than one acre in size, unless necessary to meet the needs of a site-specific species.	2006 Forest Plan, p. 24
Stipulation #1	No surface occupancy allowed on the entire lease or on designated areas of the lease (see lease map) for the protection of the Future Old Forest resources. On NFS lands in Future Old Forest Management Areas, the Forest Service will issue leases for Federal oil and gas only with an NSO stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to the Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.	2006 Forest Plan, p. 232
Stipulation #14	At the time of any new proposed lease developments, the responsible line officer shall determine the extent of the surface use restrictions necessary to maintain habitat integrity for plant and animal species dependent on such habitats.	2006 Forest Plan, p. 236
GFW-SM-21	Avoid the need for lighted towers, particularly in locations visible from a lake or in the viewshed of a Concern Level 1 or 2 travel way or use area.	2006 Forest Plan, p. 58
GFW-SM-23	Reduce visual impact of current and future obstruction lighting requirements as much as technology and FAA and FCC requirements will allow.	2006 Forest Plan, p. 58

Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards

REFERENCE	STIPULATION/NOTIFICATION/STANDARD TEXT	SOURCE
GFW-SM-24	Reduce visual impact by using such techniques as, but not limited to, directional lighting, tilting, shields, etc.	2006 Forest Plan, p. 58
GFW-SM-25	Maximum intensity of lighting shall be the minimum required by FAA and/or FCC. Unless otherwise required by the FAA, only white (preferable) or red strobe lights should be used at night, and these should be the minimum number and intensity, with the minimum frequency of flashes (maximum duration between flashes), as required by the FAA.	2006 Forest Plan, p. 58
GFW-SM-64	Strive to schedule mechanized activities along Concern Level 1 and 2 travel ways, use areas, and water bodies to occur during low-use periods to alleviate noise and visual impacts.	2006 Forest Plan, p. 62
Stipulation #11	At the time of any new proposed lease developments, the responsible line officer shall determine the need for any visual quality mitigation. Some examples of mitigation may include special design and reclamation measures, transplanting trees and shrubs, fertilization, mulching, special erosion control structures, irrigation, site recontouring to match the original land contour, low profile equipment and painting to minimize contrast. Surface occupancy may also be limited or denied in sensitive areas, such as unique geologic features and rock formations, visually prominent areas such as designated trails and developed recreation sites.	2006 Forest Plan, p. 235
GFW-ARR-23	Avoid adverse impacts to ephemeral wetlands during ground-disturbing activities.	2006 Forest Plan, p. 19
GFW-ARR-4	Where possible, do not construct new facilities (such as roads, trails, campsites, and buildings) within riparian areas. Where such facilities must be located in riparian areas, construct and maintain them to minimize adverse impacts to ecological function.	2006 Forest Plan, p. 17
Stipulation #15	At the time of any new proposed lease developments, the responsible line officer shall determine the appropriate surface use restrictions necessary to maintain the structural and ecological integrity of riparian areas, and aquatic and riparian-dependent species viability.	2006 Forest Plan, p. 236

Appendix G – Wayne National Forest Oil and Gas Leasing Biological Assessment

Wayne National Forest Oil and Gas Leasing Biological Assessment

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April 2025



U.S. Department of the Interior, Bureau of Land Management. 2025. *Wayne National Forest Oil and Gas Leasing Biological Assessment*. With Technical Assistance from ICF.

TABLE OF CONTENTS

Chapter 1.	Introduction.....	1
1.1.	Consultation History	12
Chapter 2.	Description of the Action.....	13
2.1.	Proposed Action and Project Summary	13
2.2.	Project Purpose.....	17
2.3.	Geographic and Temporal Scope.....	17
2.3.1.	Terrestrial Action Area.....	17
2.3.2.	Aquatic Analysis Area.....	18
2.4.	Project Type and Deconstruction	24
2.4.1.	Phases of Oil and Gas Development.....	24
2.4.2.	Reasonably Foreseeable Development Scenario.....	25
2.4.3.	Vertically Drilled/Vertical Completions versus Horizontally Drilled/Hydraulically Fractured Completions	26
2.5.	Description of Habitat.....	36
2.5.1.	Habitat in the Terrestrial Action Area.....	36
2.5.1.1.	Vegetation	36
2.5.1.2.	Existing Disturbances to Terrestrial Action Area Habitat	39
2.5.2.	Habitat in the Aquatic Analysis Area	41
2.5.2.1.	Water Resources	41
2.6.	General Conservation Measures	53
2.6.1.	Avoidance and Minimization Measures for Species Protected under the Endangered Species Act.....	54
2.6.1.1.	Bat AMMs	60
2.6.1.2.	Aquatic AMMs to Protect Mussels and the Eastern Hellbender.....	61
2.6.1.3.	Monarch AMMs.....	62
2.6.1.4.	Plant AMMs	62
2.6.2.	Environmental Protections Required for a Federal Minerals Lessee Applying to Drill on NFS Lands.....	63

2.7.	Other Agency Partners and Interested Parties	75
2.7.1.	BLM Regulatory Jurisdiction	75
2.7.2.	State of Ohio Regulatory Jurisdiction	76
Chapter 3.	Species Effects Analysis	82
3.1.	Threatened, Endangered, Proposed, and Candidate Species Considered	82
3.1.1.	Indiana Bat, Northern Long-Eared Bat, and Tricolored Bat	88
3.1.1.1.	Status of the Species	88
3.1.1.2.	Recovery Plans.....	88
3.1.1.3.	Life History Information	88
3.1.1.4.	Conservation Needs	90
3.1.1.5.	Environmental Baseline.....	91
3.1.1.5.1.	Species Presence	91
3.1.1.6.	Survey Efforts	92
3.1.1.7.	Species Conservation Needs within the Terrestrial Action Area.....	96
3.1.1.8.	Habitat Condition (General)	97
3.1.1.9.	Effects of the Action	98
3.1.1.9.1.	Direct and Indirect Interactions	98
3.1.1.9.2.	Cumulative Interactions	101
3.1.1.10.	Determination of Effects.....	103
3.2.2.	Freshwater Mussels and Eastern hellbender	104
3.2.2.1.	Status of the Species	104
3.2.2.2.	Recovery Plans.....	104
3.2.2.3.	Life History Information	104
3.2.2.4.	Conservation Needs	108
3.2.2.5.	Environmental Baseline.....	108
3.2.2.5.1.	Species Presence.....	108
3.2.2.6.	Habitat Condition (General)	109
3.2.2.7.	Effects of the Action	110

3.2.2.7.1. Direct and Indirect Interactions.....	110
3.2.2.7.2. Cumulative Interactions.....	120
3.2.2.8. Determination of Effects	124
3.2.3. Monarch Butterfly.....	124
3.2.3.1. Status of the Species	124
3.2.3.2. Recovery Plans.....	124
3.2.3.3. Life History Information	124
3.2.3.4. Conservation Needs	124
3.2.3.5. Environmental Baseline.....	125
3.2.3.5.1. Species Presence.....	125
3.2.3.6. Species Conservation Needs within the Terrestrial Action Area.....	125
3.2.3.7. Habitat Condition (General)	126
3.2.3.8. Effects of the Action	126
3.2.3.8.1. Direct and Indirect Interactions.....	126
3.2.3.8.2. Cumulative Interactions.....	127
3.2.3.9. Determination of Effects	128
3.2.4. Northern Monkshood, Small Whorled Pogonia, and Virginia Spirea	128
3.2.4.1. Status of the Species	128
3.2.4.2. Recovery Plans.....	128
3.2.4.3. Life History Information	129
3.2.4.4. Conservation Needs	129
3.2.4.5. Environmental Baseline.....	130
3.2.4.5.1. Species Presence.....	130
3.2.4.6. Species Conservation Needs within the Terrestrial Action Area.....	131
3.2.4.7. Effects of the Action	132
3.2.4.7.1. Direct and Indirect Interactions.....	132
3.2.4.7.2. Cumulative Interactions	133
3.2.4.7.3. Determination of Effects.....	135

Chapter 4.	Summary Discussion and Conclusion	135
Chapter 5.	References	137
Chapter 6.	List of Contacts Made and Preparers.....	153

LIST OF TABLES

Table 1-1. Effects Determination Summary.....	5
Table 2-1. HUC-12 Watersheds within the Aquatic Analysis Area for Aquatic Species	21
Table 2-2. Potential Disturbance in the Terrestrial Action Area Projected by the RFDS	26
Table 2-3. Representative Differences between Vertically Drilled/Conventionally Completed Wells and Horizontally Drilled/Hydraulically Fractured Wells	28
Table 2-4. Land Cover in the Terrestrial Action Area	36
Table 2-5. Existing Oil and Gas Wells within the Terrestrial Action Area (4.5-mile buffer)	39
Table 2-6. Water Resources in the Aquatic Analysis Area	45
Table 2-7. Water Quality Descriptions in HUC-12 Watersheds within the Aquatic Analysis Area	48
Table 2-8. Registered Groundwater Withdrawals in the Aquatic Analysis Area from 2017 to 2021.....	50
Table 2-9. Registered Surface-Water Withdrawals in the Aquatic Analysis Area from 2017 to 2021.....	52
Table 2-10. Existing Stipulations, Notifications, Guidelines, and Standards Applicable to Oil and Gas Development on NFS Lands	64
Table 3-1. Species Addressed in this Biological Assessment	82
Table 3-2. Comparison of Level of Summer Mistnetting Effort (Mistnet Nights per Site) per National Forest Unit per Year in the Wayne National Forest (1997–2014).....	92
Table 3-3. Streamflow Summary for the Little Muskingum River from 1959 to 2022	116
Table 3-4. Streamflow Summary for the Ohio River from 2014 to 2023	118
Table 4-1. Effects Determination Summary.....	136

LIST OF FIGURES

Figure 1-1.	Proclamation Boundary of the Wayne National Forest, including the Three Management Units (Ironton Unit, Athens Unit, Marietta Unit)	7
Figure 1-2.	Counties in the Vicinity of the Marietta Unit of the Wayne National Forest	8
Figure 2-1.	Expressions of Interest on the Marietta Unit.....	15
Figure 2-2.	Terrestrial Action Area for Terrestrial Species (Marietta Unit plus a 4.5-mile buffer)	19
Figure 2-3.	Aquatic Analysis Area for Aquatic Species	20
Figure 2-4.	Oil and Gas Drilling Using Vertical and Horizontal Drilling Techniques	27
Figure 2-5.	Land Cover Classes within the Terrestrial Action Area	38
Figure 2-6.	Existing Disturbance and Developed Land in the Terrestrial Action Area	40
Figure 2-7.	Aquatic Life Use Monitoring	42
Figure 2-8.	Aquatic Life Designations.....	43
Figure 2-9.	Existing Surface Disturbance and Developed Land in the Aquatic Analysis Area	44
Figure 2-10.	Groundwater Uses for Registered Withdrawals in the Aquatic Analysis Area	51
Figure 2-11.	Surface-Water Uses for Registered Withdrawals in the Aquatic Analysis Area	53
Figure 3-1.	All Bats Captures per Unit Effort by Unit Between 1997-2014, Wayne National Forest	94
Figure 3-2.	Forest-wide Bats Captured per Unit Between 1997-2014, Wayne National Forest	94
Figure 3-3.	Known Northern long-eared bat Roost Tree Areas on the Marietta Unit	95
Figure 3-4.	Annual Mean Streamflow in the Little Muskingum River from 1959 to 2023	117

ACRONYMS AND ABBREVIATIONS

Term	Definition
AMM	avoidance and minimization measure
APD	Application for Permit to Drill
BA	biological assessment
BLM	U.S. Department of the Interior, Bureau of Land Management
BO	Biological Opinion
<i>CBD</i>	<i>Center for Biological Diversity et al. v. United States Forest Service et al.</i>
CFR	Code of Federal Regulations
COA	Condition of Approval
CWA	Clean Water Act
DBH	diameter at breast height
EA	Environmental Assessment
EOI	Expression of Interest
ESA	Endangered Species Act
FLPMA	Federal Land Policy and Management Act of 1976
Forest Plan	<i>Wayne National Forest Land and Resource Management Plan</i>
FR	<i>Federal Register</i>
GFW	forest-wide guideline
Gold Book	<i>Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development</i>
HUC	hydrologic unit code
Mgal	million gallons
NEPA	National Environmental Policy Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NLE	northern long-eared bat
NSO	no surface occupancy
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code
PIM	Permanent Instruction Memorandum
RFDS	Reasonably Foreseeable Development Scenario
SFW	forest-wide standard
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WNF	Wayne National Forest
WNS	white-nose syndrome

CHAPTER 1. INTRODUCTION

The U.S. Department of the Interior, Bureau of Land Management (BLM) proposes potential leasing of Federal mineral estate within the Marietta Unit of the Wayne National Forest (WNF), Athens Ranger District (

Figure 0-1). The Proposed Action is (i) the leasing of up to 40,000 acres of Federal mineral estate in the WNF, though it is expected that only a very small percentage of this acreage will actually be developed, (ii) potential resumption of activities on 36 leases in the Marietta Unit issued in 2016 and 2017 and challenged in court; and (iii) potential resumption of activities on 29 leases that were issued during subsequent lease sales in 2017, 2018 and 2019, where development is currently on hold pending a decision associated with a supplemental environmental assessment (EA) that BLM is preparing. The U.S Department of Agriculture Forest Service (USFS) has participated as a cooperating agency in the preparation of this Biological Assessment (BA), required under Endangered Species Act (ESA) Section 7(c) “for the purpose of identifying any endangered species or threatened species which is likely to be affected” by a proposed action (16 U.S.C. § 1536(c)). The Marietta Unit lands are within the National Forest System (NFS) and located in Monroe, Noble, and Washington Counties in Ohio (

Figure 0-2).

In 2016, the BLM and USFS prepared an environmental assessment (2016 EA) to analyze impacts of potential leasing of Federal mineral estate in the Marietta Unit (the proposed action) along with a no-action alternative. BLM also completed a Finding of No Significant Impact (FONSI) and signed a Decision Record (BLM 2016), selecting the proposed action. BLM did not prepare a BA specific to the 2016 EA; instead the agencies relied on consultation with U.S. Fish and Wildlife Service (USFWS), as well as on a BA and Programmatic Biological Opinion (BO), each prepared in support of the *Wayne National Forest Land and Resource Management Plan* (Forest Plan) (USFS 2006a). The 2016 EA and 36 of the 65 leases issued in reliance on it were subsequently challenged in the U.S. District Court for the Southern District of Ohio and found to fall short of the requirements of the National Environmental Policy Act of 1969 (NEPA) with respect to its analysis of certain resource issues (*Center for Biological Diversity et al. v. United States Forest Service et al.* (S.D. Ohio, No. 2:17-cv-372; U.S. District Court 2021), hereafter referred to as *CBD*).

On remand from the district court, the BLM released a Draft Supplemental EA for public comment in March 2024 with updated analysis to address deficiencies in the 2016 EA that had been identified by the court in its 2020 decision on the merits of plaintiffs' claims (Appendix C). The EA relied, for its impacts analysis, on an updated BLM assessment of likely oil and gas development, specifically, BLM's 2020 Reasonably Foreseeable Development Scenario (RFDS). The RFDS projected that all wells would be horizontally drilled gas wells with most well pads being constructed on private surface lands. The RFDS projected development that may occur over a 15-year period. New horizontal wells that may be permitted during that 15-year period would be expected to produce marketable quantities for several decades thereafter. During that foreseeable period of production, various factors affecting ESA-listed species, including the global market for natural gas, drilling and production technology, and the status of such species can, and most likely will, change.

The RFDS and the analysis of the reasonably foreseeable development of the leases in this BA includes specific thresholds and limits on construction and operational activities. These include a maximum of 1,015 total acres of short-term disturbance¹ (i.e., construction-related disturbance that occurs prior to interim reclamation), a maximum of up to 285 total acres of long-term disturbance (disturbance remaining after interim reclamation and that persists during operation), a maximum of 29 new well pads, and a maximum of 81 new horizontally drilled wells over a 15-year development period where operator-submitted Applications for Permits to Drill (APDs) are approved and construction of well pads, wells, and other infrastructure occurs. Following approval of any APDs submitted for the noted 65 leases and any APDs submitted in connection with future lease sale actions, the BLM would track all APDs and their final approved disturbance, well pads, and well sites during the 15-year development period. Under the EA's proposed action, the BLM would not approve activities that exceed these total thresholds without conducting additional environmental review and consultation with the USFWS. The number of wells, well pads, and

¹ This assumes 29 pads with 35 acres of disturbance per pad for a total of 1,015 acres. The 2020 RFDS contains a math error for total estimated acres of long-term disturbance that has been updated from 998 acres to 1,015 acres and is carried forward throughout the BA.

acreage of disturbance falling under BLM's authority will be tracked and count towards these thresholds.

The BLM would undertake three Stages of environmental review associated with oil and gas leasing and development of the Federal mineral estate underlying the Marietta Unit that includes the following.

- Stage 1: Environmental review in support of identifying areas that are available for or closed to oil and gas leasing, here the *Wayne National Forest 2006 Land and Resource Management Plan* (Forest Plan);

The Stage 1 environmental review was completed as part of the 2006 Forest Plan (USFS 2006a), which identified areas as available for or closed to oil and gas leasing and established appropriate USFS stipulations, notices, standards and guidelines that limit surface use that could be applied to areas identified as available for leasing.

- Stage 2: Environmental review in support of conducting competitive lease sales for parcels that are available for leasing and nominated in Expressions of Interest; and

The Stage 2 environmental review for potential leasing of parcels identifies which parcels should be offered for leasing, the conditions under which leasing and eventual development should occur, and an analysis of potential impacts from reasonably foreseeable development of the leases. The EA, once BLM makes a decision, will complete the Stage 2 environmental review for the WNF Marietta Unit for future BLM oil and gas lease sales and for the BLM lease sales challenged in the *CBD* case. It will also support USFS's review of its consent authorizations to BLM leasing proposals that were remanded to USFS by the *CBD* court, and its consideration of consent authorizations to future BLM proposals to lease on the Marietta Unit. Assessing and issuing consent to BLM proposals to lease is part of USFS's regulatory duties (36 C.F.R. § 228.102(e)). The consent review consists of verifying whether leasing of specific lands has been adequately addressed in a NEPA document and is consistent with the governing Forest Plan, ensuring that any conditions of surface occupancy are included in the lease stipulations, and confirming that surface use is permitted somewhere on the lease (except in no-surface-occupancy (NSO)) leases).

- Stage 3: Environmental review in support of approving Applications for Permits to Drill (APDs) based on specific development proposals.

Once Federal oil and gas lease sales are conducted, operators bid on and obtain valid leases at auction. Not all leases that are issued proceed to oil and gas development but for those leases that do, operators are required to submit an APD to the BLM. Operators on the noted 65 leases will also be required to submit APDs if they wish to pursue development. The Stage 3 environmental review of proposed development includes analysis of potential impacts from an identified site-specific proposed project (as described in the APD) that includes well-completion techniques, specific areas of proposed surface disturbance, proposed transportation routes and road use, specific amounts and sources of water for site-specific project development, specific workforce numbers that would be utilized, and other details of specific development proposals. Stage 3 environmental review allows site-specific information regarding local resource conditions to be evaluated and potential impacts to be understood and disclosed. Concurrently during Stage 3 environmental review, the BLM would initiate another consultation with USFWS (referred to as Tier 2 consultation,

as discussed below) to assess the site-specific development proposals included in the APDs so that the agencies may evaluate and disclose potential impacts on Federally listed species. The BLM would finalize design features and apply avoidance and minimization measures (AMM) to APDs as conditions of approval and include stipulations, notices, standards and guidelines from the Forest Plan where a project proposes to occupy NFS surface (USFS 2006a). If surface occupancy on NFS lands is proposed, a Surface Use Plan of Operations will be submitted by the operator and reviewed by the BLM and USFS.

The USFWS has outlined the process for tiered consultations with BLM and USFS for future oil and gas developments under the Proposed Action. There will be two tiers of consultation with the USFWS:

- Tier 1 is programmatic consultation completed in conjunction with this EA that identifies listed species that could be affected by proposed oil and gas development and identifies a set of AMMs (such as those in Appendix G), some or all of which may be applied to APDs as conditions of approval during tier 2 consultation.
- Tier 2 is consultation on site-specific development proposals included in APDs. The agencies would select appropriate AMMs from the set of AMMs identified during Tier 1 consultation and apply those AMMs to APDs as conditions of approval. Additionally, if necessary to further protect federally listed species, the agencies could decide that additional AMMs are needed as conditions of approval.

The purpose of this BA is to satisfy requirements that the BLM and USFS consult with USFWS under Section 7 of the Endangered Species Act (ESA) when any project or action these agencies authorize, fund, or carry out may affect a listed species or designated critical habitat. With this BA, the BLM is undertaking Tier 1 consultation with USFWS during the Stage 2 environmental review associated with the Proposed Action. Assuming the USFWS concurs with BLM's determinations, this BA and USFWS's concurrence with BLM's determinations would complete the Tier 1 programmatic consultation.

The administrative process of leasing Federal mineral estate for oil and gas development itself does not directly affect Federally listed species; therefore, no direct effects would occur under the Proposed Action considered in the EA. However, potential construction and operation of reasonably foreseeable oil and gas development from future leasing as described in the RFDS, as well as resumption of oil and gas development activities on the 65 leases, could affect Federally listed species. This BA analyzes these associated effects, the overall impact of the Proposed Action and reasonably foreseeable development of the leases, and protection measures that would be applied for development on Federal land and private surface land to avoid and minimize effects on Federally listed species in the Aquatic Action Area (Table 3-21 in the EA) and in the Terrestrial Analysis Area (Table 3-24 in the EA).

The BLM would conduct a site-specific analysis of potential impacts on natural resources during the Stage 3 environmental review of APDs, would coordinate with the USFWS under Tier 2 consultation during site-specific permitting, would apply additional AMMs and other measures to APDs as conditions of approval if needed, and would not permit site-specific activities that would result in the take of Federally listed species.

Since completion of the Programmatic BO prepared in support of the Forest Plan (USFS 2006a), there have been a variety of changes to environmental conditions, species listings, and technology that warrant preparation of a new BA. These include:

- Changes in gas extraction technology, including use of hydraulic fracturing, have increased the distance from which drill holes can reach target formations (up to 4 or more miles away). Horizontal wells require more infrastructure, such as roads, pipelines, and gathering lines, than conventional (vertical) wells due to the significantly increased volume of oil and gas extracted from fracked wells. Horizontal drilling also requires larger pipelines and gathering lines to transport the increased volume at higher pressures compared to conventional drilling methods. For example, conventional drilling gathering lines typically range 2 to 12 inches in diameter; however, hydraulic fracturing requires gathering lines of 12 to 36 inches in diameter. The operating pressure within these larger pipelines is also increased which can increase associated risk factors. Horizontal drilling is also associated with significantly higher volumes of water, trucking, and waste for disposal. As such, the area of potential impacts on threatened and endangered species and their habitat can be larger.
- Hydraulic fracturing technology also requires notably more water than conventional drilling techniques, often requires deeper and longer well bores, and results in more wastewater and produced water that must be disposed of by underground injection, transport to a disposal facility, or other methods. As such, hydraulic fracturing can present potential impacts across a larger watershed area that warrant further analysis.

In addition, the USFWS has updated its ESA threatened and endangered species lists since completion of the 2006 Programmatic BO for the Forest Plan, including proposing tricolored bat (*Perimyotis subflavus*) for listing as endangered under the ESA in 2022 (DOI 2022), uplisting northern long-eared bat from threatened to endangered (DOI 2022), delisting running buffalo clover (*Trifolium stoloniferum*) in 2021 (DOI 2021), proposing monarch butterfly (*Danaus plexippus*) for listing as threatened in 2024 (DOI 2024bR), proposing the eastern hellbender for listing as threatened in 2024 (DOI 2024a), listing round hickorynut (*Obovaria subrotunda*) mussel and longsolid mussel as threatened under the ESA in 2023 (DOI 2023a), and proposing salamander mussel (*Simpsonaias ambigua*) for listing as endangered in August 2023 (DOI 2023b).

In preparing this BA, the agencies queried the USFWS Information for Planning and Consultation system to determine which Federally listed, proposed, and candidate species could occur in the Terrestrial Action Area (USFWS 2024a). The list of potentially affected species was further refined based on consultation among the BLM, USFS, and USFWS. Table 0-1 summarizes the species potentially affected, their status, and BLM's determinations as to the effect of the Proposed Action on listed species. There is currently no designated or proposed critical habitat in the Terrestrial Action Area or Aquatic Analysis Area. The determination of "not likely to jeopardize the continued existence of" has only been assigned to proposed species.

Table 0-1. Effects Determination Summary

Common Name	Scientific Name	Federal Status	Determination
<i>Animals</i>			

Common Name	Scientific Name	Federal Status	Determination
Indiana bat	Myotis sodalis	Endangered	may affect, not likely to adversely affect
Northern long-eared bat	Myotis septentrionalis	Endangered	may affect, not likely to adversely affect
Tricolored bat	Perimyotis subflavus	Proposed Endangered	not likely to jeopardize the continued existence of
Monarch butterfly	Danaus plexippus	Proposed Threatened	not likely to jeopardize the continued existence of
Clubshell mussel	Pleurobema clava	Endangered	may affect, not likely to adversely affect
Fanshell mussel	Cyprogenia stegaria	Endangered	may affect, not likely to adversely affect
Northern riffleshell mussel	Epioblasma rangiana	Endangered	may affect, not likely to adversely affect
Pink mucket mussel	Lampsilis abrupta	Endangered	may affect, not likely to adversely affect
Longsolid mussel	Fusconaia subrotunda	Threatened	may affect, not likely to adversely affect
Purple cat's paw mussel	Epioblasma obliquata	Endangered	may affect, not likely to adversely affect
Round hickorynut mussel	Obovaria subrotunda	Threatened	may affect, not likely to adversely affect
Salamander mussel	Simpsonia ambigua	Proposed Endangered	not likely to jeopardize the continued existence of
Sheepnose mussel	Plethobasus cyphus	Endangered	may affect, not likely to adversely affect
Snuffbox mussel	Epioblasma triquetra	Endangered	may affect, not likely to adversely affect
Rabbitsfoot mussel	Quadrula cylindrica	Threatened	may affect, not likely to adversely affect
Eastern hellbender	Cryptobranchus alleganiensis	Proposed Endangered	not likely to jeopardize the continued existence of
Plants			
Northern monkshood	Aconitum noveboracense	Threatened	may affect, not likely to adversely affect
Small whorled pogonia	Isotria medeoloides	Threatened	may affect, not likely to adversely affect
Virginia spiraea	Spiraea virginiana	Threatened	may affect, not likely to adversely affect

Figure 0-1. Proclamation Boundary of the Wayne National Forest, including the Three Management Units (Ironton Unit, Athens Unit, Marietta Unit)

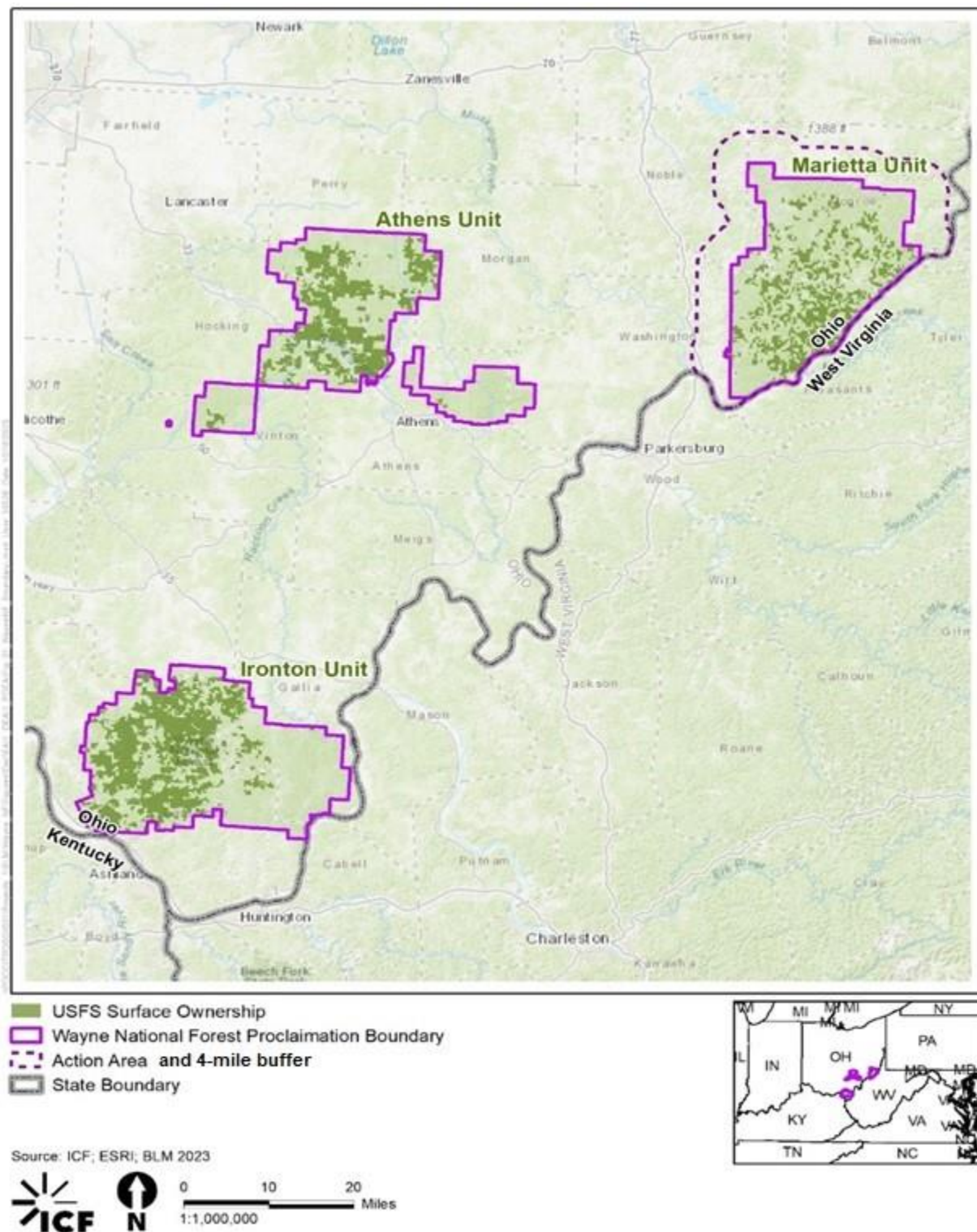
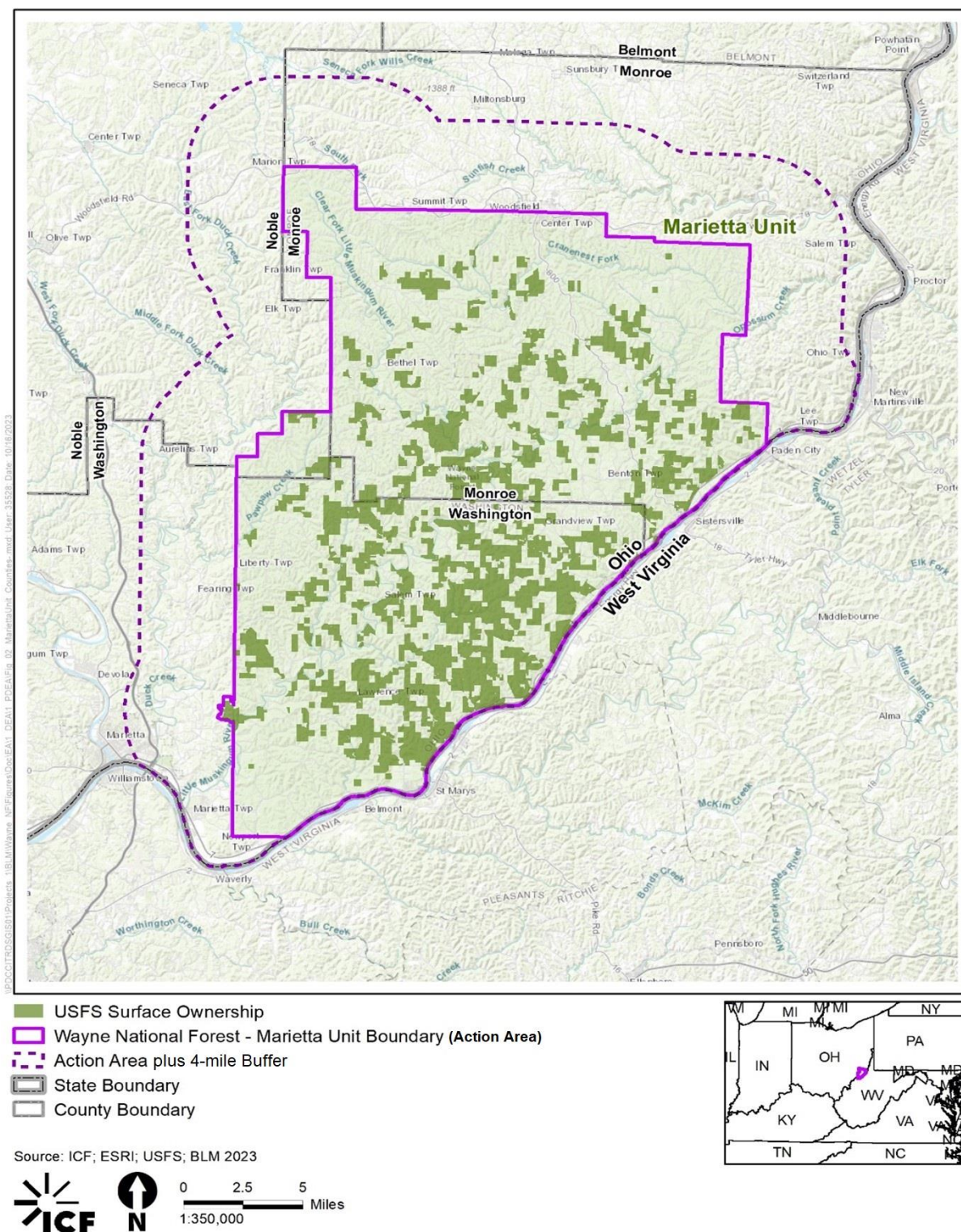


Figure 0-2. Counties in the Vicinity of the Marietta Unit of the Wayne National Forest

This BA analyzes the effects on Federally listed species in a programmatic approach prior to availability of leases (other than the 65 noted above), considers the effects of all the leasing and

development as a whole over a 55-year period, and is part of a tiered consultation process. The term of this BA analysis will span 55 years to account for the time needed to develop a producing well (15-years) and cover the typical 25–40-year production period of wells (BLM 2020). Other than the 65 leases noted above, drilling associated with new leases will not immediately begin upon approval of the EA, and it is anticipated it would take up to five years before many of the oil and gas development effects associated with reasonably foreseeable development of the leases would occur. Therefore, the BA analysis spans 55 years to account for the entire leasing, development, and production processes. At the end of this 55-year period, if activities are ongoing, BLM would reinitiate consultation with USFWS.

If an applicant cannot follow all appropriate AMMs then a separate consultation between FWS and the BLM (outside this programmatic informal consultation) may be required as well as coordination with the FS, if the proposed project will impact the WNF.

There are four possible oil and gas development situations that may occur including:

- **Situation 1: Surface disturbance completed on private land to access private minerals prior to submittal of an APD to the BLM, and no further surface disturbance will occur to access Federal minerals.**

Under BLM regulations, an applicant could cause surface disturbance on private land, clear a well pad, and drill up to the border of Federal minerals prior to submitting the APD. In Situation 1, an operator submits an APD for drilling a new Federal wellbore or horizontal leg into Federal minerals from an existing well pad that was constructed on private surface lands. All the disturbance at the well pad will have occurred prior to BLM involvement, subject to State of Ohio regulatory oversight and ESA section 9 prohibitions.

As further discussed in Section 2.9 of this BA, the State of Ohio Department of Natural Resources (ODNR) has sole authority for regulating the construction of well pads and development of private wells on private surface land in Ohio (ORC 1509). As Appendix E in the EA informs, Ohio regulations impose strict requirements for the protection of natural resources, including compliance with the ODNR Best Management Practices for Oil and Gas Well Site Construction (ODNR 2013), so as to reduce impacts from surface disturbance, vegetation removal, sedimentation and erosion, waste disposal, construction of well sites and access roads, and other activities.

Non-Federal parties are also subject to the ESA section 9 take prohibitions. During the state process, the applicants have the option to contact the USFWS for technical assistance to obtain USFWS recommendations for avoiding take of Federally listed species. The USFWS regularly provides such technical assistance to entities conducting oil and gas activities on private lands in Ohio.

In Situation 1, BLM would only assess the down-hole impacts of the proposed drilling to access Federal minerals and the impacts of production operations, such as truck trips. Any construction impacts (tree clearing, soil disturbance, road building) that did not have Federal involvement (i.e., it occurred before an APD was sought) would be considered under cumulative effects in any formal consultation with USFWS in Tier 2 if they occurred within the area likely to be affected by a Federal action. These effects are also considered under the cumulative effects analysis. Although they are outside of BLM's or USFS's control, they have been considered in both the BA as well as the EA. Impacts to mussels could occur

if significant water withdrawal is required for boring of the well to reach Federal minerals. Any such impacts would be connected to BLM's authorization and therefore subject to agency oversight. In Situation 1, Tier 2 consultation with USFWS under Section 7 of the ESA would be conducted upon receipt of an APD from an operator, and as identified in Section 2.9 of this BA, the BLM would apply appropriate AMMs in EA Appendix G and other measures to APDs as conditions of approval, such as prohibiting water withdrawals from the Little Muskingum River for oil and gas operations.

- **Situation 2: Some disturbance on private surface may have occurred prior to submitting an APD to the BLM and additional disturbance will occur to access Federal minerals.**

In Situation 2, an operator submits an APD for drilling a new Federal wellbore or horizontal leg into Federal minerals from an existing surface disturbance constructed on private surface lands, but additional surface disturbance (e.g., well pad or road expansion) is anticipated. Previous disturbance will have already occurred prior to BLM involvement, under State of Ohio regulatory oversight. The applicant may have contacted USFWS for technical assistance under Section 9 of the ESA and USFWS may have provided recommendations for avoiding take of Federally listed species. Any such impacts (tree clearing, soil disturbance, road building) that did not have Federal involvement (i.e., it occurred before and APD was sought) would be considered under the cumulative effects analysis if they occurred within the area likely to be affected by a Federal action. Although they are outside of the BLM's or USFS's control, they have been considered in both the BA as well as the EA. Section 7 (i.e., Federal) consultation is triggered when the APD is submitted. The additional/new disturbance would be considered effects resulting from the BLM's authorization to access Federal oil/gas and reviewed under the ESA Consultation Framework.

The analysis of the cumulative effects on the resources affected by approving an APD would recognize any ongoing or future environmental effects of other actions if the effects of those actions are relevant to assessing how the Federal action or undertaking will affect specific resources. Tier 2 consultation with USFWS under Section 7 of the ESA would be conducted upon receipt of an APD from an operator and the BLM would apply appropriate AMMs from this BA (Appendix G of the EA) and other measures to APDs as conditions of approval to avoid and minimize the impacts of any APD to Federally listed species on a site-specific basis.

- **Situation 3: No disturbance on private surface has occurred prior to submittal of an APD to the BLM, but new disturbance will be needed to access Federal minerals.**

In Situation 3, an operator submits an APD for drilling a new Federal wellbore or horizontal leg into Federal minerals on undeveloped private land and for construction of roads and well pads to access Federal minerals. The new disturbance would be considered an effect of the Federal action and is subject to the ESA Consultation Framework described below. New disturbance triggers analysis of potential environmental effects associated with construction and operation of the well, including the well pad, access roads, pipelines, or other infrastructure, as appropriate. In general, the NEPA analysis at the APD Stage will consider a range of reasonable alternatives in the siting of surface facilities, to the extent such alternatives would be substantially different in effect from the proposed action.

For all APDs in Situation 3, BLM will consult with USFWS under Section 7 upon receipt of an APD from an operator. BLM will apply appropriate AMMs from Appendix G of the EA and other measures to APDs.

- **Situation 4: Any and all surface disturbance will occur on Federal surface to access Federal minerals and an APD is submitted to the BLM prior to any surface disturbance on Federal land.**

In Situation 4, an operator submits an APD for drilling a new Federal wellbore or horizontal leg into Federal minerals from a well pad to be constructed on Wayne National Forest (or other Federal agency) surface. Impacts on Forest Service lands would require adherence to Forest requirements and the governing Forest Plan. The new disturbance would be an effect of the Federal action and regulated under the ESA Consultation Framework described below. No surface disturbance could occur until the lead Federal agency has completed Tier 2 section 7 consultation, and the applicant has obtained the necessary permits from the surface management agencies. The environmental analysis must consider all potential environmental effects associated with construction and operation of the well, including the well pad, access roads, pipelines, or other infrastructure, as appropriate. In general, the NEPA analysis will consider a range of reasonable alternatives in the siting of surface facilities. Consultation with USFWS under Section 7 would be conducted upon receipt of an APD from an operator and BLM would apply appropriate AMMs from Appendix G of the EA, Forest Service lease stipulations, notifications, standards, guidelines from the Forest Plan and other measures to APDs as conditions of approval.

The BLM is seeking a letter of concurrence from the USFWS for informal consultation. As appropriate, the BLM will apply the AMMs from Appendix G of the EA as conditions of approval to all APDs associated with developing leases that may be issued under the Proposed Action and to any APD for developing the noted 65 leases. During the site-specific APD permitting process, the BLM will conduct additional Section 7 consultation with the USFWS based on the situations described above. Section 7 consultation during the APD process could result in conditions of approval for APDs to address potential impacts to Federally listed species.

We conclude that the Proposed Action may affect, but is not likely to adversely affect, Federally listed species and is not likely to jeopardize the continued existence of ESA candidate or proposed species based on the following:

- application of USFS forest-wide standards (SFW) and forest-wide guidelines (GFW) to all Federal oil and gas leases issued, and notifications and stipulations (Appendix F);
- operator's compliance with the State of Ohio's regulations and standards for oil and gas development (see Section 2.9, State of Ohio Regulatory Jurisdiction);
- application of required Federal protection measures (i.e., avoidance and minimization measures [AMMs] as conditions of approval to any approved Applications for Permit to Drill [APD]) for Federal minerals (see Section 2.6, General Conservation Measures).

1.1. Consultation History

USFWS Consultation with Forest Service on Forest Plan Activities:

In 2005 USFS completed a formal consultation with USFWS on the revised Land and Resource Management Plan (USFS 2006a). A BA was prepared by USFS (USFS 2005) and a Programmatic BO was prepared by USFWS (USFWS 2005) for two species, Indiana bat (*Myotis sodalis*) and running buffalo clover.

USFS sent USFWS two letters documenting that the continued implementation of the WNF Forest Plan would have “no effect” on sheepshead (*Plethobasus cyphus*) mussel (on April 4, 2012) and rayed bean (*Villosa fabalis*) mussel and snuffbox (*Epioblasma triquetra*) mussel (on April 6, 2012) (USFS 2012a, 2012b). USFWS replied on April 12, 2012, that it did not anticipate any impact on these species from implementation of the Forest Plan and associated projects within the proclamation boundaries of the WNF, unless new information became available (USFWS 2012c).

USFWS Consultation with BLM for Proposed Action:

ICF biologist Martin Melville contacted USFWS on July 12, 2023, regarding the presence of two additional mussel species, clubshell (*Pleurobema clava*) and purple cat’s paw (*Epioblasma obliquata*). Mr. Melville met with Jennifer Finfera at USFWS on July 13, 2023, via video conference. Ms. Finfera provided Mr. Melville with a map showing round hickorynut habitat in the WNF and example documents for reference (ICF 2022; USFWS 2023a, 2014; ORSANCO 2014; OEPA 2020a, 2020b).

In March 2024, USFWS provided AMMs and outlined the process for tiered consultations for future oil and gas developments under the Proposed Action. USFS contacted USFWS in March 2024 to discuss potential species to carry forward into the BA, the anticipated consultation process, and findings in the 2024 draft Supplemental EA (BLM 2024b). The USFWS received a draft of the BA to review in April 2024 and the USFWS provided a variety of comments and requested revisions.

On April 12, 2024, the BLM, USFS, and USFWS met to discuss mussel species occurrences, the BA outline, and the schedule for finalizing the BA and providing it to USFWS.

The BLM has continued to coordinate with the USFWS throughout 2024 and into 2025 to address comments and to solicit additional information regarding the AMMs, leading up to submittal of the final BA to the USFWS in March 2025.

CHAPTER 2. DESCRIPTION OF THE ACTION

2.1. Proposed Action and Project Summary

The Proposed Action associated with this BA is (i) the leasing of up to 40,000 acres of Federal mineral estate in the WNF, though it is expected that only a very small percentage of this acreage will actually be developed – *see* EA section 3.8.2.2 (impacts on terrestrial wildlife); (ii) potential resumption of activities on thirty-six leases in the Marietta Unit issued following lease sales in 2016 and 2017 and challenged in court; and (iii) potential resumption of activities on 29 leases that were issued following subsequent lease sales in 2017, 2018 and 2019, where development is currently on hold pending a decision on the EA. A decision by BLM to approve the proposed action would not result in approval of any oil and gas construction, development, or operation, though it would allow lessees or their operators on the 65 leases to submit APDs. Once any new leases are obtained, lessees or operators must submit site-specific development APDs, which are then subject to Stage 3 NEPA environmental review as described in Chapter 1. Stage 3 NEPA environmental review would be required for approval of development on the 65 leases and any leases issued under the Proposed Action, whether from private surface or Federal surface.

Review of site-specific APDs includes an initial on-the-ground, site-specific field evaluation by resource specialists from BLM, and from USFS as well if the project is on NFS surface, in addition to a site-specific environmental analysis. Not all leases that are issued proceed to development. The environmental review performed during Stage 3 allows site-specific information regarding local resource conditions to be evaluated and potential impacts of the specific APD disclosed. During the Stage 3 project-specific analysis, the BLM would finalize AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis. Following BLM approval of APDs that would contain conditions of approval, operators could conduct subsurface drilling activities to develop Federal minerals.

The BLM has leased or is proposing to lease Federal mineral estate within the Proclamation Boundary of the WNF, Athens Ranger District, Marietta Unit (Figure 2-1). The parcels that could be leased as part of the Proposed Action consist of all Federal mineral estate underlying NFS lands in the Marietta Unit.

As noted above, the parcels could be offered for sale at future competitive sales and subsequently be leased for potential future oil and gas development. Drilling into Federal minerals would only occur following approval of APDs based on site-specific plans approved by the BLM. However, lessees could construct well pads, access roads, and other infrastructure on private surface land prior to submitting APDs for access to Federal minerals (Situation 1 and 2 as described in Chapter 1). At the APD Stage for Situations 2, 3, and 4 (as described in Chapter 1), the BLM would consult with USFWS under the project's Tier 2 consultation process. BLM has the authority to apply additional AMMs to APDs as conditions of approval and will comply with NEPA in evaluating site-specific impacts of APDs. During Stage 3 environmental review, which includes the Tier 2 consultation process, the BLM would consult with USFWS on specific development proposals included in APDs to assess potential impacts to Federally listed species to identify additional AMMs or other measures that would be applied to APDs as conditions of approval to avoid and minimize impacts to Federally listed species. For example, as a condition of approving an APD, BLM can limit the extent and timing of water withdrawals based on drought conditions or low flow conditions to protect water quality, water quantity, aquatic habitat, and Federally listed species.

Under mineral leasing statutes and regulations, interested parties, such as private individuals or companies, may file Expressions of Interest (EOIs) with the BLM to nominate parcels for competitive bid and leasing. As of August 2024, the BLM has received at least 33 pending EOIs nominating parcels on the Marietta Unit (**Error! Reference source not found.1**). Importantly, not all EOIs would result in a lease, and not all leases would result in development.

Before any future competitive lease sale, the BLM would review nominated parcels to ensure that potential environmental impacts have been appropriately considered and disclosed to the public in compliance with NEPA. This would begin with confirming the adequacy of the environmental analysis in the EA (BLM 2024b) and other prior analyses, such as the previous 2016 EA which is incorporated by reference into the EA. After BLM review and approval, USFS would then review each proposed lease and its supporting analysis to determine whether to authorize the BLM to offer specific lands for lease (see 36 C.F.R. § 228.102(e)). As described in Chapter 1 of this BA, if leases are issued and they proceed to Stage 3 development, the BLM would consult with USFWS (Tier 2 consultation), considering site-specific development proposals included in the APDs.

A Federal oil and gas lease is a legal contract that grants exclusive rights to the lessee to develop Federally owned oil and gas resources. However, it does not, by itself, authorize surface-disturbing activities on Federal surface or obligate the lessee to drill a well on the parcel or into the oil and gas below or near the parcel in the future. Should the parcel be leased and the lessee submit a detailed plan for oil and gas development as part of an APD, including a plan for intended surface occupancy on any Federal parcel, then the BLM and USFS would conduct appropriate site-specific environmental analysis (Stage 3) and additional Section 7 consultations (Tier 2 consultation). If the parcel to be developed is on NFS surface lands, then development must be consistent with the Forest Service's management area direction, applicable SFWs and GFWs as identified in the governing Forest Plan (USFS 2006a) and those in Appendix F, as well as all identified AMMs.

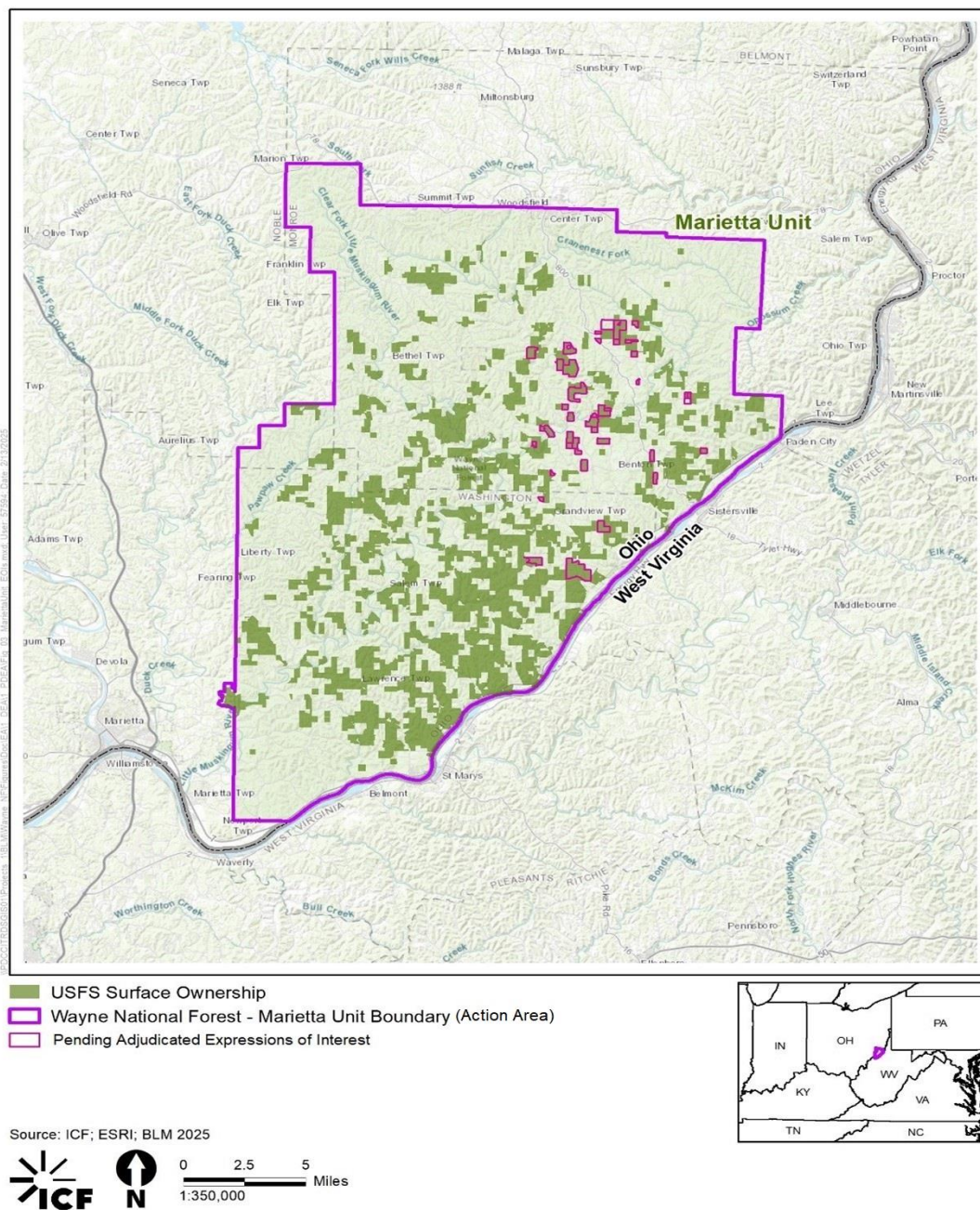
The Record of Decision approving the Forest Plan (USFS 2006a) made all Federally owned minerals in the WNF administratively available to be leased. At that time, horizontal drilling was generally not yet economically feasible. Technological developments in the following years changed that. To address potential leasing and development using hydraulic fracturing technology on the WNF, in 2012 the USFS prepared a *Supplemental Information Report: Horizontal Drilling Using High Volume Hydraulic Fracturing – Wayne National Forest* for oil and gas activity (2012 SIR; USFS 2012), which projected that 13 horizontal well sites could be developed using high-volume hydraulic fracturing technology across the WNF through the remainder of the first 10 years of Forest Plan (USFS 2006a) implementation.

In the 2012 SIR, the USFS concluded that the predicted impacts from horizontal drilling did not present a seriously different picture relative to the effects analysis disclosed in the programmatic EIS (for the 2006 Forest Plan) and associated planning documents. USFS also determined that the USFS, along with partner agencies involved in oil and gas management, have the ability to provide for the appropriate protection of natural resources and the public if horizontal drilling using hydraulic fracturing were to take place on the WNF. The WNF Supervisor determined in 2012 that there was no need to supplement the EIS prepared for the Forest Plan revision, nor the need to correct or amend the Forest Plan at this time (USFS 2006a).

In 2020, the USFS undertook an analysis to determine if a Forest Plan amendment or revision was necessary and concluded that it was not. As a part of this effort, the USFS completed the *Mineral*

Resources Supplemental Assessment Report - Wayne National Forest (2020c) that acknowledged the types of hydraulic fracturing utilized in developing oil and gas resources on the WNF Marietta Unit.

Figure 2-1. Expressions of Interest on the Marietta Unit



When a lease has been issued and a lessee proposes to develop Federally owned oil and gas resources from private surface, the lessee or operator must submit an APD, which initiates further, site-specific NEPA analysis, including ESA Section 7 consultation. The BLM would apply appropriate AMMs to APDs AS conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis (see Section 2.6 of this BA), such as those restricting water withdrawals from certain mussel streams and the Little Muskingum River, but SFWs and GFWs from the Forest Plan (USFS 2006a) cannot be applied on private surface land. The Federal government has no authority to regulate activities on private land that do not have a Federal nexus, so a lessee could construct well pads, access roads, and other infrastructure on private surface land prior to submittal of APDs (Situation 1- completed development on private surface prior to submittal of APDs to the BLM). In this situation, operators would still be required to submit a drilling permit to the State of Ohio for approval and meet the State of Ohio regulations and standards for oil and gas development, including designing and constructing well sites in a manner that minimizes damage to natural resources that the state has authority over (see Section 2.9 of this BA). In addition, under Situation 1, oil and gas developers are still subject to the ESA and required to follow protective measures or development alternatives should any endangered species be known to inhabit or be found inhabiting a potential development site (16 U.S.C. §§ 1531-44). All operators on private land are subject to Section 9 of the ESA (16 U.S.C. § 1538) that makes it illegal to harass, hunt, shoot, capture, trap, kill, collect, wound, or harm (i.e., “take”) any ESA-listed species or to pursue/attempt any of these activities. Unauthorized take is punishable by substantial civil or criminal penalties. *Id.* § 1540(a), (b), (g).

The BLM prepared an RFDS (BLM 2020) to estimate the level of oil and gas development that could occur following the issuance of leases associated with the Proposed Action or on the 65 noted leases. The 2020 RFDS estimates up to 29 horizontal well pads could be constructed to support up to 81 horizontal wells within the Marietta Unit during the 15-year development period. Multiple wells could occupy a single well pad. During interim reclamation, well pad disturbance areas, ranging in disturbance acreage from 6 to 35 acres, are typically regraded, seeded, and reduced to a size of 3 to 10 acres that remains until final reclamation (when wells are plugged). Most of these wells are projected to be horizontally drilled gas wells from private surface pads using hydraulic fracturing. Based on recently installed well pads and wells in the Action Area, it is estimated that oil and gas activity for the RFDS 15-year development period would result in between 171 and 1,015 new acres of initial disturbance and, following interim reclamation, between 86 and 285 acres of longer-term disturbance remaining until final reclamation of the pad, access roads, and other infrastructure is complete. The BLM will not permit activities that exceed the disturbance figures described above without conducting additional review under NEPA and the National Historic Preservation Act (NHPA), as well as ESA Section 7 consultation with the USFWS.

The figures described above were derived from multiple sources, including previous oil and gas environmental assessments, recent drilling permit applications, discussion with state oil and gas personnel, and discussion with an oil and gas operator in the Wayne National Forest. In addition to these foreseeable average figures, the BLM approved three APDs under a lease that was approved under the 2016 EA. These three wells were drilled in 2019 and 2021 from a single pad. Based on an aerial imagery analysis, site development caused an initial disturbance of approximately 11.6 acres. The disturbance that remains today, while the wells are producing, includes a 250-foot road that accounts for 0.3 acre and a 3.2-acre pad, a 70 percent reduction. This example is cited to

demonstrate site-specific, known disturbance. However, not all well pads are identical, so we cannot use a single example to estimate total disturbance from all of the foreseeable future development, which is why the BLM conducts site-specific analysis at the APD Stage.

It is important to note that both the EA and this BA were conducted at a level of detail appropriate for a programmatic lease sale action described above as Stage 2. Oil and gas leasing and development of Federal mineral estate occurs in multiple Stages of Federal government environmental analysis and authorization (see Section 2.2, *Project Purpose*, for more information on the three Stages of environmental review).

The lead agency for the Proposed Action is the BLM Northeastern States District Office. The contact information for the district manager of the lead agency is as follows:

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District Manager
BLM Northeastern States District
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Milwaukee, WI 53202
Cell: (602) 402 7690
Email: pmathis@blm.gov

2.2. Project Purpose

The purpose of the Proposed Action is to respond to EOIs to lease Federal oil and gas resources through a competitive lease sale process and to address certain deficiencies identified in *CBD* and affecting 65 leases issued following sales in 2016 and 2017. The need for the action is established by both the court's ruling, as further discussed below, and by the BLM's responsibility under the Mineral Leasing Act of 1920, (30 U.S.C. §§ 181 *et seq.*), and the Mineral Leasing Act for Acquired Lands of 1947 (30 U.S.C. § 351, *et seq.*) to promote the exploration and development of oil and gas on the public domain. With respect to the latter, it is the policy of the BLM—under the noted statutes as well as the Federal Land Policy and Management Act of 1976 (FLPMA), and the Energy Policy Act of 2005—to make mineral resources available for development to meet national, regional, and local needs

With respect to deficiencies identified in the *CBD* case, the need to develop the EA was established by the court's finding that neither the USFS nor the BLM had taken a hard look at the reasonably foreseeable impacts of hydraulic fracturing operations associated with (1) impacts of surface-area disturbance; (2) cumulative impacts on the Indiana bat (*Myotis sodalis*) and the Little Muskingum River and other local water sources; and (3) impacts on air quality.

2.3. Geographic and Temporal Scope

The effects analysis timeframe (i.e., temporal scope) for this BA is 55 years, which includes an anticipated 15-year development period and a 40-year period of production. This programmatic consultation spans 55 years to account for processing and approval of APDs, as well as typical construction and production timeframes for the reasonably foreseeable oil and gas development.

2.3.1. Terrestrial Action Area

The Terrestrial Action Area is the Marietta Unit proclamation boundary plus a 4-mile buffer, plus an additional 0.5-mile buffer, but excluding West Virginia (Figure 2-2, below). This area encompasses

the extent of where potential surface impacts could occur from reasonably foreseeable development of the leases due to hydraulic fracturing technologies allowing private landowners up to 4 miles outside of the Proclamation Boundary to access Federal subsurface minerals below the Marietta Unit. The additional 0.5-mile buffer is included to account for potential impacts to terrestrial species from effects that can extend outside the disturbance area such as noise, dust deposition, erosion, and sedimentation.

Coordination with the ODNR indicates it is not realistic for an operator to drill from West Virginia into Ohio minerals. At present, the states of Ohio and West Virginia have not approved an Memorandum of Understanding (MOU) that would authorize oil and gas wells drilled in West Virginia to extend into minerals under Ohio (Holzel and Grubaugh, pers. comm.). If such a MOU was approved in the future, it is still not reasonably foreseeable that Federal minerals in Ohio would be accessed from a well in West Virginia, due to the necessity for an operator to obtain separate permits from West Virginia, Ohio, and the BLM prior to drilling the well.

Land ownership within the Terrestrial Action Area consists of intermingled private and Federal ownership. Privately owned lands (412,129 acres) account for approximately 86 percent of the total Terrestrial Action Area (478,316 acres). Public lands (66,188 acres) account for approximately 14 percent of the Terrestrial Action Area, including public lands managed by USFS (64,788 acres) as part of the WNF and U.S. Army Corps of Engineers (USACE) (150 acres) as part of the Parkersburg Levee System (DOI and USFS 2023). This BA reviews the potential impacts on threatened and endangered species, and those currently proposed for listing, resulting from the Proposed Action and reasonably foreseeable development of leases on both private surface and Federal surface accessing Federal mineral estate.

2.3.2. Aquatic Analysis Area

U.S. Geological Survey (USGS) uses a system of hydrologic unit codes (HUC) to classify watersheds in the United States and the Caribbean (*see* EA Section 3.6.1). The Aquatic Analysis Area for water aquatic plant and aquatic wildlife species includes the full extent of the 12-digit HUC, or HUC-12, watersheds overlapping the Marietta Unit and the surrounding 4.5-mile buffer (Figure 0-2). There are 32 total HUC-12 watersheds within the Aquatic Analysis Area (Table 01). This HUC level was chosen because water-quality reporting to the U.S. Environmental Protection Agency (USEPA) and water withdrawals reported to ODNR were performed at the HUC-12 level and provide the most readily available, current, and consistent information for examining water resources. The Aquatic Analysis Area encompasses watersheds where water withdrawals may occur to support reasonably foreseeable drilling and hydraulic fracturing activity associated with leases that are issued under the Proposed Action. Water withdrawals and impacts to water resources and aquatic species outside of the Aquatic Analysis Area are unlikely because operators strongly prefer to obtain water from a source that is close to the well site to be developed.

Figure 0-1. Terrestrial Action Area for Terrestrial Species (Marietta Unit plus a 4.5-mile buffer)

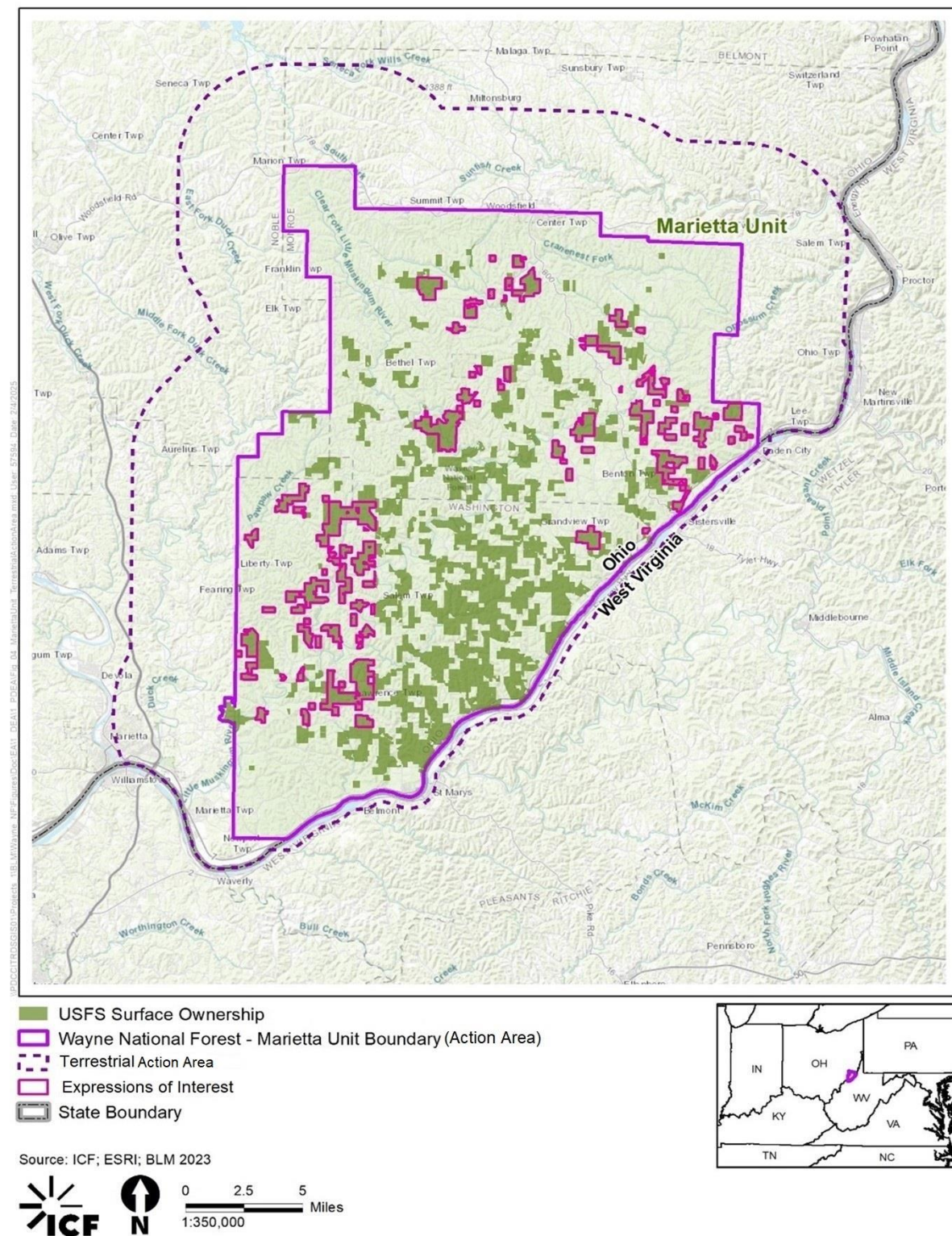


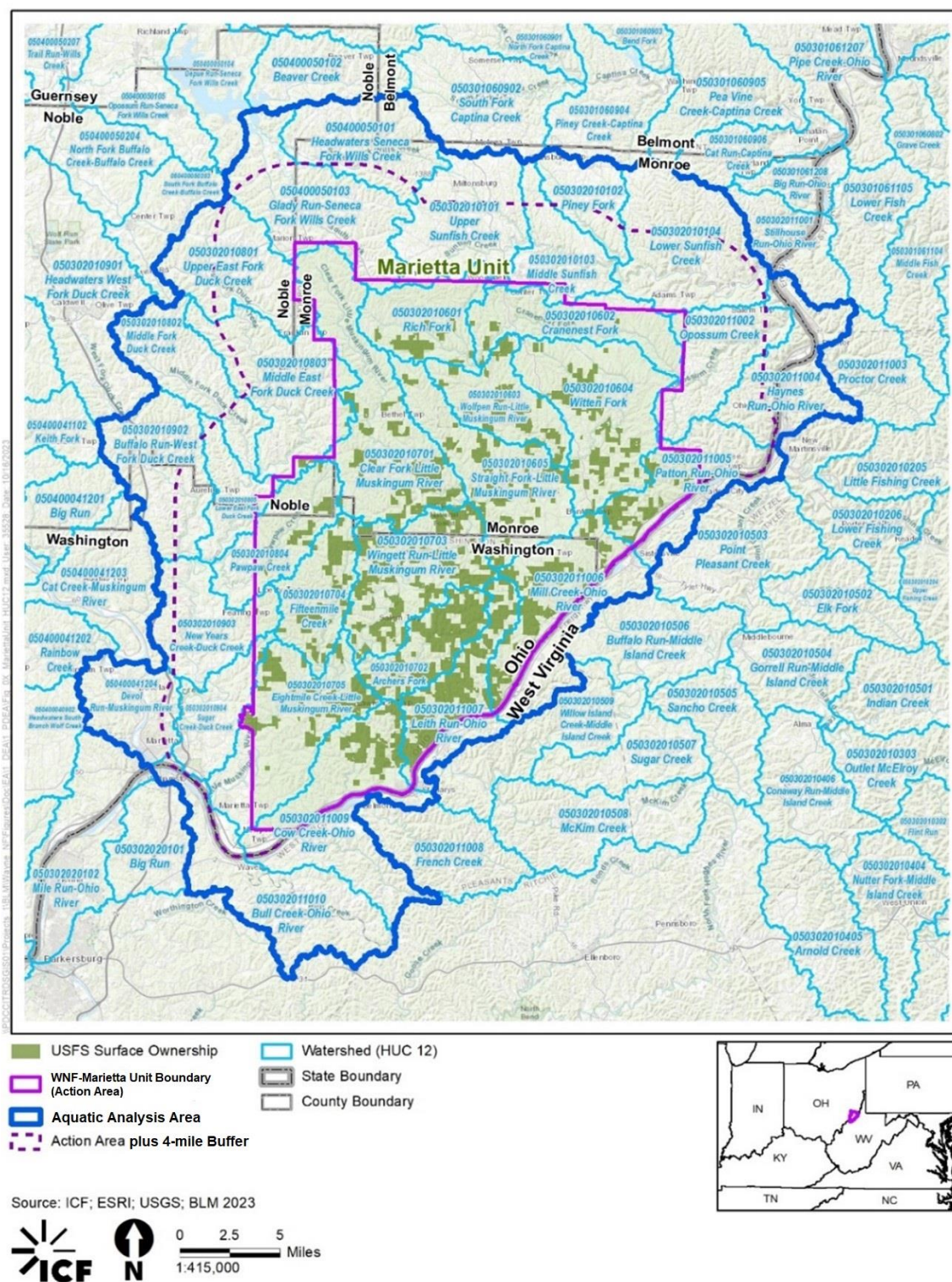
Figure 0-2. Aquatic Analysis Area for Aquatic Species

Table 01. HUC-12 Watersheds within the Aquatic Analysis Area for Aquatic Species

Watershed Name	State	HUC-12 (Subwatershed)	Acres within the Aquatic Analysis Area	Percentage of the Aquatic Analysis Area
<i>Little Muskingum–Middle Island (HUC8 – Subbasin)</i>				
Archers Fork	Ohio	050302010702	11,873	1.89%
Buffalo Run–West Fork Duck Creek	Ohio	050302010902	20,355	3.24%
Bull Creek–Ohio River	Ohio	050302011010	2,145	0.34%
	West Virginia	050302011010	25,424	4.05%
Clear Fork Little Muskingum River	Ohio	050302010701	31,242	4.98%
Cow Creek–Ohio River	Ohio	050302011009	15,675	2.50%
	West Virginia	050302011009	15,138	2.41%
Cranenest Fork	Ohio	050302010602	16,839	2.68%
Eightmile Creek–Little Muskingum River	Ohio	050302010705	26,676	4.25%
Fifteenmile Creek	Ohio	050302010704	13,135	2.09%
Haynes Run–Ohio River	Ohio	050302011004	9,018	1.44%
	West Virginia	050302011004	10,366	1.65%
Leith Run–Ohio River	Ohio	050302011007	13,174	2.10%
	West Virginia	050302011007	3,978	0.63%
Lower East Fork Duck Creek	Ohio	050302010805	9,171	1.46%
Lower Sunfish Creek	Ohio	050302010104	27,595	4.40%
Middle East Fork Duck Creek	Ohio	050302010803	25,812	4.11%
Middle Fork Duck Creek	Ohio	050302010802	16,958	2.70%
Middle Sunfish Creek	Ohio	050302010103	12,724	2.03%
Mill Creek–Ohio River	Ohio	050302011006	16,872	2.69%
	West Virginia	050302011006	10,827	1.73%
New Years Creek–Duck Creek	Ohio	050302010903	16,302	2.60%
Opossum Creek	Ohio	050302011002	16,197	2.58%
Patton Run–Ohio River	Ohio	050302011005	14,481	2.31%

Watershed Name	State	HUC-12 (Subwatershed)	Acres within the Aquatic Analysis Area	Percentage of the Aquatic Analysis Area
	West Virginia	050302011005	6,090	0.97%
Pawpaw Creek	Ohio	050302010804	14,990	2.39%
Piney Fork	Ohio	050302010102	9,992	1.59%
Rich Fork	Ohio	050302010601	14,343	2.29%
Straight Fork–Little Muskingum River	Ohio	050302010605	23,489	3.74%
Sugar Creek–Duck Creek	Ohio	050302010904	11,342	1.81%
Upper East Fork Duck Creek	Ohio	050302010801	20,248	3.23%
Upper Sunfish Creek	Ohio	050302010101	22,463	3.58%
Wingett Run–Little Muskingum River	Ohio	050302010703	23,258	3.71%
Witten Fork	Ohio	050302010604	27,111	4.32%
Wolfpen Run–Little Muskingum River	Ohio	050302010603	13,597	2.17%
Little Muskingum–Middle Island Subtotal			568,901	90.69%
<i>Muskingum (HUC8 – Subbasin)</i>				
Devol Run–Muskingum River	Ohio	050400041204	13,249	2.11%
<i>Wills (HUC8 – Subbasin)</i>				
Gladys Run–Seneca Fork Wills Creek	Ohio	050400050103	26,451	4.22%
Headwaters Seneca Fork Wills Creek	Ohio	050400050101	18,681	2.98%
Aquatic Analysis Area Total			627,283	100.00%

2.4. Project Type and Deconstruction

The Proposed Action applies to the leasing of Federal minerals, regardless of the amount of Federal surface interest. USFS has authority to purchase lands, and some mineral rights owned by private parties may revert to United States ownership after a set period of time, which may increase the total acreage of Federal minerals available for lease.

This BA analyzes the effects on Federally listed species in a programmatic approach prior to availability of leases (other than the 65 five noted above), considers the effects of all the leasing as a whole over a 55-year period, and is part of a tiered consultation process. The effects analysis timeframe (i.e., temporal scope) for this BA is 55 years, which assumes an anticipated 15-year development period and a 40-year period of production. To date, interested parties have submitted at least 33 EOIs for parcels on the Marietta Unit (**Error! Reference source not found.**). Additionally, 65 total leases have been issued, including 36 leases challenged in *CBD*, and 29 leases that were not challenged in *CBD*, but which were based on the same NEPA analysis that the court found insufficient as to the 36 leases.

As leasing nominations are received, the BLM and USFS will review specific information about the lands nominated to ensure they contain Federal minerals and are administratively available for lease (i.e., are not already leased, or not within incorporated towns). If the Proposed Action is implemented, the BLM would affirm the issuance of the 65 leases and make “eligible and available” determinations for those parcels that have not yet been offered for competitive lease. Prior to offering any parcels for lease, the BLM would need to request and receive USFS consent. Additionally, if the Proposed Action is approved, USFS will determine whether to issue consent authorizations under 36 C.F.R. § 228.102(e) when requested by the BLM. This includes reconsideration of consent as to the 65 leases noted above.

In accordance with 43 C.F.R. § 3120.41, prior to a lease sale, parcels nominated for leasing at a quarterly lease sale would be identified and would apply AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis, through a Notice of Competitive Lease Sale. Under 43 C.F.R. § 3120.42, at least 60 calendar days prior to conducting a competitive auction, the BLM will make available to the public a list of lands to be offered for competitive lease sale in a Notice of Competitive Lease Sale. Oil and gas leases are issued for a 10-year period and continue for as long thereafter as oil or gas is produced in paying quantities.

2.4.1. Phases of Oil and Gas Development

For a characterization of the phases of oil and gas development for both conventional (i.e., vertical) and horizontal drilling techniques, refer to Section 2.2.1 of the 2016 EA and Section 9.2 of the 2020 RFDS (Appendix D in the Supplemental EA; BLM 2020). Phases of oil and gas development include surface exploration, geophysical exploration, exploratory drilling, in-field drilling, well stimulation/hydraulic fracturing, production, well abandonment, and reclamation. Table 2-3 provides a comparison of techniques, equipment, and impacts resulting from conventionally (vertically) completed wells versus hydraulically fractured wells using horizontal drilling.

2.4.2. Reasonably Foreseeable Development Scenario

The BLM's 2020 RFDS (BLM 2020) estimates the extent of reasonably foreseeable development of oil and gas resources that could occur in the Marietta Unit of the WNF following the issuance of leases covered by the Proposed Action. The 2020 RFDS (BLM 2020) acknowledged the feasibility of the use of high-volume hydraulic fracturing based on improved technology and other factors and projected an increased level of well development and surface disturbance compared to the 2006 RFDS.

Wells and Well Pads

The 2020 RFDS projects up to 29 horizontal well pads will be constructed to support up to 81 horizontal wells within the Marietta Unit between 2020 and 2034 (BLM 2020). Based on this forecast of proposed wells, construction of up to two well pads is anticipated each year, with two to three wells estimated per pad, for up to six wells per year. According to the 2020 RFDS, all wells in the WNF are projected to be primarily gas wells, many of which would also produce some oil. No oil-only wells are projected in the WNF. All of these wells are projected to be horizontally drilled gas wells with most being drilled from private surface pads using hydraulic fracturing.

Surface Disturbance

The 2020 RFDS predicts that up to 81 new horizontally drilled wells (some potentially drilled from well pads containing multiple wells) would be drilled in the Action Area. Some of these wells would target the Marcellus Shale, but most were projected to target the deeper Point Pleasant/Utica formations. Well pads used to support horizontally drilled wells in southeastern Ohio have ranged in surface disturbance acreage from 6 to 35 acres (RFDS) depending on topography, access, pipelines (including gathering lines and regional distribution lines), and the number of wells proposed per pad (BLM 2020). After initial construction of a well pad, access roads, and any pipelines, most of the associated disturbance is typically regraded and seeded as interim reclamation measures for preventing erosion. Well pads, access roads, and other surface disturbance remaining after interim reclamation range from 3 to 10 acres and typically remain until final reclamation is complete (BLM 2020).

All reclamation activities accessing Federal minerals from Federal surface would be performed in accordance with the *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (commonly referred to as the Gold Book) (BLM 2007), which provides information about the requirements for obtaining permit approval and conducting environmentally responsible oil and gas development, operation, and reclamation on Federal lands and non-Federal surface overlying Federal minerals. If drilling were to occur on Federal surface, the Forest Service would require the operator to reclaim the surface to the standards in the Forest Plan. Were development to occur on private surface, the BLM would consult with the Fish and Wildlife Service, and any requirements, including reclamation, would be stated as conditions of approval of the APD.

Interim reclamation consists of reducing the original disturbance footprint by reclaiming portions of the well site not needed for production operations. Final reclamation requires the well site be recontoured to original contour or to a contour that blends with the surrounding landform, with stockpiled topsoil evenly redistributed and the site revegetated (BLM 2007). Refer to Section 9.2.3

in the 2020 RFDS (Appendix D in the Supplemental EA) for additional information about reclamation.

Based on recently constructed well pads and wells in the Action Area, it is estimated that oil and gas activity for the RFDS 15-year development period would result in between 171 and 1,015 new acres of initial disturbance and 86 to 285 acres of longer-term disturbance remaining after interim reclamation and until final reclamation of the pad, access roads, and other infrastructure is complete (Table 0-2). The projected surface disturbance in the 2020 RFDS, as depicted in Table 2-2, includes all acreage potentially affected by reasonably foreseeable future oil and gas development of the leases that could be issued or affirmed under the Proposed Action, such as road construction and maintenance, well-pad construction, water storage tanks, construction of turnaround/production facility areas, pipelines (including gathering lines and distribution lines), staging areas, water impoundments, and other related activities.

Table 0-2. Potential Disturbance in the Terrestrial Action Area Projected by the RFDS

Surface Disturbance Description	Development Period
Total Initial Acres of Surface Disturbed by Oil and Gas Drilling before Reclamation	171 to 1,015
Total Acres of Surface Needed to Support Long-Term Production (i.e., Remaining)	86 to 285

Source: BLM 2020

Note: As described in the BLM 2020 RFDS (BLM 2020), horizontal well pads in southeastern Ohio have ranged in disturbance acreage from 6 to 35 acres, depending on topography, access, pipelines, and the number of wells proposed per pad. After initial construction of a well pad, access roads, and any pipelines, most of the associated disturbance is typically regraded and seeded as interim reclamation to prevent erosion. Well pads and access disturbances remaining after interim reclamation range from 3 to 10 acres and typically remain until final reclamation (when wells are plugged).

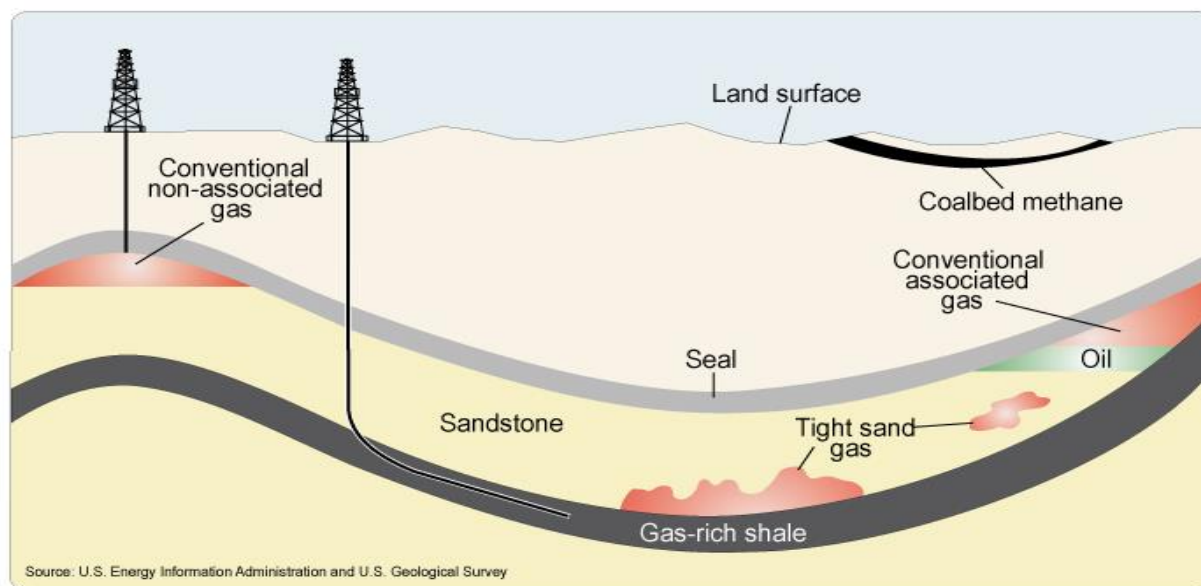
In the years following BLM's decision to select the proposed action in the 2016 EA, BLM issued a total of 65 leases. However, operators only submitted APDs and obtained approval for six Federal wells, to be drilled from private surface, of which just five were completed. This occurred between 2019 and 2021. The BLM reviewed the permits that the State of Ohio issued for the well pads and roads that supported the five wells that the BLM had approved. These are known as the Forni wells and are located on the Forni North well pad (Forni 1UH, Forni 3UH, Forni 4UH, Forni 5UH, Forni 6UH). These permits are available at <https://ohiodnr.gov/business-and-industry/energy-resources/well-information/well-locator>. For the Forni APDs, the BLM reviewed the acres cleared for an access road, acres cleared for the well pad, water withdrawn for fracking, and the various wastes generated and hauled offsite. All of these surface disturbances and associated water withdrawals fell within the ranges anticipated in the projections of the RFDS.

2.4.3. Vertically Drilled/Vertical Completions versus Horizontally Drilled/Hydraulically Fractured Completions

Horizontal drilling (also known as unconventional drilling) and hydraulic fracturing completion technologies have made it possible to commercially develop gas reserves not previously developable, particularly shale gas reserves as exist beneath Marietta Unit. The 2020 RFDS assumed that most new wells in the WNF would be horizontally drilled, natural-gas wells, with

high-volume hydraulic fracturing being the predominant well-stimulation technique (BLM 2020). Table 0-3 compares the general activities associated with horizontally drilled, hydraulically fractured wells to vertically drilled and completed wells. The parameters described for vertical well completions are provided for comparison purposes only, as the types of wells projected in the RFDS are mostly horizontal drilled wells. The horizontally drilled, hydraulically fractured well-parameter values summarized in Table 0-3 are considered in the impact analysis described in this BA. Figure 0-3 depicts oil and gas drilling using vertical (the drill on the far left of Figure 0-3) and horizontal drilling techniques (the drill second to the left on Figure 0-3).

Figure 0-3. Oil and Gas Drilling Using Vertical and Horizontal Drilling Techniques



Source: EIA 2011

Table 0-3. Representative Differences between Vertically Drilled/Conventionally Completed Wells and Horizontally Drilled/Hydraulically Fractured Wells

Category	Vertically Drilled and Completed Wells/Pads	Horizontally Drilled and Hydraulically Fractured Completed Wells/Pads
Disturbance Area	Short-term Disturbance²: • The total acreage of surface disturbance by oil and gas drilling activity before interim reclamation averages approximately 0.7 to 1.1 acres (USFS 2012c). • Short-term disturbance lasts approximately 2 to 4 weeks (Lioudis 2022). • Vertical wells require tighter spacing and are typically drilled from individual well pads. Long-term Disturbance³: • The total acreage of surface needed to support drilled wells that were completed for production (excess disturbance reclaimed) averages approximately 0.6 to 0.7 acre (USFS 2012c). • Long-term disturbance lasts approximately 20 to 30 years, until the well is plugged (BLM 2020).	Short-term Disturbance (roads, pads, pipelines, etc.): • The total acreage of surface disturbance by oil and gas construction and drilling activity before interim reclamation averages approximately 6 to 35 acres⁴ (BLM 2020). • Short-term disturbance lasts approximately 8 to 10 weeks until reclamation (Lioudis 2022). (Reclamation is regrading and replanting, as appropriate to each site.) • Horizontal wells can be dispersed more than vertical wells (due to longer lateral reach) and typically include multiple wells per pad. Long-term Disturbance: • The total acreage of surface needed to support drilled wells that were completed for production (excess disturbance reclaimed) averages approximately 3 to 10 acres (BLM 2020). • Long-term disturbance lasts approximately 20 to 30 years, until the well is plugged (BLM 2020).

DOGRM = Division of Oil and Gas Resources Management; Mgal = million gallons; OEPA = Ohio Environmental Protection Agency; VOC = volatile organic compound

² *Short-term surface disturbance impacts* are defined as disturbance associated with well-pad construction (including access roads, staging areas, water impoundments, pipelines) and well completion (when the well is ready to produce oil or gas). Interim reclamation occurs following these activities.

³ *Long-term surface disturbance impacts* are defined as disturbance associated with well operation.

Well Depth	Well depth varies from less than 1,000 feet to more than 10,000 feet (BLM 2020).	- Horizontal wells in the Marcellus and Utica Shales can reach from 5,000 to 10,000 feet below the surface (BLM 2020). - Horizontal wells in the area are around 10,000 feet deep.
Well Lateral Reach	There is no lateral reach associated with vertical wells, as the well bore is generally vertical as depicted on Figure 0-3.	- In 2017, the average length of laterals in the Utica formation (located primarily in Ohio) was 8,628 feet (EIA 2018). - The reasonably foreseeable extent of lateral reach for a horizontal well in this BA is assumed to be up to 4 miles (BLM 2020). For example, in Monroe County, Ohio, a horizontal well reached a total horizontal reach of approximately 4 miles (ODNR 2018).
Process Duration (days of continuous 24-hour drilling activity)	Although many variables can affect drilling time, a typical vertical well takes about 3 days to drill (BLM 2020).	- Although many variables can affect drilling time, a typical horizontal well takes from 5 days to 25 days to drill (BLM 2020). - Multiple wells may be drilled in succession, thus increasing the number of consecutive drilling days. Well pads used for horizontal drilling in the area of the WNF may contain one to 18 or more wells, with three wells per well pad being common (BLM 2020). - Completing a well using hydraulic fracturing typically

⁴ The estimated surface disturbance of 6 to 35 acres for construction and drilling of a horizontal well pad includes all acreage potentially affected by reasonably foreseeable future oil and gas development of the leases that could be issued or affirmed under the Proposed Action, such as road construction and maintenance, well-pad construction, water storage tanks, construction of turnaround/production facility areas, pipelines (including gathering lines and distribution lines), staging areas, water impoundments, and other related activities (BLM 2020).

Noise Impacts per Pad	• Drilling is a continuous operation until the total depth of the well is reached, typically about 3 days (BLM 2020). • Noise levels at drilling sites measured at approximately 63 decibels at 200 feet from the source (BLM 1999)	takes an additional 10 days. If there are multiple wells on a pad, completions would take longer for each well. • Drilling is a continuous operation until the total depth of the well is reached, typically about 5 days (BLM 2020). As such, duration of noise impacts during drilling is typically longer than for vertical drilling. • Noise levels during well construction and drilling generally average 65 decibels (dBA)⁵ at 350 feet from the source (Radtke 2016). • Noise levels during hydraulic fracturing of wells generally average 69 dBA at 350 feet from the source (Radtke 2016). • Noise levels during well production generally average 47 dBA at 350 feet from the source (Radtke 2016). • Increased amounts of heavy-truck traffic, mainly for hydraulic fracturing waste transport, would result in increased noise levels along access routes with noise level increases being higher closer to the source of the heavy-truck traffic
Visual Impacts per Well	Short-term Impacts²: • Disturbance averages 0.7 to 1.1 acres and lasts in the landscape 2 to 4 weeks (USFS 2012c; Lioudis 2022). • The height of the drilling rig (its tallest component) is typically 80 to 100 feet, depending on well depth (BLM 2020). • Because drilling is a continuous operation until the	Short-term Impacts: • Disturbance averages 6 to 35 acres and stays in the landscape for 8 to 10 weeks (BLM 2020; Lioudis 2022). • The height of the drilling rig (its tallest component) is typically 80 to 100 feet, depending on well depth (BLM 2020).

⁵ Decibel levels cited are all reported in 5 Second Leq A-weighted Decibels. The Leq (Equivalent Continuous Sound Level) is a key metric in acoustics and noise studies, representing the average sound level over a designated period, in this case the average sound level over 5 seconds during the monitoring periods.

	total depth of the well is reached, sites are lit at night, and the rig masts are lit for aircraft safety (BLM 2020). • Short-term impacts associated with construction also would include heavy equipment and employee vehicles (stationary and traveling to/from well pad locations) and fugitive dust. Long-term Impacts¹: • Disturbance averages 0.6 to 0.7 acre and lasts in the landscape 20 to 30 years (USFS 2012c). • Wells might produce for many years, depending on the resource; drilling rigs are typically in place only during the drilling phase.	• Because drilling is a continuous operation until the total depth of the well is reached, sites are lit at night, and the rig masts are lit for aircraft safety (BLM 2020). • Short-term impacts associated with construction would also include heavy equipment, heavy-truck traffic, employee vehicles (stationary and traveling to/from well pad locations), and fugitive dust. • The tallest hydraulic fracturing-related unit on site is typically a 43-foot-tall pump in place for limited days needed to conduct hydraulic fracturing on all wells (BLM 2019). • Short-term impacts are associated with increased amounts of heavy-truck traffic, mainly for hydraulic fracturing waste transportation. Long-term Impacts: • Disturbance averages 3 to 10 acres and lasts 20 to 30 years in the landscape (BLM 2020). • Wells might produce for many years, depending on the resource; drilling rigs are typically in place only during the drilling phase. • Hydraulic fracturing could occur at any time during a well's productive life (typically lasting 1 to 2 days). To help retain a consistent production rate, a well may need to be hydraulically fractured on a periodic basis, which necessitates additional heavy equipment, water storage, and vehicle traffic (OEPA 2020).
Air Emissions	• In addition to contributing to the formation of ozone, Hazardous air pollutants (HAPs) associated with the oil and gas industry include air toxics, such as benzene, ethylbenzene, and n-hexane (USEPA 2022) and other criteria pollutants such as particulate matter, carbon monoxide, sulfur dioxide, nitrogen dioxide and lead.	• In addition to contributing to the formation of ozone, Hazardous air pollutants (HAPs) associated with the oil and gas industry include air toxics, such as benzene, ethylbenzene, and n-hexane (USEPA 2022) and other criteria pollutants such as particulate matter, carbon monoxide, sulfur dioxide, nitrogen dioxide and lead.

Water Use	Conventional drilling activities typically use approximately 44,000 to 85,000 gallons (or 0.044 to 0.085 Mgal) of water per well (BLM 2012).	- During hydraulic fracturing's gas-collection process, it is estimated that 3.6 to 7.9 percent of methane leaks into the atmosphere during the service life of a hydraulically fractured well (Mrdjen and Lee 2016). - Additional vehicle trips required for hydraulic fracturing would increase tailpipe emissions (see Pad Construction Vehicle Trips, below). - Horizontal wells in Monroe, Washington, and Noble Counties have been reported to use between 19 and 27 Mgal of water per well during drilling and completion (OEPA 2020). During operations, horizontal wells have been found to use between 2 and 6 Mgal of water per well (University of Michigan 2013). If recompletion of a well is required, additional water would be needed. - Because horizontal completions take longer and require more water, the timeframe during which water is drawn is longer than for vertical drilling and conventional completions. - Not all water withdrawals are taken from local sources. Some originate from recycled water sources.
Water Disposal	- Wastewater discharge tends initially to be modest and increases with a well's production age, producing a smaller amount of near-term wastewater volume but a larger amount of water discharge the longer they exist (Xu et al. 2022). - Approximately 98 percent of produced wastewater is disposed of via underground injection into Class II wells that USEPA and the State of Ohio regulate, and 2 percent is spread on roads for dust and ice control subject to local government approval and requirements (ODNR 2023c).	- Wastewater generation is concentrated in the early Stage of production and declines with a well's production age, producing a larger amount of near-term wastewater volume and water discharge decreasing the longer they exist (Xu et al. 2022). - Concentrations of inorganic elements and radioisotopes are generally higher (USEPA 2019). - Flowback from hydraulic fracturing is required to be treated separately. It is typically maintained in segregated tanks and disposed of per ODNR-DOGRM regulations. - Approximately 98 percent of produced wastewater and fracturing flowback is disposed of via

Pad Operations	• Pad operations typically have a 20- to 30-year life span (BLM 2019).	underground injection into Class II wells that USEPA and the State of Ohio regulate (ODNR 2023c). • Pad operations typically have a 25-to-40-year life span (BLM 2020). • Hydraulic fracturing could occur at any time during a well's productive life and lasts 1 to 2 days. This most frequently occurs as soon as a well drilling is complete, or shortly thereafter (BLM 2019), but additional rounds of hydraulic fracturing may occur on a periodic basis during production to help maintain target production rates (OEPA 2020b).
Pad Construction Vehicle Trips	• Vehicle trips during the construction phase of vertical drilling include equipment trucks, worker trips, water trucks, and product transport. • On average, 287 trips are needed for construction of one well pad with one vertical well that is not hydraulically fractured (CDOT 2015).	• Vehicle trips during the construction phase include equipment trucks, worker trips, water trucks, and product transport. • A study in Colorado found that, on average, 1,941 trips are needed for construction of one well pad with one horizontal well that is hydraulically fractured (CDOT 2015) and, on average, 6,414 trips are needed for construction of one well pad with three horizontal wells that are hydraulically fractured (CDOT 2015). • If wells require additional rounds of hydraulic fracturing during the production lifetime, additional vehicle trips would occur. A study in the Permian Basin estimated that re-fracking a well can require up to 80 percent of the original truck trips needed during initial completions/fracking (Texas A&M 2016).
Well Operations Vehicle Trips	• Vehicle trips during the operational phase of vertical drilling could include trucking water to dispose of produced water.	• Increased vehicle trips during the operational phase of horizontal drilling could include trucking water to dispose of produced water. A study in the Permian Basin estimated that up to 349 truck trips are required during well operation/production activities for a single horizontal well (Texas A&M 2016)
Workers for Well Pad	• Crews of two to five daytime workers are typically	• Crews of two to five daytime workers are typically

Construction and Drilling	employed to construct each well pad. Well pad construction typically lasts 7 to 10 days (BLM 2019) • Crews of approximately 12 workers are typically employed to drill each well (BLM 2019). BLM data indicate that wells drilled in shallow formations typically take 2 to 4 days to drill (BLM 2019).	employed to construct each well pad. Well pad construction typically lasts 7 to 10 days (BLM 2019) • Crews of approximately 12 workers are typically employed to drill each well (BLM 2019). BLM data indicate that wells drilled in shallow formations typically take 2 to 4 days to drill (BLM 2019), with longer/deeper wells taking longer.	1 1
Workers for Well Pad Operations/ Production	• Typically, five to eight employees for a standard 12-hour shift (BLM 2019).	• Typically, eight to 15 employees are required for each shift (typically a 12-hour standard shift), and usually no more than one shift is required per day. Additional personnel from the owner/operator may be on site to observe and run ancillary equipment, as necessary (BLM 2019).	

2.5. Description of Habitat

The Marietta Unit of the WNF lies mostly within the Ohio Valley Lowlands Subsection of the Southern Unglaciaded Allegheny Plateau Section. This subsection is characterized by steep, wooded lands with high-gradient, often ephemeral streams. Ongoing uses of the land in the WNF include timber harvest, recreation, and mineral development. Private lands in the area are primarily for mineral development, agriculture, business, recreation, and residential uses. Habitat in the Terrestrial Action Area and Aquatic Analysis Area is characterized below.

2.5.1. Habitat in the Terrestrial Action Area

2.5.1.1. Vegetation

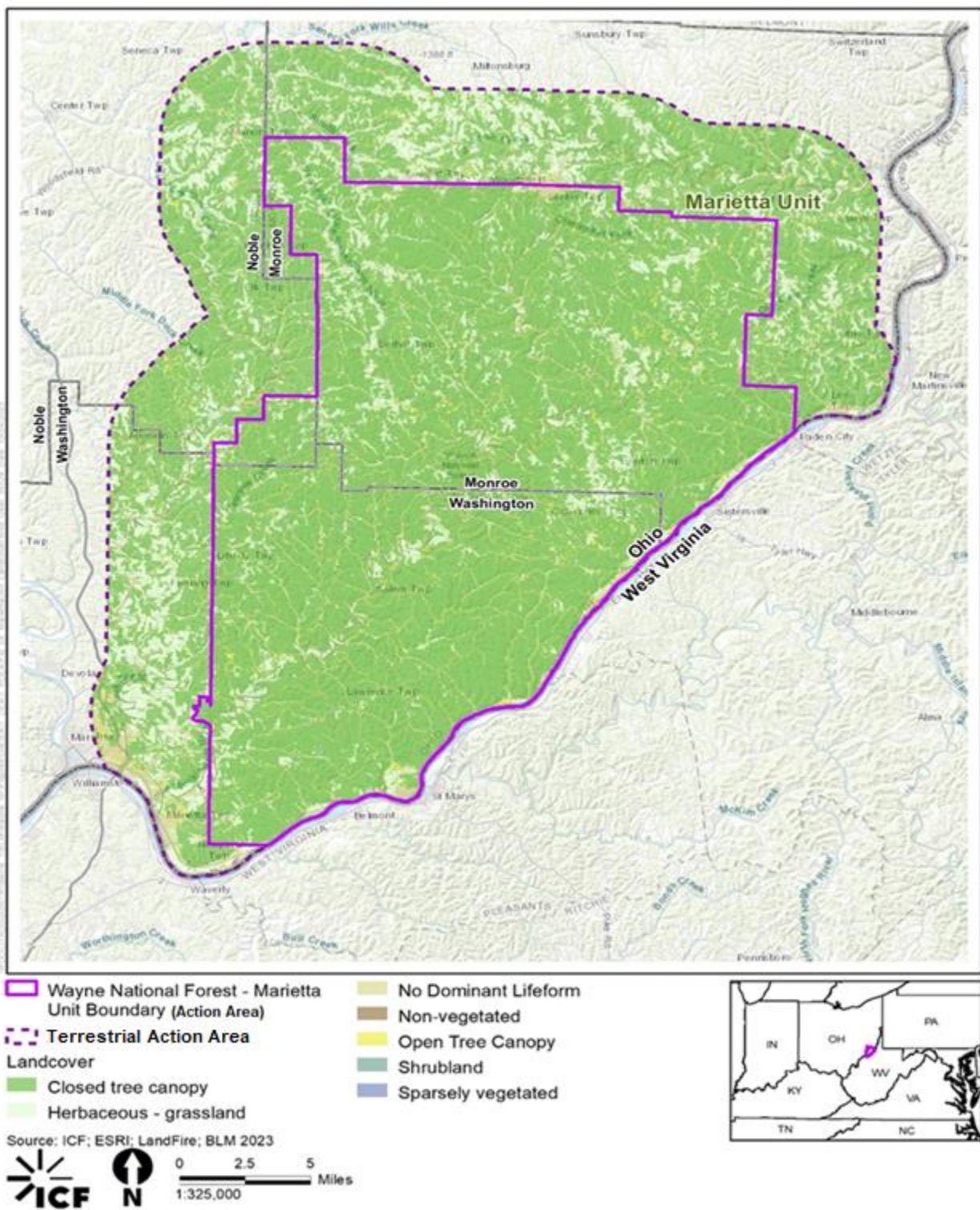
The condition of vegetation can result in direct and indirect impacts on federally listed species and their habitat. Vegetation was mapped within the Terrestrial Action Area using the USGS LANDFIRE Database, resulting in 14 land cover classes and 42 land cover types (Table 0-4;

Figure 0-4). The majority of the Terrestrial Action Area (approximately 74 percent) is classified as deciduous closed tree canopy, approximately 12 percent is annual graminoid/forb, and approximately three percent is deciduous open tree canopy (Table 0-4) (USGS 2023a).

Table 0-4. Land Cover in the Terrestrial Action Area

Land Cover Class and Type	Acres	Percentage
<i>Annual graminoid/forb</i>	62,878	11.57%
Eastern Cool Temperate Close Grown Crop	407	0.07%
Eastern Cool Temperate Fallow/Idle Cropland	344	0.06%
Eastern Cool Temperate Pasture and Hayland	59,188	10.89%
Eastern Cool Temperate Row Crop	2,884	0.53%
Eastern Cool Temperate Row Crop - Close Grown Crop	16	0.00%
Eastern Cool Temperate Wheat	38	0.01%
<i>Deciduous closed tree canopy</i>	398,257	73.28%
Allegheny-Cumberland Dry Oak Forest and Woodland	18,367	3.38%
Appalachian Northern Hardwood Forest	2,049	0.38%
Northeastern Interior Dry-Mesic Oak Forest	141,864	26.10%
South-Central Interior Mesophytic Forest	235,977	43.42%
<i>Deciduous open tree canopy</i>	15,547	2.86%
Eastern Cool Temperate Developed Deciduous Forest	1,242	0.23%
Eastern Cool Temperate Orchard	11	0.00%
Eastern Cool Temperate Urban Deciduous Forest	14,294	2.63%
<i>Deciduous shrubland</i>	593	0.11%
Northern & Central Ruderal Shrubland	593	0.11%
<i>Developed</i>	31,245	5.75%
Developed-High Intensity	838	0.15%
Developed-Low Intensity	3,575	0.66%
Developed-Medium Intensity	1,658	0.31%
Developed-Roads	24,803	4.56%
Quarries-Strip Mines-Gravel Pits-Well Pads and Pads for Wind Turbines	370	0.07%
<i>Evergreen closed tree canopy</i>	89	0.02%
Appalachian Hemlock Forest	89	0.02%
<i>Evergreen open tree canopy</i>	6,752	1.24%
Eastern Cool Temperate Developed Evergreen Forest	128	0.02%
Eastern Cool Temperate Urban Evergreen Forest	354	0.07%
Northeastern North American Temperate Forest Plantation	6,270	1.15%
<i>Mixed evergreen-deciduous closed tree canopy</i>	1,172	0.22%
Appalachian (Hemlock)-Northern Hardwood Forest	977	0.18%
Northern & Central Native Ruderal Flooded & Swamp Forest	196	0.04%
<i>Mixed evergreen-deciduous open tree canopy</i>	7,950	1.46%
Eastern Cool Temperate Developed Mixed Forest	134	0.02%
Eastern Cool Temperate Urban Mixed Forest	1,483	0.27%

Land Cover Class and Type	Acres	Percentage
Northern & Central Native Ruderal Forest	3,796	0.70%
South-Central Interior Large Floodplain Forest	1,071	0.20%
South-Central Interior Small Stream and Riparian Forest	1,466	0.27%
<i>Mixed evergreen-deciduous shrubland</i>	1,349	0.25%
Eastern Cool Temperate Developed Shrubland	8	0.00%
Eastern Cool Temperate Urban Shrubland	1,337	0.25%
South-Central Interior Large Floodplain Shrubland	1	0.00%
South-Central Interior Small Stream and Riparian Shrubland	3	0.00%
<i>Non-vegetated</i>	9,812	1.81%
Open Water	9,812	1.81%
<i>Perennial graminoid</i>	3,169	0.58%
Eastern Cool Temperate Developed Herbaceous	432	0.08%
Eastern Cool Temperate Urban Herbaceous	2,684	0.49%
South-Central Interior Large Floodplain Herbaceous	22	0.00%
South-Central Interior Small Stream and Riparian Herbaceous	31	0.01%
<i>Perennial graminoid grassland</i>	4,680	0.86%
Northern & Central Ruderal Meadow	4,665	0.86%
Northern & Central Ruderal Wet Meadow & Marsh	14	0.00%
<i>Sparsely vegetated</i>	1	0.00%
Cumberland Acidic Cliff and Rockhouse	1	0.00%
Total	543,494	100.00%

Figure 0-4. Land Cover Classes within the Terrestrial Action Area

2.5.1.2. Existing Disturbances to Terrestrial Action Area Habitat

In addition to specific, planned, and completed USFS projects on NFS lands within the Marietta Unit Proclamation Boundary, private landowners in the Terrestrial Action Area conduct oil and gas activities, farming and grazing activities, and timber sales on their land.

The majority of past, present, and future surface disturbance in the Terrestrial Action Area is a result of oil and gas drilling. As of October 2023, there were 16,175 oil and gas wells in the Terrestrial Action Area that were not dry, orphan, or plugged wells, with 13,155 (i.e., 81 percent) of those wells occurring on private land (Table 0-5). The number of oil and gas wells on both private and NFS land within the Terrestrial Action Area is tallied in Table 0-5 below. A total of 3,020 oil and gas wells are on NFS lands within the Proclamation Boundary of the Marietta Unit. Of these wells, 1,941 are on NFS land in Washington County, 1,009 are on NFS land in Monroe County, and 70 are on NFS land in Noble County. In Ohio, private land within the Terrestrial Action Area is interspersed within the WNF. Approximately 7,582 wells are on private land in Monroe County, 1,082 in Noble County, and 4,491 in Washington County (ODNR 2023a).

Table 0-5. Existing Oil and Gas Wells within the Terrestrial Action Area (4.5-mile buffer)

County	Wells on NFS Land	Wells on Private Land
Monroe	1,009	7,582
Noble	70	1,082
Washington	1,941	4,491
Total	3,020	13,155

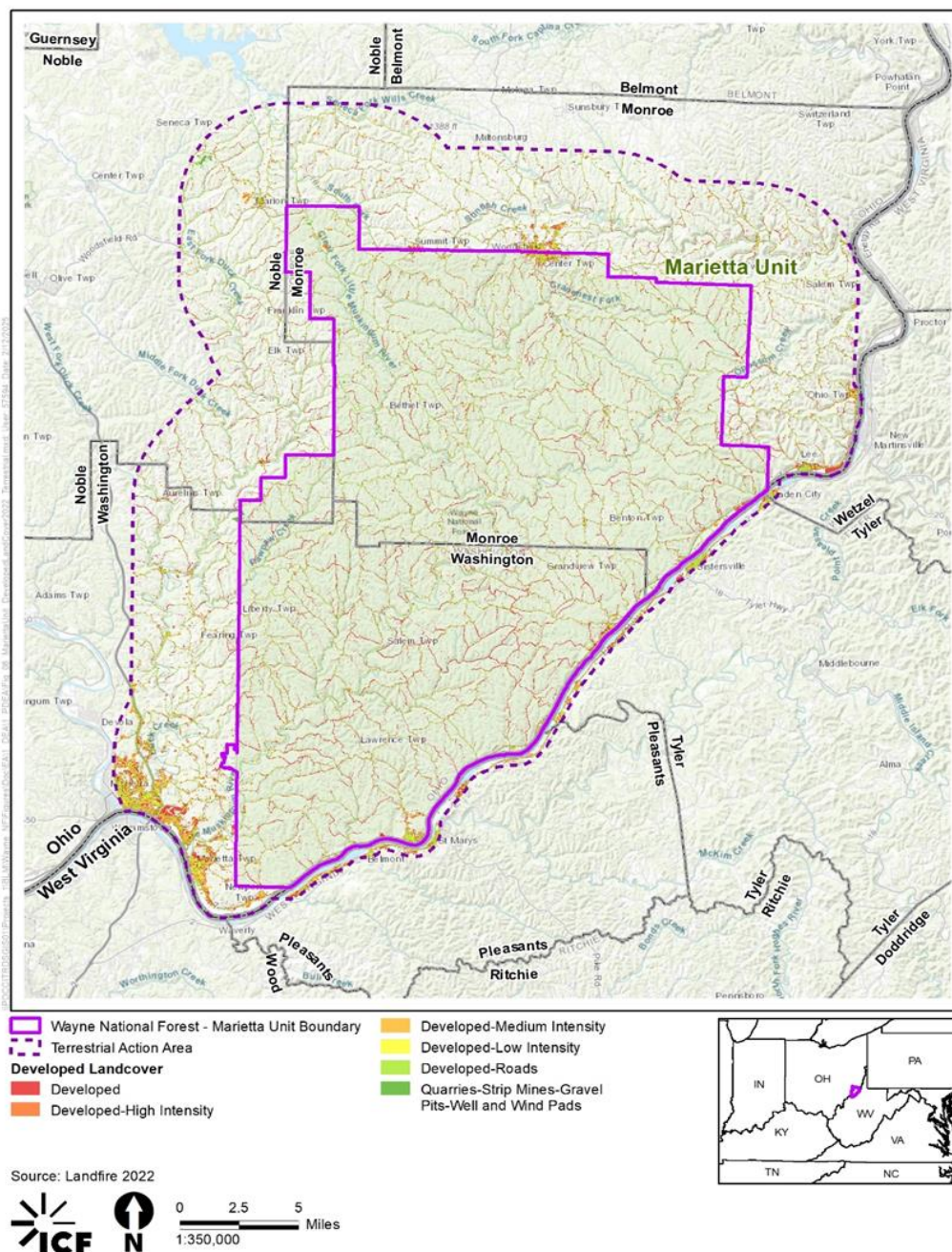
Source: ODNR 2023a

As of 2022, there were an estimated 42,183 acres of developed land/existing surface disturbance within the Terrestrial Action Area, which accounts for approximately 9.4 percent of the total acreage within the Terrestrial Action Area (LANDFIRE 2022a). Figure 2-6 depicts the developed land/existing disturbance in the Terrestrial Action Area as of 2022. Prior to the boom in oil and gas drilling utilizing horizontal drilling and hydraulic fracturing, there was an estimated 37,172 acres of developed land/disturbance within the Terrestrial Action Area in 2001 (LANDFIRE 2001a). As such, estimated developed land/surface disturbance has increased approximately 13.5 percent between 2001 and 2022 in the Terrestrial Action Area, primarily resulting from increased oil and gas development and development of roads.

There was also surface and underground mining in the more distant past. Staff from ODNR, Division of Mineral Resources Management provided a focused review in the Terrestrial Action Area for abandoned underground mines and potentially bat-accessible mine openings using records only internally available. The WNF Wildlife Biologist concluded from the provided information that there are at least six mine openings that are potentially bat-accessible, but they have not been evaluated by a trained biologist to determine bat hibernation habitat suitability. Furthermore, there are an additional 26 known mine sites that have not been inspected or evaluated to determine bat-accessibility as well as probably a few more unknown/unmapped, bat-accessible mine openings within the Terrestrial Action Area. However, there are very few open entries overall, the underground mines tend to be relatively small and not connected to one another, the majority of drift entries showing on the public ODNR mine map viewer are likely not open or bat-accessible, and none of the sites have been confirmed as potentially suitable bat hibernation habitat (including areas along the Ohio River toward West Virginia).

Thus, there might be limited bat hibernation habitat available within the Terrestrial Action Area. Additional analysis would be conducted at the site specific APD stage.

Figure 0-5. Existing Disturbance and Developed Land in the Terrestrial Action Area



2.5.2. Habitat in the Aquatic Analysis Area

2.5.2.1. *Water Resources*

The Aquatic Analysis Area for water resources includes the 12-digit HUC, or HUC-12, watersheds overlapping the Marietta Unit and the surrounding 4.5-mile buffer (Figure 0-2). A total of 32 HUC-12 watersheds are within the Analysis Area. The Aquatic Analysis Area encompasses watersheds where water withdrawals would most likely occur to support reasonably foreseeable drilling and hydraulic fracturing activity associated with leases that are issued under the Proposed Action. Water withdrawals and impacts to water resources and aquatic species outside of the Aquatic Analysis Area are unlikely because operators strongly prefer to obtain water from a source that is close to the well site. This HUC level was also chosen because water-quality reporting to USEPA and water withdrawals reported to ODNR are performed at the HUC-12 level.

Wetlands and riparian zones in the Aquatic Analysis Area largely follow the Little Muskingum and Ohio Rivers. Most wetlands found in the WNF are palustrine emergent, forested, or shrub-scrub wetlands, as described in the USFWS classification system (FGDC 2013). Although wetlands can be groundwater dependent, they do not always receive groundwater discharge. Many of the larger wetlands in the WNF were artificially constructed, and there is little evidence to suggest that they are heavily dependent on groundwater (USFS 2020a). Additional regional information about goals and objectives related to wetlands and riparian zones for the WNF is provided in the aquatic and riparian resources section of the Forest Plan Final EIS (USFS 2006b).

Figure 0-6 and

Figure 0-7 show the Ohio Environmental Protection Agency (OEPA), Division of Surface Water aquatic life use for the Terrestrial Action Area, showing many exceptional warmwater habitat streams on the WNF (OEPA 2024a).

As of 2022, there were an estimated 65,117 acres of developed land/existing surface disturbance within the Aquatic Analysis Area, which accounts for approximately 10.4 percent of the total acreage within the Aquatic Analysis Area (LANDFIRE 2022b). Figure 2-9 depicts the developed land/existing surface disturbance in the Aquatic Analysis Area as of 2022. Prior to the boom in oil and gas drilling utilizing horizontal drilling and hydraulic fracturing, there was an estimated 58,220 acres of developed land/surface disturbance within the Aquatic Analysis Area in 2001 (LANDFIRE 2001b). As such, estimated developed land/surface disturbance has increased approximately 11.8 percent between 2001 and 2022 in the Aquatic Analysis Area, primarily resulting from increased oil and gas development and development of roads.

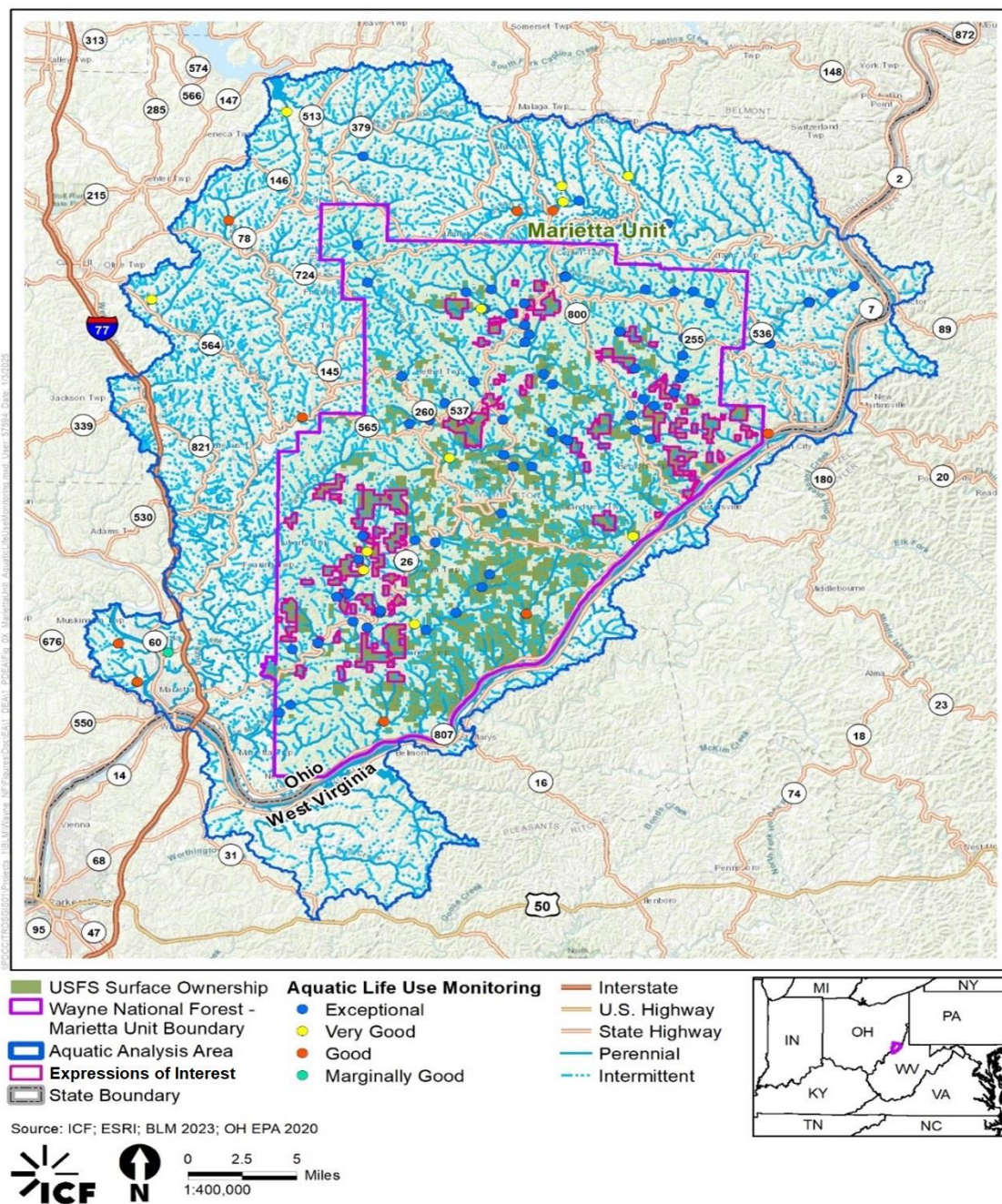
Figure 0-6. Aquatic Life Use Monitoring

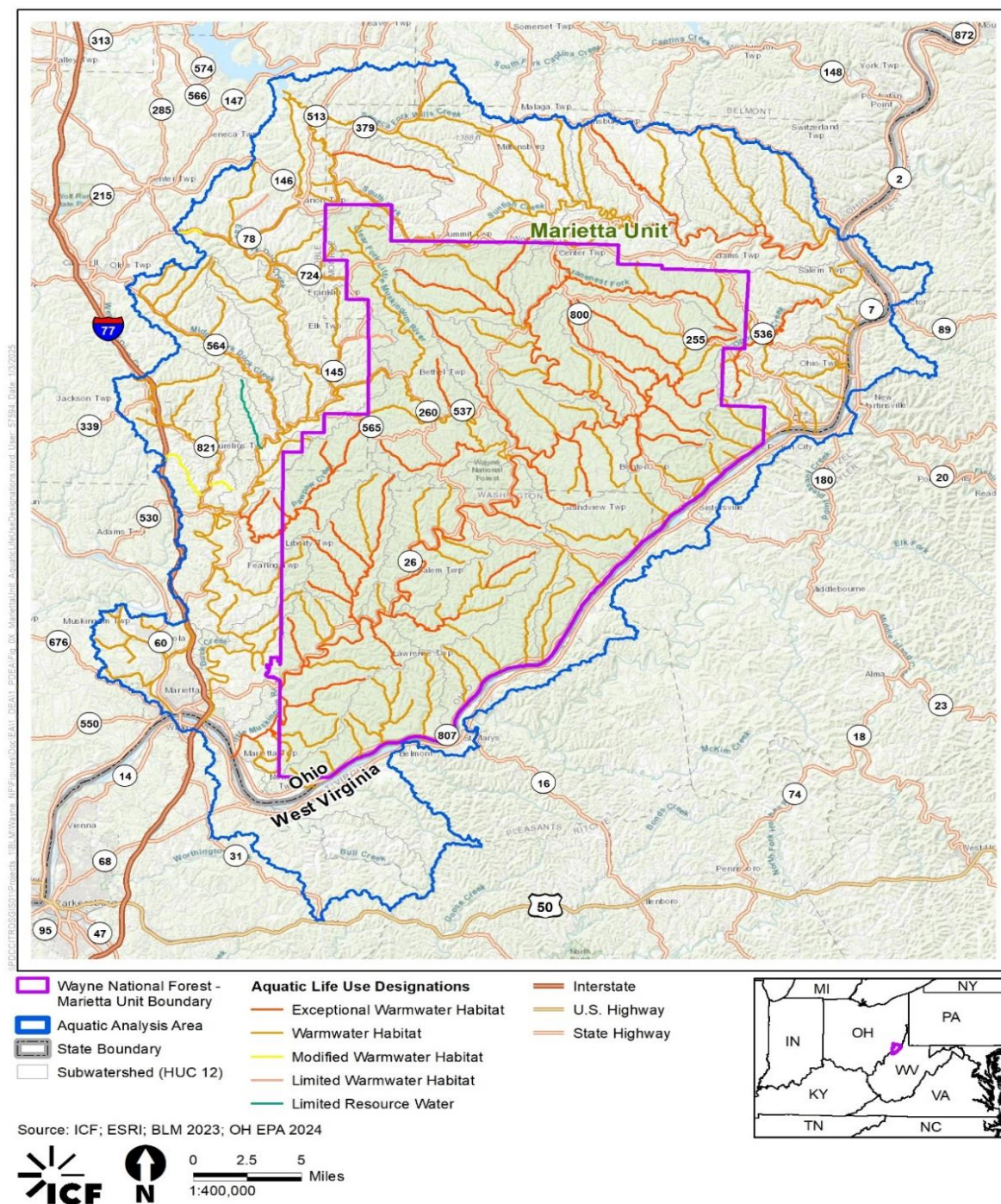
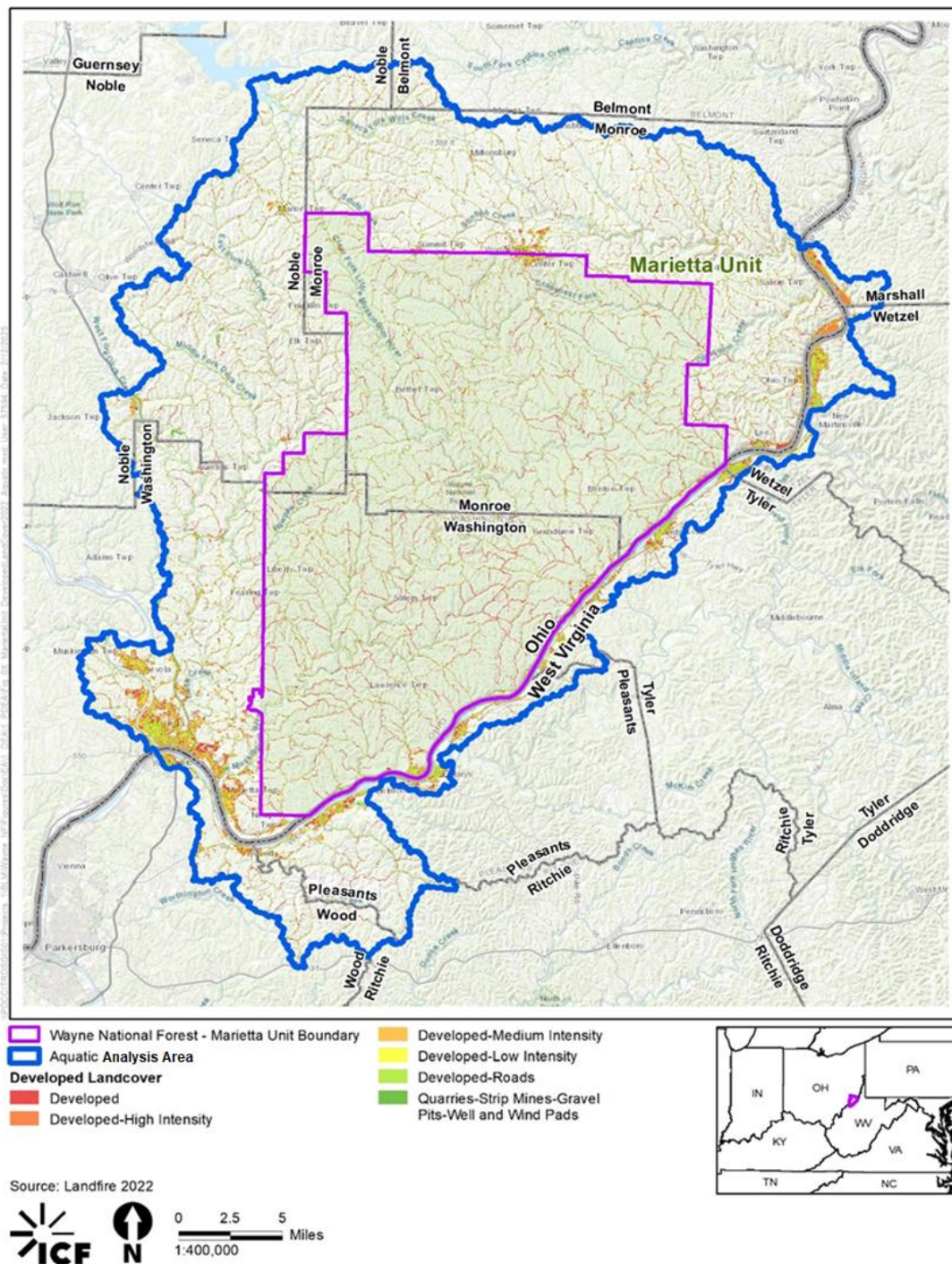
Figure 0-7. Aquatic Life Designations

Figure 0-8. Existing Surface Disturbance and Developed Land in the Aquatic Analysis Area



Water resources were mapped within the Aquatic Analysis Area using the USGS National Hydrography Dataset and the USFWS National Wetlands Inventory. There are approximately 556 miles of perennial streams/ivers in the Aquatic Analysis Area and 1,865 miles of intermittent streams/ivers (Table 0-6) (USGS 2023a).

Table 0-6. Water Resources in the Aquatic Analysis Area

Aquatic Resource	Miles in Aquatic Analysis Area	Acres in Aquatic Analysis Area
<i>National Hydrography Dataset Features¹</i>		
Perennial Stream/River	556	10,276
Intermittent Stream/River	1,865	--
Perennial Lake/Pond	--	1,056
<i>National Wetlands Inventory Features²</i>		
Freshwater Emergent Wetland	--	943
Freshwater Forested/Shrub	--	1,024
Wetland	--	
Riverine	--	16,606

¹ USGS 2023a

² USFWS 2023b

Water Quality

The Clean Water Act (CWA) requires States to assess waterbodies (Section 305(b), 33 U.S.C. § 1315(b)), as well as to identify and prepare a report on those surface waterbodies that are polluted (Section 303(d), 33 U.S.C. § 1313(d)). These waterbodies, referred to in 40 C.F.R. § 130.2(j) as “water quality limited segments,” do not meet water quality standards even after discharges of wastes from point sources have been treated by the minimum required levels of pollution-control technology. States are required to compile these waterbodies into a list and develop Total Maximum Daily Loads to improve the water quality. A Total Maximum Daily Load is a numeric measure representing the maximum amount of a pollutant that a particular body of water can receive without violating water quality standards. See 33 U.S.C. § 1313(d)(1)(C). States are allowed to report on all their assessed waterbodies under CWA Section 305(b) and those listed as impaired per CWA Section 303(d) in a single Integrated Report. States submit an Integrated Report to fulfill reporting requirements under both CWA Sections 303(d) and 305(b) every 2 years. Water quality standards designate the use of the particular waterbody (e.g., recreation, protection of aquatic life), establish water quality criteria to protect the waterbody, and implement requirements to protect and maintain healthy waters (USEPA 2025a).

Table 0-7, below, with data derived from the *Ohio 2024 Integrated Water Quality Monitoring and Assessment Report* (USEPA 2025b), outlines the 32 HUC-12 watersheds that occur in the Aquatic Analysis Area and indicates whether the Section 303(d) water quality standards are being met for each watershed. The majority of HUC-12 watersheds within the Aquatic Analysis Area (78 percent) are not meeting current water quality standards. The data for five of the 32 watersheds—Clear Fork Little Muskingum River, Leith Run–Ohio River, Lower Sunfish Creek, Opossum Creek, and Piney Fork—indicate that they are attaining some designated beneficial uses under the CWA. These watersheds

support aquatic life (warmwater habitat and cold-water habitat), and their condition allows for recreational use. Additionally, 12 of the 32 watersheds listed as impaired were fully supporting some beneficial uses (USEPA 2025b). *Impairment* refers to a condition in which the waterway does not meet the water quality standards for the designated beneficial use. A waterway can be impaired and still be fully supporting some beneficial uses because the water quality requirements vary depending on the applicable beneficial uses.

Watersheds can be impaired for a single reason or multiple reasons, and most streams have some sort of impairment. Of the 32 total HUC-12 watersheds, 25 are considered impaired by varying degrees, and many still support aquatic species functions. Most were impaired because of bacteria and other microbes, metals, polychlorinated biphenyls, or low oxygen, or a combination of these (USEPA 2025b). Other impairments in the Aquatic Analysis Area include algae, toxic chemicals, sediment, abnormal flow, dioxins, murky water, degraded habitat, degraded aquatic life, and other known and unknown causes (Table 0-7). Streams in the Marietta Unit are considered the highest quality in the WNF compared to the other units (USEPA 2025b).

The Little Muskingum River flows through densely wooded areas of Wayne National Forest and has a total of 73 species of fish including breeding populations of Muskellunge, a state listed Species of Concern. There are also populations of state endangered Ohio lamprey and numerous species that are sensitive to pollution including bigeye chub, black redhorse, river redhorse, silver shiner, rosyface shiner, mimic shiner, channel shiner, stonecat madtom, brindled madtom, slenderhead darter, dusky darter, blackside darter, sand darter, variegate darter, banded darter and bluebreast darter. A total of 22 species of mussels have been documented in the Aquatics Analysis Area including two species listed by Ohio DNR as Species of Concern (salamander mussel and deertoe), one listed as State Threatened (threehorn wartyback)(OEPA 2020b), and 11 mussels species listed as endangered, threatened, or proposed endangered under the ESA (USFWS 2024a).

The ODNR protects Ohio's groundwater resources by regulating the disposal of brine and other wastes produced from the drilling, stimulation, and production of oil and natural gas in Ohio. Within the State, approximately 98 percent of all brine is disposed of by underground injection into brine-bearing or depleted oil and gas formations deep below the surface (ODNR 2024a, ODNR 2024b). The other 2 percent is spread on roads for dust and ice control and used with local government approval. There are seven Class II brine injection wells within the Marietta Unit of the WNF: five in Washington County, one in Monroe County, and one in Noble County (ODNR 2024b). In accordance with Ohio Administrative Code 1501:9-3-07(G), Class II disposal well owners must file Quarterly Reports as well as Annual Reports, documenting the total volume of brine or other waste substances received, the maximum injection pressure reached, the average daily injection pressure, the volume and delivery date for each shipment of brine or other waste substances, and proof of the lawful disposal of waste.

Pursuant to the Energy Policy Act of 2005, P.L. 109-58, 119 Stat. 594 (Aug. 8, 2005), the BLM is prohibited from requiring an operator to disclose its fracking chemicals. However, during the APD process, the BLM will encourage operators to identify the chemical constituents of hydraulic fracturing fluids. Oil and gas operators are encouraged to report specific information about fracturing fluid used at an individual well via a voluntary, publicly accessible website, FracFocus.org. FracFocus.org serves as a reporting method to meet state disclosure requirements for 26 states, including Ohio. In addition, safety data sheets (SDS) contain safety, health, and environmental information for ingredients of the products used, including those denoted as

proprietary. SDS documents must be available onsite for the substances used in the hydraulic fracturing process as required by the Occupational Safety and Health Administration (OSHA).

Table 0-7. Water Quality Descriptions in HUC-12 Watersheds within the Aquatic Analysis Area

Watershed Name	HUC-12	Meeting 303(d) Standards?¹	Impairment Categories
<i>Little Muskingum–Middle Island</i>			
Archers Fork	050302010702	No	Bacteria and Other Microbes
Buffalo Run–West Fork Duck Creek	050302010902	No	Total Toxic Chemicals; Sediment; Low Oxygen; Abnormal Flow; Cause Unknown
Bull Creek–Ohio River	050302011010	Unknown	PCBs; Metals; Bacteria and Other Microbes; Dioxins; Total Toxic Chemicals; Sediment; Low Oxygen; Abnormal Flow; Impaired, Other Cause
Clear Fork Little Muskingum River	050302010701	Yes	N/A
Cow Creek–Ohio River	050302011009	No	Bacteria and Other Microbes; Metals; PCBs; Degraded Aquatic Life; Dioxins
Cranenest Fork	050302010602	No	Bacteria and Other Microbes
Eightmile Creek–Little Muskingum River	050302010705	No	Bacteria and Other Microbes; PCBs
Fifteenmile Creek	050302010704	No	Bacteria and Other Microbes; Impaired, Other Cause
Haynes Run–Ohio River	050302011004	Unknown	Bacteria and Other Microbes; PCBs; Dioxins; Metals
Leith Run–Ohio River	050302011007	Yes	Bacteria and Other Microbes; PCBs; Dioxins; Metals
Lower East Fork Duck Creek	050302010805	No	Murky Water; Total Toxic Chemicals; Sediment; Low Oxygen; Metals; Abnormal Flow; Degraded Habitat; Cause Unknown
Lower Sunfish Creek	050302010104	Yes	N/A
Middle East Fork Duck Creek	050302010803	No	Murky Water; Total Toxic Chemicals; Sediment; Low Oxygen; Metals; Abnormal Flow; Degraded Habitat; Cause Unknown
Middle Fork Duck Creek	050302010802	No	Murky Water; Total Toxic Chemicals; Sediment; Low Oxygen; Metals; Abnormal Flow; Degraded Habitat; Cause Unknown
Middle Sunfish Creek	050302010103	No	Bacteria and Other Microbes
Mill Creek–Ohio River	050302011006	No	Bacteria and Other Microbes; Metals; PCBs; Dioxins; Degraded Aquatic Life
New Years Creek–Duck Creek	050302010903	No	Total Toxic Chemicals; Sediment; Low Oxygen; Abnormal Flow; Cause Unknown
Opossum Creek	050302011002	Yes	N/A

Watershed Name	HUC-12	Meeting 303(d) Standards?¹	Impairment Categories
Patton Run–Ohio River	050302011005	Unknown	PCBs; Bacteria and Other Microbes; Metals; Dioxins
Pawpaw Creek	050302010804	No	Murky Water; Total Toxic Chemicals; Sediment; Low Oxygen; Metals; Abnormal Flow; Degraded Habitat; Cause Unknown
Piney Fork	050302010102	No	N/A
Rich Fork	050302010601	No	Bacteria and Other Microbes
Straight Fork–Little Muskingum River	050302010605	No	Bacteria and Other Microbes
Sugar Creek–Duck Creek	050302010904	No	Total Toxic Chemicals; Sediment; PCBs; Low Oxygen; Abnormal Flow
Upper East Fork Duck Creek	050302010801	No	Murky Water; Total Toxic Chemicals; Sediment; Low Oxygen; Metals; Abnormal Flow; Degraded Habitat; Cause Unknown
Upper Sunfish Creek	050302010101	No	Algae
Wingett Run–Little Muskingum River	050302010703	No	Bacteria and Other Microbes
Witten Fork	050302010604	No	Bacteria and Other Microbes
Wolfpen Run–Little Muskingum River	050302010603	No	Bacteria and Other Microbes
<i>Muskingum</i>			
Devol Run–Muskingum River	050400041204	No	Bacteria and Other Microbes; Impaired, Other Cause; PCBs
<i>Wills</i>			
Gladly Run–Seneca Fork Wills Creek	050400050103	No	Sediment; Bacteria and Other Microbes
Headwaters Seneca Fork Wills Creek	050400050101	No	Bacteria and Other Microbes

Source: USEPA 2023

¹ Yes = use attaining or available data indicate some uses attaining; Unknown = use attainment unknown/insufficient information; No = impaired

N/A = not applicable; PCBs = polychlorinated biphenyls

Water Quantity

Owners of land in Ohio adjacent to lakes or watercourses possess riparian water rights, entitling them to make reasonable use of the groundwater underlying their land or the water in an adjacent lake or watercourse. These rights are protected by Article 1, Section 19b, of the Ohio Constitution. ODNR's Water Withdrawal Facilities Registration Program requires the owner of any facility with the capacity to withdraw more than 100,000 gallons of water per day (70 gallons per minute) to register the facility with the ODNR, Division of Water Resources (Ohio Revised Code [ORC] § 1521.16). Facilities registered with ODNR's Division of Water Resources must complete and submit an annual report of all water withdrawn in a calendar year. This reporting requirement applies to groundwater withdrawals, surface-water withdrawals, or any combination of the two (ODNR 2021). Withdrawals in the Aquatic Analysis Area that were reported from 2017 and 2021 are outlined in Table 0-8 and Table 0-9 below. All groundwater and surface-water withdrawals reported in the Aquatic Analysis Area during this time are within the Little Muskingum–Middle Island HUC-8 cataloguing unit.

Table 0-8. Registered Groundwater Withdrawals in the Aquatic Analysis Area from 2017 to 2021

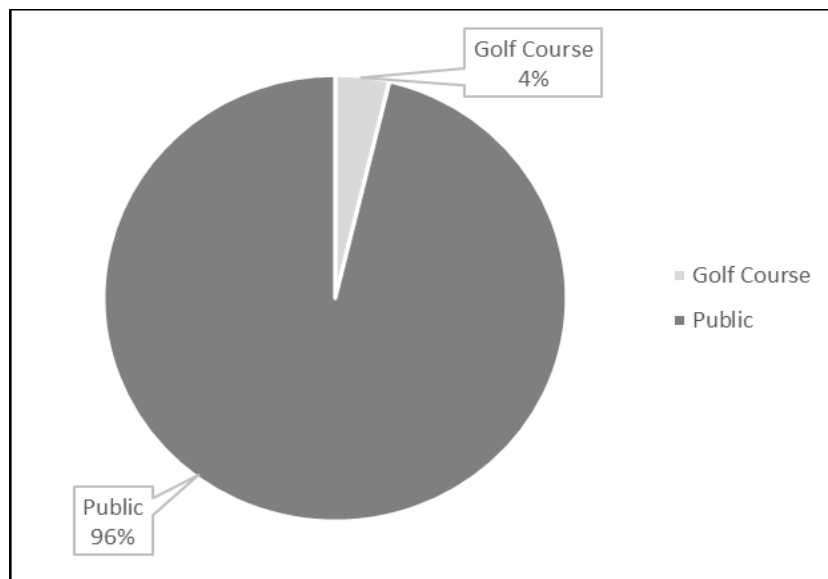
Watershed Name	HUC	Water Withdrawals (Mgal)					HUC Avg
		2017	2018	2019	2020	2021	
Patton Run–Ohio River	050302011005	238.0	269.7	262.9	272.0	278.3	264.2
Mill Creek–Ohio River	050302011006	35.5	34.6	26.6	24.3	22.3	28.7
Cow Creek–Ohio River	050302011009	52.2	56.4	65.4	60.7	52.4	57.4
Little Muskingum–Middle Island	05030201	325.7	360.7	354.9	357.0	353.0	350.3

Source: ODNR 2023b

Avg = average; Mgal = million gallons

As seen in Table 0-8, facilities registered with ODNR withdrew an average of 350.3 million gallons (Mgal) of groundwater from the Little Muskingum–Middle Island HUC-8 between 2017 and 2021. These withdrawals were from three HUC-12s, with the majority of water withdrawn from the Patton Run–Ohio River watershed. None of the reported groundwater withdrawals are associated with hydraulic fracturing or mineral extraction; they were all associated with public uses (i.e., 96 percent) or golf courses (i.e., 4 percent; see 10). Records from existing well logs in the WNF and surrounding area indicate that groundwater is unlikely to be recovered in sufficient quantities to support tight shale hydraulic fracturing operations (Thompson 2012). Most groundwater drinking wells produce less than 10 gallons per minute. Because of this low production rate, it is unlikely high-volume hydraulic fracturing would utilize this source (BLM 2016).

Figure 0-9. Groundwater Uses for Registered Withdrawals in the Aquatic Analysis Area



Source: ODNR 2023b

While groundwater wells along the Ohio River and the Muskingum River valleys can produce up to several hundred gallons per minute, both Monroe and Washington Counties, which make up a majority of the Marietta Unit, lie within the non-glaciated central hydrogeologic setting and wells within this area are only capable of producing low-flow groundwater yields. The geologic formations beneath the Little Muskingum and its tributary streams are primarily consolidated bedrock, which generally provide low-producing aquifers (averaging less than 3 gallons a minute), although yields can be slightly higher if wells are drilled within stream valleys (ODNR 2016, 2002). The groundwater yield is dependent on other factors besides the value of the aquifer, such as the number and type of wells drilled. Occasionally within the unit area, bedrock zones can intersect with several aquifers and bedding planes. In these locations, the result can be a decrease in depth to water and the wells can produce slightly higher groundwater yields. In many places along the tributaries of the Little Muskingum, depth to water averages less than 30 feet. However, even in these areas, groundwater wells within the Marietta Unit connect to low-producing aquifers, with averages between 3 and 10 gallons per minute. For this reason, domestic wells are typically smaller in diameter and are low-producing wells (ODNR 2016, 2002).

Reported surface-water withdrawals in the Little Muskingum–Middle Island HUC-8 averaged 1,570.9 Mgal between 2017 and 2021 (Table 0-9). These withdrawals are from 14 different HUC-12 watersheds, with approximately 58 percent of water withdrawn during this time coming from the Cow Creek–Ohio River HUC-12 for mineral extraction (ODNR 2023b).

It is important to note that the data presented in Table 2-9 is associated with water withdrawals that are reported with reporting requirements applying to facilities and operations that have capacity to withdraw more than 2 Mgal of water per day (60 Mgal per month). Operators and facilities that consume and have a capacity less than 2 Mgal a day could also be withdrawing surface

water from the Little Muskingum–Middle Island HUC-8 watershed which could increase the total water withdrawals beyond what is presented in Table 2-9.

Table 0-9. Registered Surface-Water Withdrawals in the Aquatic Analysis Area from 2017 to 2021

Watershed Name	HUC	Water Withdrawals (Mgal)					HUC Avg
		2017	2018	2019	2020	2021	
Upper Sunfish Creek	050302010101	109.0	105.8	96.4	122.6	151.2	117.0
Piney Fork	050302010102	7.7	0.0	NDA	NDA	NDA	3.9
Middle Sunfish Creek	050302010103	0.0	35.2	152.3	47.9	0.0	47.1
Lower Sunfish Creek	050302010104	132.4	164.4	189.3	84.4	151.8	144.5
Wolfpen Run–Little Muskingum River	050302010603	27.7	45.2	0.0	69.3	0.0	28.4
Witten Fork	050302010604	0.0	82.9	94.0	0.0	16.6	38.7
Straight Fork–Little Muskingum River	050302010605	44.7	0.0	37.4	0.0	68.3	30.1
Clear Fork Little Muskingum River	050302010701	120.0	0.0	0.0	0.0	0.0	24.0
Upper East Fork Duck Creek	050302010801	9.1	8.3	9.7	3.8	2.4	6.7
Lower East Fork Duck Creek	050302010805	5.1	7.5	8.6	2.5	2.1	5.2
Haynes Run–Ohio River	050302011004	0.0	7.8	52.8	105.0	0.0	33.1
Patton Run–Ohio River	050302011005	127.2	104.8	283.9	154.1	87.8	151.6
Mill Creek–Ohio River	050302011006	3.5	53.3	6.8	5.9	50.9	24.1
Cow Creek–Ohio River	050302011009	894.8	1532.2	647.7	808.7	667.0	910.1
Little Muskingum–Middle Island	05030201	1,525.9	2,147.5	1,579.0	1,404.1	1,198.1	1,581.2

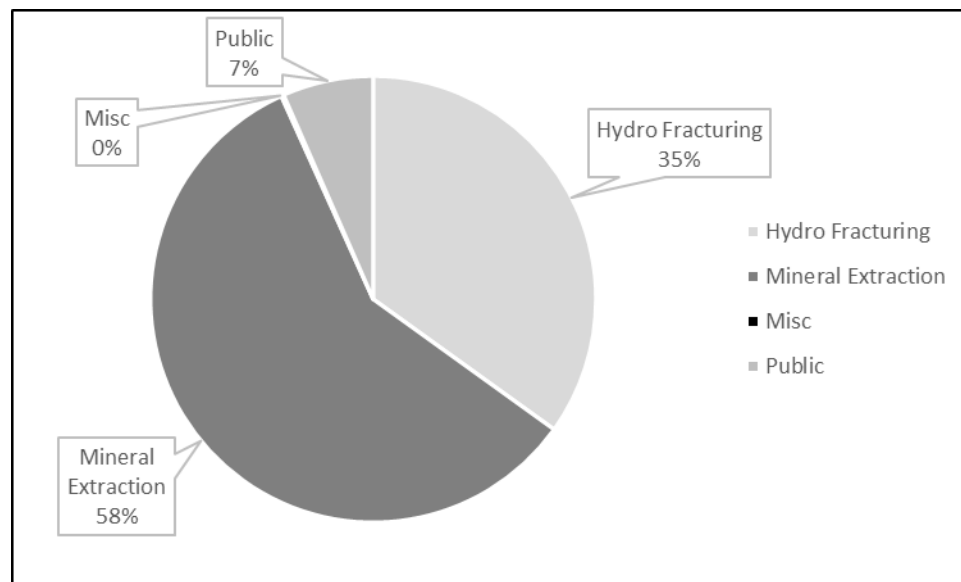
Source: ODNR 2023b

Avg = average; NDA = no data available

Of the surface-water withdrawals reported between 2017 and 2021, an average of 921.9 Mgal (i.e., 58 percent) of water were used for mineral extraction (coal, salt, sand and gravel, limestone), 552.1 Mgal (i.e., 35 percent) for hydraulic fracturing, 104.1 Mgal (i.e., 7 percent) for public uses, and 3.0 Mgal (i.e., 0.2 percent) for miscellaneous uses (Figure 2-11). Withdrawals for mineral extraction

(such as coal, salt, sand and gravel, and limestone) and hydraulic fracturing during these years came from 23 different facilities.

Figure 0-10. Surface-Water Uses for Registered Withdrawals in the Aquatic Analysis Area



Source: ODNR 2023b

2.6. General Conservation Measures

In order to lease and develop Federal minerals, operators and BLM must execute a standard lease form (BLM Form 3100-011, *Lease for Oil and Gas* [BLM 2023a]) regardless of whether the operator intends to drill on Federal or private surface.

Form 3100-011 includes 14 lease terms, including Section 6, *Conduct of operations*, which directs:

Lessee must conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee must take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures... Lessee may be required to complete minor inventories or short-term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee must immediately contact lessor. Lessee must cease any operations that would result in the destruction of such species or objects (BLM 2023a).

Under Section 6, the lessee agrees to minimize environmental impacts, and the BLM, as the lessor, has the authority to require this. The BLM may request inventories and technical studies to ensure impacts are minimized and may suspend operations if sensitive resources are identified (BLM

2023a). The lessee must comply with all regulations and policies, including their duty to comply with the ESA if construction occurs outside the APD process.

Section 0 (*Environmental Protections Required for a Federal Minerals Lessee Applying to Drill on NFS Lands*) provides additional information on environmental protections required for a Federal minerals lessee applying to drill on NFS land, including Table 0-10 that presents SFWs and guidelines for oil and gas development applicable to NFS lands.

2.6.1. Avoidance and Minimization Measures for Species Protected under the Endangered Species Act

This section describes the AMMs intended to reduce potential impacts of the Proposed Action on Federally listed plants, bats, and mussels and reasonably foreseeable development of the leases. The AMMs are required measures for Federal permit applications and approvals in the Marietta Unit. The BLM will apply appropriate AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis all APDs associated with developing Federal leases that may be issued under the Proposed Action and to the 65 Federal leases that were previously issued under the 2016 EA and Decision Record. These AMMs would be applied to APDs on both Federal and private surface throughout the entire life (perpetual) of leases issued under the Proposed Action and the life of reasonably foreseeable development of the leases. During the site-specific APD permitting process, the BLM will conduct additional Section 7 consultation with the USFWS based on the specific elements of development proposals to determine the exact AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis to address potential impacts on Federally listed species; this consultation is referred to as Tier 2 consultation. If an applicant cannot follow all appropriate AMMs then a separate consultation between FWS and the BLM (outside this programmatic informal consultation) may be required as well as coordination with the FS, if the proposed project will impact the WNF.

Federal minerals in the Marietta Unit may be accessed either from Federal or private surface. Access from private surface is subject to the guidance of BLM's Permanent Instruction Memorandum (PIM) 2018-014 (Directional Drilling into Federal Mineral Estate from Well Pads on Non-Federal Locations), which identifies four situations under which Federal minerals may be accessed, three from private surface and one from Federal surface. The situations are discussed below and in Appendix G ("Recommendations from the U.S. Fish and Wildlife Service for Avoiding Adverse Effects to Federally listed Species from Bureau of Land Management Leasing and Subsequent Permitting of Federal Oil and Gas Rights on Marietta Unit of the Wayne National Forest in Ohio").

As a preliminary matter, we note three important factors that apply in all situations:

1. The issuance of a lease does not automatically result in drilling: Once a lease is obtained, an operator seeking to develop that lease must submit an Application for a Permit to Drill (APD) that includes site specific details, necessary for BLM to perform its Stage 3 environmental review.
2. As identified in Section 2.9 of this BA, the State of Ohio (through the ODNR) has authority to regulate the construction of well pads and development of wells accessing private minerals

underling private surface land in Ohio (ORC 1509). Appendix E of the EA articulates the state's authority to protect resources, and we presume state agencies will follow their regulations. Operators are also subject to the prohibitions of ESA section 9, 16 U.S.C. 1538 et seq. Section 9 prohibits the "take" of any endangered species. Id. 1538(a)(1)(B). Unauthorized take is punishable by substantial civil or criminal penalties. Id. § 1540(a), (b), (g).

3. Any action proposed for extracting Federal minerals, even if the action originates from private property, will be subject to Federal oversight. If accessing Federal minerals from private surface will involve any surface disturbance, the BLM will include, as conditions of APD approval, such AMMs, BMPs, and Stipulations as are deemed necessary, based on BLM's review of site-specific plans. Where private surface is fully built out and no new surface disturbance is needed to add a Federal well to an existing well pad, any APD approval will include AMMs, BMPs, and stipulations consistent with BLM's authority to regulate down-hole drill operations and surface activities that occur during operations, but not including the surface disturbance already completed for well pads, roads and related infrastructure.

Situation 1:

Private Property: Surface disturbance completed on private land to access private minerals prior to submittal of an APD to the BLM, and no further surface disturbance will occur to access Federal minerals.

This situation is fully described in Chapter 1. The chart below further illustrates the Avoidance and Minimization Measures for Species Protected under the Endangered Species Act.

Resources/Actions for Review That May Affect T&E Species	Authority (Ohio DNR/BLM/FWS)	AMM (Stipulations to Leases and APDs as specified in BA (Appendix G of the EA)), site specific determinations
Disturbance - Noise	BLM/ODNR	<u>Already disturbed surface:</u> All Necessary State Permits; Bat AMM 6
Vegetation and Rare Plants, including suitable habitat, spread of invasive species and site remediation	BLM/ODNR	<u>Already disturbed surface:</u> All Necessary State Permits; Plant AMMs 2, 3, 5; Monarch AMMs 1, 2 (mowing), 3
Tree Clearing/Cutting Terrestrial Species/Bats	BLM/FWS	<u>Already disturbed surface:</u> All Necessary State Permits; Bat AMMs 3, 5, 6, 7
Water Quantity (withdrawal)	BLM/ODNR/FWS	<u>Already disturbed surface:</u> All Necessary State or Federal

Resources/Actions for Review That May Affect T&E Species	Authority (Ohio DNR/BLM/FWS)	AMM (Stipulations to Leases and APDs as specified in BA (Appendix G of the EA)), site specific determinations
		Permits; Aquatic AMMs 5, 6, 7, 9
Water Quality (Mussels/Eastern hellbender)	BLM/ODNR/FWS	<u>Already disturbed surface:</u> All Necessary State or Federal Permits; Aquatic AMMs 1, 3, 4, 8

Situation 2:

Private Property: Some disturbance on private surface previously occurred and additional private surface disturbance is requested to reach Federal minerals.

This situation is fully described in Chapter 1. The chart below further illustrates the Avoidance and Minimization Measures for Species Protected under the Endangered Species Act.

Resources/Actions for Review That May Affect T&E Species	Authority (Ohio DNR/BLM/FWS)	AMM (Stipulations to Leases and APDs as specified in BA (Appendix G of the EA)), site specific determinations
Disturbance - Noise	BLM/ODNR	<u>Already disturbed surface:</u> All Necessary State Permits; Bat AMM 6
		<u>New surface disturbance:</u> All Necessary State Permits; All appropriate Bat AMMs that would apply to noise based on site-specific drilling plans
Vegetation and Rare Plants, including suitable habitat, spread of invasive species and site remediation	BLM/ODNR	<u>Already disturbed surface:</u> All Necessary State Permits; Plant AMMs 1, 2, 3, 4, 5; Monarch AMMs 1, 3
		<u>New surface disturbance:</u> All Necessary State Permits; All appropriate Plant AMMs and Monarch AMMs that would apply to vegetation and rare

Resources/Actions for Review That May Affect T&E Species	Authority (Ohio DNR/BLM/FWS)	AMM (Stipulations to Leases and APDs as specified in BA (Appendix G of the EA)), site specific determinations
		plants, invasive species, and site remediation based on site-specific drilling plans
Tree Clearing/Cutting Terrestrial Species/Bats	BLM/FWS	<u>Already disturbed surface</u> : All Necessary State Permits; Bat AMMs 4, 5, 7
		<u>New surface disturbance</u> : All Necessary State Permits; All appropriate Bat AMMs that would apply to tree cutting and clearing based on site-specific drilling plans
Water Quantity (withdrawal)	BLM/ODNR/FWS	<u>Already disturbed surface</u> : All Necessary State or Federal Permits; Aquatic AMMs 5, 6, 7, 9
		<u>New surface disturbance</u> : All Necessary State or Federal Permits; All appropriate Aquatic AMMs that would apply to water withdrawals based on site-specific drilling plans
Water Quality (Mussels/Eastern hellbender)	BLM/ODNR/FWS	<u>Already disturbed surface</u> : All Necessary State or Federal Permits; Aquatic AMMs 1, 2, 3 4, 9
		<u>New surface disturbance</u> : All Necessary State Permits; All appropriate Aquatic AMMs that would apply to water quality based on site-specific drilling plans

Situation 3:

Private property: No disturbance has occurred on private surface and an Operator submits an APD seeking to build roads, well pads, and associated infrastructure.

This situation is fully described in Chapter 1. The chart below further illustrates the Avoidance and Minimization Measures for Species Protected under the Endangered Species Act.

Resources/Actions for Review That May Affect T&E Species	Authority (Ohio DNR/BLM/FS/FWS)	AMM (Stipulations to Leases and APDs as specified in BA (Appendix G of the EA)), site specific determinations
Disturbance - Noise	BLM Verifies/ ODNR/FS	All Necessary State Permits; All appropriate Bat AMMs that would apply to noise based on site-specific drilling plans
Vegetation and Rare Plants, including suitable habitat, spread of invasive species and site remediation	BLM/ODNR/FS	All Necessary State Permits; All appropriate Plant AMMs and Monarch AMMs that would apply to vegetation and rare plants, invasive species and site remediation based on site-specific drilling plans
Tree Clearing/Cutting Terrestrial Species/Bats	BLM/FS/FWS	All Necessary State Permits; All appropriate Bat AMMs that would apply to tree cutting and clearing based on site-specific drilling plans
Water Quantity (withdrawal)	BLM/ODNR/FS/FWS	All Necessary State or Federal Permits; All appropriate Aquatic AMMs that would apply to water withdrawals based on site-specific drilling plans
Water Quality (Mussels/Eastern hellbender)	BLM/ODNR/FS/FWS	All Necessary State or Federal Permits; All appropriate Aquatic AMMs that would apply to water quality based on site-specific drilling plans

Situation 4:

Public Lands – Any and all surface disturbance will occur on Federal surface to access Federal minerals and an APD is submitted to the BLM prior to any surface disturbance on Federal land.

This situation is fully described in Chapter 1. The chart below further illustrates the Avoidance and Minimization Measures for Species Protected under the Endangered Species Act.

Action – Receipt of a complete APD	Authority	AMM (Stipulations to Leases and APDs as specified in BA (Appendix G of the EA)), site specific determinations
Site-specific NEPA analysis	Forest Plan/ BLM	BLM imposes appropriate notices, stipulations, standards, and guidelines from the Forest Plan to site-specific APDs
Section 7 Consultation with FWS	FWS/ BLM	BLM imposes appropriate AMMs (Appendix G) to site-specific APDs
Section 106- Cultural Resources	FS/BLM	Consultation and SHPO Concurrence

In circumstances where operators proceed with private surface development prior to submitting APDs to the BLM (as in situations 1 and 2 described in Chapter 1), operators would still be required to comply with State of Ohio regulations and standards intended to minimize impacts to natural resources, including Federally protected species, as described in Section 2.9, *State of Ohio Regulatory Jurisdiction*. In addition, operators on private land are subject to Section 9 of the ESA (16 U.S.C. §1538) that makes it illegal to harass, hunt, shoot, capture, trap, kill, collect, wound, or harm (i.e., “take”) any ESA-listed species or to pursue/attempt any of these activities and it is incumbent on operators on private land to comply with the ESA.

2.6.1.1. Bat AMMs

1. Require seasonal clearing/cutting (from October 1 to March 31) of all trees greater than 3 inches diameter at breast height (DBH).
2. Prohibit clearing/cutting of mature trees (not including scrub/shrub/saplings less than 5 inches DBH) to 10 acres or less for each new Federal project including well pads, laydown yards, pipelines, access roads, etc. (i.e., choose non-wooded locations or already-disturbed

areas for development). If greater than 10 acres of clearing is necessary, then additional conditions, in coordination with USFWS, may apply.

3. Require a closed system for the containment of produced water from drilling and all applicable local, state, and Federal regulations apply for the appropriate disposal of produced water.
4. Restrict tree clearing near potential bat hibernacula. Prohibit tree clearing/cutting and construction of well pads within $\frac{1}{4}$ mile of a hibernaculum. Limit tree clearing/cutting to November 15 to March 15 in areas located between $\frac{1}{4}$ mile and 5 miles of a hibernaculum.
5. Restrict the cumulative removal of forest habitat to no more than 105 acres of deciduous forest (trees greater than 5 inches DBH) annually and 1,015 acres total over the 55-year term of the consultation.
6. Restrict activities that may create vibrations or increase noise levels at a hibernaculum when bats may be using them. Prohibit these activities from October 1 to March 31 within 0.5 miles of identified hibernaculum, or at any distance throughout the year that would threaten the structural integrity of an occupied hibernaculum. Such activities may include blasting, pile driving, hydraulic drilling, and similar geotechnical activities.
7. For any known Indiana, northern long-eared, or tricolored bat roost trees, prohibit year-round removal of the roost and any tree within 150 feet until the roost is deemed unsuitable in coordination with FWS. Additionally, for known maternity roosts, establish a 0.25-mile roost area buffer centered on the original roost location. Tree cutting and removal will also be prohibited year-round within the established buffer, until such time that FWS agrees it is no longer an occupied roost area, or sufficient alternate avoidance and minimization measures to protect the colony can be applied in coordination with FWS prior to approval of the APD.

2.6.1.2. Aquatic AMMs to Protect Mussels and the Eastern Hellbender

1. Prohibit in-water work in Group 2 and 4 mussel streams (currently identified in Appendix A of the 2024, or most recent version, of the Ohio Mussel Survey Protocol and hereafter identified as “mussel streams”) as well as eastern hellbender streams. If in-stream work is proposed within a mussel stream, mussel surveys would be required using the FWS-approved mussel survey methodology from the most recent version of the Ohio Mussel Survey Protocol. If in-stream work is proposed within an eastern hellbender stream, a survey in coordination with FWS would be required.
2. Prohibit well pads within 1,000 feet of a mussel stream or eastern hellbender stream.
3. Establish 300-foot no-disturbance buffers along each side of mussel or eastern hellbender streams (no access roads within this buffer).
4. Require the use of best management practices (BMPs) for construction of access roads.
5. The BLM will prohibit water withdrawals from Little Muskingum River, Muskingum River (these are the Group 2 and 4 streams that currently occur within the Action Area), and any

additional Group 2 and 4 streams and eastern hellbender streams that may be identified in the future.

6. BLM will encourage the use of recycled water to minimize the amount of water withdrawals from surface sources.
7. BLM will track annual water withdrawal from all surface water sources used to support development of leases issued under the Proposed Action to confirm withdrawals do not exceed the limits expected and analyzed (total water use of 1,539 Mgal to 2,187 Mgal during well development).
8. BLM will prohibit the use of brine on roads for dust and ice control within 1,000 feet of a mussel or eastern hellbender stream. BLM will require safe disposal of brine in accordance with state requirements.
9. BLM will require monitoring of stream flow to confirm that it is maintained at a level to maintain aquatic functions as required by USFWS at the tier 2 review Stage.

2.6.1.3. *Monarch AMMs*

1. In appropriate habitat locations, milkweed and other monarch preferred forb species will be included in the seed mix for habitat restoration or creation to provide for monarch butterfly larval habitat during early successional Stages, or as directed by the USFWS.
2. Prohibit mowing monarch habitat from March 15 to August 31 when monarchs are breeding and avoid mowing of blooming habitat September 1 to October 31 when large numbers of monarchs are migrating.
3. Prohibit the use of terrestrial pesticides or herbicides in and within 100 feet of monarch habitat from March 15 to October 30.

2.6.1.4. *Plant AMMs*

1. Prohibit disturbance to suitable habitat for Virginia spiraea and northern monkshood.
2. The applicant or BLM will conduct a desktop analysis to determine if potentially suitable habitat for plant species is present. Desktop analysis should include mapping of habitat types in the area, review of soils/geology in the area, and review of aerial maps to see if the area is within a completely closed forest. If the project area is entirely mowed lawn or is entirely developed (such as parking lot, buildings) then the project would have no effect to listed plant species. USFWS will review the desktop analysis to determine if it is acceptable and then provide guidance on whether a presence/absence plant survey is needed when BLM requests Tier 2 consultation.
3. If Federally listed plants are present onsite, BLM will coordinate with USFWS during Tier 2 consultation to develop a protective buffer to avoid adverse effects to these species.
4. Clean equipment before entering a site to prevent movement and spread of invasive species.
5. Revegetate disturbed areas with a mix of noninvasive annual ground cover and perennial native species that has been approved by USFWS.

2.6.2. Environmental Protections Required for a Federal Minerals Lessee Applying to Drill on NFS Lands

This section identifies the certain requirements applicable to Federal oil and gas leases or APDs to ensure that oil and gas operations do not pose threats to endangered, threatened, or candidate species. Table 0-10 contains the Forest Service's existing forest-wide standards (SFWs), guidelines (GFWs), stipulations, and notifications for NFS lands. SFWs and GFWs must be applied to every lease issued under the Forest Plan (USFS 2006a) that proposes accessing Federal minerals from Federal surface.

SFWs set limits for management activities. These limitations are designed to help USFS attain desired forest conditions and fulfill management objectives for the WNF. SFWs also ensure compliance with laws, regulations, Executive Orders, and policy direction. Any proposed departures from SFWs must be analyzed and documented in a Forest Plan Amendment.

In contrast to SFWs, guidelines are preferred limits to management actions and are expected to be followed. They help USFS attain desired forest conditions and fulfill objectives for the WNF, while permitting some operational flexibility to respond to specific situations. Lessee requests for departures from guidelines must be analyzed during environmental review at the APD Stage and documented in a project decision document. However, approved departures do not require a Forest Plan Amendment.

Notifications and stipulations implement the standards and guidelines of the Wayne National Forest's 2006 Forest Plan. These are in addition to the standard lease terms for oil and gas leases (BLM Form 3100-11).

The Forest Service standards, guidelines, stipulations, and notifications were developed to provide general habitat protection and setbacks that exclude sensitive habitats from oil and gas development. Resource protection measures applicable to proposed development on NFS lands are provided in Table 0-10 below.

It is important to note that while some standards, guidelines, stipulations, and notifications are associated with specific species (e.g., Indiana bat), these measures would also confer benefits to other species (e.g., northern long-eared bat, tricolored bat).

Notifications and stipulations are necessary to protect specific resource values on the lease area. They may be made less restrictive or modified for site-specific situations if such change is found to be in the public interest. These notifications and stipulations may be made less restrictive or modified only after a formal analysis has been completed and specifically approved in writing by a Forest Service line officer.

Table 0-10. Existing Stipulations, Notifications, Guidelines, and Standards Applicable to Oil and Gas Development on NFS Lands

Reference	Stipulation/Notification/Standard/Guideline
GFW-AIR-1	Coordinate management activities with air quality regulatory authorities and with research activities on the impact of air pollution on Forest resources.
GFW-AIR-2	Coordinate with air quality regulatory authorities and with research activities on preventative practices to control any significant air pollution emissions resulting from National Forest management activities.
GFW-AIR-3	Conduct management activities (including permitted activities) in a manner that does not contribute significantly to violations of National Ambient Air Quality Standards or violations of applicable provisions in the State Implementation Plan.
GFW-AIR-4	The Forest Supervisor will advise the Regional Forester on the potential effects of proposals by the State of Ohio to modify air quality standards or attainment areas and the identification of present and potential impairment of Forest resources attributable to air pollution.
Notification #1	The Forest Service is responsible for ensuring the area to be disturbed is examined for cultural resources prior to allowing surface disturbing activities on lands covered by this lease. Important cultural resource values may be present on portions of a lease. Surface-disturbing activities must avoid these areas unless the authorized officer agrees to the mitigation measures. The lessee/operators may, at their discretion and cost, conduct the examination on the lands to be disturbed. This examination must be done by or under the supervision of a qualified resource specialist approved by the Forest Service. An acceptable report must be provided to the Forest Service identifying the anticipated effects of the Proposed Action on cultural resource values. If items of substantial archaeological or paleontological values are discovered during operations, or a known deposit of such items is disturbed, the lessee (or operator) will cease work in the affected area. The lessee (or operator) will then notify the Forest Service and will not resume excavation until the Forest Supervisor gives written approval.
Stipulation #7	No surface occupancy (NSO) within archaeological or historical sites of known significance (see lease map). At the time of any new proposed lease developments, a Forest Service archeologist shall determine the need for any setbacks or restrictions for the protection of objects of historic or scientific interest.
Notification #2	Any activities proposed in, or likely to affect a floodplain will be subject to: • Analysis and identification of alternate sites • Public notification and comment period • Provisions of any other Federal, state, or local laws and regulations as required under presidential Executive Order 11988, Protection of Floodplains
Stipulation #16	Oil and gas activities may be allowed within that portion of a floodplain outside riparian areas. Mineral activities will be evaluated on a case-by-case basis, and appropriate mitigation measures will be applied. The leaseholder and Forest Service inspector shall work together to identify locations for roads, pipelines, well pads and production facilities
Notification #4	Operators are required to comply with all public laws and Federal regulations that apply to National Forest System lands and the WNF Land and Resource Management Plan.

Reference	Stipulation/Notification/Standard/Guideline
SFW-MIN-1	Prevent or eliminate occupancy that is not reasonably incident to, or required for, legitimate mineral operations.
SFW-MIN-11	Within management areas where surface occupancy is generally permitted, apply the Controlled Surface Use stipulation for new Federal leases where the following conditions occur: • Riparian areas and wetlands • Managed wildlife openings • Developed recreation sites (located outside the Developed Recreation Management Area) • Areas of land with a Scenic Integrity Objective of <i>High</i> or <i>Moderate</i> • Known locations of Federally listed species • Known locations of Regional Forester sensitive species • Portions of floodplains outside riparian areas • Slopes between 35 and 55 percent
SFW-MIN-12	Consider approval of plans of operation based on applicable regulations and analysis of: • Surface/subsurface resources • Any restrictions and mitigations determined by an environmental analysis • Road construction standards • Standard BLM lease stipulations • Appropriate lease-specific oil and gas notifications and stipulations
SFW-MIN-9	Apply the NSO stipulation to new Federal leases in the following Management Areas: • Future Old Forest • Developed Recreation • Timbre Ridge Lake • Special Areas • Research Natural Areas • Candidate Areas
Stipulation #2	No surface occupancy within designated areas of the lease (see lease map) for the protection of natural processes or research, historical, or educational values. On NFS lands in Research Natural Area Management Areas, the Forest Service will issue leases for Federal oil and gas only with a No Surface Occupancy (NSO) stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to the Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed, and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.

Reference	Stipulation/Notification/Standard/Guideline
Stipulation #3	No surface occupancy within designated areas of the lease (see lease map) to protect natural processes or research, historical or educational values. On National Forest System lands in Special Interest Management Areas, the Forest Service will issue Federal oil and gas leases only with an NSO stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed, and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.
Stipulation #4	No surface occupancy within designated areas of the lease (see lease map) for the protection of natural processes or research, historical or educational values. On National Forest System lands in Candidate Research Natural Management Areas, the USDA Forest Service will only issue Federal oil and gas leases that have an NSO stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed, and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.
Stipulation #6	No surface occupancy within designated areas of the lease (see lease map) for the protection of the Timbre Ridge Lake Management Area. On NFS lands in the Timbre Ridge Lake Management Area, the Forest Service will issue Federal oil and gas leases only with an NSO stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed, and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.
SFW-MIN-2	Require that all proposed surface-disturbing mineral activities have an approved operation and reclamation plan before the activity begins.
SFW-MIN-5	The operator, as directed by Ohio EPA, is responsible for remedial action for cleanup of soil and water resources and timely repair of damaged wells, pipelines, or tanks.
SFW-MIN-8	Require owners and lessees to plug oil and gas wells when production ceases. Work with cooperating agencies to plug abandoned non-producing wells without identified owners.
SFW-SAFE-17	Post warnings of dangerous conditions and threats of immediate concern for the safety of Forest employees and the public
SFW-SAFE-18	Issue closure orders to protect the public when clear and present dangers cannot be mitigated in a timely manner.

Reference	Stipulation/Notification/Standard/Guideline
SFW-SAFE-19	Any wastewater that originates from oil and gas operations would be considered non-Federal and so disposal would not be allowed on Wayne National Forest lands (including the roads under jurisdiction of the WNF). In addition, the Ohio Revised Code only allows for four different disposal methods of fluids associated with oil and gas operations: injection, surface application (on roads only, and only when permitted by the authority with jurisdiction over the road), enhanced recovery (reuse of the fluids in other wells) or other methods to test new technologies and methodologies (ORC 1509.22(C)(1)).
Stipulation #5	No surface occupancy within designated areas of the lease (see lease map) to protect special management units such as developed recreation areas, trails and associated trailheads, water supply facilities, administrative site, etc. On NFS lands within administrative sites, developed recreation areas, trails and associated trailheads, the Forest Service will issue leases for Federal oil and gas only with an NSO stipulation. The NSO designation will include a buffer zone, which will be determined in accordance with the Implementation Guide for Scenery Management. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to the Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed, and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.
SFW-MIN-10	Within management areas where surface occupancy is generally permitted, apply the No Surface Occupancy stipulation for new Federal leases where the following conditions occur: • Slopes in excess of 55 percent and areas prone to mass soil movement • Areas within ¼ mile of Indiana bat hibernacula • Cultural resource sites of known significance.
GFW-SM-54	Native soil should be removed and stockpiled before ground disturbance.
GFW-WSH-10	Modify resource management practices according to soil characteristics and slope to protect soil productivity and minimize erosion and sedimentation. Refer to soil map unit descriptions and appropriate interpretive tables in the Wayne National Forest Soils Inventory (based on the USDA County Soil Surveys).
GFW-WSH-11	Plan and implement erosion control measures for management activities that create bare mineral soil conditions. Stabilize disturbed areas based on direction in SFW-WSH-6, and GFW-WSH 7 and GFW-WSH-8.

Reference	Stipulation/Notification/Standard/Guideline
GFW-WSH-8	When stabilizing disturbed areas, give priority to stabilizing areas that are discharging soil into watercourses, especially in municipal and recreational impoundment watersheds. Techniques may include: • Placing straw bales in ditch lines and small drainages • Leaving berms in road embankments during construction • Constructing diversion ditches • Hand placing slash and unmerchantable logs across slopes and trails • Installing check dams and ditch lines • Excavating sediment detention basins
Notification #5	The area of this lease contains a considerable amount of land with steep slopes and/or unstable soils. Accordingly, the opportunity to locate access roads, drilling sites, pipelines, storage tanks and other improvements may be extremely limited.
Stipulation #17	Oil and gas activities will be allowed on slopes from 35 to 55 percent on a case-by-case basis with appropriate mitigation. New road construction and maintenance shall be planned to disturb the least amount of ground. The leaseholder and Forest Service inspector shall work together to identify locations for roads, pipelines, well pads, and production facilities.
Stipulation #8	No surface occupancy on slopes in excess of 55 percent (see lease map) to protect soil and water from erosion and mass failure hazards because of steep slopes.
Stipulation #9	No surface occupancy is allowed for the exploration and development of energy minerals on areas with mass soil instability, as defined by the USDA County Soil Surveys (see lease map).
GFW-TES-22	Limit ground compaction to the minimum area possible during major earth disturbing activities (including, but not limited to new road and trail construction, mineral resource exploration and development, or new facilities) that occur in suitable ABB habitat within 10 air miles of known occupied ABB habitat.
GFW-TES-24	In occupied ABB habitat, design new roads with the minimum safe width necessary for planned use of the road.
GFW-TES-25	Within 10 air miles of known occupied ABB habitat, keep ground disturbance to a minimum during the reconstruction and maintenance of existing roads. Limit width of road, ditches, and surface materials to the minimum necessary for the planned use.
GFW-TES-3	Establish a one quarter-mile forested buffer around all mine openings that are known Indiana bat fall swarming sites, but where actual Indiana bat hibernation has not been established. Reduce or eliminate human disturbances within the buffer. Implement vegetation management only to maintain or improve Indiana bat roosting, swarming, or foraging habitat.
GFW-TES-31	Conduct surveys for running buffalo clover in suitable habitat prior to implementing ground or canopy disturbing activities.

Reference	Stipulation/Notification/Standard/Guideline
SFW-TES-10	During the non-hibernation season (April 15–September 15), do not cut, unless they are a safety hazard: • Trees of any species 6 inches DBH or more that are hollow, have major splits, or have broken tops that provide maternity habitat. • Snags 6 inches DBH or more that have Indiana bat roost tree characteristics. Consider any tree with less than 10 percent live canopy to be a snag. When removal of hazard trees is necessary in a recreation area during the non-hibernation season (e.g., developed recreation sites, access roads, trails), conduct emergence surveys at the identified hazard trees that possess the characteristics identified above, and at any hazard trees that possess large areas of loose bark providing maternity habitat.
SFW-TES-2	Establish a one-quarter mile buffer around all known hibernacula. Within this one quarter mile buffer: • Prohibit new trail and road construction. • Do not conduct prescribed burning during the fall swarming period (generally mid-August to mid-October) or during the hibernation period (September 15 through April 15). • Do not permit surface occupancy for exploration or development of Federally owned minerals. • Implement vegetation management only to maintain or improve Indiana bat roosting, swarming, or foraging habitat.
SFW-TES-32	Protect and improve occupied Regional Forester sensitive species habitat.
SFW-TES-33	Do not conduct vegetation management within a 50-foot radius of rock shelters, or within 50 feet of the base and 50 feet of the top (measured horizontally) of naturally occurring, large rock faces or outcrops, unless designed to enhance the site characteristics for a Federally listed species or a known population of Regional Forester sensitive species. Large rock faces or outcrops are defined as rock outcrop areas 15 feet or more in height and 100 feet or more in length. These rock outcrop habitats are not limited to solid “cliffs” and may include discontinuous rock faces, if the outcrop area is predominantly rock faces.
SFW-TES-34	Avoid vegetation management within 50 feet of the base and 50 feet of the top of smaller rock faces (approximately 15 feet or more in height and less than 100 feet in length).
SFW-FH-8	Forest contracts and permits shall include appropriate clauses for the prevention and/or treatment of nonnative invasive species.
SFW-FH-11	Ensure that seed mixes or cultivated plants used for restoring disturbed areas or landscaping on NFS land do not include any species on the Forest’s NNIS list or NNIS species identified by the State of Ohio or its neighboring states (i.e., Kentucky, Pennsylvania, Michigan, Indiana, and West Virginia).

Reference	Stipulation/Notification/Standard/Guideline
GFW-FH-11	When restoring disturbed areas, prevent nonnative invasive species plant invasion or spread by using the following measures: • Use weed-free mulch and forage when available. • Use natural re-vegetation of native species for small-sized disturbances (e.g., utility rights-of-way, fire lines) where the threat of erosion and sedimentation is limited. When seeding is necessary to accomplish re-vegetation, prioritize the composition of the seed mix as follows: • Native species with local genotypes (locally adapted) • Native species with non-local genotypes (not locally adapted) • Desirable nonnative species that are non-aggressive and non-persistent (annuals) • Encourage use of locally grown/adapted native plant materials
GFW-FH-12	Consider nonnative invasive species situations on adjacent lands when planning and conducting management activities.
Stipulation #10	No surface occupancy within ¼ mile of all known Indiana bat hibernacula.
Stipulation #12	No cutting of snags (trees with less than 10% live canopy), shagbark or shellbark hickories, or trees that are hollow and/or have major splits or broken tops, except during the bat hibernation season (September 15 to April 15). If such trees are a safety hazard, they may be cut anytime they pose an imminent threat to human safety, but if cut in the non-hibernation season the Forest Service biologist must be notified in advance. This stipulation applies only to trees over six inches in diameter. Protect all super canopy trees or other identified congregation roost trees for bald eagles along major river corridors and lakes. Protect known nests and roosts as described in the Bald Eagle Recovery Plan, or as directed by the US Fish and Wildlife Service. Prior to any surface disturbing activities, a Forest Service biologist will conduct an assessment for potential American burying beetle habitat and occurrence. Occupancy restrictions will be determined at the time of the evaluation.
Stipulation #13	Controlled surface use may include setbacks or restrictions from portions of the lease to ensure protection of habitat for regional sensitive species. At the time of any new proposed lease developments, the responsible line officer shall determine the need for any setbacks or restrictions, or the need for timing-related stipulation in accordance with the aquatic and terrestrial wildlife and botanical resources standards and guidelines. The leaseholder and Forest Service inspector shall work together to identify locations for development and production facilities in order to protect the structural integrity of large old trees found on a portion of the tract.

Reference	Stipulation/Notification/Standard/Guideline
Notification #3	The Forest Service is responsible for assuring that the area to be disturbed is examined prior to allowing any surface disturbing activities on lands covered by this lease. The examination is to determine effects upon any plant or animal species listed, or proposed for listing, as Federal endangered or threatened, regional sensitive, and their habitats. If the findings of this examination determine that the operation(s) may have a detrimental effect on a species covered by the Federal endangered Species Act, the operator's plans may be denied or restrictions added. The presence of regional sensitive species may also require some restrictions of the operation(s). The Forest Service has the responsibility to conduct the required examination. In cases where the Forest Service time frames cannot meet the needs of the lessee/operator, the lessee/operator may, at his discretion and cost, conduct the examination on the lands to be disturbed. This examination must be done by or under the supervision of a qualified resource specialist approved by the Forest Service. An acceptable report must be provided to the Forest Service identifying the anticipated effects of the proposed action on Federal endangered or threatened species, regional sensitive species, or their habitats.
GFW-ARR-12	Improve existing crossings to ensure passage of aquatic organisms when maintenance and reconstruction activities are scheduled.
GFW-ARR-29	Prohibit vegetation management or ground disturbing activities within 100 feet of perennial springs, unless the activity is designed to protect water quality of the spring or integrity of the surrounding area.
GFW-ARR-5	Where earth-disturbing activities expose mineral soil, establish filter strips along waterbodies. • Filter strip width along perennial water bodies should be a minimum of 100 feet, measured horizontally from the edge of the aquatic ecosystem. • Filter strip width along intermittent water bodies should be a minimum of 75 feet, measured horizontally from the edge of the aquatic ecosystem. • Filter strip width along ephemeral water bodies should be a minimum of 50 feet, measured horizontally from the edge of the aquatic ecosystem.
GFW-ARR-6	Earth-disturbing activities that expose mineral soil may occur within the filter strip only if effective sediment control measures that minimize and/or mitigate any detrimental effects are employed.
GFW-ARR-8	Design stream crossings to be at right angles.
GFW-ARR-9	Design and construct new permanent stream crossings (ephemeral, intermittent and perennial streams) to maintain upstream and downstream passage of aquatic and semiaquatic organisms.
GFW-WSH-1	Water should not be diverted from streams, lakes, or springs when in-stream flow needs or water-level assessments indicate that diversion would adversely affect stream processes, aquatic and riparian habitats and communities, or recreation and aesthetic values.
GWF-ARR-14	Avoid the use of heavy equipment in flowing streams. Alternatives may include concentric pipe (double pipe) and plowing.
GWF-ARR-15	Encourage the location of pipelines at existing bridges.

Reference	Stipulation/Notification/Standard/Guideline
GWF-ARR-16	When a pipeline crosses a stream on NFS land, the following should apply: • Encourage the use of boring to locate pipeline crossings beneath Forest streams where topography, soil, and stream bottom conditions permit. • Stabilize disturbed soil and protect streamside banks as work progresses.
SFW-ARR-10	Do not allow roads, trails, or log skidding within streambeds except at designated crossings.
SFW-ARR-11	If stream crossings are removed, restore banks and channel to a natural dimension and shape.
SFW-ARR-13	Pipelines of 9-inch diameter or larger that cross streams on NFS land must be reviewed by the Ohio Public Utilities Commission and the Federal Energy Regulatory Commission.
SFW-ARR-17	Require appropriate technology on all pipelines that cross streams so that supply and flow can be shut off upon detection of a leak.
SFW-ARR-7	Design mitigation measures (e.g., sizing culverts to match the drainage area) into crossings of perennial, intermittent or ephemeral streams to meet site-specific needs.
SFW-MIN-3	Require that operators conduct activities and maintain equipment to prevent the discharge of oil or brine onto the ground or into surface waters.
SFW-MIN-4	Upon discovery or notification of an accidental spill of crude oil or brine that discharges, or threatens to discharge, into surface waters, notify the Ohio Environmental Protection Agency Emergency Response and Special Investigations unit in Columbus.
GFW-TRANS-10	New road construction should follow the design guidance provided in Appendix A of the Forest-wide Roads Analysis document.
GFW-TRANS-11	Use existing roads as an alternative to construction of new roads whenever possible.
GFW-TRANS-5	Place load limits on roads that are susceptible to damage.
GFW-TRANS-7	Avoid co-locating motorized trails with Maintenance Level 2 to 5 roads.
GFW-TRANS-8	Avoid new road construction: • Within 50 feet of OHV or pedestrian trails (except at crossings) • Within riparian areas • Within the filter strips of streams and waterways, except for infrequent crossings • On mechanically unstable soils.
GFW-TRANS-9	Require permit holders to install and maintain an appropriate physical barrier on special use roads to prevent unauthorized use. If special use roads remain in place without a barrier, the permit holder must reconstruct the road to Maintenance Level 3.
SFW-TRANS-4	Allow motor vehicles licensed for travel on the State and Federal highways to use National Forest System roads at Maintenance Levels 2 to 5.
SFW-TRANS-6	All roads are closed to the public unless the Forest road atlas specifically lists them as Maintenance Level 2 to 5 (open to the public).

Reference	Stipulation/Notification/Standard/Guideline
G-DCF-VEG-2	Use even-aged timber management (thinning, shelterwood, clearcut or two-aged harvest) on approximately 25 percent of the area to perpetuate visual and vegetative diversity. Concentrate even-aged management on the periphery of the management area or on the periphery of large blocks of land targeted for uneven-aged management.
GFW-TES-9	Retain all shagbark and shellbark hickory trees > 6 inches DBH, unless removal is necessary to protect human safety or to avoid adverse impacts to steep slopes, erodible soils, floodplains, or wetlands.
GFW-WLF-11	In conjunction with opening development and maintenance, retain existing snags and create additional ones, unless they pose a safety hazard.
GFW-WLF-6	When oil and gas well developments meet, or can be made to meet, the objectives of permanent forest openings, designate them accordingly so they may also contribute to herbaceous habitat objectives.
GFW-WLF-7	Permanent forest openings should be larger than one acre in size, unless necessary to meet the needs of a site-specific species.
Stipulation #1	No surface occupancy allowed on the entire lease or on designated areas of the lease (see lease map) for the protection of the Future Old Forest resources. On NFS lands in Future Old Forest Management Areas, the Forest Service will issue leases for Federal oil and gas only with an NSO stipulation. In the case of Federal leases issued pursuant to the Comprehensive National Energy Policy Act of 1992, the Forest Service will recommend to the Bureau of Land Management that operations be allowed to continue provided that all activities comply with Forest guidance. When the existing well (or wells) is depleted, all facilities must be removed, and the site rehabilitated to Forest Service standards. No new wells will be allowed, nor will existing wells be allowed to be drilled to deeper formations. The NSO stipulation does not apply to reserved or outstanding mineral rights.
Stipulation #14	At the time of any new proposed lease developments, the responsible line officer shall determine the extent of the surface use restrictions necessary to maintain habitat integrity for plant and animal species dependent on such habitats.
GFW-SM-21	Avoid the need for lighted towers, particularly in locations visible from a lake or in the viewshed of a Concern Level 1 or 2 travel way or use area.
GFW-SM-23	Reduce visual impact of current and future obstruction lighting requirements as much as technology and FAA and FCC requirements will allow.
GFW-SM-24	Reduce visual impact by using such techniques as, but not limited to, directional lighting, tilting, shields, etc.
GFW-SM-25	Maximum intensity of lighting shall be the minimum required by FAA and/or FCC. Unless otherwise required by the FAA, only white (preferable) or red strobe lights should be used at night, and these should be the minimum number and intensity, with the minimum frequency of flashes (maximum duration between flashes), as required by the FAA.
GFW-SM-64	Strive to schedule mechanized activities along Concern Level 1 and 2 travel ways, use areas, and water bodies to occur during low-use periods to alleviate noise and visual impacts.

Reference	Stipulation/Notification/Standard/Guideline
Stipulation #11	At the time of any new proposed lease developments, the responsible line officer shall determine the need for any visual quality mitigation. Some examples of mitigation may include special design and reclamation measures, transplanting trees and shrubs, fertilization, mulching, special erosion control structures, irrigation, site recontouring to match the original land contour, low profile equipment and painting to minimize contrast. Surface occupancy may also be limited or denied in sensitive areas, such as unique geologic features and rock formations, visually prominent areas such as designated trails and developed recreation sites.
GFW-ARR-23	Avoid adverse impacts to ephemeral wetlands during ground-disturbing activities.
GFW-ARR-4	Where possible, do not construct new facilities (such as roads, trails, campsites, and buildings) within riparian areas. Where such facilities must be located in riparian areas, construct and maintain them to minimize adverse impacts to ecological function.
Stipulation #15	At the time of any new proposed lease developments, the responsible line Supplemental Information Report officer shall determine the appropriate surface use restrictions necessary to maintain the structural and ecological integrity of riparian areas, and aquatic and riparian-dependent species viability.

Source: USFS 2006a. ¹ Although the 2006 Forest Plan dictates these dates as April 15 to September 15, the WNF operates under a new timeframe of April 1 to September 30 based on new science and agency capability. Operators will be expected to abide by this updated timeframe.

ABB = American burying beetle; FAA = Federal Aviation Administration; FCC = Federal Communications Commission; NNIS = nonnative invasive species; OHV = off-highway vehicle; SIR = Supplemental Information Report; USDA = U.S. Department of Agriculture

2.7. Other Agency Partners and Interested Parties

Coordinating agencies include the USFS Eastern Regional Office, the WNF Supervisor's Office and Athens Ranger District, and the USFWS Columbus Ecological Services Field Office.

2.7.1. BLM Regulatory Jurisdiction

The BLM's regulatory jurisdiction over oil and gas operations in the WNF is limited to Federal lands and minerals. Because the BLM's regulatory jurisdiction is limited, BLM activities that affect private lands must be examined to ensure that the BLM does not exceed its authority. To guide drilling activities accessing Federal minerals from a non-Federal surface, the BLM created Permanent Instruction Memorandum (PIM) 2018-014, *Directional Drilling into Federal Mineral Estate from Well Pads on Non-Federal Locations* (BLM 2018). Relevant policies and procedures from PIM 2018-014 have been incorporated into the discussion below.

When a lease has been issued and a lessee proposes to develop Federally owned oil and gas resources from private surface, a lessee or operator must submit an APD, which initiates further, site-specific NEPA analysis, including ESA Section 7 consultation. As addressed twice above (see Section 2.6 of this BA) and in the EA Appendix G, the BLM has authority to enforce AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis, such as those restricting water withdrawals from certain mussel streams and the Little Muskingum River, but stipulations, standards and guidelines from the Forest Plan (USFS 2006a) (Table 2-10) cannot be applied on private surface land. The Federal government has no authority to regulate activities that do not have a Federal nexus that occur on private lands, so a lessee could construct well pads, access roads, and other infrastructure on private surface land prior to submittal of APDs. Additionally, NEPA's procedural requirements do not expand or extend the BLM's authority beyond that provided in authorizing statutes such as FLPMA and the Mineral Leasing Act (BLM 2018). Nonetheless, the BLM's Section 6 lease term (BLM 2023a) requires minimization of adverse environmental impacts. The authority of the Section 6 lease term is imposed on Federal and non-Federal surface development during the APD process by requiring completion of necessary inventories and technical studies as well as application of design features, AMMs and other measures as conditions of APD approval. Furthermore, approval of an APD is a Federal action or undertaking subject to the statutory requirements of NEPA, the ESA, and NHPA.). Therefore, a site-specific review of APDs to access Federal minerals (from both Federal and private surface) will be performed by the BLM to ensure compliance with Federal regulations. The PIM indicates that the BLM has no jurisdiction to require an APD before an operator may begin well pad and road construction or drilling on the non-Federal land and doing so is not a violation of the Federal lease (BLM 2018). This would apply to Situation 1 and Situation 2 for surface disturbance actions on non-Federal land taken before an APD is submitted that triggers Federal involvement (see Chapter 1). Only actions and their associated effects to listed species occurring after Federal involvement would be analyzed during tiered consultation process. While Federal law requires that an operator refrain from any action that results in the "take" of threatened or endangered species (16 U.S.C. §1538), neither the BLM nor USFS have the ability to regulate surface disturbance on private land should operators choose to operate outside of established APD procedures.

Once the BLM authorizes drilling on private lands, the agency has the authority to enter and monitor the permitted activities. However, prior to a Federal authorization, the agency lacks

authority to enter non-Federal lands without the landowner's consent. The Gold Book advises the BLM to coordinate an on-site inspection upon receipt of an APD. When operators hire consultants to complete preapproval surveys, the operator will be expected to facilitate access to the non-Federal lands for the consultants. (BLM 2018).

The BLM's inspection and enforcement authority on non-Federal land includes compliance with any applicant-/operator-committed measures established by the operator and the BLM in the APD and relied on by the BLM in completing its reviews under NEPA, the ESA, or the NHPA. If an operator fails to carry out the measures under the APD, the BLM may, in its discretion, take enforcement action against the operator for failure to comply with the terms of the APD (43 C.F.R. §§ 3163.1-3163.2). The BLM-certified inspectors have broad responsibilities and authority to conduct inspections and ensure compliance. Enforcement actions may include, but are not limited to, issuing Incidents of Noncompliance, imposing assessments or civil penalties, ordering shutdown or curtailment of operations, and initiating the process for lease cancellation.

2.7.2. State of Ohio Regulatory Jurisdiction

Any operator who seeks to drill and operate an oil and gas well in Ohio would be required to obtain a permit from the State of Ohio. The BLM's proposed action that is analyzed in the EA and in this BA includes solely activities in Ohio. As described in the Terrestrial Action Area section, the possibility that noise from drilling could disturb a bat hibernaculum up to one-half mile from a drill site, in West Virginia, does not create a nexus with the State of West Virginia, because endangered bat conservation is a Federal regulatory responsibility. The State of West Virginia exercises no regulatory authority over oil and gas activities in the Wayne National Forest or in Ohio.

The State of Ohio has a variety of regulations and standards in place to regulate, permit, and oversee oil and gas development in the State, including development of surface well pads and associated infrastructure on private land. For drilling Federal minerals from private land, Chapter 1509 of the Ohio Revised Code (ORC) and Chapter 1501:9 of the Ohio Administrative Code (OAC) regulate the drilling, operation, maintenance, and abandonment of oil and gas wells in the State, including the use of hydraulic fracturing. In September 2011, the State of Ohio created the Division of Oil and Gas Resources Management (DOGRM) within the Ohio Department of Natural Resources (ODNR). In accordance with the ORC, DOGRM has sole and exclusive authority to regulate the permitting, location, and spacing of oil and gas wells and production operations within the state, excepting only those activities regulated under Federal laws for which oversight has been delegated to the USEPA and activities regulated under sections 6111.02 to 6111.028 of the Ohio Revised Code (O.R.C. § 1509.02). Section 1509.23 directs the DOGRM to regulate oil and gas wells in the State of Ohio for the protection of public health and safety or to prevent damage to natural resources.

Prior to developing a pad for horizontal well construction on private land, an operator must submit a permit application to the ODNR DOGRM (O.A.C. § 1501:9-2-02). Under O.A.C. § 1501:9-2, well sites must be designed and constructed in a manner that supports the safe drilling and production operations of one or more horizontal wells, and in a manner that protects public health and safety and minimizes damage to natural resources, including conservation of topsoil where present, by managing stormwater, protecting surface water, and minimizing soil erosion. An application submitted to ODNR for construction of horizontal well site must be accompanied by a well site plan

that includes the following components intended to protect environmental resources (O.A.C. § 1501:9-2).

- Classification of soil types for the area within one hundred feet of and within the proposed well site boundary.
- The location of all springs, wetlands, streams, lakes, rivers, ponds, creeks, and water wells, which may be identified using reasonably available public resources and a field review, within one hundred feet of and within the proposed well site boundary.
- All flood hazard areas delineated on the "National Flood Insurance Rate Map" are within one hundred feet of and within the proposed well site boundary.
- Roads within the proposed well site boundary, including emergency access routes, signage to safely manage traffic flow on the site, the entrance to the well site, and any pull-off areas that may be used to manage excess traffic.
- All areas within one hundred feet of and within the proposed well site boundary that are located within the five-year time of travel associated with a public drinking water supply, as delineated or endorsed under the "Source Water Assessment and Protection Program".
- All areas within one hundred feet of and within the proposed well site boundary that are located within the emergency management zone of a public water system intake.
- A sediment and erosion control plan that describes procedures to minimize the discharge of construction related sediment to any area outside of the proposed well site, including soil stabilization measures, vegetation, mulch, and other means of controlling erosion, that will be used at the proposed well site. Operators are not permitted to remove erosion-control features until the ODNR certifies that the disturbed site is at least 70 percent revegetated (ODNR 2024c). The regulation provides basic reclamation standards that must be met.
- A dust control plan that is intended to control the generation and deposition of dust.
- A geotechnical report that identifies the factor of safety for bearing capacity and is intended to prevent failures of dams, berms, and other embankment features.
- A stormwater hydraulic report that describes stormwater and hydraulic control structures that must be designed to and be capable of managing a ten-year storm event.

Following submittal of an application with the required site plan components, the DOGRM conducts a site review meeting at the proposed well site. At the site review meeting, the DOGRM may conduct a physical review of the proposed well site, discuss the application, identify items that are necessary to ensure compliance with this rule, identify site-specific terms and conditions that may be attached to a permit that approves an application to construct a well site, and identify site-specific terms and conditions that may be attached to a permit to drill a horizontal well, such as Best Management Practices identified in the ODNR's Best Management Practices for Oil and Gas Well Site Construction (ODNR 2013). If the DOGRM identifies items that are necessary to ensure the well site design and application complies with Ohio law (including protection of public health and natural resources), the DOGRM will notify the applicant of the deficient items, and the applicant

may submit a revised application to address the deficiencies. At any time, the ODNR may require the applicant or person to submit additional information pertaining to the design or construction of the proposed well site that the DOGRM determines is necessary for the protection of public health or safety or to prevent substantial damage to natural resources or is necessary to ensure compliance (OAC § 1501:9-2).

Section 1501:9-1-08 of the OAC directs operators to apply a variety of standards for the drilling and completion of oil and gas wells to prevent inadvertent leaks, failures, and impacts to natural resources including use of drilling fluids, well casing standards, wellbore diameters, cement standards, surface casing standards, annular pressure control standards, and well construction standards.

The same regulation also provides standards for the use of drilling fluids and requires that all intervals drilled prior to reaching the Underground Source of Drinking Water protective depth shall be drilled with air, fresh water, a freshwater based drilling fluid, or a combination of the above. Only additives suitable for drilling through potable water supplies may be used while drilling these intervals. This standard is intended to protect drinking water and other groundwater sources that may have a surface water connection.

Various sections of the ORC and OAC require operators to comply with the ODNR's Best Management Practices for Oil and Gas Well Site Construction (ODNR 2013). The Best Management Practices are intended to reduce impacts to natural resources from surface disturbance, vegetation removal, sedimentation and erosion, waste disposal, construction of well sites and access roads, and other activities associated with well construction and operation. While the Best Management Practices are generally recommendations for operators, the ODNR places considerable importance on the inclusion of the Best Management Practices in application packages when permitting well pads in accordance with well permitting requirements under Chapter 1509 of the ORC and Chapter 1501:9 of the OAC.

If other Federal laws are implicated, the USFWS, U.S. Army Corps of Engineers (USACE), and U.S. Environmental Protection Agency (USEPA) may be required to approve or consult regarding oil and gas operations. Appendix C of the 2016 EA (BLM 2016) contains additional information about regulatory requirements and permitting of oil and gas operations on non-Federal surface. Oil and gas developers are subject to the ESA (16 U.S.C. §§ 1531-44), and all operators on private land are subject to Section 9 of the ESA (16 U.S.C. §1538) that makes it illegal to harass, hunt, shoot, capture, trap, kill, collect, wound, or harm (i.e., "take") any ESA-listed species or to pursue/attempt any of these activities. In addition, the ODNR has indicated that oil and gas operators regularly take voluntary steps to avoid violating the ESA including regularly conducting bat surveys and restricting their tree-cutting to winter (ODNR 2024c).

ORC Chapter 1509 defines *well stimulation* as "the process of enhancing well productivity, including hydraulic fracturing operations." Requirements for well stimulation are outlined in ORC Section 1509.19, which states that:

an owner who elects to stimulate a well shall stimulate the well in a manner that will not endanger underground sources of drinking water. Not later than twenty-four hours before commencing the stimulation of a well, the owner or the owner's authorized representative shall notify an oil and gas resources inspector. If during the stimulation of a well damage to

the production casing or cement occurs and results in the circulation of fluids from the annulus of the surface production casing, the owner shall immediately terminate the stimulation of the well and notify the chief of the division of oil and gas resources management. If the chief determines that the casing and the cement may be remediated in a manner that isolates the oil and gas bearing zones of the well, the chief may authorize the completion of the stimulation of the well. If the chief determines that the stimulation of a well resulted in irreparable damage to the well, the chief shall order that the well be plugged and abandoned within thirty days of the issuance of the order. For purposes of determining the integrity of the remediation of the casing or cement of a well that was damaged during the stimulation of the well, the chief may require the owner of the well to submit cement evaluation logs, temperature surveys, pressure tests, or a combination of such logs, surveys, and tests.

ORC Section 1509.33 sets forth violations subject to civil penalties.

Ohio law also regulates water quality and quantity. Any person or company that intends to divert more than 100,000 gallons per day of surface water must secure a permit from the Ohio Division of Water Resources (ORC §1521.22). The application must state the quantity of water to be diverted, the purpose of the diversion, the life of the project for which the water is to be diverted, and such other information as the chief may require by rule. The Division of Water Resources may deny a permit if any of the following apply:

- During the life of the project for which the water is to be diverted, some or all of the water to be diverted will be needed for use within the Ohio river watershed.
- The proposed diversion would endanger the public health, safety, or welfare.
- The applicant has not demonstrated that the proposed diversion is a reasonable and beneficial use and is necessary to serve the applicant's present and future needs.
- The applicant has not demonstrated that reasonable efforts have been made to develop and conserve water resources in the importing basin and that further development of those resources would engender overriding, adverse economic, social, or environmental impacts.
- The proposed diversion is inconsistent with regional or state water resources plans.
- The proposed diversion, alone or in combination with other diversions and water losses, will have a significant adverse impact on in-stream uses or on economic or ecological aspects of water levels.

In the State of Ohio, a person or operator that proposes to engage in an activity that involves the filling of an isolated wetland shall apply to the director for coverage under a general state isolated wetland permit or shall apply for an individual state isolated wetland permit, as applicable, in accordance with sections 6111.02 to 6111.027 of the Ohio Revised Code. State of Ohio wetland permits are subject to a variety of review levels based on the proposed acreage of wetland fill. State Review of wetland permits requires the submission of an acceptable wetland delineation, wetland categorization, and a mitigation proposal for the impact to the wetland (O.R.C. § 6111.022). Mitigation for proposed filling of wetlands may include onsite or offsite mitigation, mitigation within the same watershed, mitigation at a wetland bank, in-lieu fee mitigation, or mitigation in a

watershed that is adjacent to the watershed that is affected if there is a significant ecological reason that the mitigation location should not be limited to the watershed in which the wetland fill is located (O.R.C. §§ 6111.022, 6111.023, and 6111.024). The level of mitigation depends on the acreage of wetlands that would be filled, subject to director approval.

The ODNR also protects Ohio's groundwater resources by regulating the disposal of brine and other wastes produced from the drilling, stimulation, and production of oil and natural gas in Ohio. Within the State, approximately 98 percent of all brine is disposed of by underground injection into brine-bearing or depleted oil and gas formations deep below the surface (ODNR 2024a, ODNR 2024b). The other 2 percent is spread on roads for dust and ice control and used with local government approval. There are seven Class II brine injection wells within the Marietta Unit of the WNF: five in Washington County, one in Monroe County, and one in Noble County (ODNR 2024b). In accordance with OAC 1501:9-3-07(G), Class II disposal well owners must file Quarterly Reports as well as Annual Reports, documenting the total volume of brine or other waste substances received, the maximum injection pressure reached, the average daily injection pressure, the volume and delivery date for each shipment of brine or other waste substances, and proof of the lawful disposal of waste.

When a well owner fails to meet requirements established by law, the Division of Oil and Gas Resources Management has a variety of enforcement options to gain compliance. The Division generally maintains a standard operating procedure of escalating enforcement measures from informal to formal, depending upon the nature of the violation.

When informal measures are unsuccessful or a violation endangers public health and safety or the owner demonstrates flagrant disregard for the law, more formal enforcement measures are used. The Division chief has the authority to issue orders or file civil or criminal enforcement actions, if necessary, to correct a violation.

Enforcement regulations are found in ORC 1509.04 and are as follows:

(A) The chief of the division of oil and gas resources management, or the chief's authorized representatives, shall enforce this chapter and the rules, terms and conditions of permits and registration certificates, and orders adopted or issued pursuant thereto, except that any peace officer, as defined in section 2935.01 of the Revised Code, may arrest for violations of this chapter involving transportation of brine by vehicle. The enforcement authority of the chief includes the authority to issue compliance notices and to enter into compliance agreements.

(B)(1) The chief or the chief's authorized representative may issue an administrative order to a person that is subject to this chapter, or rules adopted under it for a violation of this chapter or rules adopted under it, terms and conditions of a permit issued under it, a registration certificate that is required under this chapter, or orders issued under this chapter.

(2)(a) If a person who is required to submit a report, test result, fee, or document by this chapter or rules adopted under it submits a request for an extension of time to submit the report, test result, fee, or document to the chief prior to the date on which the report, test result, fee, or document is due, the chief may grant an extension of not more than sixty

additional days from the original date on which the report, test result, fee, or document is due.

(2)(b) If a person who is required to submit a report, test result, fee, or document by this chapter or rules adopted under it fails to submit the report, test result, fee, or document before or on the date on which it is due and the chief has not granted an extension of time under division (B)(2)(a) of this section, the chief shall make reasonable attempts to notify the person of the failure to submit the report, test result, fee, or document. If a person who receives such a notification fails to submit the report, test result, fee, or document on or before thirty days after the date on which the chief so notified the person, the chief may issue an order under division (B)(3) of this section.

(B)(3) The chief may issue an order finding that a person has committed a material and substantial violation.

(C) The chief, by order, immediately may suspend drilling, operating, or plugging activities that are related to a material and substantial violation and suspend and revoke an unused permit after finding either of the following:

(1) A person has failed to comply with an order issued under division (B)(3) of this section that is final and nonappealable.

(2) A person that has committed a material and substantial violation is causing, engaging in, or maintaining a condition or activity that the chief determines presents an imminent danger to the health or safety of the public or that results in or is likely to result in immediate substantial damage to the natural resources of this state.

(D)(1) The chief may issue an order under division (C) of this section without prior notification if reasonable attempts to notify the person have failed or if the person is currently in material breach of a prior order, but in such an event notification shall be given as soon thereafter as practical.

(2) Not later than five days after the issuance of an order under division (C) of this section, the chief shall provide the person an opportunity to be heard and to present evidence that one of the following applies:

(a) The condition or activity does not present an imminent danger to the public health or safety or is not likely to result in immediate substantial damage to natural resources.

(b) Required records, reports, or logs have been submitted.

(3) If the chief, after considering evidence presented by the person under division (D)(2)(a) of this section, determines that the activities do not present such a threat or that the required records, reports, or logs have been submitted under division (D)(2)(b) of this section, the chief shall revoke the order. The person may appeal an order to the court of common pleas of the county in which the activity that is the subject of the order is located.

(E) The chief may issue a bond forfeiture order pursuant to section 1509.071 of the Revised Code for failure to comply with a final nonappealable order issued or compliance agreement entered into under this section.

(F) The chief may notify drilling contractors, transporters, service companies, or other similar entities of the compliance status of a person that is subject to this chapter or rules adopted under it.

If the person fails to comply with a prior enforcement action of the chief, the chief may issue a suspension order without prior notification, but in such an event the chief shall give notice as soon thereafter as practical. Not later than five calendar days after the issuance of an order, the chief shall provide the person an opportunity to be heard and to present evidence that required records, reports, or logs have been submitted. If the chief, after considering the evidence presented by the person, determines that the requirements have been satisfied, the chief shall revoke the suspension order. The person may appeal a suspension order to the court of common pleas of the county in which the activity that is the subject of the suspension order is located.

(G) The prosecuting attorney of the county or the attorney general, upon the request of the chief, may apply to the court of common pleas in the county in which any of the provisions of this chapter or any rules, terms or conditions of a permit or registration certificate, or orders adopted or issued pursuant to this chapter are being violated for a temporary restraining order, preliminary injunction, or permanent injunction restraining any person from such violation.

Chief's orders are posted to the ODNR website at <https://ohiodnr.gov/discover-and-learn/safety-conservation/about-ODNR/oil-gas/oil-gas-resources/oil-gas-inspections-enforcement>

CHAPTER 3. SPECIES EFFECTS ANALYSIS

3.1. Threatened, Endangered, Proposed, and Candidate Species Considered

Nineteen Federally listed, proposed, or candidate animal and plant species have been determined to have potential to occur within the Terrestrial Action Area or Aquatic Analysis Area (USFWS 2024a). Potential for presence is based on the presence of potentially suitable habitat ("assumed present"), reintroductions, or known occurrences. Table 3-1 provides a brief description of each species' habitat requirements and a description of known or assumed occurrences in the analysis areas. No critical habitat has been designated for any species within the Terrestrial Action Area or Aquatic Analysis Area.

Table 0-1. Species Addressed in this Biological Assessment

Common Name	Federal Status	Habitat	Potential for Presence in the Analysis Area
Indiana bat	Endangered	Hibernates primarily in caves and mines. Maternity sites generally are behind loose bark of large diameter, dead or dying trees with sun exposure. Foraging habitats include	Habitat for the species is found throughout the WNF, and it is thought to occur year-round, but numbers are very low. There are three documented occurrences in the Terrestrial Action Area

Common Name	Federal Status	Habitat	Potential for Presence in the Analysis Area
		riparian areas, upland forests, ponds, and fields.	(USFWS 2024d). There are no hibernacula or maternity roosts documented in the Marietta Unit of the WNF. The species has experienced population declines from white-nose syndrome.
Northern long-eared bat	Endangered	Hibernates primarily in caves and mines. Maternity sites generally are behind loose bark of dead or dying trees or in tree cavities while foraging habitats include forests, along forest edges, over forest clearings, and occasionally over ponds.	Suitable summer habitat available across the WNF, including roost trees identified. No hibernacula or maternity roosts documented in the Marietta Unit of the WNF, but reproductive females were captured in summer mistnet surveys in 2004 and 2014 (TRC 2004, 2014). There have been multiple captures outside the proclamation boundary but within the Terrestrial Action Area.
Tricolored bat	Proposed Endangered	Hibernates primarily in caves or mines. Maternity colonies utilize open-sided human-made structures such as under porch roofs or in live or dead leaf clusters in tree canopies. Most foraging occurs in riparian areas.	Suitable summer habitat available across the WNF. No hibernacula or maternity roosts have been documented in the Marietta Unit of the WNF, but reproductive females were captured in summer mistnet surveys in 2004 and 2014 (TRC 2004, 2014). There have been at least 17 sites where this species has been detected in the Terrestrial Action Area with other detections just outside the Terrestrial Action Area.
Monarch butterfly	Proposed Threatened	Likely to occur where milkweed (required for egg-laying) or a diversity of flowering plants are found.	Species is common throughout Ohio and the WNF during the summer months. Populations are experiencing nationwide decline.
Clubshell mussel	Endangered	Small to medium streams with gravel and sand substrate with little silt content.	No known populations in the WNF or Little Muskingum River watershed. USFWS introduced the species into the Ohio River Islands National Wildlife Refuge within the Aquatic Analysis Area between 2014 and 2018 (USFWS 2022a). Has potential to occur in Muskingum River (USFWS 2024e).

Common Name	Federal Status	Habitat	Potential for Presence in the Analysis Area
Fanshell mussel	Endangered	Characteristic habitat is medium to large streams. It has been found in river habitats with gravel substrates and a strong current, in both deep and shallow water.	Recent surveys (2012, 2016, 2019, and 2020) have documented this species in the portion of the Ohio River within the Aquatic Analysis Area (USFWS 2024). Documented in Muskingum River with at least five different sites having documentation (USFWS 2024e).
Northern riffleshell mussel	Endangered	A wide variety of streams in various sizes. This species buries itself in firmly packed gravel or sand. Remaining populations of this species occur in large and small rivers and streams (USFWS 2024b) and existing populations are very small.	No known populations occur in the WNF, Muskingum River, or Little Muskingum River watershed. This species has been reintroduced in the Ohio River Islands National Wildlife Refuge within the Aquatic Analysis Area (USFWS 2024b).
Purple cat's paw mussel	Endangered	Large to medium-large rivers in the Ohio River Watershed; prefers shallow water and requires a swift current. Found on bottom substrates ranging from sand to boulders.	No known populations in the WNF, Muskingum River, or Little Muskingum River watershed. This species has been reintroduced in the Ohio River Islands National Wildlife Refuge within the Aquatic Analysis Area (USFWS 2022a, 2024c). The reintroduced populations contain only young individuals. While some of these may have reached sexual maturity, evidence of reproduction has not yet been documented (USFWS 2022a).
Longsolid mussel	Threatened	Found in small streams to large rivers, including the Ohio River, and prefers a mixture of sand, gravel, and cobble stream bottoms.	Known from Little Muskingum - Middle Island Management Unit with an overall population condition of low and from the Ohio River in the Willow Island Pool (USFWS 2018b). Mapping indicates species also found in Muskingum River.
Pink mucket mussel	Endangered	Found in waters with strong currents and rocky or boulder substrates, with depths up to about 1 meter, but also found in deeper waters with slower currents and sand and gravel substrates.	No known populations exist in the WNF or Little Muskingum River watershed (USFS 2022). A portion of the Ohio River in the southwestern portion of the Aquatic Analysis Area has occurrences of this species (USFWS 2024e). The lower

Common Name	Federal Status	Habitat	Potential for Presence in the Analysis Area
			portion of the Muskingum River within the Analysis area is unlikely to support this species due to the system of 10 dams located upstream and associated impacts on flow, sedimentation, water quality, and interconnectedness of aquatic habitats (USFWS 2024c).
Round hickorynut mussel	Threatened	Medium to large rivers in areas with slow to swift currents over a mixture of sand and gravel substrates. Currently occupied and potentially suitable habitat in the Marietta Unit is limited to the Little Muskingum River mainstem and Ohio River within Washington County and represents a small portion of the historical distribution.	Currently occupied and potentially suitable habitat in the Marietta Unit is limited to the Little Muskingum River mainstem and Ohio River within Washington County, with approximately 1,200 miles of habitat. Documented in Muskingum River with at least five different sites having documentation (USFWS 2024e).
Salamander mussel	Proposed Endangered	Swift-flowing rivers and streams with areas of shelter under rocks or in crevices.	Known to occur within the past decade near the WNF in the lower reaches of the mainstem of the Little Muskingum River in the Little Muskingum–Middle Island watershed. Documented in Muskingum River within Washington County (USFWS 2024e).
Sheepnose mussel	Endangered	Larger rivers and streams in shallow areas with moderate to swift currents that flow over gravel or coarse sand; may also be found in areas of cobble, boulders, or mud, or deep areas of rivers.	No known populations within the WNF or Little Muskingum River watershed. The closest known extant population is in the Belleville pool, which starts at the Willow Island Locks and Dam, just south of the Marietta Unit and within the Aquatic Analysis Area. However, there is potential for this species to occur within the Ohio River and Muskingum River in the Aquatic Analysis Area and has been documented since 2011 (USFWS 2024e).
Snuffbox mussel	Endangered	Small to medium creeks in areas with swift current; also found in Lake Erie and other larger rivers. This species	This species is assumed to occur in low densities in the Ohio River within the Aquatic Analysis Area in Washington County (USFWS

Common Name	Federal Status	Habitat	Potential for Presence in the Analysis Area
		buries deep in sand, gravel, and cobble substrates.	2024). A small population exists in the Muskingum River upstream from the Analysis Area, but the potential to occur within the Analysis Area is low due to the same factors as noted above for pink mucket mussel (USFWS 2024e).
Rabbitsfoot	Threatened	Small to medium sized streams and some larger rivers. It usually occurs in shallow water areas along the bank and adjacent runs and shoals with reduced water velocity.	There is suitable habitat for this species in the Aquatics Analysis Area and this species is known to occur in the Muskingum River in the Aquatic Analysis Area (USFWS 2025b).
Eastern hellbender	Proposed Endangered	Large slabs of rock or other shelter-providing objects (logs and boards) with loose sand and gravel (not silt) on the bottom of large to medium streams or rivers with fast-moving water.	There is suitable habitat for this species in the Aquatics Analysis Area and there are documented occurrences for this species in the Little Muskingum River in both Monroe and Washington Counties (USFWS 2025b).
Northern monkshood	Threatened	Occurs on shaded or partially shaded cliffs and talus slopes with cold soil environments. There is artificially created habitat for Northern monkshood at mine portals, but only if those areas have cold air or water flow.	While there are no known occurrences of northern monkshood in the WNF and the closest known population is approximately 50 miles west of the Terrestrial Action Area in Hocking County, potentially suitable habitat exists within the Marietta Unit.
Small whorled pogonia	Threatened	Occurs primarily in second- and third-growth hardwood and mixed hemlock-hardwood forests with sparse understory, scattered tree-fall canopy gaps, and adjacent, permanent canopy gaps such as stream corridors. This habitat occurs across the WNF on the Ironton, Marietta, and Athens Units.	While there are no known occurrences of small whorled pogonia in the WNF and the closest known population is approximately 50 miles west of the Terrestrial Action Area in Hocking County, potentially suitable habitat exists within the Marietta Unit (USFS 2022).
Virginia spiraea	Threatened	Occurs along the banks of high-gradient sections of second- and third-order streams, or on meander scrolls and point bars, natural levees, and other braided features of lower reaches.	While there are no known occurrences of Virginia spiraea in the WNF and the closest known population is approximately 70 miles west of the Terrestrial Action Area (approximately 13 miles from the Ironton District

Common Name	Federal Status	Habitat	Potential for Presence in the Analysis Area
			Boundary), potentially suitable habitat exists within the Marietta Unit. Upper portions of the Little Muskingum River in Washington and Monroe Counties contain assumed suitable habitat on the WNF (USFS 2022).

Sources: Badra 2001; eBird 2023; USFWS 2019a, 2021a, 2023c

The Proposed Action would open Federally administered mineral estate in the Marietta Unit to potential leasing. The process of leasing for oil and gas development itself does not directly affect Federally listed species; therefore, no direct effects would occur under the Proposed Action. However, reasonably foreseeable construction and operation of oil and gas development, as a result of leasing, could indirectly affect Federally listed species. This BA analyzes these associated effects, the overall impact of the Proposed Action and reasonably foreseeable development of the leases, and protection measures to avoid or reduce effects on Federally listed species. It is important to note that the Supplemental EA (BLM 2024b) and this BA were conducted at a programmatic level. A programmatic consultation is “a consultation addressing an agency’s multiple actions on a program, region, or other basis. Programmatic consultations allow the Service to consult on the effects of programmatic actions such as: (1) Multiple similar, frequently occurring, or routine actions expected to be implemented in particular geographic areas; and (2) A proposed program, plan, policy, or regulation providing a framework for future proposed actions.” 50 C.F.R. § 402.02 (definitions). Oil and gas leasing and development of Federal mineral estate occurs in multiple Stages of Federal environmental analysis and authorization (see Section 2.1, *Project Summary*, for more information on the three Stages of environmental review). The BLM would conduct the Stage 3 environmental review of project-specific impacts as part of the APD review and permitting process.

The analysis below considers the AMMs (see Section 2.1.1, *Avoidance and Minimization Measures for Species Protected under the Endangered Species Act*), the forest-wide standards (SFWs), guidelines, stipulations, and notifications for NFS lands (see Section 2.6.2, *Environmental Protections Required for a Federal Mineral Lessee Applying to Drill on NFS Lands*), and other measures that would be applied within the regulatory authority of the USFS and BLM (see Section 2.8, *BLM Regulatory Jurisdiction*). Operators would be required to apply these measures to all proposed oil and gas development as part of the site-specific APD process (for both Federal and non-Federal surface) and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis. The BLM will conduct a site-specific analysis of potential impacts on natural resources during the Stage 3 environmental review of APDs, will coordinate with the USFWS under Tier 2 consultation during site-specific permitting, will apply additional avoidance and minimization measures and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis, and will not permit site-specific activities that would result in the take of Federally listed species.

In certain circumstances, operators who secured private leases to access Federal minerals from private surface may proceed with surface development of well pads, well sites, and other

infrastructure prior to submitting an APD to the BLM. In these cases, the AMMs, Forest Plan SFWs stipulations, and other measures are applied to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis.

The potential impacts on surface resources prior to submittal of an APD to the BLM are considered in the cumulative interactions sections of each species analysis below. While the BLM does not have authority to require protection measures under this situation, operators would be required to comply with the State of Ohio regulations and standards for oil and gas development on private land that include a variety of requirements intended to minimize damage to natural resources.

3.1.1. Indiana Bat, Northern Long-Eared Bat, and Tricolored Bat

3.1.1.1. *Status of the Species*

Indiana bat was listed as endangered under the ESA (16 USC 1531 *et seq.*) on March 11, 1967 (DOI 1967). The northern long-eared (NLE) bat was listed as threatened under the ESA on May 4, 2015 (80 FR 17973–18033) and reclassified as an endangered species on March 31, 2023 (88 FR 4908–4910). On September 14, 2022, USFWS proposed that tricolored bat be listed as endangered under the ESA (87 FR 56381; USFWS 2022d).

3.1.1.2. *Recovery Plans*

A recovery plan for Indiana bat was released April 16, 2007 (72 FR 19015). Five-year status reviews were performed in July 2011 (76 FR 44564) and July 2014 (79 FR 38560). There are no current recovery plans available for NLE bat or tricolored bat. An NLE bat species status assessment was updated in August 2022.

3.1.1.3. *Life History Information*

Indiana Bat

Indiana bats use upland and riparian forests for roosting, maternity sites, and foraging activities during the summer. Indiana bats roost underneath loose bark of snags and exfoliating bark of live trees, and in splits and crevices of damaged or dead trees. Maternity colonies, consisting of females with young, use both primary and alternate roost trees and tend to return to roost areas year after year. Indiana bats have a low reproductive rate, usually producing only one offspring per year (USFWS 2025a). Primary roost trees are generally defined as trees used by more than 30 bats (e.g., Menzel et al. 2001) and are the most important to protect, presumably because they are often used by the most bats at one time, contain flightless young during the maternity season, and act as colony hubs (Silvis et al. 2014). Alternate roost trees are also used by portions of maternity colonies or by male bats. Virtually all Indiana bat maternity colonies are found under exfoliating bark of larger-sized snags with sun exposure (Bergeson et al. 2018; Menzel et al. 2001; USFWS 2007). Studies from 10 States documented a mean DBH for primary and alternate maternity roost trees as approximately 15 to 24 inches for an overall average of 18 inches (USFWS 2007). Indiana bats switch roosts frequently (USFWS 2007); because snag roosts are short lived, the bats must know of and use multiple roosts in a given area. Roost area calculations seem scant in the literature, but home range size (presumably also including foraging area) was greater than 200 acres (USFWS 2007). Indiana bats have been documented foraging in floodplain, riparian, lowland, and upland

forests. They tend to forage primarily around, but not within, the canopy of trees and typically are found close to semi-open forested habitats and forest edges (USFWS 2007). They will also roost and forage in and around treatments in managed forests (Bergeson et al. 2018; Krusic et al. 1996; Loeb and O’Keefe 2011). Prey consists of flying insects, both aquatic and terrestrial, depending on the environment in which they are foraging (USFWS 2007).

Northern Long-Eared Bat

NLE bats typically roost in intact, cluttered, interior (Broders et al. 2006) and older (Carter and Feldhamer 2005; Lacki and Schwierjohann 2001; Perry and Thill 2007) forests. They roost in a wide variety of locations, including in cracks, in cavities, and underneath loose bark of snags and live trees; on buildings (Caceres and Barclay 2000); and in bat boxes (Whitaker et al. 2006; Burke 1999). During telemetry studies in the WNF, NLE bats used more cavity or crevice roosts than bark roosts and exhibited a more flexible roost selection than Indiana bats. NLE bats readily exploited alterations to forest structure created by the reintroduction of fire in West Virginia, likely due to enlargement of existing or creation of new canopy gaps (Johnson et al. 2009). O’Keefe (2009) found that several microhabitat factors were important for roost site selection by reproductive females (roosts were generally large-diameter canopy trees [average 18-inch DBH] with low canopy closure above [55 percent] and near other suitable roosts), while males were more flexible, typically selecting a cavity in a small-diameter (average 13-inch DBH) live/damaged or dead understory or mid-story tree with an average of 60-percent canopy closure. Roost tree switching is common (USFWS 2016), meaning that a variety of suitable roosts must be available within an area for successful NLE bat roosting. Roosting area can vary by sex (USFWS 2016). Like Indiana bats, NLE bats have a low reproductive rate, usually producing only one to two offspring per year.

NLE bats use a variety of habitats for foraging areas, depending on local conditions: air space under the forest canopy and just above shrub level in upland habitats (LaVal et al. 1977); nonriparian woodland characterized by a cluttered subcanopy layer (Brack 1983); cluttered, forested upland habitats and occasionally over water (Brooks and Ford 2005; Brooks 2009); canopy-covered riparian areas (Schirmacher et al. 2007); paths, roads, and forest edges (Caceres and Barclay 2000); timber harvested sites; small gaps or openings with sparse vegetation in mature stands (Loeb and O’Keefe 2006); and over smaller ponds and water seepages (Lookingbill et al. 2010).

Both Indiana and NLE bats engage in “swarming” activities in and around the openings of caves and mines from August through late October. Mating, social activities, and intense foraging take place during this time as the bats gear up to migrate or go into hibernation in belowground environments. Geology in the WNF does not support caves and, therefore, abandoned mines are important locally for swarming and hibernation. In the fall and during spring emergence from hibernation, bats use trees for roosting in the immediate vicinity of the cave or mine, and foraging occurs in the surrounding areas, usually within 1.2 to 2.1 miles of the opening for Indiana bats (USFWS 2007) and within 5 miles for NLE bats (USFWS 2016). Bats hibernate in winter (approximately October or November to mid-March or April in southern Ohio) and are particularly vulnerable to disturbance, needing to survive the winter months on a limited fat supply. Each human-caused disturbance can reduce their fat supplies, thus shortening the duration they can successfully hibernate. Indiana bats can hibernate in sizable groups that number in the thousands (USFWS 2025a; USFWS 2022b).

Tricolored Bat

Tricolored bats generally hibernate alone, often scattered throughout a hibernaculum in caves and mines (Brack et al. 2010). In the summer, females form small maternity colonies (2 to 25 individuals) and males roost alone. Most maternity roosts are in clusters of dead leaves in trees with three to four bats per cluster, with the colony using several closely associated roosts (Brack et al. 2010). Maternity colonies are also occasionally associated with a building (Brack et al. 2010), such as under a porch roof or other more exposed areas of buildings. They feed in open forest areas near a source of water. Brack et al. (2010) characterized foraging habitat as “in deep wooded ravines with streams in the bottom.” Sheets et al. (2013) report that this species is cluttered-adapted and hypothesized that, based on various studies from different geographic areas, it “may be a habitat generalist and will forage in habitats in different successional Stages.” They went on to suggest that different types of timber harvests are beneficial by creating a mosaic of different habitats with forested landscapes.

Tricolored bats require suitable habitat for roosting and foraging and commuting between those habitats during spring, summer, and fall. Forest is a primary component of roosting, foraging, and commuting habitat. Wetlands and water features are important foraging and drinking water sources. Loss of these habitats influences survival and reproduction of tricolored bat colonies. Tricolored bats require hibernation sites with specific microclimates and tricolored bats exhibit high interannual fidelity to their hibernacula. Therefore, the complete loss or modification of winter roosts (such that the site is no longer suitable) can result in impacts on individuals or at the population level. In addition, disturbance within hibernacula can render a site unsuitable or can pose harm to individuals using the site (USFWS 2021a).

A general summary of important life history considerations for white-nose syndrome (WNS)-affected bats can be found in Johnson and King (2018). Tricolored bats have a low reproductive rate, usually producing only two offspring per year. They are short-distance migrants between summer and winter habitat, so they will not be as well distributed during summer where there is no nearby winter habitat (traditionally considered as caves and mines) (Brack et al. 2010). Summer roosts, in most cases, are in clusters of dead leaves (with a preference for oak in studies in Indiana and Arkansas) (Veilleux et al. 2003; Perry and Thill 2007) and the species shows fidelity to relatively small roost areas within and between years (Veilleux et al. 2004). This species is often the first to enter hibernation and the last to emerge in spring (Brack et al. 2010).

3.1.1.4. Conservation Needs

The most significant cause of decline for Indiana, NLE, and tricolored bats is WNS (USFWS 2023c). Since its discovery in New York in 2006, WNS has spread rapidly throughout the eastern and midwestern United States and eastern Canada and has caused unprecedented mortality in bats hibernating in caves and mines in the eastern United States. Based on hibernacula studies, NLE bat has suffered estimated losses of up to 93–98 percent in certain areas of the northeastern United States since 2005 (Turner et al. 2011). Available data (Colatskie 2017) indicate the population of NLE bats in Missouri has declined by more than 95 percent since 2012. Other challenges facing cave bat species include the loss of winter and summer habitat and direct mortality at wind energy sites. Wind energy-related mortality disproportionately affects migratory tree bats but may be a consequential stressor in local areas including West Virginia and Pennsylvania. There is growing

concern about impacts on bat populations from climate change, including disease dynamics, as temperature, humidity, phenology, and other factors affect the interactions between WNS and hibernating bats.

Conservation efforts primarily focus on addressing these stressors, including initiatives underway in an attempt to reduce the impacts from WNS (USFWS 2021a). Additionally, some wind energy facilities within listed bat ranges are implementing curtailment (e.g., feathering turbine blades during low wind periods) to reduce bat fatalities (USFWS 2021a).

3.1.1.5. *Environmental Baseline*

3.1.1.5.1. Species Presence

Much of the WNF system lands are potentially suitable habitat for Indiana, NLE, and tricolored bats, whether for roosting, foraging, commuting, fall swarming, spring staging, hibernation, or a combination of all. Non-hibernation habitat is not considered a limiting factor in this heavily forested landscape. These bats will use most cover types in the WNF except for white pine plantations, perhaps dense hemlock-dominated stands, and a few non-forest habitat types, such as the larger reclaimed strip-mine grasslands (USFWS 2023c). Various forest stand conditions, such as age, vertical and horizontal structure, composition, and basal area, may contribute to or detract from the suitability of any one place for bats and their assorted activities. In contrast, suitable abandoned mines are a more limited resource, although not a particularly uncommon one with hundreds of holes located across much of the Athens Unit and portions of the Ironton District. The Marietta Unit is an exception because there was limited underground mining there; however, there is a potential for non-traditional hibernacula to occur in areas of natural rock outcrops or other as-yet unknown features. Mine openings suitable for fall swarming or hibernation have defined criteria, such as having an opening that is at least 1-foot by 1-foot across, air flow, and some connectivity to the underground mine void.

There is one known Priority 3 (i.e., 50 to 999 individuals) Indiana bat hibernaculum in the WNF (Ironton Unit) and several known fall swarming sites (Athens and Ironton Units), but neither of these is currently known in the Terrestrial Action Area. There are three documented Indiana bat summer records, which are records of occurrence in the summertime, in the Terrestrial Action Area; two records in the far northwestern corner and one in the eastern portion of the Marietta Unit (USFWS 2024d).

NLE bats typically hibernate alone and out of sight in tight spaces, such as cracks or bore holes (Brack et al. 2010) or possibly in other non-cave or -mine sites as evidenced by their commonality during fall swarming surveys but not during winter censuses. Several known fall swarming sites have been documented at abandoned mine openings in the Athens and Ironton Units, but none are currently known in the Terrestrial Action Area.

Tricolored bats are known from across the eastern and central United States as well as Canada, Guatemala, Honduras, and Mexico. This species had been well distributed across Ohio prior to WNS, but populations have decreased statewide (ODNR 2015). Geospatial records of observations are abundant and well distributed across all three units of the WNF (USFS 2020b). As documented by many bat surveys conducted with various methodologies across the seasons, this species is well distributed and, prior to WNS, was semi-abundant during summer across all three units of the WNF,

especially the Ironton Unit, and quite common during fall swarming surveys in both the Athens and Ironton Units, with no swarming habitat available in the Marietta Unit (USFS 2020b). Based on a 5-year pre-WNS average compared to hibernaculum surveys in 2014 (post-WNS), tricolored bats have seen a 97- to 98-percent decline statewide due to WNS (ODNR 2015).

3.1.1.6. Survey Efforts

Both Indiana and NLE bats are known to occur in the WNF and are considered year-round residents. Indiana bats have always been considered rare in the WNF with 9 total summer captures across 8 years, as compared to 519 NLE bats in the same years. Four lactating female Indiana bats were captured in the Athens Unit in 1997, indicating the presence of at least one maternity colony (USFS 2022). However, despite subsequent efforts, no more were captured at or near the original net site and no specific roost area was identified. Five male Indiana bats were captured in summer and eight (both sexes) were captured in fall swarming surveys in both the Athens and Ironton Units over the years. USFS also documented a small hibernating population of Indiana bats in an abandoned limestone mine in Lawrence County in the Ironton District, which was gated in 2001 (USFS 2022). Less overall summer survey effort has been expended in the Marietta Unit (Table 0-2). More recent survey efforts have documented three records of Indiana bats in the Terrestrial Action Area and four additional records just outside the Terrestrial Action Area (USFWS 2024d). In contrast, NLE bats were captured in all three units of the WNF and were considered the most common species in summer surveys and third most common during fall surveys behind little brown and tricolored bats prior to WNS being confirmed in Ohio in 2011 (Table 0-2). It is difficult to find large numbers of NLE bats during hibernation due to their tendency to select tiny cracks and crevices and their tendency to hibernate singly as opposed to in clusters, but they were also present in low numbers in the Lawrence County mine. However, since WNS arrived in Ohio in 2011, the picture for bat populations has changed dramatically.

The majority of the WNF bat capture survey work performed by USFS, in which bats were identified to species, took place prior to the onset of WNS, except for the 2014 summer surveys. Most surveys transitioned to either acoustic summer surveys (driving transects or stationary points) or visual surveys at mine openings in the fall starting in 2011 to avoid handling bats and spreading WNS. USFS biologists have continued monitoring the Lawrence County hibernaculum at least every other year. By 2012–2013, declining survey results across all survey types began to show impacts from WNS on local bat populations (USFS 2022).

Table 0-2. Comparison of Level of Summer Mistnetting Effort (Mistnet Nights per Site) per National Forest Unit per Year in the Wayne National Forest (1997–2014)

Year	Athens	Marietta	Ironton	Forest-wide
1997	62	-	63	125
1998	-	-	28	28
1999	46	-	47	93
2000	57	-	57	114
2004	-	78	32	110
2006	-	-	8	8
2008	-	-	41	41

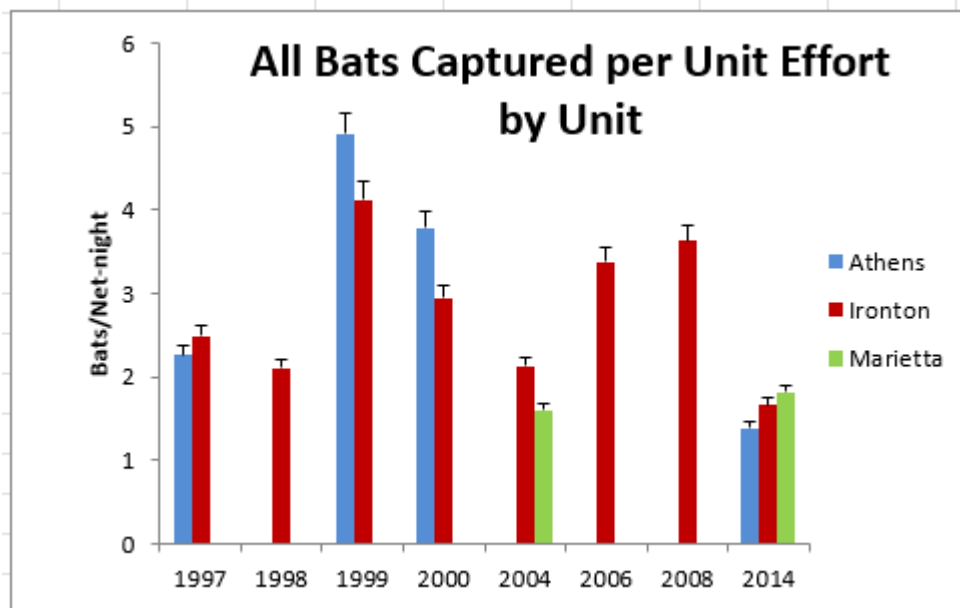
Year	Athens	Marietta	Ironton	Forest-wide
2014	34	48	50	132
Totals:	199	126	326	651

Source: USFS 2022

Level of effort is defined by the number of mistnet nights per site. 2014 represents the only post-WNS summer survey results. Blanks indicate netting was not completed in the unit for the given year.

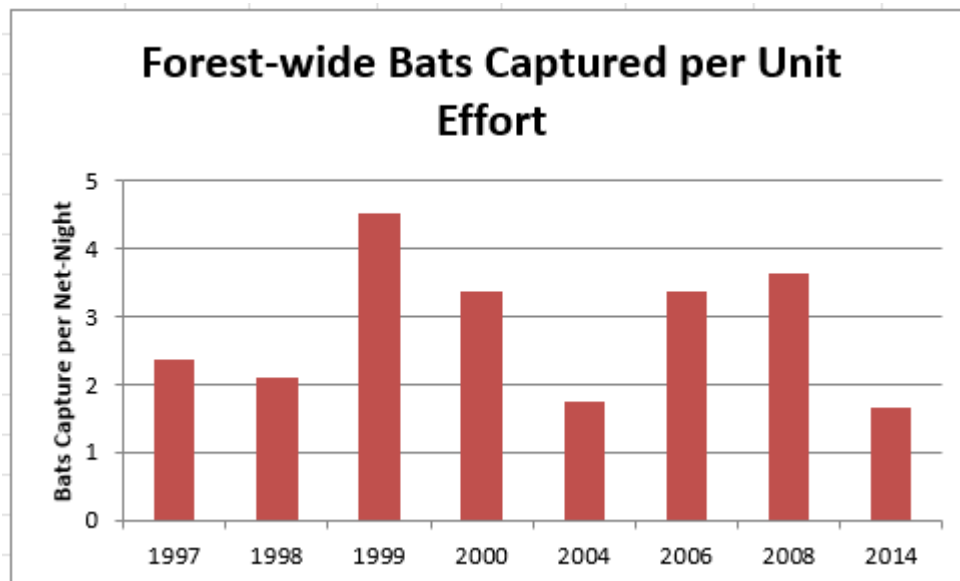
Summer surveys were conducted in different WNF units in different years and consisted of different levels of effort across years (Table 0-2), making direct comparisons of captured bats difficult. Figures 2-12 and 2-13 display the survey results as species captured per unit of effort (i.e., per mistnet night).

Figure 3-1. All Bats Captures per Unit Effort by Unit Between 1997-2014, Wayne National Forest



Source: TRC, 2004 and 2012.

Figure 3-2. Forest-wide Bats Captured per Unit Between 1997-2014, Wayne National Forest



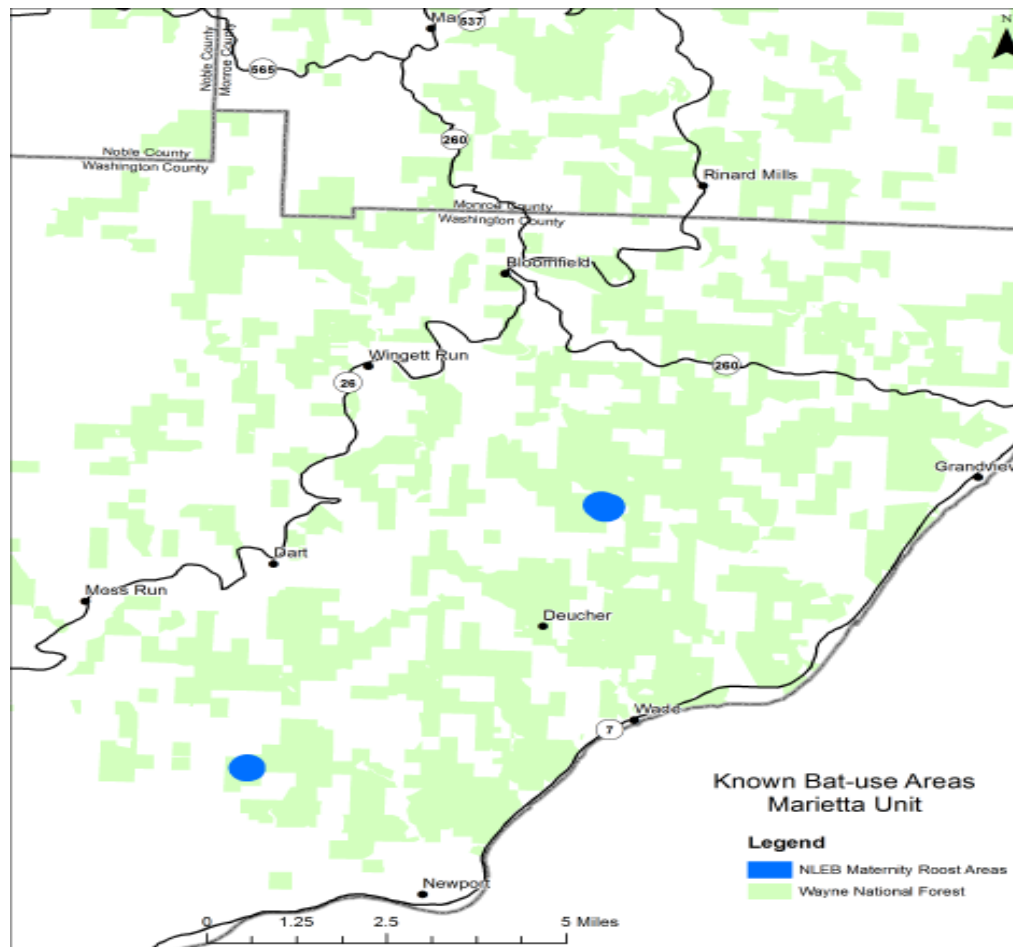
Source: TRC, 2004 and 2012.

The WNF unit sampled in a given year also affected which species were captured. For instance, little brown bats were far more often captured on the Athens Unit compared to both the Marietta and

Ironton Units, while NLE bats were just the opposite with more captured in the Marietta and Ironton Units than in the Athens Unit. The 2014 summer mistnet sites (a post-WNS year) were co-located with sites across all WNF units that were successfully netted in pre-WNS surveys to facilitate a general comparison of bat captures both pre- and post-WNS. Forest-wide capture success in 2014 was up compared to previous years. Statewide summer acoustic surveys indicate overall bat abundance has declined by 31 percent in Ohio since 2011, but there was an increase in the detection rate of low-frequency bats (e.g., big brown bats) in 2020, probably due to the addition of a new survey route that had especially high big brown bat detections (Stankavich 2020).

During mistnet surveys in 1999, 2000, and 2014, several bats were radio-tagged and tracked to roost trees. In 1999 and 2000, five male Indiana bats were tracked to eight roost trees in the Athens and Ironton Units. In 2000, five female NLE bats were tracked to 14 roost trees and two males were tracked to seven roost trees in the Athens and Ironton Units. In 2014, one adult female was tracked to four trees and one juvenile female to one tree in the Marietta Unit (USFS 2022). Known NLE bat roost trees on the Marietta Unit in Washington County are identified in Figure 3-1.

Figure 3-3. Known Northern long-eared bat Roost Tree Areas on the Marietta Unit



By 2014, the mid-winter survey in the Lawrence County mine indicated a near-100-percent collapse of the hibernating bat population and the loss of all Indiana and NLE bats. Bat counts decreased from an all-time high of 1,684 bats in 2007 to an all-time low of 2 bats in 2018 (USFS 2022). Prior to WNS at this location, little brown bats made up greater than 60 percent of the winter bat population, along with Indiana bats (average 26 percent) and tricolored bats (average 8 percent) with a few NLE and big brown bats present most years (USFS 2022).

Fall swarming capture surveys were conducted at numerous mine openings on the Athens and Ironton Units from 2002 to 2010. Little brown bats were the most common species captured pre-WNS (average 44 percent), followed by tricolored bats (32 percent), then NLE bats (23 percent), with a few Indiana bats (0.4 percent) and other species. Continued annual or biennial observation-only surveys from 2011 to 2017 at select abandoned coal mine openings in the Athens Unit documented a disappearance of bats during the regular swarming season. Starting in 2013, swarming activity began to drop off significantly at previously known-use sites and by 2017, there were no bats observed during fall swarming surveys (USFS 2022). Known-use hibernacula and swarming sites exist across the Athens and Ironton Units, but no mine openings occur on NFS lands within the Marietta Unit, although limited suitable habitat may exist in the wider terrestrial action area.

3.1.1.7. Species Conservation Needs within the Terrestrial Action Area

Indiana, NLE, and tricolored bats hibernate in caves, mines, and other belowground habitats and mainly roost in trees (but also sometimes in manmade structures) throughout the spring, summer, and fall active season. Forested upland and riparian habitats, common across the Marietta Unit, are important for these species during the active season for roosting, foraging, and commuting (Lacki and Schwierjohann 2001; Carter and Feldhamer 2005; Garroway and Broders 2008; Timpone et al. 2010 Murray and Kurta 2004; Menzel et al. 2005; Sparks et al. 2005; Henderson and Broders 2008; Bergeson et al. 2018).

Individuals and colonies also show strong fidelity to roosting and foraging areas over many years (Kurta and Murray 2002; ; Whitaker and Sparks 2008).

Based on LANDFIRE data from 2001 and 2022, it is anticipated that land cover will continue to change from undeveloped cover types to developed at an estimated 1.1 percent change over 21 years (approximately 0.05 percent per year) in the Terrestrial Action Area. Since the emergence of WNS, the loss of suitable forested habitat is not the primary threat and bat populations appeared to resilient to some forest conversion prior to the emergence of WNS (USFWS 2015). The primary factor threatening the Indiana, NLE, and tricolored bats is WNS. However, because populations of the bats are severely impacted by this disease, human activities and other factors that were not significant before may pose additive impacts. Bats may be impacted by tree removal that occurs during times when bats are active. Habitat loss and fragmentation may result in loss of suitable roosting or foraging habitat, requiring individuals to fly greater distances to rest and feed (USFWS 2024f).

The emergence of WNS in Ohio in 2011 resulted in mass mortalities of cave- and mine-hibernating bats during the winter within 3 years (USFS 2020b). The WNF has abandoned mine openings where these bat species congregated in the past but USFS monitoring from 2014-2024 at previously

known-use sites in the Athens and Ironton Units show WNS survivors are either not hibernating in these “traditional” locations currently or only in extremely low numbers. However, there may be limited potentially suitable underground bat hibernation habitat within the Terrestrial Action Area. ODNr Division of Mineral Resource Management staff conducted a GIS exercise using internal inspection data and reported six known mine openings that are potentially bat-accessible (but are as-yet not evaluated for bat habitat suitability) and 26 other uninspected/ unevaluated sites that may represent bat-accessible openings, mainly concentrated in Noble County in the northeast part of the action area within the 4.5-mile buffer area outside of the Marietta Unit proclamation boundary (ODNR 2025). The description provided is that there are few accessible underground mine entries within the action area overall and the underground mines tend to have a relatively limited extent and not be connected to one another, making them less likely to provide optimal bat hibernation habitat. Scientists agree that WNS is the greatest threat to cave- and mine-hibernating bat populations in eastern North America at this time (Johnson and King 2018). The fungus itself remains present in all affected hibernacula as an environmental reservoir despite the ongoing absence of functions and regardless of any land management activities occurring in the vicinity (USFS 2020b). The life history traits of some bat species may lower their risk of mortality and extirpation from WNS—for example, use of non-cave-type hibernacula, roosting in low densities, lower hibernacula temperature preferences, length of hibernation, body size, and innate immunity. Frick et al. (2017) documented evidence that big brown bats likely have inherent resistance or tolerance to WNS, and little brown and tricolored bats likely developed some tolerance and resistance post-infection. They found that the latter two species appear to have stabilized following steep initial declines, even if at low numbers. There is currently no cure or established treatment for bats with WNS (USFWS 2021a).

Wind energy development is not planned for the WNF (USFS 2020b); therefore, no conservation needs associated with wind energy are considered in the Terrestrial Action Area.

3.1.1.8. *Habitat Condition (General)*

The amount of forest in the WNF is increasing, and forest succession is occurring (USFS 2020b). Habitat does not appear to be a limiting factor for these species, as populations prior to WNS were likely stable or increasing. However, the WNF currently comprises mainly middle-aged mixed oak forests (USFS 2020b) and, in the future with no management intervention, oak-dominated ecosystems are projected to be less prevalent across the landscape due to issues with regeneration, oak diseases, competition with nonnative trees and shrubs, and ecosystem changes due to mesophication⁶ and a lack of landscape-scale disturbances, such as fire (USFS 2006a).

⁶ Mesophication is the process that occurs when fire-dependent open forest, woodland, or prairie types are converted to closed-canopy forests with shade-tolerant, fire-sensitive species.

3.1.1.9. *Effects of the Action*

3.1.1.9.1. Direct and Indirect Interactions

The process of leasing for oil and gas development itself does not directly affect Federally listed species; therefore, no direct effects would occur under the Proposed Action. However, reasonably foreseeable construction and operation of oil and gas development, as a result of leasing, could result in direct and indirect impacts to the bat species.

Reasonably foreseeable development of the leases could result in up to 1,015 acres of short-term disturbance during the 15-year development period, and up to 285 acres during the production period of developed well sites. This surface disturbance could affect tree roosting and foraging habitat, which could affect bats during spring, summer, and fall bat activity periods when bats typically rely on forested habitats.

Reasonably foreseeable development of the leases could also result in impacts to the bat species from loss of unknown roost trees, short-term disruption from noise or human presence, and alteration of foraging habitat (USFS 2005). Loss of roost trees can have direct and indirect implications for reproductive females (USFS 2005). Female and young Indiana and NLE bats depend on specific roost trees for their reproductive success and survival. If their primary roost tree or several potential roost trees in their network are removed during the bat activity periods, the exposed individuals will need to search for new roosting sites. Less is known about tricolored bat roosting ecology, but like Indiana and NLE bats, loss of roosts can lead to increased energy expenditure, increased torpor to conserve energy, and possible loss of young if the energy expenditure is sufficiently severe and prolonged. However, because most bats know of and use a variety of roosting sites throughout the summer and because habitat is not considered a limiting factor in the Terrestrial Action Area, the loss of one or a few unknown roost trees is unlikely to result in detrimental effects on the species.

Individual males, females, or volant young may also be killed or affected by loss of habitat if an undetected roost tree is cut while individuals occupy the tree. Typically, bats are not expected to be exposed to this threat because **Bat AMM 1** requires seasonal cutting/clearing from October 1 to March 31 of all trees greater than 3 inches DBH. Bats utilize trees during the summer, so when tree clearing is limited to the winter, when bats are hibernating below ground and not present on the landscape, direct impacts can be avoided. Any potential roosts, including snags or shagbark hickories, are to be removed when bats are not likely in trees; therefore, there would be minimal direct effects from tree removal on listed bats.

If a maternity tree were removed during the maternity period when non-volant young are potentially present, young bats could be killed due to their inability to fly away. Although currently there are no known maternity roosts trees or hibernacula in the Terrestrial Action Area, maternity roosts and hibernacula may be discovered in the future. The requirements to implement **Bat AMM 6** to protect hibernating bats and **Bat AMM 7** to protect known maternity roosts will avoid impacts to bat maternity roosts and hibernaculum as they are discovered on all lands during the APD process. Identified maternity roosts and hibernacula would be considered and addressed during Stage 3 environmental review and tier 2 consultations under this BA, which may include site-specific surveys to identify maternity roots and hibernacula if they have potential to occur and be

affected by site-specific reasonably foreseeable development of the leases. These measures are aligned with forest-wide standard SFW-TES-10, which specifies that trees with suitable Indiana bat maternity roost characteristics must be removed during the hibernation period (i.e., outside of the summer pupping season), and is applicable to development on NFS lands. Although SFW-TES-10 specifically states Indiana bat for protection this standard would also protect other bat species on NFS lands because suitable roost characteristics overlap among the species.

If a primary roost tree is cut during winter, an individual is likely to be able to locate a new roost the following spring within or near its traditional roosting area because (1) many roosts are ephemeral resources, so bats switch roost trees frequently, and (2) the small scope of individual project sites and the heavily forested context of the Terrestrial Action Area ensure an abundance of other potentially suitable trees nearby. Therefore, it is not anticipated that the physiological response of these individuals would negatively affect their overall fitness. Beneficial effects may also occur from the proposed work, including increased solar exposure to potential roost trees along the edges of the project work limits, creation of relatively small forest openings and forest edge in a heavily forested context providing foraging opportunities for both bat species, and creation or enhancement of bat travel corridors along project access roads.

Bats may also be affected through loss of roost habitat that may occur if a substantial portion of a colony's summer area or a primary maternity roost is cut in the winter (during hibernation) when bats are not present. However, these situations are unlikely in the Proposed Action given the estimated small size of individual well pads (6 to 35 acres), total estimated initial disturbance in the RFDS of 171 to 1,015 acres (Table 0-2), and total acres of surface area needed to support production of 86 to 285 acres relative to the overall size of the surrounding available forested landscape of the Terrestrial Action Area. **Bat AMM 2** will minimize clearing/cutting of mature trees to 10 acres or less for each new APD. If greater than 10 acres of clearing/cutting in suitable forest habitat is necessary, then additional coordination with USFWS will apply. It is expected that clearing of 10 acres or less of bat habitat is less likely to remove a substantial portion of a maternity roost area or key foraging habitat. Indiana, NLE, and tricolored bats exhibit strong site fidelity. When females return in the spring their energy demands are highest (due to being pregnant), and having to seek out a new roost or foraging area could result in impacts at a time when there are few insects on the landscape to support increased energy demands.

Bats could also be affected by short-term disturbance from noise, vibration, and human presence if work occurs outside of the hibernation season. A behavioral response to such human presence and noise may be temporary abandonment of a roost site. Although bats may flee a specific roost during the activity, the disturbance will be temporary, and bats will not need to permanently abandon a roosting area or search for a new one (USFWS 2005). A study comparing bat activity at loud compressor stations associated with natural gas extraction and quiet well pads was conducted in New Mexico at the second largest gas extraction field in the U.S. This study found that the assemblage of bat species emitting low frequency (<35 kHz) echolocation calls showed a response, with a 70 percent reduction in activity levels at loud sites compared to quieter well pad sites whereas the assemblage using high frequency (>35 kHz) echolocation did not exhibit altered activity levels in noise (Bunkley et al. 2015). This indicates that echolocation frequency is important to a bat species' response to noise exposures. Indiana bat, northern long-eared bat, and tricolored bat all have high frequency calls greater than 40 kHz. Male Indiana bats appeared to be relatively

tolerant of intermittent noise, as evidenced by those roosting in trees along well-used off-road vehicle trails in the WNF (Schultes pers. comm.) and in other studies (Kiser and Elliott 1996; Menzel et al. 2005). Although horizontal drilling and hydraulic fracturing have greater noise levels with longer periods than vertical drilling, the BLM would prohibit clearing and cutting vegetation within $\frac{1}{4}$ mile of hibernacula, using either the Forest Service stipulation or, in the case of an APD to drill a Federal well on private surface, a COA that is imposed through site-specific Section 7 consultation. As such, noise effects from oil and gas development under the Proposed Action are not anticipated to adversely affect listed bat populations. If bats were displaced, they would likely find alternate habitat in the vicinity, because habitat is not limited in the Terrestrial Action Area.

Bats forage over water (streams, wetlands, as well as other waterbodies). Bats will also drink water from surface sources, such as small impoundments. At well development sites, produced water from drilling in an open system could expose bats to contaminants. With bats' high energetic demands, contaminants can accumulate and potentially harm individuals and affect overall survivorships especially in combination with other stressors. **Bat AMM 3** requires a closed system for the containment of produced water from drilling and all applicable local, State, and Federal regulations apply for the appropriate disposal of produced water. This measure would minimize potential water quality impacts on listed bat species and reduce bat exposure to contaminated standing water from which they may drink.

No currently known hibernacula exist within the Terrestrial Action Area. However, with as-yet unevaluated potential bat-accessible mine openings present, there could be new discoveries of potential bat hibernacula over the term of the Proposed Action within the Terrestrial Action Area (ODNR 2025). Clearing trees directly in front of a hibernaculum can potentially alter air flow patterns and internal microclimate conditions, disturb roosting bats, and cause structural disturbance to the hibernaculum, as well as make it more accessible to the public who may disturb or destroy a hibernaculum. All three bat species will congregate near hibernacula in the spring and fall until such time as they leave the area for summer habitat or enter the hibernaculum for the winter. The Forest Plan includes TES-02 and TES-03 that include restrictions within 0.25 mile of known hibernacula and fall swarming sites and is applicable to activities on Forest Service lands. Furthermore, **Bat AMM 4** prevents or limits tree cutting to November 15 to March 15 near a potential hibernaculum (up to 5 miles away).

An individual bat's home range can be relatively large. Impacts on a significant portion of bat home ranges may result in a loss of roost trees, foraging habitat, and prey base. Acreage of tree removal is expected to be dispersed throughout the landscape. However, it can take a significant amount of time for trees to become a suitable size for roosting by bats. Therefore, a limited acreage of tree removal annually is recommended to ensure that there is a significant number of mature trees on the landscape at all times. **Bat AMM 5** limits the cumulative removal of suitable forest habitat to an average of no more than 105 acres annually and 1,015 acres total over the next 55 years. Following the BLM's signature of a Decision Record associated with the lease sale action covered in this BA, the BLM will track the acres of suitable forest habitat removed after the lease sale but prior to APDS and the acres of suitable forest habitat removal approved along with APDs during the 15-year development period. The BLM would not permit activities that exceed the total thresholds of development identified in the RFDS without conducting additional environmental review and consultation with the USFWS.

BLM would conduct a site-specific analysis of potential impacts on the listed bat species during the Stage 3 environmental review of APDs, would coordinate with the USFWS under Tier 2 consultation during site-specific permitting, would apply additional avoidance and minimization measures and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis, and would not permit site-specific activities that would take the Federally listed bat species.

3.1.1.9.2. Cumulative Interactions

Cumulative interactions include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the analysis area and that overlap the geographic and temporal scope of effects from the Proposed Action. Future Federal actions that are unrelated to the Proposed Action are generally not considered in cumulative effects analysis because they require separate consultation pursuant to Section 7 of the ESA. Reasonably foreseeable development of private surface to access Federal and private minerals would likely be the largest contributor to cumulative interactions in the analysis area.

WNS is the greatest threat to the persistence of Indiana bat, northern long-eared bat, and tricolored bat and will continue to be so into the future until effective containment and treatments are developed or species adapt and become resilient. The Proposed Action does not have any activities that would change effects from WNS and therefore, would not contribute to cumulative WNS interactions.

Surface disturbance and tree clearing activities as a result of residential or other development, agricultural, timber harvest, and transportation projects that occur on state, local, or private lands across southeastern Ohio could cumulatively decrease suitable bat habitat in the Terrestrial Action Area. In most cases these activities on state, local, and private lands receive little oversight from Federal agencies as there is no Federal nexus to trigger Federal permitting and oversight. As such the AMMs, Forest-wide SFWs and stipulations, and other Federal protection measures would likely not be applied. Construction and operation on private land without application of Federal protection measures could result in impacts to bat species from removal of unknown occupied roost trees that, depending on the season, could result in the death of flightless pups or other individuals unable to flee in time. Such activities could also remove a portion of a bat or maternity colony's home range or key foraging habitat, resulting in unexpected energy demands and fragmentation of roost networks (Silvis et al. 2014, 2015). Over time, such undocumented and unknown losses may contribute to cumulative impacts on local bat populations. In addition, due to the declines in bat populations due to WNS, mortality and injury to individual bats from removing or disturbing essential bat habitat features (i.e. maternity roosts, hibernaculum) during sensitive periods could cumulatively affect bat recovery.

The number and intensity of surface disturbance and tree clearing activities are hard to predict and vary by locality and year. Changes to forest structure and loss of forest cover affect listed bats that rely on forest habitats for roosting, pup-rearing, and foraging during the summer. Ongoing development may affect canopy cover in the analysis area and associated forested habitat for bats. In 2022, there was an estimated 42,183 acres of existing development/disturbance in the Terrestrial Action Area (9.4 percent of the total 446,907 acres of the Terrestrial Action Area) (LANDFIRE 2022a). Reasonably foreseeable development of the leases is estimated to result in up

to 1,015 acres of short-term disturbance and up to 285 acres of long-term disturbance, resulting in an approximate 2.4 percent increase in cumulative short-term disturbance and an approximate 0.7 percent increase in cumulative long-term disturbance. Based on trends in development and disturbance overtime using LANDFIRE data from 2001 and 2022 (LANDFIRE 2001 and 2022) it is anticipated that land cover will continue to change from undeveloped cover types to developed types in the Terrestrial Action Area at an estimated 0.6 percent per year. The cumulative amount of surface disturbance and development in the analysis area has and likely will continue to result in cumulative effects to bat species and their habitat, especially when Federal AMMs are not applied. However, due to the low rate of conversion from undeveloped to developed land, the abundant suitable forested habitat in the analysis area, and that suitable forest habitat is generally not a limiting factor for Federally protected bats, the Proposed Action (not including development of well sites that will occur on private land outside of Federal jurisdiction but in conjunction with Federal leasing) would minimally contribute to cumulative effects on Federally protected bats.

Future oil and gas development on private land is expected to continue and expand as demand for energy rises. Tree clearing and surface disturbance associated with oil and gas development on private lands would have the same effects as described above for oil and gas leasing for Federal minerals but without the oversight of BLM requiring AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis to protect resources and species to access Federal mineral estates.

Similarly, if operators develop private surface prior to submittal of APDs, there is potential to remove suitable habitat and to directly harm or kill ESA-protected bat species before they apply for an APD from BLM. For example, if an operator previously developed a surface well pad on private land to access private minerals and then secures a Federal mineral lease and proposes an APD to develop that lease using the same well pad, the BLM would only be assessing the down-hole impacts of accessing the Federal minerals. In this case, AMMs, and other resource protection measures for listed species may not have been applied because the surface disturbance occurred prior to Federal agency involvement.

Climate change has the potential to contribute to cumulative effects to bat species. Climate change effects that alter precipitation regimes and increase drought also contribute to decreases in available water and changes in aquatic habitat that could cumulatively impact bat prey species with an aquatic life Stage.

It would have been up to operators on private lands to contact USFWS to request and follow technical assistance under Section 9 of the ESA (16 U.S.C. §1538) and any resulting effects of their actions would have been outside of BLM or USFS control; as such, the surface activities not following technical assistance may contribute to cumulative impacts. If it is apparent that private surface disturbance and development prior to submittal of APDs has resulted in removal of suitable bat habitat which has: 1) likely resulted in adverse effects to ESA-protected bat species, 2) is directly interconnected to development of Federal mineral leases under this Proposed Action, and 3) would otherwise not have occurred, the BLM may choose to not approve an APD or will apply AMMs and other measures to APDs as conditions of approval to avoid and minimize new impact to Federally listed species on a site-specific basis.

Issuance and subsequent development of leases under the Proposed Action are not likely to result in substantial cumulative effects to Federally listed bat species because of BLM's Section 6 lease terms (see Section 2.8, *BLM Regulatory Jurisdiction*), the relatively minor percent of increased disturbance to suitable habitat, suitable bat habitat not being the primary threat to bat recovery (as described in Section 3.2.1.1), and requirement of AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis.

BLM's Section 6 lease term requires that all adverse impacts on biological resources and land be 'minimized'. The BLM evaluates if this lease term is satisfied by conducting site-specific analysis of the proposed drilling activities and by monitoring the operator's activities to ensure compliance. While the term 'minimal' is not defined, the BLM's Sec. 7 consultation at the time an APD is received gives the BLM and the FWS the opportunity to evaluate site-specific impacts of a proposed action and apply appropriate minimization measures.

If in the conduct of operations threatened or endangered species or substantial unanticipated environmental effects are observed, the lessee must immediately contact the BLM. Furthermore, the lessee must cease any operations that would result in the destruction of such species (BLM 2023a). Although the BLM does not have the authority to enter the non-Federal lands without the landowner's consent, the BLM may deny the APD if the inability to access the surface prevents the BLM from meeting its obligations under the ESA.

The State of Ohio has a variety of regulatory requirements and standards intended to minimize potential impacts to natural resources, including rare species from development on private surface, as described in Section 2.9, *State of Ohio Regulatory Jurisdiction*. As part of the State of Ohio permitting process, the ODNR DOGRM would conduct a site review meeting at proposed well sites on private land. At the site review meeting, the DOGRM may conduct a physical review of the proposed well site, discuss the application, identify items that are necessary to ensure compliance with state regulations, identify site-specific terms and conditions that may be attached to a permit that approves an application to construct a well site, and identify site-specific terms and conditions that may be attached to a permit to drill a well, such as Best Management Practices identified in the ODNR's *Best Management Practices for Oil and Gas Well Site Construction* (ODNR 2013). For example, during the DOGRM site review meeting, if it is determined that suitable bat habitat exists or if hibernaculum or roosts are present at or near the proposed well site, the DOGRM may require specific terms and conditions as part of the permit to minimize impacts to state listed bat species and their habitat.

Oil and gas operators developing on private land are subject to the ESA and required to follow protective measures or development alternatives should any endangered species be known to inhabit or be found inhabiting a potential development site (16 U.S.C. §§ 1531-44). All operators on private land are also subject to Section 9 of the ESA which makes it illegal to harass, hunt, shoot, capture, trap, kill, collect, wound, or harm (i.e., "take") any ESA-listed species or to pursue/attempt any of these activities.

3.1.1.10. *Determination of Effects*

Based on the effects analysis, potential effects from the Proposed Action and reasonably foreseeable development of the leases, with incorporation of AMMs, are unlikely to occur (discountable) and

the size of any impact, were it to occur, would be too small to be measured or evaluated (insignificant). Therefore, the BLM seeks concurrence of an effects determination of **may affect, not likely to adversely affect** for listed Indiana and NLE bats and **not likely to jeopardize the continued existence of** the proposed endangered tricolored bat. If the tricolored bat is officially listed, the effects analysis and implementation of AMMs would also result in an effects determination of *may affect, not likely to adversely affect* tricolored bat.

3.2.2. Freshwater Mussels and Eastern hellbender

3.2.2.1. Status of the Species

Eleven listed freshwater mussels have the potential to occur in the Aquatic Analysis Area. Clubshell and northern riffleshell mussels were listed as endangered on January 22, 1993 (58 FR 5638–5642). Fanshell mussel was listed as endangered on June 21, 1990 (55 FR 25591–25595). Pink mucket mussel was listed as endangered on June 14, 1976 (41 FR 24062–24067). Purple cat’s paw mussel was listed as endangered on July 10, 1990 (55 FR 28209–28213). Round hickorynut mussel and longsolid mussel were listed as threatened on April 10, 2023 (88 FR 14869). Salamander mussel was proposed for listing as endangered on August 22, 2023 (88 FR 57224). Sheepnose mussel was listed as endangered on March 13, 2012 (77 FR 14914). Snuffbox mussel was listed as endangered on March 15, 2012 (77 FR 8632–8665). Rabbitsfoot was listed as threatened on October 17, 2013 (78 FR 57076).

One amphibian has the potential to occur in the Aquatic Analysis Area. The eastern hellbender was proposed for listing as endangered on December 12, 2024 (89 FR 100934).

3.2.2.2. Recovery Plans

Clubshell and northern riffleshell have a 1994 recovery plan (USFWS 1994). Fanshell mussel has a 1991 recovery plan (USFWS 1991). Pink mucket mussel has a 1985 recovery plan (USFWS 1985). Sheepnose and snuffbox have a draft recovery plan (USFWS 2023d) with supporting species status assessment for snuffbox mussel. Purple cat’s paw has a 1992 recovery plan (USFWS 1992a). Rabbitsfoot has a 2023 recovery plan (USFWS 2023f). There are no current recovery plans for the eastern hellbender population in Ohio, but a species status assessment report was developed in 2018 (USFWS 2018d).

3.2.2.3. Life History Information

The life history information below is taken from the NatureServe website (NatureServe 2023). Adult freshwater mussels are filter feeders, siphoning phytoplankton, diatoms, and other microorganisms from the water column. Mussels tend to grow relatively rapidly for the first few years, and then their growth slows appreciably at sexual maturity (when energy is being diverted from growth to reproductive activities). Their lifecycles entail spawning and the development of larvae in the females that mature into glochidia, which are released and attach to host species (typically specific fish species) where they mature before dropping off. There is ongoing discussion among scientists concerning the life span of mussels but, as a group, they are generally acknowledged to be long-lived organisms

Clubshell Mussel

Clubshell is found in clean, coarse sand and gravel in runs, often just downstream of a riffle. It cannot tolerate mud or slackwater conditions and is very susceptible to siltation. The extant clubshell populations occur in relatively small streams to medium-sized rivers. USFWS introduced the species into the Ohio River Islands National Wildlife Refuge within the Aquatic Analysis Area between 2014 and 2018 (USFWS 2022a). The reintroduction sites have not shown evidence of successful reproduction as of 2018; however, clubshells take several years to reach a size likely to be detected.

Northern Riffleshell Mussel

Riffleshell occurs in packed sand and gravel in riffles and runs. Northern riffleshell is also known to occur in relatively slow-flowing, more lentic, or deep-run habitats. Use of low-flow areas may be limited to more turbid waters where concomitant silt deposition may limit survival or successful reproduction. There are four host fish species identified: banded darter, blue breast darter, brown trout, and banded sculpin, but other host fishes are likely. Riffleshells appear to have a relatively short lifespan for freshwater mussels. Sexual maturity can be reached in as little as 3 years and most individuals probably live for only 7 to 15 years (USFWS 2019b).

Snuffbox Mussel

Snuffbox is a small to medium-sized mussel; males reach up to 2.8 inches in length, while the maximum length of females is about 1.8 inches. It has an estimated lifespan of approximately 20 years. The mussel is found in rivers, streams, creeks, or lakes, in areas of moderate flow, in sand and gravel substrate. There are several known host fishes for the snuffbox, including species of darters and sculpins, with logperch (*Percina caprodes*) being the primary host. Snuffbox historically occurred least 210 streams and lakes in 18 States and one Canadian province. It has declined both in distribution and number of populations; it currently occurs in 83 streams in 14 states and one Canadian province (USFWS 2023d).

Fanshell Mussel

Fanshell inhabits gravel substrate in medium to large rivers of the Ohio River basin. The species' distribution and reproductive capacity has been seriously affected by the construction and operation of reservoirs and by other impacts on water and substrate quality. Researchers have observed gravid females from late October to late May and have identified nine host fishes. Fanshells are difficult to detect because a portion of the population can occur below the substrate (USFWS 2019c).

Pink Mucket Mussel

Pink mucket mussel often inhabits regulated rivers, particularly those navigational waters modified by locks and dams. Although not necessary reservoir tolerant, it is found sporadically in transitional areas between lentic and lotic habitats of reservoir systems in large navigational rivers. The species becomes gravid in August, with glochidia overwintering and being released the following June. Host fishes identified include largemouth bass, smallmouth bass, spotted bass, and walleye. Dispersal by their large habitat-generalist host fishes may account for the sporadic and sometimes highly

disjunct occurrences of pink mucket individuals in non-riverine conditions and in streams long distances from known populations (USFWS 2018a).

Longsolid Mussel

Longsolid adult mussels are light brown in color but darken with age. The shell is thick and medium sized (up to 5 inches) and typically has a dull sheen. Little information is available on the life history of longsolid; as such, the best available scientific and commercial information for other closely related species is used for this description. Adult freshwater mussels within the genus *Fusconaia* are suspension feeders that filter water and nutrients to eat. Mussels may shift to deposit feeding, although reasons for this are poorly known and may depend on flow conditions or temperature. Longsolid is a short-term brooder, typically gravid from May to July. Host fish species are unknown but, based on other species of *Fusconaia*, likely hosts are minnows of the family Cyprinidae and genera *Campostoma*, *Cyprinella*, *Notropis*, and *Luxilus* as well as potentially sculpins of family Cottidae, genus *Cottus* (USFWS 2018b).

Purple Cat's Paw Mussel

The biology of purple cat's paw mussel is similar to that of other bivalved mollusks belonging to the family Unionidae. However, due in large part to its rarity, relatively little is known about its specific life history requirements. There has been little new information on the species' biology or life history since 2020 when the last 5-year review was conducted; new information is limited to the determination of suitable fish hosts. There has been no change in the species' spatial distribution or historical range, with the exception of a new population that was discovered in Killbuck Creek in Ohio in 1994. Threats persist for the remaining purple cat's paw mussel populations, including habitat degradation and climate change. The life history and environmental sensitivity of the subspecies are poorly known, increasing the probability that previously unidentified activities could cause a precipitous decline of the only remaining populations. Reintroduced populations in the Walhonding River, Ohio River, Licking River, Green River, and Duck River currently only harbor juveniles and young adults and natural reproduction of the species has not yet been documented in these populations (USFWS 2020a).

Rabbitsfoot Mussel

The Rabbitsfoot inhabits small to medium sized streams and some larger rivers. It usually occurs in shallow water areas along the bank and adjacent runs and shoals with reduced water velocity. The Rabbitsfoot occurs in continuous flowing water such as rivers, streams, and creeks, which provide the resources it needs to survive and reproduce: suitable physical habitat and water quality conditions, food, and host fish species. This freshwater mussel subspecies historically occurred within at least 434 watersheds located throughout the lower Great Lakes and lower Mississippi river sub-basins and Ohio, Cumberland, Tennessee, White, Arkansas, and Red river systems in 15 states, including Ohio. It is presumed extirpated from 288 of those watersheds, a reduction of between 63% and 70% of its historical range (USFWS, 2023f).

Round Hickorynut Mussel

This species is bradytic; egg-bearing females are found in September and glochidia in late September, with glochidia overwintering until the following May and June (Ortmann 1919). Gravid

females were found in the Ohio River drainage of western Pennsylvania in September; females discharging glochidia were found in May (Ortmann 1912). Several host fish species have been documented but the dominant host fishes appear to be darters of the genera *Ammocrypta*, *Etheostoma*, and *Percina* (Shepard et al. 2021). This becomes important in the effects analysis because round hickorynut relies on sight-feeding fishes as part of its lifecycle, so cloudy water at critical reproductive periods (late spring to early summer) may affect reproductive success. The lifespan is relatively short, at around 13 years (Shepard et al. 2021).

Sheepnose Mussel

Sheepnose is a medium-sized, thick-shelled species that can reach nearly 5.5 inches (13.97 centimeters) in length and has an estimated lifespan of approximately 30 years. It inhabits medium to large river systems, typically within shallow shoal habitats with moderate to swift currents over mixtures of coarse sand, gravel, and clay. Evidence suggests that habitat ranges from riffles a few inches deep to runs exceeding approximately 20 feet (6 meters) in depth. To date, laboratory studies have identified more than 30 species of suitable host fishes, with varying degrees of juvenile production (USFWS 2023d). Presently, sheepnose occurs in all 14 states of its historical range, but the species' distribution has decreased over time, with extant populations known from 22 streams range wide.

Salamander Mussel

Salamander mussels use habitats with flat rocks and bedrock crevices free of excessive silt and fine sediments with a flow regime that maintains these elements (USFWS 2023e). Salamander mussel's host species is the mudpuppy (*Necturus maculosus*), a salamander (rather than a fish) that relies on similar habitat. This species lives approximately 10 years and is bradytictic; it spawns in the spring and females retain glochidia over the winter until release the following spring or summer (USFWS 2023e). The salamander mussel is hard to find as it is often under rocks (habitat that the mudpuppy prefers). Current mussel surveys may not adequately detect this species; therefore, it is likely that it occurs in surveyed areas but has gone undetected. In addition, this species has a very thin shell so any evidence that they were in an area quickly gets worn away and may not be detected by surveys in recently occupied areas. More research and specific survey methodologies to detect this species are needed.

Eastern hellbender

Hellbenders are the largest of North America's salamanders, growing up to 29 inches. They can live up to 30 years and spend their entire lives in water, living in perennial streams and rivers of the eastern and central United States. Hellbenders hide under large flat rocks on the streambed. The eastern Hellbender is a long-lived species that inhabits fast-flowing, cool, and highly oxygenated streams with unembedded boulder, cobble, and gravel substrates. Eastern Hellbenders reproduce via external fertilization (females deposit eggs under a nest rock and males fertilize the egg clutch) after which a single male defends the nest from other hellbenders. Survival and successful recruitment require abundant prey (primarily crayfish but also small fish, insects, and frogs) and large (greater than 30 cm), flat rocks, partially embedded with a single opening facing downstream, for nests and shelter (USFWS, 2018d).

3.2.2.4. *Conservation Needs*

The primary threat to freshwater mussels is the loss of or degradation to its habitat. Threats to eastern hellbenders include stream sedimentation, poor water quality, disease, habitat loss, and pet trade collection. Mussel species and the eastern hellbender are sensitive to changes in water quality and quantity, sedimentation of habitat, and increases in water temperatures due to climate change and modification of streamside vegetation. Sedimentation caused by agriculture, silviculture, oil and gas development, residential development, off-road vehicles, impoundments, instream gravel mining, and road construction alters habitat suitability and is extremely harmful for sensitive aquatic species by smothering eggs, young, and habitat, which can result in a loss of viability to the population. Isolation of populations is also a concern for recovery.

Achieving recovery for freshwater mussel species and the eastern hellbender depends on a strategy of cooperative work with partners to conserve habitat within watersheds with multiple, healthy populations across the historical range and high connectivity among those watersheds. The path to achieving recovery is structured by delineating units that ensure adaptive capacity is sufficient to allow for both near- and long-term adaptation to changes in the species' environment and restoring redundancy and resiliency within these units to ensure the species can withstand existing and predicted future natural variations (e.g., temperature, rainfall), stressors, and potential catastrophes.

3.2.2.5. *Environmental Baseline*

3.2.2.5.1. Species Presence

The Federally listed mussel species that may occur in the Analysis Area (Table 0-1) are mostly associated with medium to large streams and rivers. Streams within the WNF are mostly small headwater streams and do not provide the type of habitat required for the endangered mussels (USFWS 2019d). Larger Ohio River tributaries do pass through the Proclamation Boundary of the Marietta Unit, specifically the Little Muskingum River.

The endangered clubshell inhabits areas with sand or gravel substrate and also prefers areas with riffles and runs. Individuals were translocated into the Ohio River but the year and number of individuals are unknown (Boyer pers. comm. 2025).

The northern riffleshell inhabits areas with sand or gravel substrate and also prefers areas with riffles and runs. Individuals were translocated into the Ohio River but the year and number of individuals are unknown (USFWS unpublished data).

USFWS has provided information that snuffbox occurs in the Ohio River in Washington County and overlaps the Analysis Area (USFWS 2024c).

Recent surveys for fanshell mussel have documented this mussel in the Ohio River in Washington County (USFWS 2024c). Individuals were translocated into the Muskingum River in 2010 and recruitment of this species was documented in 2024 (BioSurvey Group 2024).

There are 5 years of data compiled by USFWS that identify pink mucket in portions of the Ohio River in the southwestern portion of the Analysis Area.

Longsolid is a freshwater mussel currently found in the Ohio, Cumberland, and Tennessee River basins, overlapping within the states of Alabama, Kentucky, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. The most recent species status assessment states the Ohio River (Willow Island Pool) has an occupied river contiguous population but, within the Little Muskingum–Middle Island Management Unit, longsolid has an overall population condition of low (USFWS 2018b). It is known to occur in the Muskingum River.

There are no known populations of purple cat’s paw mussel in or near the WNF Marietta Unit. However, this species has been reintroduced in the Ohio River Islands National Wildlife Refuge within the Aquatic Analysis Area (USFWS 2022a, 2024c).

There is suitable habitat for rabbitsfoot in the Aquatics Analysis Area, but not within the Terrestrial Action Area. Based on multiple surveys, rabbitsfoot is known to occur in the Muskingum River in the Aquatic Analysis Area (USFWS 2025b).

In Ohio, round hickorynut is associated with a variety of flow regimes. It is found in medium headwaters to large streams in areas with swift to slow water. It must have adequate flow to deliver oxygen, enable passive reproduction and deliver food to filter-feeding mussels. It inhabits a mixture of sand and gravel substrates (NatureServe 2023). Within the Terrestrial Action Area, the species is known to occur in the Muskingum River, Little Muskingum River and Ohio River within Washington County (USFWS 2024a).

There are no known populations of sheepsnose mussels within the WNF. However, there is potential for this species to occur within the Ohio River in the Aquatic Analysis Area and it has been detected in the Mjusingum River as recently as 2024 (BioSurvey Group 2024) The closest known extant Ohio River population is in the Belleville pool, which starts at the Willow Island Locks and Dam, just south of the Marietta Unit.

Salamander mussel is known to occur in and near the WNF. Known populations are in the lower reaches of the mainstem of the Little Muskingum River in the Little Muskingum–Middle Island watershed and in the New Years Creek–Duck Creek watershed.

The eastern hellbender is a large aquatic salamander that lives in cool permanent streams across 15 states. Eastern hellbender can be found in Northeastern Mississippi, northern Alabama, northern Georgia, Tennessee, western North Carolina, western Virginia, West Virginia, Kentucky, southern Illinois, southern Indiana, Ohio, Pennsylvania, western Maryland, and southern New York, and with disjunct populations occurring in east-central Missouri.

The eastern hellbender has multiple occurrence records in the Little Muskingum River in both Monroe and Washington Counties from multiple records within the Aquatic Analysis Area.

3.2.2.6. *Habitat Condition (General)*

As noted in Section 2.5.2, *Habitat in the Aquatic Analysis Area*, the majority of HUC-12 watersheds within the Analysis Area are not meeting current water quality standards (see Table 2-7). However, the quality of individual streams in the WNF is generally high despite the region’s history of natural resource extraction (USFS 2020b). Approximately 75 percent of the high-quality stream sites in the WNF are in the Marietta Unit, 19 percent in the Ironton Unit, and only about 6 percent in the Athens Unit, which suffers from a stronger legacy of acid mine drainage from past coal mining operations.

Although the Marietta Unit contains the highest-quality and most biologically diverse watersheds, there is also evidence of human modification of some stream reaches including nutrient discharge and sedimentation (USFS 2020b). For further information on existing water resource conditions in the analysis area, refer to Section 2.5.2, *Habitat in the Aquatic Analysis Area*, of this document.

3.2.2.7. Effects of the Action

3.2.2.7.1. Direct and Indirect Interactions

The process of leasing for oil and gas development itself does not directly affect Federally listed species; therefore, no direct effects would occur under the Proposed Action. However, reasonably foreseeable construction and operation of oil and gas development, as a result of leases that are issued under the Proposed Action, could result in direct and indirect impacts to the mussel species.

Reasonably foreseeable development of the leases could result in up to 1,015 acres of short-term disturbance during the 15-year development period and up to 285 acres during the production period of the developed well sites. Clearing of land and surface disturbance could increase the potential for erosion and sedimentation transport to surface waters that can affect water quality resulting in impacts to mussel species and the Eastern hellbender. Additional effects on mussels and the Eastern hellbender from reasonably foreseeable oil and gas development of the leases could result from physical disturbance to, or destruction of, aquatic individuals and habitats as well as from water withdrawals during low-flow conditions or from increased potential for contamination of water resources from accidental spills, leaks, and failed wells. In addition, reasonably foreseeable development of the leases can also increase the potential for the spread and establishment of nonnative or invasive species that can outcompete mussel species and the Eastern hellbender.

In-water work can result in direct mortality of mussels and the Eastern hellbender through crushing as well as impacts such as siltation and increased sedimentation and erosion, which can suffocate mussels, affect their host fishes, and result in the dislodging of individual mussels. It can also destroy, alter, or degrade suitable instream habitat. Instream work is not anticipated as part of development that may arise from the Proposed Action, but, if required, then use of equipment adjacent to and within waterways could result in physical disturbance to aquatic wildlife individuals or long-term destruction of aquatic wildlife habitats, including wetlands, riparian areas, streams, and rivers. **Aquatic AMM 1** would prohibit in-water work in Group 2 and 4 mussel streams or require a USFWS-approved mussel survey following the most recent version of the Ohio Mussel Survey Protocol to assess presence of ESA-listed mussels. If Federally protected mussel species are identified, additional analysis under the ESA would be required. The BLM would coordinate with the USFWS during site-specific permitting of APDs to identify and include AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis. These measures would avoid in-water effects on mussels and the Eastern hellbender where they are most likely to occur.

Reasonably foreseeable development of the leases would increase the volume of hydraulic fracturing fluids that would be utilized to develop the reasonably foreseeable 81 wells compared to previously analyzed traditional well development. The chemicals associated with hydraulic fracturing fluid and wastewater can be more toxic and/or higher in concentration than fluids used

in vertical drilling. The USEPA has compiled a list of 1,606 chemicals associated with hydraulic fracturing, including 1,084 chemicals that are used in hydraulic fracturing fluid and 599 chemicals that have been detected in produced water. Of these chemicals, the USEPA found a median of 14 chemicals are used for one well with 90 percent of wells using from four to 28 chemicals (USEPA 2019). Hydraulic fracturing wastewaters are generally high in Total Dissolved Solids (TDS), especially those from shales and tight formations. The TDS in wastewaters from shale formations is typically dominated by sodium and chloride and may also include elevated concentrations of bromide, bicarbonate, sulfate, calcium, magnesium, barium, boron, strontium, radium, organics, and heavy metals. Hydraulic fracturing wastewater typically contains some heavy metals, as well as barium and strontium, in concentrations that can reach hundreds or even thousands of milligrams per liter (USEPA 2019). Infiltration or runoff of spilled hazardous materials and chemicals can result in potential groundwater and surface water contamination that can affect aquatic habitat of the Eastern hellbender and the mussel species that occur in aquatic habitat.

Reasonably foreseeable development of the leases would also increase the volume of wastewater that must be disposed through underground injection or other methods such as trucking the wastewater to disposal or recycling facilities. Due to the high brine content and other chemical constituents of wastewater, if there are spills of wastewater or if wastewater is not properly disposed of or adequately regulated/monitored under the ODNr Class II injection regulations there could be impacts to surface water and groundwater quality that would affect the Eastern hellbender and mussel species. The potential impacts on the Eastern hellbender and mussel species from spills of contaminated water or failure of injection wells would be highly dependent on the location of site-specific projects, methods of wastewater disposal, the location/extent of spills and contamination, and a variety of other factors that would be further analyzed during site-specific permitting of APDs and assessed as part of the Tier 2 consultation process. **Aquatic AMM 8** requires safe disposal of brine in accordance with state requirements. This will protect surface water and groundwater from contamination with brine.

If operators utilize brine mixtures or water mixtures with other pollutants to control dust on dirt roads, there would be increased potential for contamination of water resources that could affect aquatic wildlife, especially if brine water is mobilized during stormwater events or if brine is applied close to surface water resources, including the Little Muskingum River. During the Stage 3 environmental reviews of site-specific APDs, the BLM would assess operator proposals for dust control in relation to nearby surface water features, drought conditions, and other factors. The BLM will apply AMMs and other measures to APDs as conditions of approval to avoid and minimize potential impacts to mussels. **Aquatic AMM 8** prohibits the use of brine for dust and ice control within 1,000 feet of a mussel or eastern hellbender stream.

As seen in Table 2-7, the majority of watersheds within the Analysis Area are not currently meeting water quality standards set under Section 303(d) of the CWA due to bacteria and other microbes, metals, polychlorinated biphenyls, and low oxygen. Developing up to 29 well pads and up to 81 wells in the Aquatic Analysis Area could further contribute to these watersheds (including the Little Muskingum) not meeting water quality standards due to potential impacts described above. For the five watersheds in the Analysis Area meeting water quality standards, or the 12 watersheds fully supporting designated uses, developing up to 81 wells in the Analysis Area could pose a risk to these watersheds of retaining their functional status, especially if accidental spills of hydraulic

fracturing fluid and wastewater occur that can have high heavy metal concentrations. Potential spills and contamination could impact water quality in water resources, including the Little Muskingum River, especially if they were to occur close to surface water features or upstream of surface waters. Any impacts to surface water quality and further impairment of surface waters could affect mussel species and the Eastern hellbender that inhabit the affected waters. During site-specific permitting of APDs, further analysis of potential impacts on water resources and associated mussel species and the Eastern hellbender would be conducted based on the specific location of proposed development, especially if development is proposed in close proximity to surface water resources. If potential impacts to mussel species and the Eastern hellbender are identified, the BLM would coordinate with the USFWS during site-specific permitting of APDs to identify and apply AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis.

USFWS identified several primary threats to mussels including changes in water flow and depth, contaminants, landscape alteration, lack of connectivity, invasive species, and risks to their host species, including the mudpuppy. Threats to Eastern hellbenders include stream sedimentation, poor water quality, disease, habitat loss, and pet trade collection (USFWS, 2018d). Significant decreases in flow conditions can also increase concentrations of contaminants, leading to a potentially acute exposure as well as an accumulation of waste. USGS analyses of water use associated with hydraulic fracturing in eastern Ohio looked at water quality. Seven of eight of the sampling sites were compromised by mine-drainage contaminants and there was indication that four sites contained a component of brine from hydraulic fracturing, but they did not exceed OEPA aquatic life use criteria (Covert and Koltun 2024).

Mussels are potentially affected by sedimentation both at the source and downstream of proposed activities. Sediment entering streams could potentially alter the survival of mussels by burying them or displace suitable habitat by filling in the interstitial spaces between stable substrates (NatureServe 2023). Loose sediment coursing through the gills and intestinal tracts of mussels would likely increase the physiologic load on the animals needed to process their intake or even cause them to die of suffocation if covered with fine particulates (NatureServe 2023). Additionally, mussels may close their shells when disturbed as a form of protection, but this in turn reduces respiration, feeding, gestation, and reproduction activities (NatureServe 2023). Mussels, such as round hickorynut, salamander mussel, sheepnose, and others, that rely on sight-feeding organisms as part of their lifecycles are especially sensitive to sedimentation of habitat because cloudy water at critical reproductive periods (late spring to early summer) may affect reproductive success. These impacts would be most likely to occur in the Little Muskingum River and other rivers and streams if disturbance occurs in close proximity to or upstream of the river or stream.

The primary stressor to Eastern Hellbender is sedimentation, caused by multiple sources, which is occurring throughout much of the species' range. As documented in literature, other major stressors include water quality degradation, habitat destruction and modification, disease, and direct mortality or removal of hellbenders from a population by collection, persecution, recreation, or gravel mining. Additional risk factors include climate change, small population effects, and increased abundance of native and non-native predators (USFWS, 2018d).

Conservation measures for the species include habitat restoration and management, and captive propagation, augmentation, and reintroduction. Long-term success of reintroductions, however, is unknown (USFWS, 2018d).

Tree clearing and construction of reasonably foreseeable development of the leases that are adjacent to or upstream of occupied mussel habitat could result in pollutants entering these streams. Impervious surfaces cause disruption to surface-water flow and absorption and increase erosion and runoff, which can increase potential for water source contamination (Shuster et al. 2005). Well-pad construction would increase the amount of impervious surface, resulting in more long-term runoff. The physical nature of sediment movement causes scouring and deposition and can alter suitable habitat conditions including important spawning habitat for host fishes. Tree clearing within riparian areas could result in increased instream temperatures, which could potentially affect water conditions (i.e., dissolved oxygen).

Aquatic AMMs 2 and 3 would prohibit well pad construction within 1,000 feet of mussel streams and establish 300-foot no-disturbance buffers along mussel streams to minimize contamination, reduce sedimentation, and maintain quality riparian and aquatic habitats. **Aquatic AMM 4** requires the use of BMPs for construction of access roads to minimize erosion and sedimentation.

During site specific permitting, the BLM would review the proposed source and amount of water use and wastewater disposal and would apply AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis. This could include prohibiting lessees from withdrawing water for drilling, completion, or any other purposes related to an APD, from the Little Muskingum River or any other Group 2 or Group 4 streams (**Aquatic AMM 5**), requiring operators to install additional stream gauge monitors, proper disposal of wastewater to avoid aquatic habitat quality effects, and application of additional resource protection measures during site-specific permitting of APDs.

Dredging or filling of wetlands is not anticipated for reasonably foreseeable wells on Federal land. However, private landowners accessing Federal minerals may seek to perform these activities that could affect water resources and riparian and wetland areas. In Ohio, anyone who wishes to discharge dredged or fill material into the waters of the U.S., regardless of whether on private or public property, must obtain a Section 404 permit from the U.S. Army Corps of Engineers (Corps) and a Section 401 Water Quality Certification (WQC) from the state (OEPA 2024b).

Issuance of a CWA Section 404 permit requires its own NEPA analysis to review environmental impacts. Although oil and gas activities are typically exempt from the National Pollutant Discharge Elimination System permitting program under CWA Section 402, the permitting provisions are applicable if there is a discharge of stormwater resulting in a discharge of a reportable quantity of oil or hazardous substances, or the facility contributes to a water quality violation, or has a general permit for oil and gas operations that requires operators to develop and implement a stormwater pollution prevention plan. The potential presence of Federally listed species on either Federal or private land would also trigger the need for additional analysis under the ESA and consultation with USFWS during site-specific permitting of APDs, with the potential for additional required conservation measures.

For APDs and Surface Use Plans of Operations proposing development on NFS lands, compliance with Forest Plan SFWs and guidelines and Federal and State regulations would further limit the potential for surface-water contamination. There are several SFWs and guidelines for the protection of aquatic resources, such as GFW-ARR-5 that requires the establishment of filter strips along perennial, intermittent, and ephemeral waterbodies where earth-disturbing activities expose mineral soil on NFS lands and GFW-WSH-8 and Stipulation #8 that are aimed at reducing erosion and sedimentation that can affect water quality.

Operators developing wells on private land must include preventive measures for stormwater runoff and erosion from well-pad construction activities in drilling plans they submit to ODNR. To reduce the amount of runoff and sedimentation after construction, USFS and the BLM would also require well operators to reclaim all disturbed areas as soon as possible. As part of the APD process, the BLM will invite private surface owners to participate in the onsite and final reclamation inspections, will take into consideration the needs of the surface owner when reviewing the APD and reclamation plans, and when approving final abandonment and reclamation. Prior to approval of the APD (or Sundry Notice to conduct new surface disturbing activities), an operator must certify as part of the complete application that a good faith effort had been made to reach a surface use agreement with the private surface owner and that an agreement was reached or that it failed. If the surface owner and operator fail to reach an agreement, the operator must file an adequate bond with the BLM for the benefit of the surface owner to cover compensation (BLM 2007).

Surface water is the primary freshwater source for horizontal drilling and hydraulic fracturing in the Ohio River basin (USEPA 2015). Private access to and use of surface waters within the Marietta Unit's watersheds may result in indirect effects on listed mussels. The supplementary water required for hydraulic fracturing and horizontal well drilling may affect aquatic species by depleting freshwater sources that are essential to their habitats.

Based on the assumption that one well in Monroe County or Noble County requires 19 to 27 Mgal, and on the 2020 RFDS (BLM 2020) projection that five to six wells would be developed each year over the 15-year development period, it is predicted that approximately 114 to 162 Mgal of water would be required each year during reasonably foreseeable development of the leases, or total water use of to 1,539 Mgal to 2,187 Mgal during well development. Considering that the surface water withdrawals in the Analysis Area averaged 1,581.2 Mgal per year between 2017 and 2021, the development of wells projected in the 2020 RFDS would result in an approximate 10-percent increase in withdrawal per year if all water used for drilling and hydraulic fracturing activities is surface water withdrawn from the Analysis Area. In addition, during operations horizontal wells have been found to use between 2 and 6 Mgal of water per well. Assuming that all 81 wells are developed, operation of these wells could result in total water use of 486 Mgal during the operation/production phase. The annual distribution of this total estimated water use of 486 Mgal during operation/production would be spread out over the productive lifetime of the wells, which can range from 20 to 30 years (16.2 Mgal per year if production lasts 30 years and 24 Mgal per year if production lasts 20 years). This amount of water use during operation equates to an approximate increase of 1 to 1.5 percent of total annual water withdrawals per year if all water withdrawals for operation come from surface water in the Analysis Area.

The BLM reviewed the permits that the State of Ohio issued for five wells that the BLM had approved, known as the Forni wells. In this case, the BLM approved six wells, of which five were

completed between 2019 and 2021. These permits are available at <https://ohiodnr.gov/business-and-industry/energy-resources/well-information/well-locator>. The volumes of water used were within the range described above and in Table 2-3. The BLM learned from the ODNR that the company that drilled the Forni wells had four registered water withdrawal facilities within 5 miles of the well pad, including three facilities on the Little Muskingum River and one on the Ohio River. The company obtained 75 percent of the water used in completing the Forni wells from the Little Muskingum River. These withdrawals occurred during months when the Little Muskingum-Middle Island watershed was not experiencing drought. During months for which the Little Muskingum-Middle Island watershed experienced drought, the company's reported water withdrawals were from the Ohio River.

Considering that all surface water withdrawals in the Analysis Area between 2017 and 2021 were within the Little Muskingum–Middle Island HUC-8, future withdrawals for mineral development are expected to also be from this watershed. Concentration of withdrawals in this HUC-8 watershed would result in impacts on water quantity with the extent of impacts depending on where within the watershed the withdrawals occur, timing of water use throughout the year and if use would occur during drought or low flow conditions, the extent to which all 81 wells would be constructed, drilled, and completed during the same timeframe, and other factors. The primary surface waters that would potentially be utilized to supply water for the reasonably foreseeable development of the leases include the Little Muskingum River (due to its location in the Marietta Unit) and the Ohio River (due to the proximity to the Marietta Unit and the relatively high volumes of water in the river). To determine the extent of potential impacts to these surface waters, this analysis uses publicly available streamflow data from the USGS (2023b; USGS 2025).

In the Little Muskingum–Middle Island HUC-8, USGS maintains seven streamflow-monitoring stations that provide flow data. This analysis uses streamflow data from Little Muskingum River Site 03115400 as a representative case study for surface waters. Additionally, this monitoring site provides the largest available dataset, with measurements taken from October 1958 through September 1981, and from October 1995 to today. Other surface-water monitoring stations only provide data from as early as 2012. Using Site 03115400 stream gauge data, USGS (2023b) calculated various streamflow measurements in the Little Muskingum River as presented in Table 3-3, below. The predicted volumes of water passing through the river annually were then calculated based on streamflow.

Table 0-3. Streamflow Summary for the Little Muskingum River from 1959 to 2022

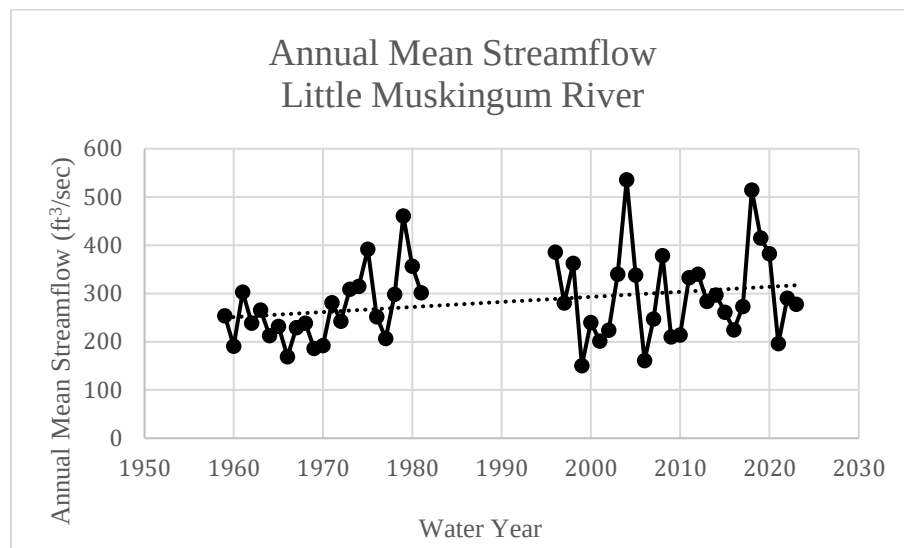
MEASUREMENT	STREAMFLOW (FT ³ /S)	ANNUAL WATER	DATE RECORDED
		VOLUME (MGAL/YEAR)	
Annual Mean	284.1	67,020.8	–
Highest Annual Mean	535.7	126,374.7	2004
Lowest Annual Mean	150.7	35,551.0	1999
Highest Daily Mean	28,000.0	–	September 18, 2004
Lowest Daily Mean	0.0	–	September 18, 1967
Annual 7-day Minimum	0.047	–	September 23, 1999
10% Exceeds	658.0	155,225.9	–
50% Exceeds	96.8	22,835.7	–
90% Exceeds	4.80	1,132.3	–

Source: USGS 2023b.

ft³/s = cubic feet per second

Annual streamflow of the Little Muskingum River over the past 63 years averaged 284.1 cubic feet per second (ft³/sec). In 2004, the river saw its highest annual mean streamflow at 535.7 ft³/sec and in 1999 its lowest annual mean flow at 150.7 ft³/sec. The highest daily mean streamflow for the Little Muskingum River was recorded on September 18, 2004, at 28,000 ft³/sec, and the lowest daily mean was recorded on September 18, 1967, at 0 ft³/sec (Table 3-3).

Figure 3-1 presents the annual mean streamflow in the Little Muskingum River from 1959 to 2023. The annual stream flow, a metric of water quantity, in the Little Muskingum River has been variable over time since 1959, mostly reflecting annual precipitation patterns. The overall trend line indicates that the Little Muskingum River has been gaining flow since 1959.

Figure 0-4. Annual Mean Streamflow in the Little Muskingum River from 1959 to 2023

Source: USGS 2023b.

Projected surface-water usage during well drilling and development based on development estimates in the 2020 RFDS (BLM 2020) is approximately 114 to 162 Mgal of water needed annually. Based on the average streamflow rate of 284.1 ft³/sec, the Little Muskingum River carries about 183.6 Mgal per day (approximately 67,020.8 Mgal per year). If all the water required for proposed horizontal drilling and hydraulic fracturing in the 2020 RFDS (BLM 2020) were withdrawn directly from the Little Muskingum River over fifteen years, then this use would equate to approximately 0.17 to 0.24 percent of the river's average annual water total. In 1999, the year with the lowest annual mean streamflow rate (150.7 ft³/sec) over the past 63 years, approximately 35,551.0 Mgal passed through the Little Muskingum River. If all the water for horizontal drilling and hydraulic fracturing were withdrawn from the Little Muskingum River over fifteen years, then projected surface-water usage would equate to removing about 0.32 to 0.46 percent of the river's water in the lowest streamflow year. Removal of this percentage of the river's water, even during low-streamflow years, is anticipated to have minimal impacts on the Little Muskingum River's streamflow given the total streamflow in the river. If all water used during operations (estimated at 16.2 Mgal per year if production lasts 30 years and 24 Mgal per year if production lasts 20 years) were taken from the Little Muskingum River potential impacts on streamflow would be correspondingly minimal. Moreover, water needs associated with operation of a well are generally concentrated in the early stage of production and decline with a well's production age (Table 23) and thus the minimal streamflow impacts during operation would further decline with time. In addition, as depicted on Figure 3-1, the trendline for annual mean streamflow in the Little Muskingum River indicates that the river has generally been gaining flow since 1959.

Nonetheless, Harmon et al. (2023) modeled and calculated the potential impacts of hydraulic fracturing-related water withdrawals on daily flow in HUC-12 watersheds of the Ohio River Basin and concluded that extreme withdrawals (withdrawals that are substantially above average withdrawal levels) could result in episodic and relatively short-lived, but potentially harmful,

reduced streamflow depending on location and timing, and in the absence of appropriate mitigation measures. The Little Muskingum River experienced the lowest mean streamflow for a 7-consecutive-day period in 1999, at 0.047 ft³/sec (Table 3-3). This streamflow equates to approximately 0.03 Mgal per day, which is not enough water to support the 0.31 Mgal to 0.44 Mgal required per day (based on 114 to 162 Mgal per year) for horizontal drilling and hydraulic fracturing. As seen in Table 3-3, these low-flow events are infrequent, with 90 percent of water years experiencing streamflow above 4.80 ft³/sec, totaling 1,132.3 Mgal through the river per year. Although withdrawals are unlikely during these low-flow events due to the decreased quantity of flowing of water, if withdrawals did occur, streamflow reductions in the Little Muskingum River and other surrounding surface waters within the Little Muskingum–Middle Island HUC-8 could occur. Streamflow reductions could result in impacts to water quantity and water quality that affect mussel species that inhabit the Little Muskingum River.

There is one USGS streamflow-monitoring station that provides streamflow and volume data for the Ohio River within the water resource analysis area, Station USGS 031143060. Using Site 031143060 stream gage data (USGS 2025), Table 3-4 below presents calculated streamflow measurements in the Ohio River at this monitoring station. The predicted volumes of water passing through the river annually were then calculated based on streamflow.

Table 0-4.4 Streamflow Summary for the Ohio River from 2014 to 2023

MEASUREMENT	STREAMFLOW (FT ³ /S)	ANNUAL WATER VOLUME (MGAL/YEAR)	DATE RECORDED
Annual Mean	44,918	10,603,667.7	–
Highest Annual Mean	62,500	14,754,201.7	2019
Lowest Annual Mean	33,970	8,019,203.7	2016
Highest Daily Mean	290,000	–	September 11, 2018
Lowest Daily Mean	576	–	September 28, 2016
Annual 7-day Minimum	5,451.4	–	August 9, 2020
10% Exceeds	94,570	22,324,877.6	–
50% Exceeds	33,200	7,837,431.9	–
90% Exceeds	9,420	2,223,753.3	–

Source: USGS 2025.

ft³/s = cubic feet per second

Based on the average streamflow rate of 44,918 ft³/sec, the Ohio River at the monitoring station carries about 29,051.1 Mgal per day (approximately 10,603,667 Mgal per year). If all of the water required for construction, drilling, and hydraulic fracturing of the 81 reasonably foreseeable wells were withdrawn directly from the Ohio River, then this use would equate to approximately 0.0010 to 0.0015 percent of the river's average annual water total. In 2016, the year with the lowest annual mean streamflow rate (33,970 ft³/sec) over the past 10 years, approximately 8,019,203.7 Mgal passed through the Ohio River at the monitoring station. If all the water for construction, drilling, and hydraulic fracturing of the 81 reasonably foreseeable wells were withdrawn from the Ohio

River during the lowest streamflow year, then projected surface-water usage would equate to removing about 0.0014 to 0.0020 percent of the river's water in the lowest streamflow year. Given the relatively large streamflows and water volume in the Ohio River, and the relatively low percentage of the annual water totals that would be withdrawn from the Ohio River if all 81 reasonably foreseeable wells sourced all water from the Ohio River, there would be no anticipated impacts to the water quantity in the Ohio River or to other uses of water from the Ohio River.

Poorly timed water withdrawal, such as extreme withdrawals during drought or low-flow periods, could deplete minimum flows or shorten the duration of periods of inundation for wetlands, and lower levels in lakes, ponds, and reservoirs. This could impact ecosystem functions like primary productivity and leaf litter processing (Poff et al. 1997). Increased water withdrawals could also create "simplified" streams and rivers by reducing flow in one or several sites, resulting in the loss of branches and stream features in riparian areas. Simplified streams lose their ability to adapt to disturbances like floods, fires, or landslides (Penaluna et al. 1997).

Water withdrawals during low-flow conditions could impact mussel species by temporarily stranding mussels, resulting in mortality. Lower water levels can result in increases in water temperature as well as decreases in oxygen levels, which could also result in mortality of mussels. Lower water levels may reduce connectivity and prevent the movement of fish hosts, potentially affecting the movement and survival of glochidia. Lower water levels may also increase predation from some mammals, as mussels are easier to access during low flow. USGS analyses of annual streamflow statistics showed no general indication that low flows or extreme low flows at reference or study gauges have lowered, become more frequent, or lengthened in duration since 2010, when records for hydraulic fracturing water withdrawals began in eastern Ohio. In almost all cases, the opposite was indicated (Covert and Koltun 2024). Since these low flow events are infrequent, potential impacts on freshwater mussels from poorly timed withdrawals are possible but not unavoidable. During the Stage 3 environmental reviews of site-specific APDs, the BLM would further assess potential impacts on water quantity based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. The BLM would not approve APDS that include water withdrawals that would take Federally listed freshwater mussels and the Eastern hellbender under this consultation. Any proposed projects that would result in take of Federally listed species would be consulted on separately, outside of this programmatic consultation.

Aquatic AMMs 5, 6, 7, and 9: (see Section 2.6.1, *Avoidance and Minimization Measures for Species Protected under the ESA*) address the potential effects of water withdrawals on mussels and the Eastern hellbender associated with reasonably foreseeable development of leases that may be issued under the Proposed Action.

Aquatic AMM 5 prohibits lessees from withdrawing water for drilling, completion, or any other purposes related to an APD, from the Little Muskingum River or any other Group 2 or Group 4 streams. **Aquatic AMM 6** also encourages the use of recycled water to minimize the amount of water withdrawals from surface sources and reduce potential impacts on mussel species from decreased water quantity in the watershed. **Aquatic AMM 7** requires BLM to annually track water withdrawals from mussel streams to monitor effects from reasonably foreseeable development of the leases that may be issued under the Proposed Action to ensure that annual impacts are below

the threshold of effects considered in this BA. **Aquatic AMM 9** requires monitoring of stream flow to confirm that it is maintained at a level to sustain aquatic functions, as determined by USFWS at the tier 2 review Stage. FWS may provide additional restrictions on water withdrawal at the tier 2 consultation Stage based on the location of the project within the watershed, current hydrologic conditions, the status of other projections in the area, and other factors that may result in stream quality or quantity impacts that would affect aquatic species.

BLM's Section 6 lease term (BLM 2023) requires that adverse impacts on water resources, including water quality and quantity, be minimized. If the conduct of operations results in substantial unanticipated environmental impacts, the lessee must immediately contact the BLM (BLM 2023a). Processing an APD would also require site-specific assessments of Federally listed aquatic species within suitable habitat on both private and Federal land. Although the BLM does not have the authority to enter the non-Federal lands without the landowner's consent, the BLM may deny the APD if the inability to access the surface prevents the BLM from meeting its obligations under the ESA. During site-specific permitting of APDs on NFS lands, SFWs and guidelines for watershed health, aquatic and riparian resources (riparian corridors), wildlife, and plants from the Forest Plan (USFS 2006a) would be applied to maintain watershed and aquatic-ecosystem health, which would, in turn, protect aquatic wildlife species. GFW-WSH-1 requires avoidance of water diversions from streams, lakes, or springs when instream flow needs or water-level assessments indicate that diversion would adversely affect stream processes, aquatic and riparian habitats and communities, or recreational and aesthetic values.

Due to the limited amount of surface disturbance associated with reasonably foreseeable development of the leases and application of the AMMs and other conservation measures described above, potential impacts on freshwater mussels from the Proposed Action are anticipated to be minimal. If potential impacts are identified during APD permitting, additional resource protection measures would be applied to avoid or minimize potential impacts on aquatic species.

3.2.2.7.2. Cumulative Interactions

Cumulative interactions include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the analysis area. Reasonably foreseeable development of private surface to access private minerals would likely be the largest contributor to cumulative interactions in the analysis area.

Surface disturbance and tree clearing activities as a result of residential or other development, agricultural, timber harvest, and transportation projects that occur on state, local, or private lands across southeastern Ohio could cumulatively decrease or degrade suitable mussel habitat in the Aquatic Analysis Area. These effects would be similar to the direct and indirect effects on mussel species described above and include erosion, sedimentation, and potential pollutants that would degrade aquatic habitats. In most cases these activities on private land receive little oversight from BLM, USFS, and USFWS and may result in unknown adverse effects to listed mussels.

In 2022, there was an estimated 65,117 acres of existing development/disturbance in the Aquatic Analysis Area which accounts for approximately 10.4 percent of the total acreage within the Aquatic Analysis Area (LANDFIRE 2022b). Reasonably foreseeable development of the leases is estimated to result in up to 1,015 acres of short-term disturbance and up to 285 acres of long-term

disturbance, resulting in an approximate 1.5 percent increase in cumulative short-term disturbance and an approximate 0.4 percent increase in cumulative long-term disturbance in the Aquatic Analysis Area. Based on trends in development and disturbance overtime using LANDFIRE data from 2001 and 2022 (LANDFIRE 2001 and 2022) it is anticipated that land cover will continue to change from undeveloped cover types to developed types in the Aquatic Analysis Area at an estimated 0.5 percent per year. The cumulative amount of surface disturbance and development in the analysis area has and likely will continue to result in cumulative effects to aquatic resources and mussel species from erosion, sedimentation, and increases in impervious surfaces. However, as described in Section 2.9, *State of Ohio Regulatory Jurisdiction*, the State of Ohio requires a variety of controls for oil and gas projects on private land to limit the movement of sediment that could affect water resources including requiring a sediment and erosion control plan, soil stabilization measures, stormwater control structures that must be capable of managing a ten-year storm event, and reclamation standards that must be met by operators. Due to the relatively minimal increase in cumulative surface disturbance compared to the total acreage in the Aquatic Analysis Area and the State of Ohio standards that are in place for stormwater and erosion control, potential impacts on water quality and mussel species from disturbance, erosion, and sedimentation from development of well sites on private land are expected to be minimal.

Climate change has the potential to contribute to cumulative effects to water quality, water quantity, aquatic habitats, and mussel species. Climate change may cause more severe or frequent floods in some places. As warmer temperatures cause more water to evaporate from the land and oceans, changes in the intensity and frequency of heavy precipitation events may in turn affect the intensity and frequency of flooding (IPCC 2021). Increased streamflow events from flooding and extreme weather could increase sedimentation into mussel streams degrading habitat and affecting survivorship, especially of younger mussels. Prolonged droughts could reduce available water and strand mussels or cause unfavorable water conditions that could affect survivorship.

Future oil and gas development on private and state lands and associated water use are expected to increase and contribute to cumulative impacts in the Aquatic Analysis Area. On private lands within the Aquatic Analysis Area, it is assumed that future land use will remain similar to current land use and would continue to contribute to erosion and sedimentation at rates similar to what occurs in the current baseline. An exception to this would be horizontal well drilling on private lands, where it is assumed that there will be increased activity.

The re-use of wastewater and brine laden water for activities such as dust control on roads and construction sites could adversely affect aquatic habitat and mussel species. These activities could most notably affect water quality and mussel species during low water events or if disposal is concentrated in areas near occupied mussel streams. As described in Section 2.9, *State of Ohio Regulatory Jurisdiction*, the ODNR protects Ohio's water resources by regulating the disposal of brine and other wastes produced from the drilling, stimulation, and production of oil and natural gas in Ohio. Class II disposal well owners must file Quarterly Reports to ODNR as well as Annual Reports, documenting the total volume of brine or other waste substances received, the maximum injection pressure reached, the average daily injection pressure, the volume and delivery date for each shipment of brine or other waste substances, and proof of the lawful disposal of waste.

Injection well mechanical failures or accidental spills or leaks associated with oil and gas development may contribute to adverse effects to mussel species and their habitat. Ohio

Administrative Code 1501:09-3-04 prohibits the construction of a Class-II injection well within 100 feet of a wetland or surface waters of the state. A spill, to have an adverse impact to a mussel population, would need to travel overland or into the groundwater and enter the waterway – in this case, a river – at a volume that is high enough to have toxic effects on a population after being diluted by the waterway.

As of 3rd quarter, 2024, there were 230 active Class II brine injection wells, 14 being drilled or drilling, 12 permitted, and 8 plugged and/or abandoned, in Ohio (ODNR, 2024a). ODNR has regulatory authority over Class II injection wells in Ohio. If there are issues with injection wells, the ODNR is notified and may issue orders that suspend/cease operations of these wells to address a mechanical integrity issue or where active leaking of the wells has been identified. ODNR may also issue an order to operators that fail to submit injection well fees. Suspension orders essentially shut in the injection wells and these orders can only be terminated when an operator demonstrates that the conditions that caused the orders are repaired satisfactorily to ODNR standards.

The ODNR DOGRM Chief issued 47 violations for Class II injection wells between 2019 and 2024. Orders by the Chief can be found at <https://ohiodnr.gov/discover-and-learn/safety-conservation/about-ODNR/oil-gas/oil-gas-resources/chiefs-orders> (ODNR, 2025b). Of the 47 Chief's Orders for violations issued, 21 were for failure to submit injection well fees and 26 were to suspend/cease operations to address mechanical integrity and/or for injection wells that were detected to be actively leaking.

Additionally, ODNR can deny APDs for injection wells for a variety of reasons; permits to drill five saltwater injection wells were denied in 2022.

Surface-water withdrawals from within the Aquatic Analysis Area, particularly the Little Muskingum–Middle Island HUC-8, are likely to increase as more wells are permitted in the Aquatic Analysis Area. Water withdrawals on private land are subject to ORC Section 1521.23, which requires facilities with new or increased consumptive uses of more than 2 Mgal of water per day, averaging over any 30-day period (60 Mgal per month), to obtain a permit from the Chief of the Division of Water Resources. It is likely that wells projected in the 2020 RFDS would trigger the requirement for a consumptive use permit due to the typical amount of water needed for hydraulic fracturing drilling and completions being more than the 2 Mgal per day permit threshold; however, in certain cases well sites could require less than 2 Mgal of water per day and not be subject to a consumptive use permit. Failure to consider the impacts of the requested withdrawal on water resources and conservation practices to protect these resources would result in denial of the consumptive use permit. Therefore, impacts on aquatic wildlife resulting from some water withdrawals on private lands are anticipated to be minimized through the State of Ohio permit process.

Issuance and subsequent development of leases under the Proposed Action are not likely to result in substantial cumulative effects to Federally protected mussel species because of State of Ohio regulations and standards that are in place for water withdrawals, wastewater disposal, and erosion control (see Section 2.9, *State of Ohio Regulatory Jurisdiction*); BLM's Section 6 lease terms; implementation of AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis.

Streamflow reductions related to the Proposed Action's horizontal oil and gas activities are expected to result in a minor reduction (from 0.32 percent to 0.46 percent) in annual surface-water availability, based on the Little Muskingum River case study. However, withdrawals during rare (less than 10 percent of the time), extreme, low-flow events could potentially harm the biology of streams and their adjacent riparian zones (Harmon et al. 2023). Removing water during low flow events could potentially strand and kill mussels if there is not enough water to maintain biological functions. Low flow events can also concentrate waste and potentially impact freshwater mussels. Compliance with Federal and state regulations (e.g., ORC § 1521.23) would mitigate the likelihood of substantial drawdown of surface waters in the Aquatic Analysis Area. BLM would apply AMMs and other measures to APDs as conditions of approval for water withdrawal and proper disposal of wastewater into lease terms if there is a possibility of adverse effects to mussel species. This could include restricting brine use on roads near mussel streams or during low flow events when pollutants would be more concentrated or require wastewater be trucked away from sensitive watersheds. These measures would help reduce the Proposed Action's contribution to cumulative water quality effects and effects to listed species.

Construction of well sites and other infrastructure on private and state land could also result in the removal of wetlands, riparian habitat, or other aquatic habitat important for the overall function of aquatic ecosystems. However, the State of Ohio requires a variety of standards and requirements as part of the State permitting process including identifying all springs, wetlands, and other surface water features as part of the permit package and requiring a well site visit by the ODNR as part of the permit process that can result in the identification of specific terms and conditions to protect wetlands and other aquatic habitat that would be attached to permits. In addition, in the State of Ohio, a person or operator that proposes to engage in an activity on private or state land that involves the filling of an isolated wetland shall apply to the director for coverage under a general state isolated wetland permit or shall apply for an individual state isolated wetland permit, as applicable, in accordance with sections 6111.02 through 6111.027 of the Ohio Revised Code. State of Ohio wetlands are subject to a variety of review levels based on the proposed acreage of wetland fill. State of Review of wetland permits requires the submission of an acceptable wetland delineation, wetland categorization, and a mitigation proposal for the impact to the wetland (ORC § 6111.022). Mitigation for proposed filling of wetlands may include onsite or offsite mitigation, mitigation within the same watershed, mitigation at a wetland bank, in-lieu fee mitigation, or mitigation in a watershed that is adjacent to the watershed that is affected if there is a significant ecological reason that the mitigation location should not be limited to the watershed in which the wetland fill is located (ORC §§ 6111.022, 6111.023, 6111.024). The level of required mitigation would depend on the acreage of wetlands that would be filled, subject to director approval.

The Ohio Department of Natural Resources uses water withdrawal registrations and permits to manage cumulative withdrawals, but the BLM is not aware of how this system may prevent an individual withdrawal during a drought period from affecting aquatic habitat or protected species. The most effective way for the BLM to ensure that it is not causing a negative effect to mussel populations is to prohibit the withdrawal of water from the waterways that harbor listed mussel populations and to prohibit withdrawals during drought conditions. As such, the BLM has developed a lease stipulation to prohibit withdrawals from streams that harbor mussel species (see Section 2.6.1.2, *Aquatic AMMs to Prohibit Mussels and the Eastern Hellbender*). With application of

this stipulation there would be no anticipated effects on Federally protected mussel species from water withdrawals associated with reasonably foreseeable development of leases.

3.2.2.8. *Determination of Effects*

Based on the effects analysis, potential effects from the Proposed Action with implementation of general conservation measures and aquatic AMMs are unlikely to occur (discountable) and the size of any impact, were it to occur, would be too small to be measured or evaluated. Therefore, the BLM seeks concurrence of an effects determination of **may affect, not likely to adversely affect** for clubshell, northern riffleshell, fanshell, pink mucket, purple cat's paw, round hickorynut, longsolid, rabbitsfoot, sheepnose, and snuffbox mussels. The Proposed Action, with AMMs, is **not likely to jeopardize the continued existence of** the salamander mussel or Eastern hellbender.

3.2.3. Monarch Butterfly

3.2.3.1. *Status of the Species*

On December 10, 2024, the USFWS proposed listing the monarch butterfly as a threatened species under the ESA.

3.2.3.2. *Recovery Plans*

There are no current recovery plans for monarch butterfly.

3.2.3.3. *Life History Information*

Monarch butterflies are large, migratory butterflies that inhabit almost any open habitats such as roadsides, pastures, fallow fields, gardens, and other spaces where there are blooming flowers. Suitable larval habitat for monarch butterfly is dependent on the distribution of suitable species of milkweeds (*Asclepias* spp.), its obligate host plant, and the abundance and condition of these milkweeds. In the eastern U.S., milkweeds used include common (*A. syriaca*), swamp (*A. incarnata*), and butterfly milkweed (*A. tuberosa*). Monarch butterflies lay eggs on milkweed in the eastern U.S. and larvae emerge after 2 to 5 days (USFWS 2020b). Larvae feed on milkweed over a period of 9 to 18 days, sequestering the toxic chemicals as a defense (USFWS 2020b). They then pupate in a chrysalis for 6 to 14 days before emerging as an adult (USFWS 2020b).

Monarch butterflies begin reaching Ohio about when milkweed foliage becomes available (starting in about June). Monarch butterflies go through several generations of eggs-larvae-pupa-adults before they get through the summer, and then the last generation migrates south to the Oyamel forests in central Mexico (USFWS 2020b). During migration, the adults need stop-over sites with forb-filled, open habitats to nectar on a variety of flowering plants to maintain energy reserves for the long journey (Kirschbaum et al. 2017).

3.2.3.4. *Conservation Needs*

In the past, the greatest threat to monarch butterfly was believed to be disturbance to its wintering grounds from deforestation and severe weather patterns that caused catastrophic mass mortality events (Flockhart et al. 2014). However, more recent research suggests the species is also threatened by habitat loss across its migration route at multiple time periods throughout its annual

cycle (Flockhart et al. 2014). Flockhart et al. (2014) found that declines of milkweed used for breeding throughout its migration may have a higher influence on population declines than previously expected, particularly in the Midwest “Corn Belt” region of the U.S. USFWS has found severe declines in population numbers that resulted from the use of pesticides, loss of habitat and native milkweed plants, and global environmental change (USFWS 2020b).

Threats to monarch butterfly breeding grounds include modification and loss of habitat due to herbicide use, development, and climate change; and direct mortality from insecticides, disease, or predation (Pocius et al. 2022; Wilcox et al. 2019). Loss of habitat due to herbicide use is primarily driven by an increase in use of the herbicide glyphosate, which destroys milkweeds that might otherwise persist throughout the agricultural landscape. Urban development also negatively affects overwintering, breeding, nectaring, and roosting sites. Fields with annual milkweed are converted to lawn or concrete and asphalt. Recent analyses (Miller et al. 2012; Brower et al. 2012; Pleasants and Oberhauser 2013; Flockhart et al. 2013, 2014; Butler 2014) suggest that loss of core breeding habitat is the leading cause of monarch butterfly population decline in the eastern North American population, placing increasing emphasis on conserving and supporting summer habitat and diversity and abundance of native milkweed in North America.

USFWS (2020b) identified overwintering habitat loss, monarch butterfly disease, widespread drought, extreme storm events (both at the Mexican overwintering sites and during migration funnel points), and widespread insecticide spray events as potential catastrophic events. Moisture regimes also affect monarch butterfly population dynamics, where years of severe drought were associated with lower monarch butterfly population estimates (Stevens and Frey 2010). This is likely due to reduction in abundance and quality of milkweed due to higher temperatures and reduced water availability (Stevens and Frey 2010). Climate change may increase the frequency and duration of droughts, potentially further reducing suitable habitat for monarch butterfly.

3.2.3.5. Environmental Baseline

3.2.3.5.1. Species Presence

Ohio is within the northern range of the monarch butterfly migratory flyway; therefore, monarch butterflies are common throughout the spring, summer, and fall in the WNF in suitable habitat (ODNR 2015). The amount of suitable habitat for monarch butterflies in the WNF is decreasing. The amount of forest in the WNF has steadily increased, leaving fewer open areas not invaded by NNIS with available native flowering plants (USFS 2020b).

3.2.3.6. Species Conservation Needs within the Terrestrial Action Area

USFWS identified overwintering habitat loss, monarch butterfly disease, widespread drought, extreme storm events, and widespread habitat loss as the primary threats to populations of monarch butterfly in the eastern United States (USFWS 2020b). Within the Terrestrial Action Area, the only threat that can be influenced is habitat loss. Habitat loss may occur through direct conversion of grasslands to row crop agriculture or urban development, or through loss of milkweed within agricultural row crops through use of glyphosate herbicides with “Round-Up” ready genetically modified crops.

Within the Terrestrial Action Area, the availability, spatial distribution, and quality of milkweed is the highest priority of species conservation.

3.2.3.7. *Habitat Condition (General)*

The Terrestrial Action Area is overwhelmingly covered with deciduous forests (Figure 0-1). These generally lack openings for milkweed for monarch butterfly reproduction and high cover of wildflowers for monarch butterfly foraging. Openings and patches of early-successional habitat are present generally around the edges of otherwise continuous blocks of mature forest and represent a small amount of cover within the Terrestrial Action Area. Numerous milkweed species are common in disturbed areas within pastures and grasslands in the Terrestrial Action Area including common, swamp, and prairie milkweed.

3.2.3.8. *Effects of the Action*

3.2.3.8.1. Direct and Indirect Interactions

The process of leasing for oil and gas development itself does not directly affect Federally listed species; therefore, no direct effects would occur under the Proposed Action. However, reasonably foreseeable construction and operation of oil and gas development, as a result of leasing, could result in direct and indirect impacts on Monarch butterfly.

Monarch butterflies may be affected through loss of habitat including up to 1,015 acres of surface disturbance during well construction and development and up to 285 acres of long-term surface disturbance during the productive life of wells. Suitable habitat for monarch butterfly has not been delineated in the Terrestrial Action Area and specific development locations are not known at this stage, so it is not possible to quantify impacts on monarch butterfly suitable habitat. However, if all surface disturbance were to occur in suitable habitat, the total habitat loss would account for 0.2 percent of the Terrestrial Action Area during well development and 0.05 percent of the Terrestrial Action Area during well production. As a result, the Proposed Action is expected to have negligible impacts on monarch butterfly habitat in the Terrestrial Action Area. Surface disturbance from reasonably foreseeable development of the leases would be small in extent but would create openings in forests that could be beneficial for monarch butterfly should its management needs be incorporated into site reclamation and revegetation requirements. Application of AMMs for construction and development on Federal land would further reduce potential impacts and benefit monarch habitat. **Monarch AMM 1** and **AMM 2** (see Section 2.6.1, *Avoidance and Minimization Measures for Species Protected Under the ESA*) would help create and restore monarch habitat. **Monarch AMM 2** and **AMM 3** are measures to minimize potential effects on monarchs by limiting mowing during sensitive periods and avoiding pesticides in monarch habitat.

Increased vehicle trips and workers in operation at drilling sites can also increase the risk for transport of invasive, nonnative vegetation to areas, especially if native vegetation has been damaged or lost through surface disturbance. Nonnative vegetation may outcompete native vegetation and vegetation that is desirable for Monarch, such as milkweed, and reduce the amount of available monarch butterfly habitat. Implementation of AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis, and Forest Plan (USFS 2006a) SFWs/guidelines (for APDs on NFS lands) that minimize surface disturbance impacts and spread of invasive plants would help protect monarch butterfly

habitat in the Terrestrial Action Area. Reclaimed areas of disturbance could also be planted with forb species that support monarch butterflies. Projects will need to comply with Stipulation #14, which, at the time of new proposed lease developments, requires the BLM to determine the extent of surface use restrictions necessary to maintain habitat integrity for plant and animal species dependent on such habitats. Additionally, SFW-MIN-11 describes the application of a Controlled Surface Use stipulation for new Federal leases where known locations of Federally listed species occur on NFS land.

Surface disturbance associated with reasonably foreseeable development of the oil and gas leases and protection measures intended to successfully reclaim and revegetate disturbed areas could create early successional habitat that may be suitable as foraging habitat for monarch butterfly, which has the potential to benefit monarch butterfly. However, due to the relatively small amount of surface disturbance in relation to the total acreage of the Terrestrial Action Area, these effects are expected to be minimal.

3.2.3.8.2. Cumulative Interactions

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the Proposed Action are not considered in cumulative effects analysis because they require separate consultation pursuant to Section 7 of the ESA.

Non-Federal activities are expected to continue in the next 35 years and include surface disturbance, oil and gas development, road construction, water withdrawals, and other activities. In most cases these activities that occur off Federal land receive little oversight from the BLM and USFWS and may result in adverse effects on monarch butterflies and their habitat. Reasonably foreseeable development of private and state surface to access Federal and private minerals would likely be the largest contributor to cumulative interactions in the Terrestrial Action Area.

Suitable habitat for monarch butterflies has not been specifically delineated in the Terrestrial Action Area and at this time specific development locations are not known, so it is not possible to quantify cumulative impacts on monarch suitable habitat from surface disturbance at this stage. However, monarch butterflies and their habitat could generally be affected by the cumulative removal of habitat and surface disturbance in the Terrestrial Action Area. In 2022, there was an estimated 42,183 acres of existing development/disturbance in the Terrestrial Action Area (9.4 percent of the total 446,907 acres of the Terrestrial Action Area) (LANDFIRE 2022a). Reasonably foreseeable development of the leases is estimated to result in up to 1,015 acres of short-term disturbance and up to 285 acres of long-term disturbance, resulting in an approximate 2.4 percent increase in cumulative short-term disturbance and an approximate 0.7 percent increase in cumulative long-term disturbance. Based on trends in development and disturbance overtime using LANDFIRE data from 2001 and 2022 (LANDFIRE 2001 and 2022) it is anticipated that land cover will continue to change from undeveloped cover types to developed types in the Terrestrial Action Area at an estimated 0.6 percent per year. The cumulative amount of surface disturbance and development in the Terrestrial Action Area has and likely will continue to result in cumulative effects to monarch butterfly habitat. However, due to the low rate of conversion from undeveloped to developed land (0.6 acres per year), cumulative interactions are not anticipated to notably affect monarch butterfly or their habitat.

The State of Ohio has a variety of regulatory requirements and standards intended to minimize potential impacts to natural resources, including Federally protected species from development on private surface, as described in Section 2.9, *State of Ohio Regulatory Jurisdiction*. As part of the State of Ohio permitting process, the ODNR DOGRM would conduct a site review meeting at proposed well sites on private land. At the site review meeting, the DOGRM may conduct a physical review of the proposed well site, discuss the application, identify items that are necessary to ensure compliance with state regulations, identify site-specific terms and conditions that may be attached to a permit that approves an application to construct a well site, and identify site-specific terms and conditions that may be attached to a permit to drill a well, such as Best Management Practices identified in the ODNR's *Best Management Practices for Oil and Gas Well Site Construction* (ODNR 2013).

Oil and gas operators developing on private land are subject to the ESA and required to follow protective measures or development alternatives should any endangered species be known to inhabit or be found inhabiting a potential development site (16 U.S.C. §§ 1531-44). All operators on private land are also subject to Section 9 of the ESA which makes it illegal to harass, hunt, shoot, capture, trap, kill, collect, wound, or harm (i.e., "take") any ESA-listed species or to pursue/attempt any of these activities.

3.2.3.9. Determination of Effects

Based on the effects analysis, the Proposed Action and reasonably foreseeable development of the leases may result in direct and indirect impacts on monarch butterfly, even with implementation of AMMs and State of Ohio requirements. However, due to the relatively small amount of estimated surface disturbance associated with reasonably foreseeable development of the leases, any impacts are expected to be minimal. As such, the BLM is seeking a determination of **not likely to jeopardize the continued existence of** monarch butterfly.

3.2.4. Northern Monkshood, Small Whorled Pogonia, and Virginia Spirea

3.2.4.1. Status of the Species

Northern monkshood (*Aconitum noveboracense*) was listed as threatened on May 27, 1978 (DOI 1978). Small whorled pogonia (*Isotria medeoloides*) was listed as threatened on September 9, 1982 (DOI 1982). Virginia spiraea (*Spiraea virginiana*) was listed as threatened on June 15, 1990 (DOI 1990).

3.2.4.2. Recovery Plans

A recovery plan for northern monkshood was released on September 23, 1983 (USFWS 1983). No 5-Year Reviews for this species have been released.

A recovery plan for small whorled pogonia was released on November 13, 1992 (USFWS 1992b). The most recent 5-Year Review for this species was released on August 26, 2022.

A recovery plan for Virginia spiraea was released on November 13, 1992 (USFWS 1992c). The most recent 5-Year Review for this species was released on December 20, 2021.

3.2.4.3. Life History Information

Northern Monkshood

Northern monkshood is a habitat specialist species associated with cliff-lines and steep talus slopes with cold air drainage and winter ice accumulation (USFS 2022). Known populations exist in Iowa, Wisconsin, Ohio, and New York. The species is thought to be a glacial relict and persists in isolated microsite conditions mimicking glacial conditions that ended approximately 10,000 years ago (USFS 2022).

Small Whorled Pogonia

Small whorled pogonia occurs both in fairly young forests and in maturing stands of mixed-deciduous or mixed-deciduous/coniferous forests. The majority of small whorled pogonia sites share several common characteristics: sparse to moderate ground cover in the microhabitat (except when among ferns); a relatively open sub-canopy (permitting diffuse light to reach the forest floor, while limiting direct light); and close proximity to trails, old logging roads, streams, or other features that create long-persisting breaks in the forest canopy. The soil in which the shallow-rooted small whorled pogonia grows is usually covered with leaf litter and decaying material. The spectrum of habitats includes dry, rocky, wooded slopes to moist slopes or slope bases crisscrossed by vernal streams. Small whorled pogonia is a perennial orchid 5 to 25 centimeters tall that occurs in 16 States from Maine to Georgia (USFWS 2022c). It is primarily found in the Northern Appalachian Mountains of New England, with secondary population centers in the Southern Appalachians of Georgia, North Carolina, and South Carolina and the Virginia, Delaware, and New Jersey Coastal Plain. Scattered outlier populations also exist, including two populations in Ohio. Suitable habitat includes open, second-growth hardwood forest or mixed, second-growth hardwood/hemlock stands. Although widespread in distribution, small whorled pogonia is rarely found and typically occurs with fewer than 20 plants in any given population. Rarity for the species is most attributed to poor reproductive success and canopy closure shading out populations (USFS 2022).

Virginia Spiraea

Suitable habitat for Virginia spiraea is limited to riparian habitats along rocky streambanks or sandbars. Known populations of Virginia spiraea in Ohio occur on large, long-established gravel bars. Virginia spiraea is a clonal shrub that occurs on scoured banks of high-gradient flow streams from northern Alabama to southern Ohio (USFS 2020b). Virginia spiraea is a habitat specialist that requires gravel bars and adjacent rocky slopes along higher-gradient, medium-sized streams with boulder, cobble, and gravel substrates. It requires severe flood events to scour the creek banks to uproot competitive woody vegetation without uprooting the shrub itself. Reproduction is primarily asexual from rhizomes. Seed production is rare, and no seedlings have been observed in nature (USFS 2020b). The introduced Japanese spiraea (*Spiraea japonica*), which is increasing in Ohio, may hybridize with Virginia spiraea (USFS 2020b).

3.2.4.4. Conservation Needs

Northern Monkshood

Threats to northern monkshood populations include flooding behind impoundments, road construction and maintenance, power line construction and maintenance, logging operations, quarrying operations, overgrazing, and residential development (USFWS 1983). The primary conservation actions are therefore to provide security for known northern monkshood populations and protection from damage or destruction (USFWS 1983).

Small Whorled Pogonia

The small whorled pogonia recovery plan describes the primary threat to this species' habitat as residential development (USFWS 1992b). Too much shade from forest succession reduces the suitability of habitat for this species. Within the WNF there is no planned residential development.

Virginia Spiraea

The final listing rule described threats to Virginia spiraea to include competition by both native and nonnative species and anthropogenic disturbances to habitat (e.g., development, railroads, roads, clearing, mowing, recreational use of rivers, dam construction). In particular, loss of suitable habitat due to dam construction was listed as a threat due to flooding of populations in the upstream impoundment and stabilization of flows, which would eliminate or reduce scouring action necessary to maintain downstream open habitat for the species (USFWS 2021b). The potential habitat for Virginia spiraea has serious competition from other plants that are similar in vegetative and environmental tenacity but also have prolific sexual reproduction. These species, including Japanese rose (*Rosa multilora*) and Japanese meadowsweet (*Spiraea laponica*), can crowd out the potential habitat for Virginia spiraea. Competition can also occur from native species including poison ivy (*Toxicodendron radicans*). Potential habitat can also be shaded by overstory forests and made to be unsuitable.

3.2.4.5. Environmental Baseline

3.2.4.5.1. Species Presence

Northern Monkshood

Three populations of northern monkshood are known in the State of Ohio: one each in Summit, Portage, and Hocking Counties. None of the known populations occur on WNF lands. The closest known population to the WNF is approximately 6.5 miles away in the Hocking Hills area of Hocking County, which is over 50 miles west of the Marietta Unit. All Ohio populations reside in shaded cliff-lined habitat with cold air drainage and occur on moist shelves and lower slopes near the cliff base (USFS 2022).

Northern monkshood's geographical range is most likely determined in Ohio (USFS 2020b). The Ohio Natural Heritage Program has conducted surveys for this species in areas with the best potential habitat without successfully locating new sites. The Hocking Hills Region is the best possible area in Ohio for the discovery of new populations (USFS 2020b) and that region is outside of the Athens District.

Suitable habitat for northern monkshood is relatively restricted on the WNF, but suitable natural sandstone features occur in the Ironton District and the Marietta Unit of the Athens District (USFS 2022). Over the 40-plus years of the Ohio Natural Heritage Program, botanists have visited

sandstone areas in the Ironton District with assistance of USFS botanists without successfully locating any populations (USFS 2020b). USFS botanists have assisted in monitoring northern monkshood to see the plant and its habitat. Although it cannot be said for certain that the species does not occur in the WNF and extensive species-specific surveys have not been conducted for all of the area, it is unlikely that it will be found based on low potential for suitable habitat (USFS 2020b).

Small Whorled Pogonia

There are two known small whorled pogonia populations in Ohio in western Scioto County and western Hocking County. The closest population to the Terrestrial Action Area is about 4 miles west of the Athens Unit of the WNF in Hocking County (approximately 50 miles west of the Terrestrial Action Area). The Scioto County population (over 70 miles west of the Marietta Unit) is a record of a single plant found in 1985, but this occurrence has not produced another individual since the 1985 record (USFS 2022). The Hocking County population was discovered in 1998 and consists of few infrequently flowering individuals (USFS 2022).

Small whorled pogonia suitable habitat occurs primarily in second- and third-growth hardwood and mixed hemlock-hardwood forest with sparse understory, scattered tree-fall canopy gaps, and adjacent, permanent canopy gaps such as stream corridors (USFS 2022). Small whorled pogonia grows in sandstone-based soils in mid- to late-successional, mesic forests with an open understory (USFS 2020b). This habitat occurs across the WNF on both the Ironton and Athens Units (USFS 2022). A predictive habitat model created by the West Virginia Division of Natural Resources determined the Marietta Unit to have the best potential habitat for the species in the WNF (USFS 2020b).

Virginia Spiraea

The closest known Virginia spiraea population to WNF land is approximately 13 miles from the Ironton District Boundary along the Scioto Brush Creek in Scioto County. Virginia spiraea occurs in specialized microhabitats in higher-order streams where scour occurs to control competition but not so much as to displace Virginia spiraea (USFWS 1992c). Streams throughout the Terrestrial Action Area are largely unsuitable for Virginia spiraea. This is largely due to human-caused impacts including construction of impoundments (USFWS 1992c), past mining, farming, and land clearing that have resulted in siltation of regional streams. As a result, most streams on the WNF lack gravel bars, gravel/cobble substrate, rocky banks, and sufficient streamflow. The upper portions of the Little Muskingum River in Washington and Monroe Counties share similarities with the Scioto Brush Creek site and compose the known suitable habitat for Virginia spiraea within the Terrestrial Action Area (USFS 2022).

3.2.4.6. Species Conservation Needs within the Terrestrial Action Area

Northern monkshood, small whorled pogonia, and Virginia spiraea are not currently known in the Terrestrial Action Area, however, extensive surveys have not been conducted in all potential habitat on the Marietta Unit. The primary conservation need for these listed plants is to identify potential habitat and conduct species-specific surveys to determine their presence. If discovered, populations would need to be protected from known threats including surface disturbance activities and competition from other vegetation as described below.

3.2.4.7. *Effects of the Action*

3.2.4.7.1. Direct and Indirect Interactions

The process of leasing for oil and gas development itself does not directly affect Federally listed species; therefore, no direct effects would occur under the Proposed Action. However, reasonably foreseeable construction and operation of oil and gas development, as a result of leasing, could result in direct and indirect impacts on the Federally protected plant species.

The Proposed Action would result in up to 1,015 acres of surface disturbance (0.2 percent of the Terrestrial Action Area) during well construction and development and up to 285 acres of long-term surface disturbance during the productive life of wells (0.05 percent of the Terrestrial Action Area). Increased surface disturbance, truck traffic, and potential for hazardous spills associated with horizontal drilling and hydraulic fracturing could intensify impacts on vegetation and rare plants compared to vertical drilling. Increased surface disturbance can result in increased mortality of individual plants from uprooting, disruption, or removal. Additionally, increased surface disturbance can lead to increased exposure and changes in vegetative conditions along the edge of cleared areas (i.e., *edge effects*). Creation of an abrupt transition between two adjacent ecosystems (or an edge) causes changes in local biotic and abiotic conditions that can negatively affect vegetation. Abiotic changes along the edge such as the temperature, moisture, and light intensity can create an environment that is no longer suitable for native or rare plant species to survive. Because of the varied physiological tolerances of species, such changes can alter biotic factors such as stem density and species composition, which can result in increased competition for resources (Murcia 1995). Furthermore, increased surface disturbance can lead to increased erosion, runoff, and sedimentation that may affect vegetation and rare plants by washing away individuals, eroding or destabilizing soils, or reducing soil quality. These factors could ultimately reduce plant productivity.

Although unlikely, Federally listed plants could be missed during survey efforts. Impacts from project actions on undiscovered listed plants could include injury or death by crushing or uprooting from equipment utilization during road and trail creation or rehabilitation of old access routes, site clearing, earth moving, or well pad construction. Materials placed in staging areas could also crush or kill Federally listed plants if they were to occur. However, potential impacts on Federally listed plant species are unlikely due to the relatively small amount of surface disturbance that would occur at each well site, the lack of known populations of Federally listed plant species in the Terrestrial Action Area, and requirements to avoid suitable habitat or conduct site-specific surveys for Federally listed plant species during APD permitting (**Plant AMMs 1, 2 and 3**).

Tree cutting associated with temporary road creation, trail creation, road reconstruction, and staging area creation would temporarily increase the amount of sunlight that reaches the ground. Cutting trees could temporarily increase the amount of suitable habitat for small whorled pogonia, as population declines are associated with decreased light availability (Brumback et al. 2011). Any potential Virginia spiraea habitat would also benefit from tree removal, as competition by arboreal species is one of the most important limiting factors where Virginia spiraea occurs (USFWS 1992c). Once woody vegetation becomes reestablished, which is estimated to take approximately 15 years after vegetation removal, shading would return. Conversely, northern monkshood needs shaded to semi-shaded conditions and an increased amount of light might be too intense in locations that

could support northern monkshood (USFWS 1983). A temporary negligible amount of habitat could be lost until woody vegetation reestablishes in approximately 15 years.

Although unlikely, there could be temporary or long-term losses of a minimal amount of suitable habitat for northern monkshood, Virginia spiraea, or small whorled pogonia when new roads, well pads, pipelines, and other infrastructure is developed. The amount of potential habitat for small whorled pogonia would likely be affected more often than Virginia spiraea or northern monkshood due to small whorled pogonia's less specific habitat requirements. Habitat for small whorled pogonia occurs more frequently across the WNF and therefore the probability of affecting small whorled pogonia habitat is higher. Once the roads, trails, and pads are no longer used, habitat may revert to its previous state depending on the amount of use.

Impacts from loss of vegetation could include an increased risk of establishment and spread of nonnative, invasive plant species and noxious weeds that may outcompete native flora and reduce the overall diversity of native vegetation. Many nonnative species and noxious weeds are opportunistic colonizers that respond particularly well to disturbance and prevent native plants from establishing successive communities (Sieg et al. 2003). Because horizontal wells require increased surface disturbance, more opportunities would be created for the establishment and spread of invasive species compared to vertical drilling and completions. Furthermore, additional vehicle trips associated with horizontal well development and hydraulic fracturing would increase the risk of transporting invasive, nonnative vegetation and noxious weeds to and from well-development sites. **Plant AMM 4** would reduce potential impacts resulting from invasive and noxious weeds by requiring equipment to be washed to remove potential plant propagules prior to entering any work site. This will prevent the movement of hitchhiker seeds and plant material of invasive plants that can quickly colonize an area and create a monoculture of vegetation, reducing habitat quality. **Plant AMM 5** requires revegetating disturbed areas with a mix of noninvasive annual ground cover and perennial native species, to also prevent noninvasive species establishment.

In accordance with the BLM's Section 6 lease term (BLM 2023a), all adverse impacts on biological resources must be minimized. Additionally, site-specific environmental reviews would be required for APDs proposing surface disturbance on both Federal and private land to analyze the impacts of proposed development on vegetation and rare plants. Design features, AMMs and other measures would be applied to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis.

3.2.4.7.2. Cumulative Interactions

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the Proposed Action are not considered in cumulative effects analysis because they require separate consultation pursuant to Section 7 of the ESA. The cumulative analysis area for vegetation encompasses the Terrestrial Action Area, which includes the area where vegetation could be affected by surface disturbance, fluid spills, movement of soils and runoff, and deposition of dust from project-related activities.

Non-Federal activities are expected to continue in the next 35 years and include surface disturbance, oil and gas development, road construction, water withdrawals, and other activities. In most cases these activities that occur off Federal land receive little oversight from the BLM and USFWS and may result in adverse effects on Federally protected plants and their habitat. Reasonably foreseeable development of private and state surface to access Federal and private minerals would likely be the largest contributor to cumulative interactions in the Terrestrial Action Area. In addition, nonnative and invasive treatments on non-Federal lands generally do not require plant surveys and are outside the authority of BLM and the USFS. These treatments could adversely affect ESA listed plants if present in treatment areas.

Suitable habitat for the Federally listed plant species has not been specifically delineated in the Terrestrial Action Area and at this time specific development locations are not known, so it is not possible to quantify cumulative impacts on suitable habitat from surface disturbance at this Stage. However, Federally listed plant species and potentially suitable habitat could generally be affected by the cumulative removal of habitat and surface disturbance in the Terrestrial Action Area. In 2022, there was an estimated 42,183 acres of existing development/disturbance in the Terrestrial Action Area (9.4 percent of the total 446,907 acres of the Terrestrial Action Area) (LANDFIRE 2022a). Reasonably foreseeable development of the leases is estimated to result in up to 1,015 acres of short-term disturbance and up to 285 acres of long-term disturbance, resulting in an approximate 2.4 percent increase in cumulative short-term disturbance and an approximate 0.7 percent increase in cumulative long-term disturbance. Based on trends in development and disturbance overtime using LANDFIRE data from 2001 and 2022 (LANDFIRE 2001 and 2022) it is anticipated that land cover will continue to change from undeveloped cover types to developed types in the Terrestrial Action Area at an estimated 0.6 percent per year. The cumulative amount of surface disturbance and development in the Terrestrial Action Area has and likely will continue to result in cumulative effects to Federally listed plant species. However, due to the low rate of conversion from undeveloped to developed land (0.6 acres per year) and the lack of documented occurrences of the Federally listed plant species in the Terrestrial Action Area, cumulative interactions are not anticipated to notably affect Federally listed plant species.

The State of Ohio has a variety of regulatory requirements and standards intended to minimize potential impacts to natural resources, including Federally protected species from development on private surface, as described in Section 2.9, *State of Ohio Regulatory Jurisdiction*. As part of the State of Ohio permitting process, the ODNR DOGRM would conduct a site review meeting at proposed well sites on private land. At the site review meeting, the DOGRM may conduct a physical review of the proposed well site, discuss the application, identify items that are necessary to ensure compliance with state regulations, identify site-specific terms and conditions that may be attached to a permit that approves an application to construct a well site, and identify site-specific terms and conditions that may be attached to a permit to drill a well, such as Best Management Practices identified in the ODNR's *Best Management Practices for Oil and Gas Well Site Construction* (ODNR 2013). In addition, the State of Ohio requires a variety of reclamation standards for development on private land that encourage revegetation by native plants.

Oil and gas operators developing on private land are subject to the ESA and required to follow protective measures or development alternatives should any endangered species be known to inhabit or be found inhabiting a potential development site (16 U.S.C. §§ 1531-44). All operators on

private land are also subject to Section 9 of the ESA which makes it illegal to harass, hunt, shoot, capture, trap, kill, collect, wound, or harm (i.e., “take”) any ESA-listed species or to pursue/attempt any of these activities. Issuance and subsequent development of leases under the Proposed Action are not likely to result in substantial cumulative effects to Federally listed plant species because of BLM’s Section 6 lease terms, State of Ohio standards and regulations, the minor percent of increased cumulative disturbance, the lack of documented occurrences of the Federally listed plant species in the Terrestrial Action Area, and requirement of AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis to reduce spread and establishment of nonnative species.

3.2.4.7.3. Determination of Effects

A ***may affect, not likely to adversely affect*** determination is made for northern monkshood, small whorled pogonia, and Virginia spiraea for the Proposed Action because:

1. There are no known occurrences of northern monkshood, small whorled pogonia, or Virginia spiraea in the Terrestrial Action Area.
2. Avoiding suitable habitat or conducting surveys during the growing period in suitable habitat for northern monkshood, small whorled pogonia, and Virginia spiraea should protect any new plant occurrence within a 100-foot buffer of project actions. Proposals will be modified to avoid Federally listed plants by at least 100 feet, or the proposal will be suspended and separate NEPA analysis and ESA consultation would be necessary to proceed.
3. Requiring equipment to be washed to remove potential plant propagules prior to entering any work site. This will prevent the movement of hitchhiker seeds and plant material of invasive plants that can quickly colonize an area and create a monoculture of vegetation, reducing habitat quality.
4. Requiring revegetating disturbed areas with a mix of noninvasive annual ground cover and perennial native species, to also prevent noninvasive species establishment.

CHAPTER 4. SUMMARY DISCUSSION AND CONCLUSION

Table 0-1 lists the species considered in the Terrestrial Action Area and Aquatic Analysis Area, their listing status, and the BLM’s effect determination, assuming all AMMs are implemented. The BLM will apply the AMMs and other measures to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis associated with developing leases that may be issued under the Proposed Action and to the 65 leases that were previously issued under the 2016 EA and Decision Record. These AMMs would be applied to APDs on both Federal and private surface throughout the entire life (perpetual) of leases issued under the Proposed Action and the life of reasonably foreseeable development of the leases. During the site-specific APD permitting process (Tier 2 consultation), the BLM will conduct additional Section 7 consultation with the USFWS based on the specific elements of development proposals. Section 7 consultation during the APD process would result in AMMs and other measures applied to APDs as conditions of approval to avoid and minimize impact to Federally listed species on a site-specific basis to address potential impacts on Federally listed species; this consultation is referred to as Tier 2 consultation.

Table 0-1. Effects Determination Summary

Common Name	Scientific Name	Federal Status	Determination
Animals			
Indiana bat	<i>Myotis sodalis</i>	Endangered	may affect, not likely to adversely affect
Northern long-eared bat	<i>Myotis septentrionalis</i>	Endangered	may affect, not likely to adversely affect
Tricolored bat	<i>Perimyotis subflavus</i>	Proposed Endangered	not likely to jeopardize the continued existence of
Monarch butterfly	<i>Danaus plexippus</i>	Proposed Threatened	not likely to jeopardize the continued existence of
Clubshell mussel	<i>Pleurobema clava</i>	Endangered	may affect, not likely to adversely affect
Fanshell mussel	<i>Cyprogenia stegaria</i>	Endangered	may affect, not likely to adversely affect
Northern riffleshell mussel	<i>Epioblasma rangiana</i>	Endangered	may affect, not likely to adversely affect
Pink mucket mussel	<i>Lampsilis abrupta</i>	Endangered	may affect, not likely to adversely affect
Longsolid mussel	<i>Fusconaia subrotunda</i>	Threatened	may affect, not likely to adversely affect
Purple cat's paw mussel	<i>Epioblasma obliquata</i>	Endangered	may affect, not likely to adversely affect
Round hickorynut mussel	<i>Obovaria subrotunda</i>	Threatened	may affect, not likely to adversely affect
Salamander mussel	<i>Simpsonaias ambigua</i>	Proposed Endangered	not likely to jeopardize the continued existence of
Sheepnose mussel	<i>Plethobasus cyphus</i>	Endangered	may affect, not likely to adversely affect
Snuffbox mussel	<i>Epioblasma triquetra</i>	Endangered	may affect, not likely to adversely affect
Rabbitsfoot mussel	<i>Quadrula cylindrica</i>	Threatened	may affect, not likely to adversely affect
Amphibians			
Eastern Hellbender	<i>Cryptobranchus alleganiensis</i>	Proposed Endangered	not likely to jeopardize the continued existence of
Plants			
Northern monkshood	<i>Aconitum noveboracense</i>	Threatened	may affect, not likely to adversely affect
Small whorled pogonia	<i>Isotria medeoloides</i>	Threatened	may affect, not likely to adversely affect
Virginia spiraea	<i>Spiraea virginiana</i>	Threatened	may affect, not likely to adversely affect

CHAPTER 5. REFERENCES

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Appendix H – Past, Present, and Reasonably Foreseeable Future Actions

APPENDIX H: Past, Present, and Reasonably Foreseeable Future Actions

1.1. Introduction

This Supplemental Environmental Assessment (EA) considers past, present, and foreseeable future actions occurring on both federal and private lands within the Cumulative Impact Analysis Areas (CIAAs). Land within the Marietta Unit (the "Action Area") is considered "checkerboard," with private and federal ownership intermingled. Privately owned lands (382,269 acres) currently account for 85.5 percent of the total Action Area (446,907 acres). Public lands (64,638 acres) account for approximately 14.5 percent of the Action Area, including public lands managed by the U.S. Forest Service (USFS) (64,637 acres) and the Wayne National Forest (WNF) and U.S. Army Corps of Engineers (USACE) (1 acre) as part of the Parkersburg Levee System (USGS 2023a).

1.2. Past, Present, and Reasonably Foreseeable Future Actions

The analysis of potential cumulative effects incorporates information from the 2016 EA (BLM 2016), 2020 RFDS (BLM 2020), 2006 Forest Plan (USFS 2006a), 2006 Forest Plan Final EIS (USFS 2006b), and 2012 SIR (USFS 2012), as well as new information that the BLM and USFS provided.

Historically, the largest contributors to existing vegetation and soil conditions in the WNF were grazing and other resource-extraction activities, including timber removal, which dominated current WNF lands throughout the twentieth century (BLM 2016). Land clearing resulted in regrowth of homogenized, single-aged stands across much of the WNF and many monoculture white pine stands were planted to combat soil erosion. Additionally, wildfire suppression, which decreases the ability of oak forests to regenerate properly, was practiced throughout the twentieth century (BLM 2016; USFS 2020a). It is estimated that 14 percent of Dry-Mesic Mixed Oak Hardwood Forest in the WNF would burn annually per historical fire regimes (USFS 2020a).

The largest historical contributors to existing conditions of wetlands, water resources, and water quality in the WNF were mining, timber extraction, farming and grazing, impoundment of water or water withdrawal, and pollution resulting from early settlements near and in the WNF that occurred throughout the twentieth century. Common historical practices included diverting and rerouting waterways, draining wetlands for farming, farming, and grazing right up to and in streams and rivers, and mining that produced acid wastes (BLM 2016). Many of these historical practices have ceased with the establishment of the WNF, and USFS focuses on sustainable management in the Marietta Unit.

At this time, a variety of specific, planned, and completed USFS projects on NFS lands within the Action Area have the potential to contribute to cumulative effects in combination with the Proposed Action, as listed below and shown on Figures H-1 and H-2. However, most of the USFS land management projects (excluding special uses and minerals) involve habitat manipulation rather than habitat loss and are typically small-scale, geographically and temporally scattered, and subject to Forest Plan Standards and Guidelines as well as Avoidance and Minimization Measures and other project-specific design criteria that all reduce direct, indirect, and cumulative effects. These projects were authorized under the 2006 Forest Plan (USFS

2006a) and 2006 Forest Plan Final EIS (USFS 2006b), or USFS or the BLM identified them as part of the NEPA review for the Supplemental EA process.

PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE USFS ACTIONS
<i>Nonspecific Locations around the Marietta Unit</i>
Spongy moth (<i>Lymantria dispar</i>) aerial treatments (i.e., mating disruption and insecticide applications) are permitted anywhere on the Marietta Unit except Rheas Run Research Natural Area and within buffered distance of open water
Nonnative and invasive species treatments
Trail and recreation site maintenance
System Trail Adaptation, Rehabilitations, and Relocation project (i.e., allowing for trail relocations and reconstruction/rehabilitation across NFS lands, as needed)
Orphan Wells and Abandoned Mines Project authorizes plugging and reclamation on 680 acres
<i>Specific Locations</i>
Trailhead development (Plainview Horse Trail)
Marietta Athens Pine Project – timber harvests
Ongoing use, occupancy, and maintenance of rights-of-way and other uses permitted through special use authorizations
Yellow fringed orchid (<i>Platanthera ciliaris</i>) prescribed fire implementation
Pleasant Bear Vegetation Management Project, included timber harvests and prescribed fire implementation
Periodic maintenance at operating oil and gas wells

In addition to the discrete projects listed above, the cumulative effects analysis considers past, ongoing, and reasonably foreseeable actions on private land dispersed throughout the Action Area. Private landowners conduct oil and gas activities, farming and grazing activities, and timber sales on their land.

The majority of past, present, and reasonably foreseeable future activity in the CIAA is associated with oil and gas drilling, development, and operation. As of August 2024, there were approximately 21,598 oil and gas-related wells that have been permitted or drilled the CIAA (Marietta Unit plus a 4-mile buffer). Of the 21,598 total oil and gas-related wells in the CIAA, 3,019 (approximately 14 percent) are on NFS lands and 18,579 (approximately 86 percent) are on non-NFS lands in the CIAA. The majority (approximately 89 percent) of oil and gas related wells in the CIAA are vertically drilled (ODNR 2024e; WVGES 2024).

Table H-1 Oil and Gas Wells within the Cumulative Impact Analysis Area

STATE	WELLS ON NFS LAND	WELLS ON NON-NFS LAND
Ohio Total Vertical Wells	3,019	16,100

STATE	WELLS ON NFS LAND	WELLS ON NON-NFS LAND
Ohio Total Horizontal and Directional Wells	0	474
West Virginia Total Vertical Wells	0	1,927
West Virginia Total Horizontal and Directional Wells	0	78
Total	3,019	18,579

Source: ODNR 2024e; WVGES 2024

Leasing federal minerals within the Marietta Unit may lead to additional future mineral development on private land and private minerals within the area because the investment and cost for construction of well pads and infrastructure to access federal minerals could be leveraged in the future to develop private land and minerals. Although development of federal minerals requires compliance with a variety of federal environmental and resource regulatory requirements, numerous State laws and regulations in place also govern mineral development activities on private land (see Appendix E, Legal and Regulatory Authorities for a summary of the laws and regulations that govern mineral development activities on private land in Ohio).

As of 2022, there were an estimated 53,491 acres of developed land/existing disturbance within the CIAA (Figure H-3), which accounts for approximately 9.8 percent of the total acreage within the CIAA (LANDFIRE 2022). Figure H-3 depicts the developed land/existing disturbance in the CIAA as of 2022. Prior to the boom in oil and gas drilling utilizing horizontal drilling and hydraulic fracturing, there were an estimated 47,319 acres of developed land/disturbance within the CIAA in 2001 (LANDFIRE 2001). As such, estimated developed land/surface disturbance has increased approximately 13 percent between 2001 and 2022 in the CIAA, primarily resulting from increased oil and gas development and development of roads. In addition to individual past, present, and reasonably foreseeable projects, changes in environmental trends over the cumulative analysis timeframe could contribute to and/or exacerbate cumulative impacts. Changes in climate trends over time can contribute to effects on vegetation and forestry, wildlife, social and economic conditions, and water resources. For example, climate change may cause more severe or frequent floods in some places, including the Northeastern U.S. As warmer temperatures cause more water to evaporate from the land and oceans, changes in the intensity and frequency of heavy precipitation events may in turn affect the intensity and frequency of flooding (IPCC 2021).

The ability to accurately assess potential cumulative impacts from future development is limited because of the lack of site-specific information regarding whether, where, when, and to what scale potential future oil and gas development activities would occur. Therefore, at this stage, the 2020 RFDS has been used to generalize the types of cumulative impacts that could occur associated with the proposed action. However, for the purpose of this analysis, the BLM has considered potential cumulative effects based on what is reasonably foreseeable at this time as described in the 2020 RFDS. On receipt of an APD, which would identify specific parcel(s) for development, a site-specific analysis would be conducted by the BLM, and by the USFS if development is proposed on NFS surface, along with additional cumulative effects analysis based on the specific development proposal.

Figure H-1. Marietta Unit Past, Present, and Reasonably Foreseeable Future Actions

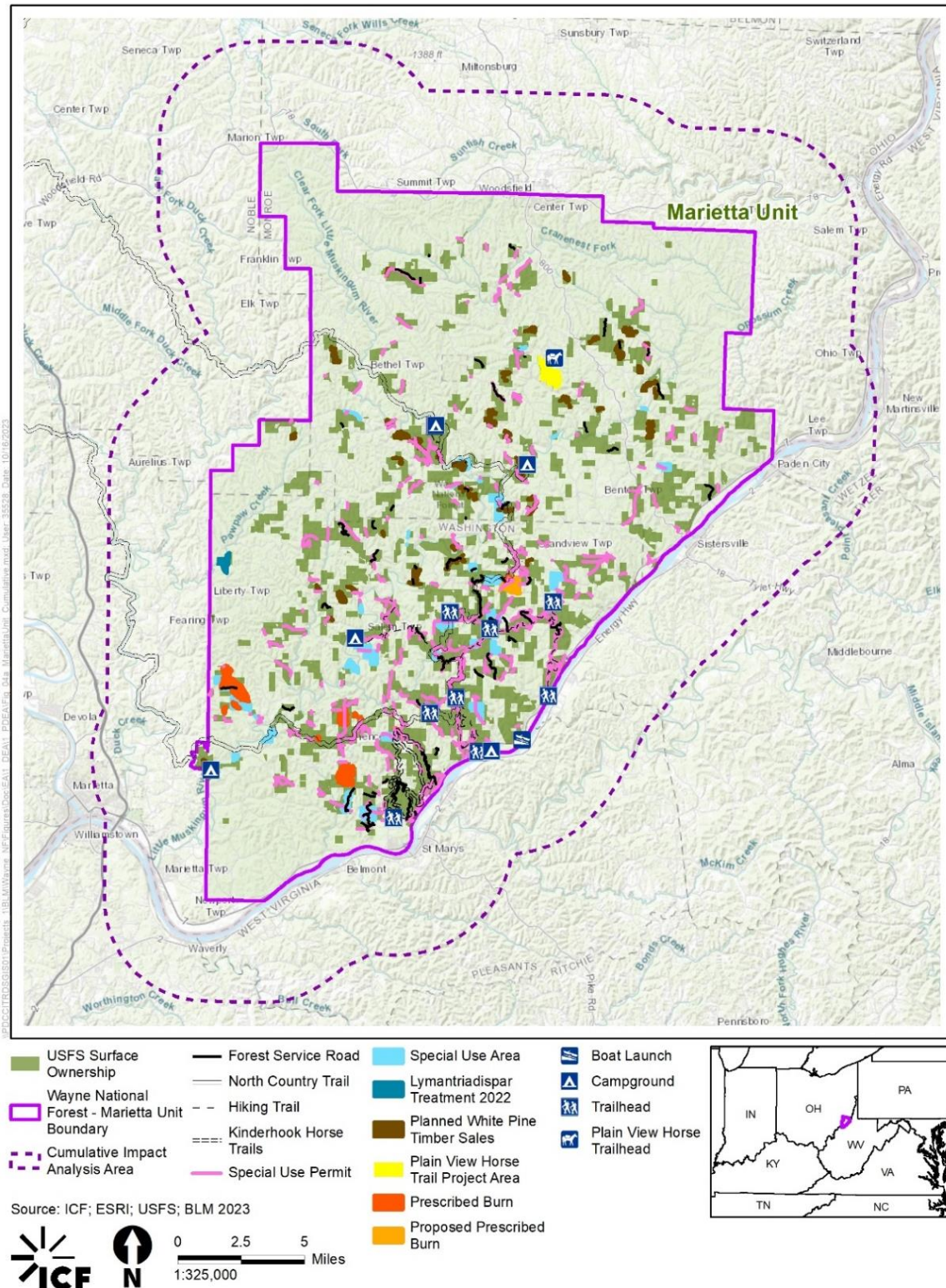


Figure H-2. Past, Present, and Reasonably Foreseeable Oil and Gas Development in the Cumulative Impact Analysis Area

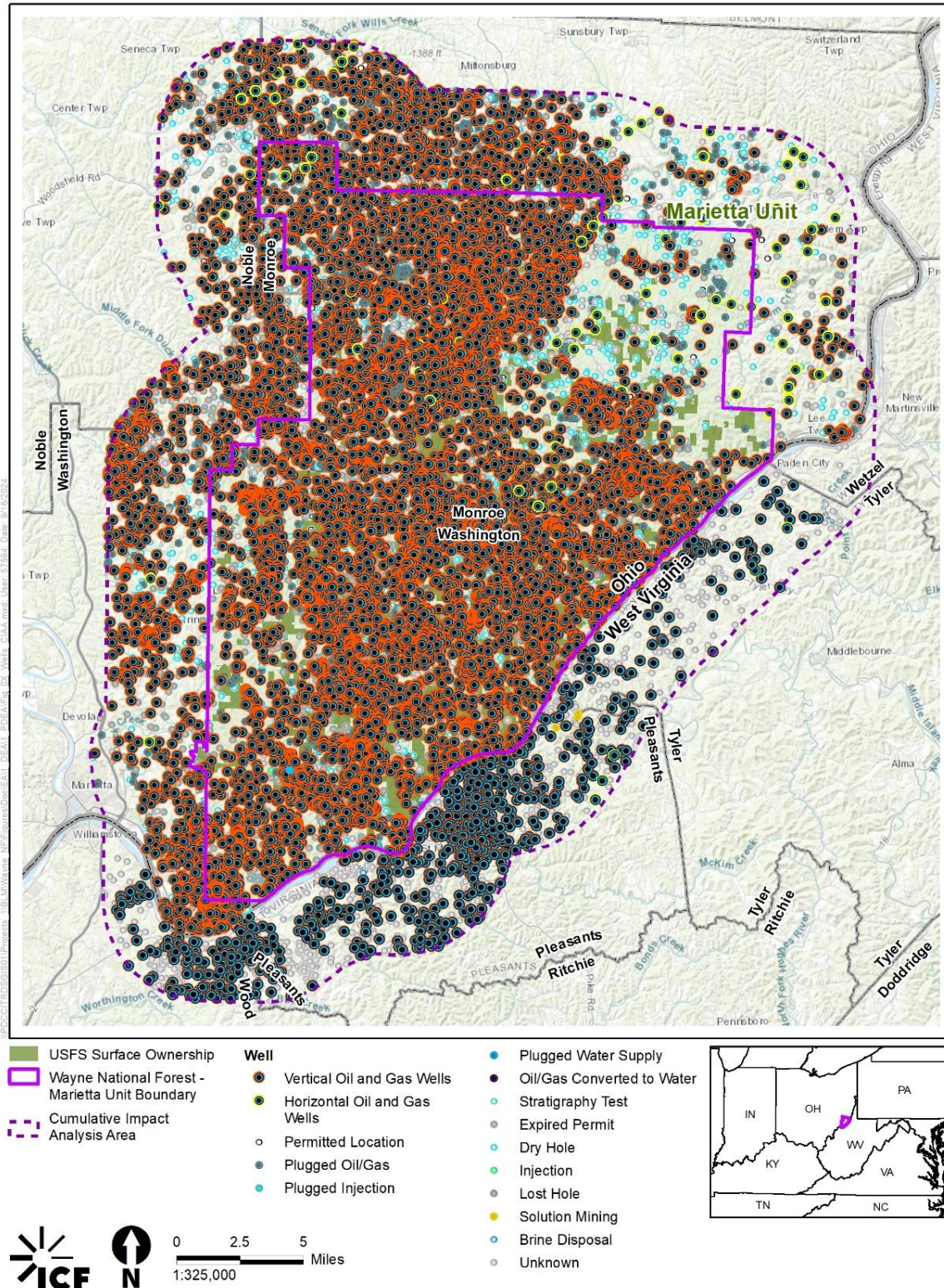
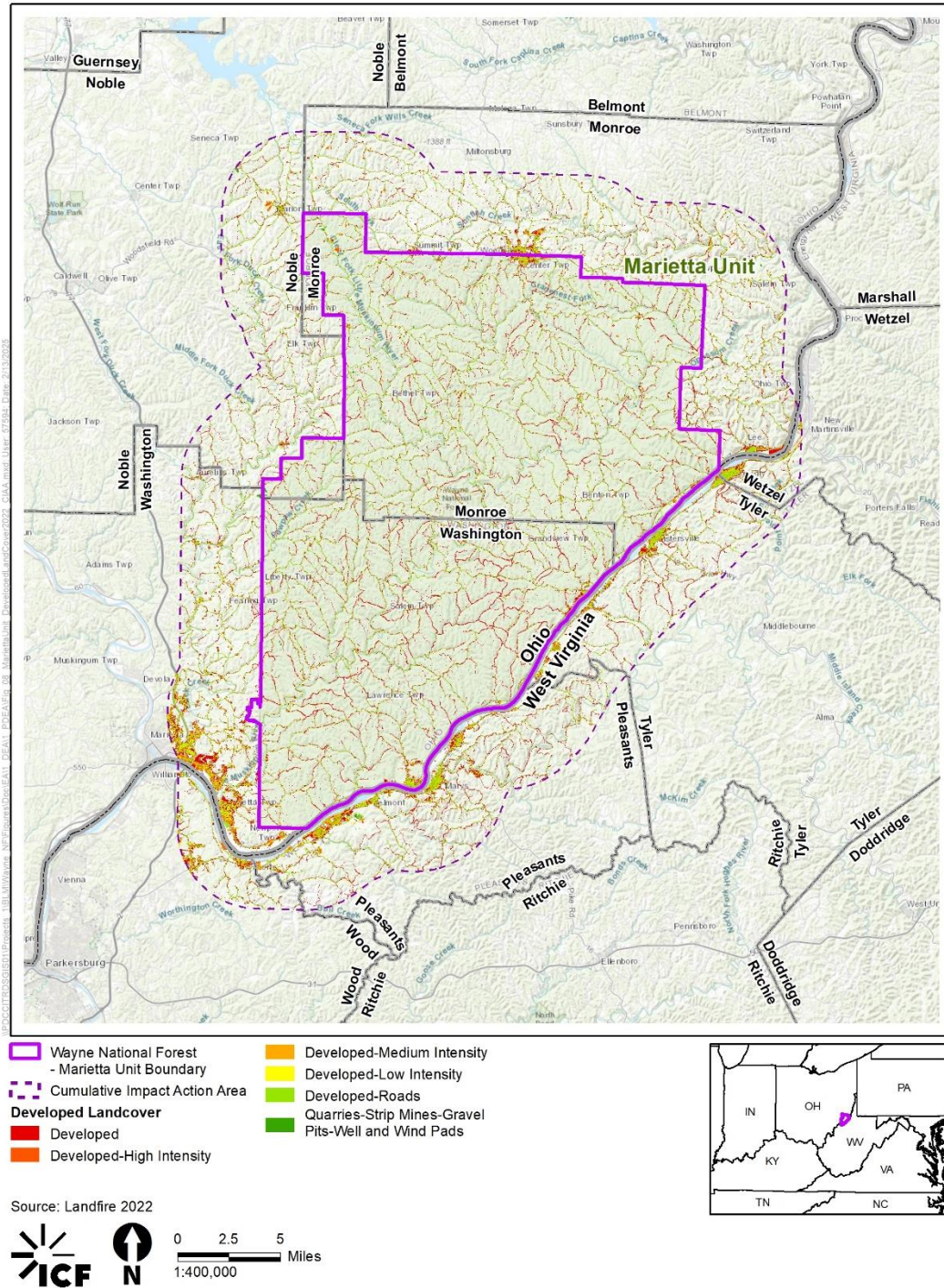


Figure H-3. Existing Development and Disturbance in the Cumulative Impact Analysis Area



Appendix I – Air Quality and Climate Impacts

APPENDIX I: AIR QUALITY AND CLIMATE IMPACTS

CHAPTER 1. AIR RESOURCES

Air quality is a component of air resources which may be affected by Bureau of Land Management (BLM) applications, activities, and resource management. Therefore, the BLM must consider and analyze the potential effects of BLM-authorized activities on air resources as part of the planning and decision-making process. This appendix serves as a supplement to Sections 4.1 and 4.2 in the Environmental Assessment (EA) to provide additional information regarding the existing climate and air quality within the area potentially affected by the parcels under consideration for leasing under the Proposed Action.

1.1. Air Quality

Air quality is influenced by the interaction of meteorology, climate, and the magnitude and spatial distribution of local and regional air pollutant sources (including natural sources), and chemical properties of emitted air pollutants. The following sections detail the existing air quality conditions within the area potentially affected by the parcels under consideration for lease, and the effects of air pollution on health, visibility, and ecology.

1.1.1. Regulatory Guidance

The Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (USEPA) to establish and revise National Ambient Air Quality Standards (NAAQS). There are currently six criteria pollutants subject to a NAAQS: sulfur dioxide (SO₂), carbon monoxide (CO), coarse and fine particulate matter (PM₁₀ and PM_{2.5}), nitrogen dioxide (NO₂), ozone (O₃), and lead (Pb). The primary standards serve to protect public health, including the health of sensitive subpopulations, with an adequate margin of safety. Secondary standards serve to protect the public welfare from adverse effects on soil, water, crops, buildings, and other matters.

The states and the USEPA are jointly responsible for ensuring that all areas of the United States have the ability to attain and maintain the NAAQS. In this partnership, states are responsible for developing enforceable state implementation plans to reduce ambient levels of air pollution to meet and maintain the standard (USEPA 2015). Areas where air quality meets the standards are called attainment areas; areas where ambient air quality concentrations do not meet the NAAQS are designated as nonattainment areas (USEPA 2022). Nonattainment areas with air quality that improves to meet the NAAQS are redesignated as attainment-maintenance areas and are required to demonstrate that the air pollutant concentrations are maintained below the NAAQS for the next 20 years.

The Ohio Environmental Protection Agency (Ohio EPA) is the delegated authority for regulating air pollution within Ohio. The Ohio EPA uses ambient air monitors at multiple locations throughout the state to determine ambient air pollutant concentration for comparison to the NAAQS. The current NAAQS are provided in Table I-1; Ohio EPA has not established separate ambient air quality standards at the time of this report's publication (Ohio EPA 2023). Ambient air pollutant concentrations are expressed in concentration of pollutant present per volume of air

and reported in units of parts per million (ppm), parts per billion (ppb), and micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

Table I-1. National Ambient Air Quality Standards (as of February 28, 2024)

PRIMARY STANDARDS		SECONDARY STANDARDS	
LEVEL	AVERAGING TIME	LEVEL	AVERAGING TIME
Carbon Dioxide (CO)		–	–
9 ppm	8 hours	None	None
35 ppm	1 hour	None	None
Lead (Pb)		–	–
0.15 $\mu\text{g}/\text{m}^3$	Rolling 3-Month Average	Same as Primary	Same as Primary
Nitrogen Dioxide (NO₂)		–	–
53 ppb	Annual (Arithmetic Average)	Same as Primary	Same as Primary
100 ppb	1 hour	None	None
Coarse Particulate Matter (PM₁₀)		–	–
150 $\mu\text{g}/\text{m}^3$	24 hours	Same as Primary	Same as Primary
Fine Particulate Matter (PM_{2.5})		–	–
9.0 $\mu\text{g}/\text{m}^3$	Annual (Arithmetic Average)	15.0 $\mu\text{g}/\text{m}^3$	Annual (Arithmetic Average)
35 $\mu\text{g}/\text{m}^3$	24 hours	Same as Primary	Same as Primary
Ozone		–	–
0.070 ppm	8 hours	Same as Primary	Same as Primary
Sulfur Dioxide (SO₂)		–	–
75 ppb	1 hour	0.5 ppm	3 hours

ppb = parts per billion; ppm = parts per million; $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter.

Any developments in nonattainment or maintenance areas are subject to the General Conformity process of the CAA. The General Conformity Rule, under the CAA, ensures federal actions conform to state air quality plans. It aims to prevent violations of NAAQS during federally supported activities. Furthermore, General Conformity requirements established in the CAA (see 42 United States Code [USC] § 7506) prohibit federal agencies from taking actions that do not conform to approved state or tribal implementation plans designed to attain and maintain national air quality standards in designated nonattainment and maintenance areas. As part of the environmental review of Applications for Permit to Drill (APDs) and other proposed development, federal agencies are responsible for demonstrating compliance with the General Conformity regulations in nonattainment or maintenance areas where federal actions are proposed to ensure that such actions conform to the applicable State or Tribal air quality implementation plan. The CAA General Conformity rule (40 Code of Federal Regulations [CFR] § 93) provides federal agencies a method for determining if proposed emissions in a nonattainment area will delay an area from attaining the NAAQS. This is done by showing that emissions are either *de minimis* or conform to a State or federal Implementation Plan. The

requirements ensure that states and tribes can improve air quality in areas that do not meet the NAAQS and ensure that maintenance areas do not revert to nonattainment.

BLM assesses applicability of the General Conformity Rule during the review of an APD. This evaluation ensures that drilling activities align with air quality goals, minimizing adverse effects on NAAQS. During its environmental analysis of an APD, BLM may apply further conditions of approval (COAs), including additional mitigation measures or emissions offsets that may be required to ensure compliance with the General Conformity Rule. If the APD is approved, the lease holder receives notification of air quality control measures necessary for NAAQS protection. Potential control measures are dependent on future regional modeling studies, other analyses, or changes in regulatory standards. The lease holder will be notified of the additional air quality control measures that are necessary to ensure protection and maintenance of the NAAQS as part of the APD approval (GPO 2016a, 2016b).

To preserve clean air in attainment areas, Ohio EPA is the authority delegated by USEPA to implement the Prevention of Significant Deterioration (PSD) program. The PSD program establishes an area classification scheme for attainment areas (USEPA 2015). Class I areas receive the highest degree of protection, with the smallest amount of additional air pollution allowed. Class II areas allow a moderate increase in certain air pollutants. No areas of the U.S. have been designated Class III, which would allow more air quality degradation (NPS 1991).

New major emitting facilities or significant modifications to major emitting facilities are required to undergo PSD pre-construction review. PSD review requires an air quality analysis to assess the project's potential contribution to the NAAQS and PSD increments (maximum allowable increases in air quality over baseline concentrations), a Best Available Control Technology Analysis, and an additional effects analysis (to assess potential effects to soils, vegetation, and visibility). A PSD review would be required if adjacent well pads were under common control and potential emissions exceeded PSD thresholds; a single well pad is not subject to PSD review. Applicability of a PSD review would be part of the environmental analysis conducted during review of an APD.

USEPA and Ohio EPA also regulate hazardous air pollutants (HAPs) also known as air toxics. HAPs are known or suspected to cause cancer or other serious health effects, or adverse environmental effects. Examples of listed HAPs emitted by the oil and gas industry include benzene, toluene, ethyl benzene, mixed xylenes, formaldehyde, n-hexane, acetaldehyde, and methanol. Ohio EPA addresses air toxic emissions via air permits issued to oil and natural gas well-site production operations.

1.1.2. Planning Area Overview

1.1.2.1. *Ambient Air and NAAQS Designations*

The Marietta Unit of the Wayne National Forest (planning area) is located within parts of Monroe, Noble and Washington counties. Monroe and Noble counties are designated as attainment areas for all NAAQS. Waterford Township in Washington County is designated as a nonattainment area for the primary SO₂ NAAQS, although the SO₂ nonattainment area does not include and is not adjacent to the Marietta Unit. All of Washington County, including part of the Marietta Unit, is designated as an attainment-maintenance area for the O₃ and PM_{2.5} NAAQS

issued in 1997 (USEPA 2023a). The West Virginia counties of Wood, Tyler, and Pleasants border the Marietta Unit and are all currently in attainment for all criteria pollutant air quality standards. Wood County is the only WV county with an air quality monitor in place. Figure I-1 is a map of the Marietta Unit, affected counties, ambient air quality monitors, and NAAQS designations.

On June 15, 2007, Washington County was redesignated as an attainment-maintenance area for the 1997 8-hour O₃ NAAQS. On August 29, 2013, Washington County was redesignated as an attainment-maintenance area for the 1997 annual PM_{2.5} NAAQS. Based on the current maintenance status of the county, any future developments in the nonattainment or maintenance areas would be subject to the general conformity process of the CAA.

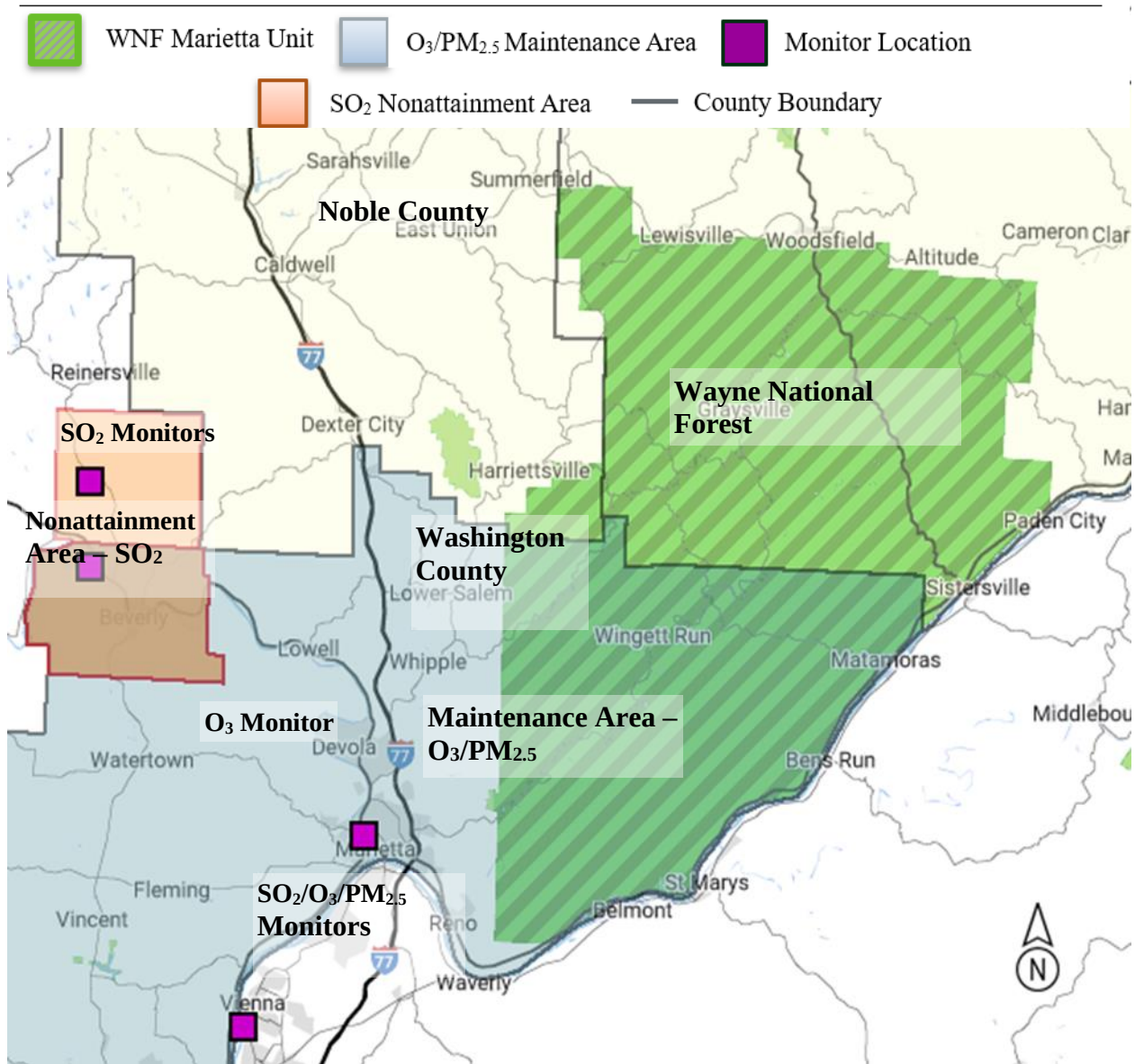


Figure I-1. Marietta Unit, Ambient Air Quality Monitors, and NAAQS Designations

Ambient air quality monitoring stations are located within and near the counties comprising the planning area, although there are no ambient air quality monitors within the Marietta Unit. Relevant information regarding ambient air quality monitoring stations is provided in Table I-2.

Table I-2. Ambient Air Quality Monitors Near the Planning Area for O₃, PM_{2.5}, and SO₂

COUNTY/ STATE	STATION ID	POLLUTANT	SAMPLING SCHEDULE	LATITUDE	LONGITUDE
Morgan/OH	39-115-0004: Hackney	SO ₂	Hourly	39.63223°N	81.67005°W
Washington/OH	39-167-0011: Globe	SO ₂	Hourly	39.58427°N	81.67015°W
Washington/OH	39-167-0004: WTP	O ₃	Hourly	39.43212°N	81.46044°W
Wood/WV	54-107-1002: Neale	SO ₂	5 Minute/ 24 Hour	39.32353°N	81.55237°W
Wood/WV	54-107-1002: Neale	O ₃ /PM _{2.5}	Hourly	39.32353°N	81.55237°W

Source: USEPA 2023b.

° = degrees; N = north; O₃ = ozone; OH = Ohio; PM_{2.5} = fine particulate matter; SO₂ = sulfur dioxide; W = west; WV = West Virginia

Except for the SO₂ monitor 39-167-0011 located at Globe Metallurgical in Waterford, Washington County, OH, all monitors listed are designated State and Local Air Monitoring Stations (SLAMS) and operated by a state air agency (Ohio EPA or West Virginia Department of Environmental Protection [DEP]). Each of the SLAMS monitors has sufficient data to calculate the 3-year design value, which is used for attainment and nonattainment designations.

Part of the Marietta Unit is located within a maintenance area for O₃ and PM_{2.5}. O₃ and PM_{2.5} are currently measured at two sites: one O₃ monitor within Washington County, Ohio and co-located O₃ and PM_{2.5} monitors in adjacent Wood County, West Virginia. The O₃ and PM_{2.5} design values for each of these sites are listed in Table I-3.

Table I-3. O₃ and PM_{2.5} Design Values for Washington County, Ohio

STATION ID	POLLUTANT	DESIGN VALUE 2018–2020	DESIGN VALUE 2019–2021	DESIGN VALUE 2020–2022	NAAQS
39-167-0004: WTP	O ₃	0.061 ppm	0.061 ppm	0.060 ppm	0.070 ppm
54-107-1002: Neale	O ₃	0.060 ppm	0.059 ppm	0.059 ppm	0.070 ppm
54-107-1002: Neale	PM _{2.5} 24-Hour	16 µg/m ³	17 µg/m ³	16 µg/m ³	35 µg/m ³
54-107-1002: Neale	PM _{2.5} Annual	7.5 µg/m ³	7.6 µg/m ³	7.5 µg/m ³	9.0 µg/m ³

Source: USEPA 2023b.

O₃ = ozone; PM_{2.5} = fine particulate matter; ppm = parts per million; µg/m³ = micrograms per cubic meter.

1.1.2.2. Prevention of Significant Deterioration Designations

Class I areas receive the highest level of protection, allowing minimal additional air pollution. The Wayne National Forest is not a designated Class I area (USFS 2023); however, Otter Creek and the Dolly Sods Wilderness Area are Class I areas within 300 km of the WNF. The Marietta

Unit is within portions of Monroe, Noble, and Washington counties that are designated as Class II for PSD. This classification permits a moderate increase in certain air pollutants.

1.1.2.3. *Hazardous Air Pollutants*

The USEPA Air Toxics Screening Assessment and Mapping tool¹ can be used to evaluate impacts from existing HAP emissions in Ohio and West Virginia. The USEPA has calculated that total cancer risk in the states of Ohio and West Virginia is 20 in 1 million. Cancer risk is defined as the probability of contracting cancer over the course of a lifetime assuming continuous exposure. County-specific cancer risk for the counties included in this analysis are 30 in 1 million in Washington County and 20 in 1 million in Noble and Monroe counties. Cancer risk in Wood County, Pleasants County and Tyler County, WV is 30 in 1 million. The oil and gas contribution to these cancers risks in each of the counties is 2.97, 0.20 and 0.30, respectively. The total cancer risk is within the acceptable range of risk published by the USEPA of 100 in 1 million as discussed in the National Contingency Plan, 40 CFR § 300.430.

The 2019 Air Toxics Screening National Respiratory Risk by Tract Source² presents noncancer hazard indexes for 14 target organ systems, or endpoints. The respiratory endpoint (the effect of air toxics on the lungs and the rest of the respiratory system) is often the driver of noncancer health effects and most applicable to oil and gas development. The noncancer respiratory hazard index for Washington, Noble and Monroe counties is 0.30, 0.30, and 0.20, respectively. The noncancer respiratory hazard index for the West Virginia counties of Wood, Pleasants, and Tyler are all 0.30. Hazard index values less than one mean it is unlikely that air toxics will cause adverse noncancer health effects over a lifetime of exposure. Oil and gas development and other foreseeable emission sources would contribute to HAP emissions and associated carcinogenic and noncancer risk.

1.1.2.4. *Air Quality Related Values*

Air Quality Related Values (AQRVs) include wet and dry nitrogen and sulfur deposition, visibility, and acidification. Atmospheric deposition occurs when gaseous and particulate air pollutants are deposited on the ground, water bodies, or vegetation via rain, snow, or fog. Sulfur and nitrogen deposited into ecosystems can lead to acidification or enrichment of soils. Atmospheric nitrogen and sulfur deposition to water bodies may affect water chemistry and impact aquatic vegetation, invertebrate communities, amphibians, and fish. Deposition can also cause chemical changes in soils that alter soil microorganisms, plants, and trees. Excess nitrogen from atmospheric deposition can stress ecosystems by favoring some plant species and inhibiting the growth of others. Deposition impacts are generally described in terms of the critical load which is the threshold of concern for deposition at which harmful effects occur for a species, ecosystem, or other sensitive receptor. Detailed information on atmospheric deposition and critical loads in the Wayne National Forest can be found in the Forest Service Air Quality Assessment Supplemental Report incorporated by reference in the EA.

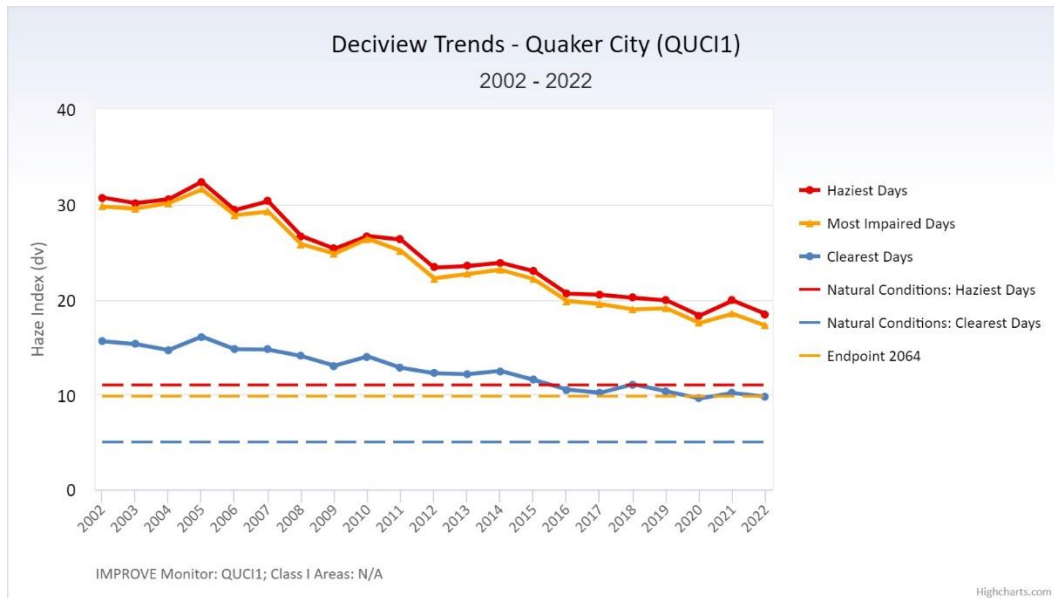
Pollution in the atmosphere can impair scenic views by degrading the contrast, colors, and distance an observer is able to see. Visibility can be assessed in terms of the distance that a

¹ <https://www.epa.gov/AirToxScreen/airtoxscreen-mapping-tool>

² <https://www.epa.gov/AirToxScreen/2019-airtoxscreen-assessment-results>

person can distinguish a large dark object on the horizon and is measured as the standard visual range in miles. Visibility is monitored using methodologies established by the Interagency Monitoring of Protected Visual Environments (IMPROVE) Program. A deciview is a unit of measurement to quantify human perception of visibility. A one deciview change is roughly the smallest perceptible change in visibility. Visibility is characterized by two main groupings: the 20 percent clearest days and the 20 percent most impaired days. The 20 percent most impaired days account for the days with the most anthropogenic impairment. Additionally, the 20 percent haziest days can be viewed in IMPROVE data, but this grouping is no longer used in visibility assessments for the Regional Haze Rule. Visibility degradation is primarily due to sulfate, nitrate, and particulate matter in the atmosphere, with contributions from both anthropogenic and natural sources. Measuring progress in air pollution control can be challenging because natural sources largely beyond human control such as dust storms and wildfires can produce significant visibility impairment over large areas for days to weeks at a time. Quaker City, Ohio is the only IMPROVE monitor (i.e., QUC11) located in Ohio. There are no IMPROVE monitors in West Virginia within 150 km of the Marietta Unit. Deciview trends for the period from 2002–2022 for the Quaker City monitor are presented in Figure I-2. The long-term trend indicates that visibility is improving at the site with the goal of reaching natural conditions by 2064. Additional information on visibility and the IMPROVE monitoring network can be found at <http://vista.cira.colostate.edu/Improve/impairment/>.

The reasonably foreseeable development of leases that could be issued under the Proposed Action could result in impacts to AQRVs. During site-specific permitting, additional analysis of impacts to AQRVs would be conducted based on the specific development proposals and associated emissions.



Source: IMPROVE 2024

Figure I-2. Quaker City, OH Visibility Trends 2002–2022

CHAPTER 2. CLIMATE

Climate is a component of air resources which may be affected by BLM applications, activities, and resource management. The focus of this section is on greenhouse gases (GHGs), including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), which significantly contribute to the greenhouse effect, influencing global climate patterns. The report examines the scientific aspects of GHGs, their role in climate change, and the potential climate impacts from the proposed action.

2.1. Greenhouse Gases

GHGs are gases in the atmosphere that absorb infrared electromagnetic radiation contributing to the greenhouse effect. Increasing the concentration of GHGs in the atmosphere amplifies the greenhouse effect, which can create changes in temperature, precipitation, and other climate variables (BLM 2024).

GHGs including CO₂ and water vapor are emitted into the atmosphere through natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The primary GHGs that enter the atmosphere due to anthropogenic activities include CO₂, CH₄, N₂O, and fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆), with CO₂ being the most abundant anthropogenic GHG emitted (BLM 2024).

Each of these gases can remain in the atmosphere for different lifetimes, ranging from about a decade to thousands of years. As a result, these gases become well mixed such that their measurement in the atmosphere is roughly the same all over the earth, regardless of the source or origin of the emissions. For this reason, global GHG emissions are the most useful basis for the cumulative analysis of emissions related to BLM actions. Unlike other common air pollutants, the ecological impacts that are attributable to the GHGs are not the result of localized or even regional emissions but are entirely dependent on the collective behavior and emissions of the world's societies.

2.1.1. Greenhouse Gases and Climate Change

The impacts from GHGs on global warming vary depending on how long the compounds last in the atmosphere and their ability to absorb infrared radiation. To measure and compare climate impacts between various GHGs, a factor was developed for each GHG to account for these effects; this factor is known as the Global Warming Potential (GWP). Emissions of GHGs are converted into an equivalent amount of CO₂ (CO₂e) by multiplying the GHG by its GWP. The larger the GWP, the more radiative adsorption of the GHG relative to an equal amount of CO₂ (BLM 2024). The GHGs and associated CO₂e factors used in this report are provided in Table I-4.

The choice of emission metric and time horizon depends on the type of application and policy context. The 100-year GWP was adopted by the United Nations Framework Convention on Climate Change and its Kyoto Protocol. In addition, the USEPA uses the 100-year time horizon in its Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2020 (USEPA 2020), GHG Reporting Rule requirements under 40 CFR Part 98 Subpart A, and in its science communications, consistent with the Intergovernmental Panel on Climate Change (IPCC)

Climate Change Synthesis Report (IPCC 2014). In this analysis, the BLM uses the 100-year GWP time horizon in its GHG emission calculations, as provided by the USEPA (GPO 2009).

Table I-4. Greenhouse Gases and Carbon Dioxide Equivalent Factors

GREENHOUSE GAS	CARBON DIOXIDE EQUIVALENT EMISSIONS
Carbon Dioxide (CO ₂)	1.0
Methane (CH ₄)	29.8
Nitrous Oxide (N ₂ O)	273.0

Source: BLM 2021.

The IPCC concluded that GHG emissions because of human activities have caused global warming, leading to a measurable increase of 1.1 degree Celsius (°C) in the global surface temperature from 1850–1900 to 2011–2020. Furthermore, the IPCC underscored the continual escalation of global GHG emissions, emphasizing the unequal historical and ongoing contributions originating from unsustainable practices in energy use, land utilization, lifestyle choices, and production patterns at various levels—ranging from regional and national to individual (IPCC 2023). The annual average surface temperatures for the contiguous United States have increased 1.0°C (1.8 degrees Fahrenheit [°F]) from 1900 to 2019. Annual average surface temperatures are expected to increase by about 1.4°C (2.5°F) regardless of future GHG emissions. Models of future GHG emissions demonstrate an increase in the global average surface temperature between 1.6°C (3.0°F) to 6.6°C (12°F), depending on a low or high worldwide GHG emissions scenario. The conterminous U.S. has experienced varying rates of climate change, as the length of frost-free seasons have increased since the early 1900s, the frequency of cold waves has decreased since the early 1900s, and the frequency of heat waves has increased since the mid-1960s (BLM 2024).

Because GHGs circulate freely throughout Earth’s atmosphere, the region of influence for GHGs is the entire globe. The largest component of global anthropogenic GHG emissions is CO₂. Global net anthropogenic GHG emissions have been estimated at 59 gigatons (59,000,000,000 metric tons) for 2019, with CO₂ emissions from fossil-fuel combustion comprising 34 percent of that total, and the remainder resulting from industry, transport, and buildings (IPCC 2023).

2.1.2. Climate Change in the Planning Area

In the Köppen-Geiger climate classification system, Monroe, Noble, and the Washington County north of Marietta are classified as *Dfa: humid, continental*. This area is typified by hot, typically humid summers and cold snowy winters (Kottek 2017). This area experiences an average annual rainfall of 42.9 inches and snowfall of 18.0 inches, with precipitation regularly occurring each month of the year. The highest average precipitation typically occurs in March. The summer average temperature is 74.9°F, and the maximum recorded temperature was 103°F. The winter average temperature is 31.0°F, and the minimum recorded temperature was -23°F (NWS 2023). From 1972 to 2022, the average wind speed 6.0 miles per hour, with winds primarily from the southwest (ISU 2023).

Potential impacts to air resources due to climate change vary. Although potential GHG emissions at the project level can be quantified, current methodologies do not permit an assessment

between project-scale GHG emissions and specific effects on climate change, as effects on climate change are influenced by all global GHG emissions. For Ohio, the USEPA has identified the following continued changes due to an increasingly warmer climate (USEPA 2016).

- Increase in the frequency of heavy rainstorms and flooding, especially within the Ohio River and its tributaries;
- Increasing severity of summer droughts, which could impact commercial navigation;
- Decreasing the ice cover on the Great Lakes, with ice forming later and melting sooner;
- Increase the number of algal blooms in the Great Lakes, which harm fish and decrease water quality;
- Change to crop yields with increases in some crops but decreases in corn and soybean yield;
- Higher temperatures and more frequent and severe heat waves, which can threaten human health by causing heat stroke and dehydration; and
- Decreases in air quality due to the increase in formation of ground-level O₃, a pollutant that causes lung and heart problems and harms plants.

Further discussion of climate change science and predicted impacts, as well as the reasonably foreseeable and cumulative GHG emissions associated with the BLM's oil and natural gas leasing actions, were included in the *BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends* (BLM 2024; hereafter referred to as the Annual GHG Report). This report examines the estimated emissions of GHGs attributable to development and consumption of fossil fuels produced on lands and mineral estate the BLM manages. The 2023 Annual GHG Report is incorporated by reference as an integral part of this analysis and is available at <https://www.blm.gov/content/ghg/>.

The continued increase of GHG emissions over the past 60 years has contributed to global climate change impacts. A discussion of past, current, and projected future climate change impacts appears in Chapters 8 and 9 of the 2023 Annual GHG Report (BLM 2024).

2.2. Climate Change and GHG Analysis

2.2.1. Methodology

Emissions inventories at the leasing stage are imprecise due to uncertainties including the type of mineral development (i.e., oil, gas, or both), scale, and duration of potential development, types of equipment (e.g., drill-rig engine-tier rating, horsepower, fuel type), and the mitigation measures that a future operator may propose in their development plan. In order to estimate reasonably foreseeable on-lease emissions at the leasing stage, the BLM uses estimated well numbers based on state data for past lease development, combined with data on per-well drilling, development, and operating emissions from representative wells in the area. The amount of oil or gas that may be produced if the offered parcels were developed is unknown. For purposes of estimating production and end-use emissions, potential wells were assumed to produce oil and natural gas in similar amounts as existing nearby wells. Although the BLM has no authority to direct or regulate the downstream end-use of the products, for this analysis, the BLM assumes that all produced oil or gas would be combusted (e.g., for domestic heating or energy production).

The BLM acknowledges that there may be additional sources of GHG emissions during midstream operations associated with production from the lease parcels. These sources may include emissions of CH₄ (a more potent GHG than CO₂ in the short term) from pipeline and equipment leaks, storage, and maintenance activities. These sources of emissions are highly speculative at the leasing stage; therefore, the BLM has chosen to assume for this analysis that midstream emissions associated with lease parcels would be similar to the national-level emissions that the Department of Energy's National Energy Technology Laboratory (NETL) indentified (NETL 2019, 2009).

The emission estimates calculated for the GHG analysis were generated using the assumptions previously described above, using the BLM Lease Sale Emissions Tool and the 2020 RFDS (BLM 2020). Emissions are presented for each of the phases of post-lease development, including:

- **Well development emissions** occur over a short period and may include emissions from heavy equipment and vehicle exhaust, drill rig engines, completion equipment, pipe venting, and well treatments, such as hydraulic fracturing.
- **Well production operational, midstream, and downstream end-use emissions** occur over the entire production life of a well, which, for this analysis, is assumed to be 30 years, based on the productive life of a typical oil/gas field.
- For the purposes of this analysis, **downstream end-use emissions** are calculated by assuming that all produced oil and natural gas would be combusted for energy use. End-use emissions were estimated by multiplying the estimated ultimate recovery (EUR) of produced oil and natural gas with emissions factors for combustion that USEPA established (Tables C-1 and C-2 in 40 CFR § 98, Subpart C). Additional information about emission factors and EUR factors can be found in the Annual GHG Report (Chapter 4).
- **Production emissions** may result from storage-tank breathing and flashing, truck loading, pump engines, heaters and dehydrators, pneumatic instruments, or controls, flaring, fugitives, and vehicle exhaust.
- **Midstream emissions** occur from the transport, refining, processing, storage, transmission, and distribution of produced oil and natural gas. Midstream emissions are estimated by multiplying the EUR of produced oil and natural gas with emissions factors from the NETL life-cycle analysis of U.S. oil and natural gas. Additional information about emission factors can be found in the Annual GHG report (Chapter 4, Tables 4-7 and 4-9).

Several federal agencies work in concert to implement climate change strategies and meet U.S. emissions reduction goals all while supporting U.S. oil and gas development and operations. USEPA is the federal agency charged with regulation of air pollutants and establishing standards for protection of human health and the environment. The USEPA has issued regulations that will reduce GHG emissions from any development related to the proposed leasing action. These regulations include the New Source Performance Standard for Crude Oil and Natural Gas Facilities (49 CFR 60, subpart OOOOa) which imposes emission limits, equipment design standards, and monitoring requirements on oil and gas facilities. A detailed discussion of existing regulations and Executive Orders that apply to BLM management of federal lands as well as current federal and state regulations that apply to all oil and gas development and production can be found in Chapter 2 of the 2023 Annual GHG Report (BLM 2024).

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Appendix J – Draft Supplemental EA Public Comments and BLM Responses

APPENDIX J

Draft EA Public Comments and BLM Responses

Public involvement is critical in shaping management of federal lands and the federal mineral estate. Public comments assist agencies not only in fulfilling their missions and legal mandates, but also in addressing the interests of the American public. Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) require that lead agencies involve the public in preparation of environmental assessments to the extent practicable. See 40 CFR 1502.5(e) (2020). This appendix describes the substantive public comments received on the Draft EA (EA) and the agency response to those comments.

On March 20, 2024, the BLM released the Draft EA for public review and comment for a 45-day comment period. In response to several requests, the BLM extended the comment period for an additional 10 days with comments due by the end of day on May 17, 2024. The Draft EA was available for review and comment (and remains available for review) on the project ePlanning website at: <https://eplanning.blm.gov/eplanning-ui/project/2024234/510>.

During the public comment period, the BLM hosted two virtual public meetings on April 8 and April 9, 2024, where the BLM presented the Draft EA and where the public had an opportunity to learn more about the Draft EA and to ask questions of the agency team.

During the public comment period, the BLM received 264 individual substantive comments. A substantive comment does one or more of the following:

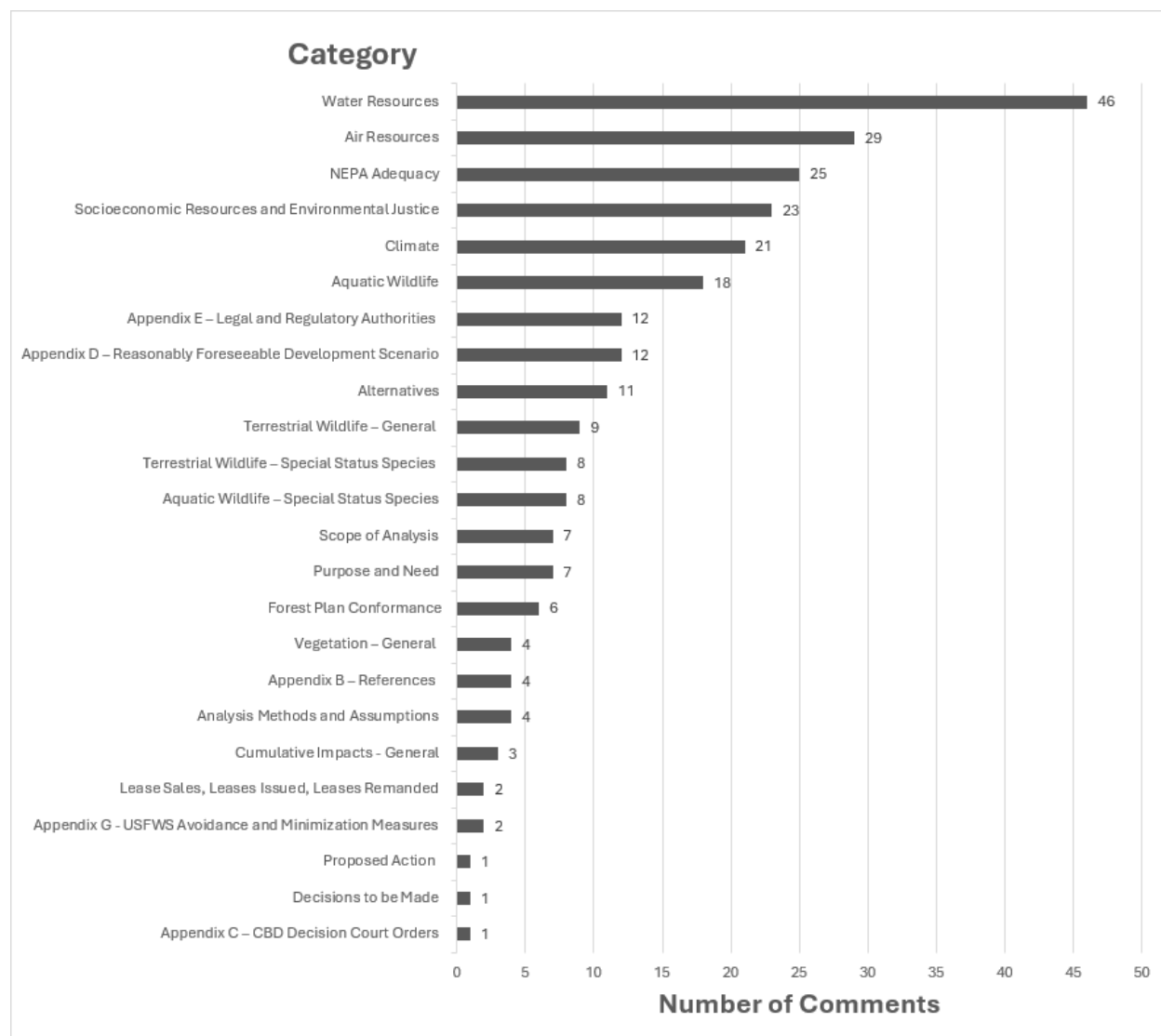
- Questions, with a reasonable basis, the accuracy of the information and/or analysis in the Draft EA;
- Questions, with a reasonable basis, the adequacy of methodology for or assumptions used in environmental analysis, or the information in the Draft EA;
- Presents new information relevant to the analysis;
- Presents a reasonable alternative, other than those presented in the Draft EA;
- Questions, with a reasonable basis, the merits of an alternative or alternatives; or
- Requests specific changes in or revisions to the EA.

Comments that are not considered substantive include the following:

- Comments in favor of or against the proposed action or alternatives without reasoning that meets the criteria listed above for substantive comments;
- Comments that only agree or disagree with BLM policy or resource decisions without justification or supporting data that meet the criteria listed above;
- Comments that do not pertain to the project area or the project; or
- Comments that take the form of vague, open-ended questions.

Although not required for EA-level projects, consistent with 40 Code of Federal Regulations (CFR) 1503.4(b), the BLM considered and responded to all substantive comments received as reflected in this appendix. The BLM carefully considered all comments received; however, non-substantive comments did not receive a detailed response. As indicated in Figure J-1 below, the categories that received the most comments included water resources (46 comments), air resources (29 comments), NEPA adequacy (25 comments), socioeconomics and environmental justice (23 comments), climate (21 comments), and aquatic wildlife (18 comments).

Figure J-1. Number of Substantive Comments Received on the Draft EA by Comment Category



Note: BLM provides a number for Environmental Justice (EJ) comments in the above figure only to account for the total number of substantive comments; however, the BLM is not addressing EJ comments in the final EA for the reasons stated in the EA in section 3.10.

The table below restates the substantive comments that were received during the Draft EA comment period and the agency responses to those comments.

FIRST NAME	LAST NAME	ORGANIZATION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
Not Provided			NEPA Adequacy	The EA is over 300 pages so it might as well have been prepared as an EIS	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not prepare a FONSI and would instead prepare an EIS. The NEPA, as amended, requires that “[a]n environmental assessment shall not exceed 75 pages, not including any citations or appendices” (42 U.S.C. 4336a(e)(2)). The CEQ regulations define a page as “500 words and does not include citations, explanatory maps, diagrams, graphs, tables, and other means of graphically displaying quantitative or geospatial information” (40 CFR 1508.1(v)) (2020). Given this definition, this EA is within 75 pages.
Lawrence	Mick		NEPA Adequacy	At the very least, the significant impacts of this project mean that the agency should prepare a full NEPA environmental review.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific Applications for Permit to Drill (APD), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs. Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
Lawrence	Mick		Climate	According to the U.S. EPA’s Greenhouse Gas Equivalencies Calculator, the amount of greenhouse gas emissions released from this project would cancel out all of the Wayne National Forest’s carbon sequestration, a crucial tool in the fight against climate change, for the next 30 years. At the very least, the significance of this project’s impacts demands full environmental review.	The BLM agrees that the total GHGs including end-use combustion exceed the forest’s ability to sequester carbon. Nonetheless, NEPA does not compel any specific outcome based on this circumstance. In accordance with NEPA, the BLM accounted for both GHG emissions using the agency’s lease sale emissions tool. The results of the GHG emissions assessment can be found in Section 3.4 (Climate Impacts) and Appendix I (Air Quality and Climate Impacts). There are no established thresholds, qualitative or quantitative, for NEPA analysis to assess the GHG emissions or social cost of an action in terms of the action’s effect on the climate, incrementally or otherwise. There is also no scientific data in the record, including scientific data submitted during the comment period for this lease action, that would allow the BLM, in the absence of an agency carbon budget or similar standard, to evaluate the significance of the GHG emissions from this proposed lease action. These methodological shortcomings prevent BLM from qualitatively comparing alternatives, and BLM has therefore not exercised its discretion to tailor this proposed lease action to account for global climate change.
Diane	Van Boxel		NEPA Adequacy	At the very least, the agency should prepare a full NEPA environmental review.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of leasing to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs. Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024</u>

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
					U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Concerned American			Climate	I urge BLM to approve the No Action Alternative to deny this proposed fossil fuel development. Fossil fuels are causing the increasingly dangerous climate crisis. Please review the attached IPCC report.	BLM has considered the 2023 IPCC Synthesis Report provided by the commenter and it is already referenced in Appendix I (Air Quality and Climate Impacts).
Leatra	Harper	Freshwater Accountability Project	Aquatic Wildlife	I would send along reports that we have given to our elected representatives and the Muskingum Watershed so-called conservancy district that have been ignored. A recent one, Our Water is Being Destroyed, builds upon the growing evidence of cumulative harms that fracking has caused in Ohio through the impending loss of environmental flow. There are also concerns about endangered species like the hellbender that are being dismissed without adequate study	Thank you for the additional information. The BLM has reviewed the provided references and additional text has been added to Section 3.6 (Water Resources) based on this and other comments to further describe the potential impacts from hydraulic fracturing including increased volumes of wastewater and potential effects to water resources from accidental spills and leaks of wastewater and injection well failures, potential impacts to water resources from the use of brine laden water for activities such as dust suppression, and potential impacts to water resources and human health from spills or migration of produced water with high concentrations of heavy metals, radioactive elements, or other chemicals. Additional Avoidance and Minimization measures have been added to the EA and to Appendix G intended specifically to avoid/reduce potential impacts to flows by prohibiting water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future.
Not Provided			NEPA Adequacy	I think that this 345 page supplemental EA should have been a Supplemental Draft Environmental Impact Statement (SDEIS). Under the CEQ context and intensity criteria, this proposed action clearly may have one or more "significant" effects on the human environment. The failure to do a SDEIS meant that no Federal Register Notice of Intent was needed for better public notice and a scoping comment opportunity. And this failure also meant that a Federal Register Notice of Availability was not needed for public notice of this supplemental EA. BLM's ePlanning for NEPA web site is relatively obscure and does not provide sufficient public notice for most people.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u> As discussed in Section 4.2 (Public Involvement) of the EA, public engagement opportunities were held as a part of the 2016 EA. Because the general scope and purpose of this EA is the same as for the 2016 EA, additional public scoping was not conducted. The record of public involvement from the 2016 EA remains relevant and applicable. Public concerns and inputs are reflected in the current analysis, fulfilling NEPA’s public involvement requirements under CEQ Implementing Regulations for NEPA at 40 CFR 1502.5(e) (2020). The NEPA, as amended, requires that “[a]n environmental assessment shall not exceed 75 pages, not including any citations or appendices” (42 U.S.C. 4336a(e)(2)). The CEQ regulations define a page as “500 words and does not include citations, explanatory maps, diagrams, graphs, tables, and other means of graphically displaying quantitative or geospatial information” (40 CFR 1508.1(v)) (2020). Given this definition, this EA is within 75 pages.
Not Provided			Climate	The attached IPCC report demonstrates the overwhelming international consensus on the already deadly climate crisis and the urgent need to transition away from fossil fuels.	Information from the 2023 IPCC Synthesis Report provided by the commenter is already included and referenced in Appendix I (Air Quality and Climate Impacts).

First Name	Last Name	Organization	Comment Category	Comment Text	Response
George	Banziger		Socioeconomic Resources and Environmental Justice	Research by the Ohio River Valley Institute has demonstrated that the oil and gas boom of the last 15 years has resulted in no appreciable improvement in the local economies of the region, no greater employment, and no prosperity when compared to national figures on these measures (https://ohiorivervalleyinstitute.org/frackalachia-update-peak-natural-gas-and-the-economic-implications-for-appalachia/).	Section 3.10.1 (Affected Environment) of the SEA has been updated with a discussion about the oil and gas industry and its relationship to current economic conditions in the socioeconomic Analysis Area, including the current share of employment and average wages in the oil and gas industry compared to other industries. Sections 3.10.2.2 (Impacts of Alternative B – Proposed Action) and 3.10.3 (Cumulative Impacts) of the EA acknowledge that the workforce may be affected by the Proposed Action but do not predict whether these impacts would be negative, positive, or neutral. Section 3.10.2.2 has been updated with more current oil and gas development data and a quantitative workforce assessment has been included. However, specific workforce impacts would depend on the specific development locations proposed during the APD stage. The BLM acknowledges that the research from the Ohio River Valley Institute presents findings that the oil and gas boom has not led to significant improvements in local economies or employment in the referenced region.
George	Banziger		Water Resources	Most brine waste is radioactive, and it contains toxic chemicals; admittedly, only about 1% of the brine waste contains these substances like heavy metals, carcinogens, volatile organic compounds, but when millions of gallons of this wastewater are involved, the total chemical contents are 40,000 gallons per frack. (https://www.hazardouswasteexperts.com/fracking-fluid-provides-many-benefits-poses-many-dangers/#:~:text=Hundreds%20of%20hazardous%20materials%20are,chemicals%20are%20used%20per%20fracturing.)	Text has been added to Section 3.6 (Water Resources) describing potential impacts of brine laden water (or brine that contains radioactive materials), including potential impacts from spills or contamination of brine and potential impacts from the use of brine laden water for dust suppression.
Anne	Sparks		Climate	Your proposal presents a big puzzle in this respect. Please address how your plans fit into our national efforts to keep climate change from worsening. (See https://www.whitehouse.gov/wp-content/uploads/2021/10/us-long-term-strategy.pdf .)	As described in Section 1.2 (Purpose and Need) of the EA the BLM’s purpose is to respond to Expressions of Interest to lease federal oil and gas resources through a competitive leasing process. The need for leasing of federal minerals is established by the Mineral Leasing Act of 1920, the Federal Land Policy and Management Act of 1976, and the Energy Policy Act of 2005. These regulations establish the BLM’s mission to provide opportunities for multiple use of BLM-administered resources (including mineral development) and require the BLM to make available federal mineral resources for development to meet national, regional, and local needs.
Randi	Pokladnik		Vegetation – General	The Wayne National Forest is home to many medicinal plants such as goldenseal and ginseng. These species hold cultural and historical significance to people in the region. Some of these plants are listed under Appendix II of the Convention on International Trade in Endangered Species (CITES).	The BLM recognizes the importance of medicinal plants to tribes and other public land users. During the stage 3 environmental review, and should a lessor apply for an application to drill permit, the BLM would further assess the potential for impacts to vegetation and plants based on specific locations of proposed development and would apply appropriate design features, best management practices, and mitigation/monitoring to reduce potential adverse effects.
Randi	Pokladnik		Vegetation – General	Fracking and the infrastructure needed has a dramatic effect on woodland plant species harming plants and destroying seed banks. Forest ecosystems are negatively affected by forest clearing, erosion, road building, and vegetation death from direct exposures to waste fluid spills which contain water soluble radionuclides and elevated levels of chloride and bromide, strontium, and hydrocarbons.	Refer to Section 3.5 (Vegetation and Rare Plants) in the EA for a description of these and other types of impacts on vegetation from the Proposed Action. The BLM recognizes the importance of vegetation and woodland plant species. During the stage 3 environmental review of APDs, the BLM would further assess the potential for impacts to vegetation and plants based on specific locations and types of proposed development and would apply appropriate design features, best management practices, and mitigation/monitoring to reduce potential adverse effects. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
Randi	Pokladnik		Terrestrial Wildlife – General	Often improper disposal of produced water into streams and rivers or into unlined waste ponds, would result in contamination as well as the deaths of avian species who mistake these waste ponds for freshwater ponds. Peer-reviewed studies show that watersheds surrounding fracking well pads test positive for radioactive substances. Of the hundreds of chemicals used to frack, more than 75% of them affect the respiratory and gastrointestinal systems; 40-50% impact the kidneys and the nervous, immune and cardiovascular systems; 37% act on the hormone system; and 25% are linked with cancer or mutations. These chemicals would also affect the health of species living around well pads as they are being exposed to water contamination	Bat AMM 3 requires a closed system for the containment of produced water from drilling and all applicable local, State, and federal regulations apply for the appropriate disposal of produced water. Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013,</u>

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
					<u>*81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
Randi	Pokladnik		Terrestrial Wildlife – General	The edge effects of cutting pipelines through forests encourages the proliferation of invasive species that can outcompete native species. Without a continuous forest canopy, there is a decline in migratory bird populations as drilling in the middle of a core forest area that was once isolated from humans creates an industrial zone. Truck traffic (up to 3300 one-way trips for chemicals, water, sand and wastewater) would increase animal fatalities. Regarding light pollution, fracking operations sometimes require flaring of natural gas. Birds have “been known to fruitlessly circle natural-gas flares, unable to navigate away from the light and as a result lose close to half their body weight in one night. Artificial light can also degrade habitat quality and disrupt predator-prey relationships.” Fracking operations are also very noisy. Studies show bats alter their echolocation when near loud infrastructure such as compressor stations and this results in their ability to detect prey.	Refer to Section 3.5 (Vegetation and Rare Plants) in the EA for a description of these types of potential edge effects and refer to Section 3.8 (Terrestrial Wildlife) for a description of potential impacts to avian species from the Proposed Action. During the stage 3 environmental review of APDs, the BLM would further assess the potential for impacts to avian species based on specific locations and types of proposed development and would apply appropriate design features, best management practices, and mitigation/monitoring to reduce potential adverse effects. Bat AMM 2 minimizes clearing/cutting of mature trees (not including scrub/shrub/saplings less than 5 inches DBH) to 10 acres or less for each new federal project including well pads, laydown yards, pipelines, access roads, etc. (i.e., promoting selection of non-wooded locations or already-disturbed areas for development). If greater than 10 acres of clearing is necessary, then additional conditions, in coordination with USFWS, may apply.
Randi	Pokladnik		Climate	Aside from the immense value forests hold for tourists such as bikers, hikers, birdwatchers, and outdoor enthusiasts, forests play a big role in mitigating climate change. Peer reviewed studies have shown that it is the big, older trees, that sequester carbon dioxide rather than younger trees, but secondary tree growth is also important in carbon storage. Additionally, the symbiotic relationship between the forest plants and mycorrhizal fungi plays a significant role in the carbon storage of forest soils.	The BLM is aware of the benefits of forests for public land users and for overall ecosystem benefits.
Not Provided	Not Provided		Purpose and Need	As described in the “1.2. Purpose and Need” section of the EA “BLM’s responsibility is “to make mineral resources available for development to meet national, regional, and local needs.” I asked what the need is that we are addressing with this action and the response was a totally inadequate version of fossil fuel industry endorsed talking points about the, and I am paraphrasing, need to extract gas to support our economy, jobs, provide for our energy needs as we continue to transition to renewable energy. My objection to that premise is primarily that although I can’t put my fingers on any statistics to show it. There seems to be excessive gas reserves in this region that are already being produced, in fact there have been all matter of efforts to find uses for this excess of gas – such as the new Shell Polymers plant along the Ohio River and efforts to establish Blue Hydrogen production with carbon capture. The Mountain Valley Pipeline if/when constructed is intended to move this excess gas to the east coast where it can, among other uses be shipped overseas – contributing to global warming. I would argue that none of these uses and others are needed. Plastic is so readily available that it has become an environmental nightmare.	As described in Section 1.2 (Purpose and Need) of the EA the BLM’s purpose is to respond to Expressions of Interest to lease federal oil and gas resources through a competitive leasing process. The need for the Proposed Action is established by the Mineral Leasing Act of 1920, the Federal Land Policy and Management Act of 1976, and the Energy Policy Act of 2005. These laws establish the BLM’s mission to provide opportunities for multiple use of BLM-administered resources (including mineral development) and require the BLM to make available federal mineral resources for development to meet national, regional, and local needs. As the EA explains, it is also necessary to address concerns identified by the court in <i>Center for Biological Diversity v. U.S. Forest Service</i> (S.D. Ohio, No. 2:17-cv-372) (<i>CBD</i>) regarding lease issuances supported, for NEPA purposes, by the original EA. The EA recognizes the need for the BLM to promote the responsible development of oil and gas resources which is accomplished through multiple stages of environmental review as described in Section 1.2.1 (Actions to be Taken); application of legal and regulatory authorities (Appendix E, Legal and Regulatory Authorities); application of standard lease terms that require lessees to minimize environmental impacts; and application of appropriate avoidance, minimization, mitigation, and monitoring measures as described throughout the EA and additional protection measures that would be applied during permitting of APDs based on the analysis of site-specific development impacts.

First Name	Last Name	Organization	Comment Category	Comment Text	Response
Not Provided	Not Provided		Purpose and Need	Also in 1.2 the language, “BLM’s oil and gas leasing program encourages the sustainable development of domestic oil and gas reserves...” seems counter to extracting a finite resource, in fact I would argue that it might be in this country’s best interest to conserve the gas for potential future need. When questioned at the public hearing the response again was totally inadequate, something about BLM’s definition of sustainable is different. It didn’t make sense to me	As described in Section 1.2 (Purpose and Need) of the EA, the BLM’s purpose is to respond to Expressions of Interest to lease federal oil and gas resources through a competitive leasing process. The need for leasing of federal minerals is established by the Mineral Leasing Act of 1920, the Federal Land Policy and Management Act of 1976, and the Energy Policy Act of 2005. These regulations establish the BLM’s mission to provide opportunities for multiple use of BLM-administered resources (including mineral development) and require the BLM to make available federal mineral resources for development to meet national, regional, and local needs. The EA recognizes the need for the BLM to promote the responsible development of oil and gas resources which is accomplished through multiple stages of environmental review as described in Section 1.2.1 (Actions to be Taken); application of legal and regulatory authorities (Appendix E, Legal and Regulatory Authorities); application of standard lease terms that require lessees to minimize environmental impacts; and application of appropriate avoidance, minimization, mitigation, and monitoring measures as described throughout the EA and additional protection measures that would be applied during permitting of APDs based on the analysis of site-specific development impacts.
Not Provided	Not Provided		Terrestrial Wildlife – General	In regard to the emphasis of this revision, wildlife populations would undoubtedly suffer, particularly mussel populations and the fish that they rely on for their life cycles. According to federal records obtained through FracTracker, Washington county producers reported 14 accidental releases or spills during 2023. The primary concern is brine disposal, considering that brine is composed of salt water, which has been shown to cause major mortality events especially with mussel glochidia and young mussels. But saltwater is relatively innocuous compared to the radioactive content, heavy metals, and hundreds of compounds considered toxic, and as has been recently revealed PFAS or forever chemicals. I would like to encourage BLM to require extraction companies to divulge the content of substances used in drilling and fracking wells and not allow any forever chemicals.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources and that there would be impacts to water resources and aquatic wildlife from brine laden water (or brine water containing radioactive materials) if used for dust suppression. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u> The BLM has previously considered a proposed rule in 2015 to require proponents to disclosure the chemical constituents of fracking fluid. The BLM reviewed the 2015 final rule as part of Interior Secretary Ryan Zinke’s Secretarial Order No. 3349, <i>Promoting Energy Independence and Economic Growth</i> , issued on March 29, 2017. During the review, the BLM found that all 32 of the 32 states with federal oil and gas leases have regulations that address hydraulic fracturing. Furthermore, since the 2015 final rule was published, more companies are using state regulatory agencies and/or databases such as FracFocus to disclose the chemical content of hydraulic fracturing fluids. As such, the BLM would not require a Proponent to disclosure chemical constituents for fracking fluids for individual projects or leases at this time.
Brian	Blair		Vegetation – General	The analysis fails to adequately evaluate the impact of additional roads and equipment, specifically the introduction and spread of invasive species of plants in the forest. The problem of invasives such as Autumn Olive, Multiflora Rose, Japanese Honeysuckle and many others is greatly exacerbated with the roads, drill pads, and disturbance caused by oil and gas development, along with the permanent impact from the roads and pads themselves. Abating such impacts would cost more than the revenue received from the leases. In addition, leases would adversely affect all other uses including recreational uses of the Wayne in the subject areas, due to the extensive damage and disturbance.	Text has been added to Section 3.5 (Vegetation and Rare Plants) analysis related to invasive species and noxious weeds to indicate that expansion of the road network and increased vehicle trips can also result in an increased risk of establishment and spread of invasive species and noxious weeds. CEQ indicates that conducting a cost-benefit analysis is not required by NEPA (https://www.federalregister.gov/d/2023-00158/p-268). Further the effects at this stage are unclear given the lack of site-specific development information. As such, the extent of the impact of development on invasives and the cost of abatement cannot be determined.
Randy	Cunningham		Water Resources	The disposal of fracking waste has been a major concern of opponents of fracking. The liquid waste of fracking is toxic and radioactive. The stuff doesn't belong anywhere where it can come into contact with living things. Yet the oil and gas industry promises that injection wells are deep enough to cause no one any worry or harm. However, recent reports in both the Cleveland Plain Dealer and the Columbus Dispatch report injection well leaking from several sites in Southeast Ohio. It seems that the wells did not listen to the assurances of their creators! Fracking is an accident waiting to happen, and according to the FracTracker Alliance has researched and reported on 1,400 fracking accidents in Ohio from 2018 to 2023.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater, leaks in injection wells, or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate.

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David	Mucklow		Water Resources	Considering the recent debacle involving leaks in the wastewater injection and the State of Ohio's delayed response, it seems ridiculous to allow more leasing on public lands without greater controls, supervision and deposits of bonding for damages to be caused to water systems in the area to ensure protection of clean drinking water.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Revision of the bonding process for the State of Ohio or BLM is beyond the scope of this EA.
Joseph	Winner		Climate	The Supplemental Environmental Assessment (SEA) is flawed because it utilizes outdated estimates for the social cost of greenhouse gases (SC-GHG). The monetized impact of the Proposed Action is discussed in Section 3.4.3 of the SEA. The calculations set forth in Tables 3-9 and 3-10 are based upon SC-GHG estimates developed by the Interagency Working Group (IWG) that were updated in 2021. The SEA references a Technical Support Document that sets forth select estimates which this commenter believes is the attached Technical Support Document: Social Cost of Carbon, Methane, (whitehouse.gov) (the TSD). In November 2023, the Environmental Protection Agency (EPA) published the attached EPA Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances (the EPA Report). This document reflects advances in the scientific literature on climate change and its economic impacts and incorporates recommendations made by the National Academies of Science, Engineering, and Medicine (National Academies 2017). The differences between the social costs estimated by the TSD and the EPA Report are significant. For example, the range for SC-CO2, emission year 2020 (in 2020 dollars) is 14 to 76 (TSD) versus 120 to 340 (EPA Report).	Comments relating to social costs of carbon (SCC) are not addressed for the reasons stated in the EA in section 3.4.3.
Joseph	Winner		Climate	The calculations resulting in the SC-GHG estimates summarized in Tables 3-9 and 3-10 are not set forth in the body of the SEA nor in Appendix I (Air Quality and Climate Impacts Impacts). It is clear, however, that more than the select information provided by the TSD was necessary and that more detailed annual estimates were utilized. Appendix A.5 of the EPA Report provides annual estimates for 2020-2080 that incorporate scientific advances. This updated data should be utilized, instead of the old annual estimates, to re-calculate Tables 3-9 and 3-10.	Comments relating to social costs of carbon (SCC) are not addressed for the reasons stated in the EA in section 3.4.3.
Joseph	Winner		Climate	On December 22, 2023, after publication of the EPA Report, the IWG issued a memorandum making it clear that agencies are not required to utilize the outdated information provided by the TSD. See attached IWG-Memo-12.22.23.pdf (whitehouse.gov). That directive states: “Since the research underlying the IWG’s interim estimates was published [i.e., the TSD], there have been a variety of developments in the scientific literature. As agencies consider applying the SC-GHG in various contexts, consistent with OMB Circular No. A-4 and applicable law, agencies should use their professional judgment to determine which estimates of the SC-GHG reflect the best available evidence, are most appropriate for particular analytical contexts, and best facilitate sound decision-making.” (bracketed material added.)	Comments relating to social costs of carbon (SCC) are not addressed for the reasons stated in the EA in section 3.4.3.
Joseph	Winner		Climate	The monetized impact of the Proposed Action is significantly greater than estimated by the SEA. Correcting this flaw is important in order that the consequences of the Proposed Action can be compared as fairly and accurately as possible to the No-Action Alternative.	Comments relating to social costs of carbon (SCC) are not addressed for the reasons stated in the EA in section 3.4.3.

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Joseph	Winner		Climate	The SEA should provide meaningful guidance regarding how, if at all, the SC-GHG estimates inform the decision of the BLM. Appendix I (Air Quality and Climate Impacts Impacts) states in Section 2.2.2 (Phases of Oil and Gas Development): “These numbers were monetized; however, they do not constitute a complete cost-benefit analysis, nor do the SC-GHG numbers present a direct comparison with other impacts analyzed in this document. For example, the BLM’s overall economic analysis for this Proposed Action does not monetize most of the major costs or benefits and does not include all revenue streams from the Proposed Action but seeks to quantify certain impacts related to employment numbers and labor income. SC-GHG is provided only as a useful measure of the benefits of GHG emissions reductions to inform agency decision making.” The SEA should provide more than this vague, non-specific statement to explain how the SC-GHG analysis informs the BLM’s decision. This commenter has been unable to find the “employment numbers and labor income” mentioned in the foregoing excerpt but agrees comparing such data to the SC-GHG estimates would probably not be helpful. However, there are other metrics that would be helpful. For instance, how do the SC-GHG estimates compare to the projected revenue that BLM would forego if the No-Action Alternative were adopted instead of the Proposed Action?	Comments relating to social costs of carbon (SCC) are not addressed for the reasons stated in the EA in section 3.4.3.
Joseph	Winner		Alternatives	Section 2-1 (Alternative A – No Action Alternative) of the SEA states that if the No-Action Alternative were adopted, operators “would develop adjacent, privately owned minerals, potentially resulting in drainage of federal minerals.” If the concern is that the federal government would not be paid for oil and gas it owns that is produced by a well located on privately owned adjacent land, then Ohio Revised Code 1509.27 might provide a remedy to BLM as a nonparticipating owner of mineral rights. “Nonparticipating” means the owner declines to sign a lease but is still entitled to royalties and possibly a share of the working interest for oil and gas extracted from under his, her or its land.	Access to federal minerals requires acquisition/issuance of a lease for the federal minerals (the action covered in the EA) and subsequent submittal of a project-specific proposal (Application for permit to drill) to develop those federal minerals. Operators who secure a lease and who propose development of those leases to access federal minerals (whether from private land or federal land) would be required to provide applicable royalty, rental, and other payments for access to federal minerals in accordance with the Mineral Leasing Act and 43 CFR Part 3100. Furthermore, leasing the federal minerals provides the BLM with the authority to regulate certain activities to protect surface resources more thoroughly than were the BLM to be a nonparticipating owner.
		American Petroleum Institute	Appendix D – Reasonably Foreseeable Development Scenario	Key members of this workgroup engaged in a smaller Technical Experts Working Group, which participated in several strategy sessions with both BLM and Forest Service staff to determine what might appropriately be deemed as a Reasonably Foreseeable Development Scenario (“RFDS”) for all three units of the WNF. The oil and gas industry representatives on the Technical Experts Working Group submitted a brief analysis to the BLM in 2019 (See Attachment 2 for an alternate RFDS provided by the commenter and prepared by the Working Group mentioned above). (See provided attachment with comments citation #3) The final scenario of Table 4 in the report displays the well development forecast (2020-2029) for federal leases accessed by private lands. Specifically for the Marietta Unit, the high scenario forecast is 4.2 wells per year for 10 years.	The RFDS follows BLM policy and guidance and a careful projection of possible future activities, based on specific assumptions including geology, resource occurrence potential, past and current leasing, past and current exploration and development activity, and engineering technology available at the time of analysis. The RFDS process included information acquisition from federal and state agency databases and other sources, information compilation, analysis including modeling by a BLM economist, and peer review. An RFDS is a technical report and not a planning decision and is intended to inform the NEPA process, providing technical information needed in the review and evaluation of management direction and alternatives for land use planning. In response to public comment on a Draft Environmental Assessment, BLM reviewed its own records and records of the Ohio Department of Natural Resources (ODNR) to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects in the EA remain valid. Accordingly, no change to the RFDS projection is necessary at this time.
		American Petroleum Institute	Appendix D – Reasonably Foreseeable Development Scenario	In the draft Supplemental EA, BLM’s 2020 RFDS projects that up to 29 well pads for horizontal drilling would be constructed to support up to 81 horizontally drilled wells between 2020 and 2034. Based on this forecast, BLM anticipates two well pads per year, with two or three wells estimated per pad, for up to six wells per year for the 15-year period. Adjusting industry’s estimate to a full 15-years compares a 6.3 projected well total annually to a BLM 6.0 well total annually. BLM further projects a surface disturbance of 171 to 998 acres (including well pads, access roads and pipelines) and a new longer term (post construction phase) surface disturbance projected to be approximately 86 to 285 acres (well pads including access after interim reclamation). API questions the amount of projected surface acreage disturbance.	The RFDS follows BLM policy and guidance and a careful projection of possible future activities, based on specific assumptions including geology, resource occurrence potential, past and current leasing, past and current exploration and development activity, and engineering technology available at the time of analysis. The RFDS process included information acquisition from federal and state agency databases and other sources, information compilation, analysis including modeling by a BLM economist, and peer review. An RFDS is a technical report and not a planning decision and is intended to inform the NEPA process, providing technical information needed in the review and evaluation of management direction and alternatives for land use planning. In response to public comment on a Draft Environmental Assessment, BLM reviewed its own records and records of the Ohio Department of Natural Resources (ODNR) to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects in the EA remain valid. Accordingly, no change to the RFDS projection is necessary at this time.

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		American Petroleum Institute	Analysis Methods and Assumptions	Within BLM’s own Instruction Manual (Directional Drilling into Federal Mineral Estate from Well Pads on Non-Federal Locations; Permanent Instruction Memorandum No. 2018-014 – June 12, 2018), the agency recognizes the benefits of directional drilling and the ability to manage operations as a Best Management Practice (“BMP”): “The development of directional drilling has allowed oil and gas operators to reach multiple formations and multiple leases from the same well pad, thereby reducing the amount of surface disturbance necessary to develop an oil and gas field relative to the use of traditional vertical wells. At the same time, these drilling techniques have given rise to many questions about the BLM’s obligations and authority with respect to wells and facilities producing Federal minerals from non-Federal locations. The use of directional drilling technology is increasing and considered a Best Management Practice (BMP). The BLM strongly supports this environmental BMP as a means of limiting surface disturbance and overall impacts from oil and gas development.” (See provided attachment with comments citation #4) If operators are accessing federal minerals from non-federal (private land) locations in the Marietta Unit, API argues that under operational best management practices, the surface disturbance acreage in the WNF would be far less than proposed, and closer to zero. The final Supplemental EA should accurately reflect the incredibly low surface impact of deep horizontal well subsurface operations.	The estimated surface disturbance that is presented in the RFDS is not specific to federal land. It encompasses potential disturbance from reasonably foreseeable development on all surface (private, federal, state). The RFDS follows BLM policy and guidance and a careful projection of possible future activities, based on specific assumptions including geology, resource occurrence potential, past and current leasing, past and current exploration and development activity, and engineering technology available at the time of analysis. The RFDS process included information acquisition from federal and state agency databases and other sources, information compilation, analysis including modeling by a BLM economist, and peer review. An RFDS is a technical report and not a planning decision and is intended to inform the NEPA process, providing technical information needed in the review and evaluation of management direction and alternatives for land use planning. In response to public comment on a Draft Environmental Assessment, BLM reviewed its own records and records of the Ohio Department of Natural Resources (ODNR) to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects in the EA remain valid. Accordingly, no change to the RFDS projection is necessary at this time.
		American Petroleum Institute	Analysis Methods and Assumptions	In compliance with the intent of the January 27, 2021, White House Memorandum titled “Restoring Trust in the Government Through Scientific Integrity and Evidence-Based Policymaking” BLM stated that “scientific and technological information, data and evidence are central to developing sound policies, delivering equitable programs, and continually improving them. For the BLM, this means using science and science-based tools to support decisions about public land uses.(See provided attachment with comments citation #5)” Therefore, the final Supplemental EA must be based on facts and sound science, not innuendo and unsubstantiated accusations that may have been expressed through the public participation process to date. API agrees that scientific findings should not be distorted or influenced by political considerations. When scientific or technological information is considered in policy decisions, it should be subjected to well-established scientific processes, including peer review where feasible and appropriate, with appropriate protections for privacy. Examples of such scientific support regarding industry operations follow below. The U.S. Environmental Protection Agency (“EPA”) initiated a study in 2010 intended to investigate the potential impacts of hydraulic fracturing on water resources. EPA publicly released the Draft Assessment Report titled Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources on June 4, 2015. The Agency concluded its year-long formal peer review by the EPA Chartered Science Advisory Board (“SAB”) with the submission of a Recommendations Report to the EPA Administrator on August 11, 2016. Afterwards, the Agency released its Final Assessment Report on December 13, 2016, retitled Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States (EPA 600-R-16-236ES).	The EA is informed by numerous studies, reports, and other information from state agencies, federal agencies, scientific researchers and other reliable sources. The EA takes a hard look at potential impacts to water resources in Section 3.6 (Water Resources) informed by numerous studies and regional/local research and information. The BLM reviewed the provided study and incorporated information from this study into the water resources section 3.6.2.2 analysis summarizing the potential health effects associated with the migration of fracking fluids and waste stream water in drinking water sources.
		American Petroleum Institute	Scope of Analysis	The EPA Chartered SAB Recommendations Report suggested that EPA needed more quantitative support of its June 2015 Draft Assessment topline and accurate conclusion of “no systemic widespread impacts from hydraulic fracturing,” As a result, API developed and shared two reports with the EPA Office of Research and Development (“ORD”) – i) Industry Practices and Trends Protecting Water Resources During Hydraulic Fracturing: Information for US EPA’s Draft Assessment (October 2016)and ii) Quantitative Support for EPA’s Finding of No Widespread, Systemic Effects to Drinking Water Resources from Hydraulic Fracturing (November 2016). Both reports are available on the API website. (See provided attachment with comments citation #6)	The EA is informed by a numerous studies, reports, and other information from state agencies, federal agencies, scientific researchers and other reliable sources. The EA takes a hard look at potential impacts to water resources in Section 3.6 (Water Resources) informed by numerous studies and regional/local research and information. The BLM reviewed the provided study and incorporated information from this study into the water resources section 3.6.2.2 analysis summarizing the potential health effects associated with the migration of fracking fluids and waste stream water in drinking water sources.

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		American Petroleum Institute	Scope of Analysis	API contends that the science and data clearly demonstrate that hydraulic fracturing can be and has been conducted safely and responsibly. Over the last decade plus, considerable taxpayer resources at the state and federal level have been directed towards the topic of hydraulic fracturing. Numerous privately funded studies have also been conducted and made available for public review, including studies that have been conducted in California. On the whole, these studies have repeatedly concluded that actual cases of documented impacts are infrequent, and concerns about the practice are rooted largely in political ambiguity. API encourages BLM to focus its review on the host of reputable studies by government agencies and academic institutions, coupled with empirical evidence, that together lead one to firmly conclude that hydraulic fracturing is not a threat to drinking water resources (see Attachment 3 to this comment letter). An example worthy of note is a two-year study released in mid-2017 by the Academy of Medicine, Engineering, and Science of Texas (“TAMEST”). (See provided attachment with comments citation #7) This work analyzed the overall impacts of oil and natural gas development in Texas – a state with a development history that dates to 1866. The report identifies data gaps and areas of concern (most notably under transportation), while recognizing that these are all being addressed by state and federal regulations and industry practices. The report concluded – based on facts – that hydraulic fracturing is being done in a safe and environmentally friendly manner with economic benefits provided to the state. This report also supports the EPA original fact-based assertion above, that hydraulic fracturing is not a significant threat to drinking water supplies, in its statement: “Direct migration of contaminants from targeted injection zones is highly unlikely to lead to contamination of potential drinking water aquifers.” (The Academy of Medicine, Engineering and Science of Texas, Environmental and Community Impacts of Shale Development in Texas – Page 128.)	The EA is informed by numerous studies, reports, and other information from state agencies, federal agencies, scientific researchers and other reliable sources. The SEA takes a hard look at potential impacts to water resources in Section 3.6 (Water Resources) informed by numerous studies and regional/local research and information. The provided study was reviewed and BLM determined that the information and analysis was specific to the State of Texas and as such is not being referenced in the EA.
		American Petroleum Institute	Appendix E – Legal and Regulatory Authorities	The oil and natural gas industry is committed to carrying out safe and environmentally responsible exploration and production activities on lands administered by state and federal authorities, including production via the use of hydraulic fracturing and horizontal drilling in unconventional plays. As previously discussed, relevant federal and state regulations in Ohio are comprehensive. Hydraulic fracturing activity occurring on Forest Service lands in Ohio would be subject to the state’s own comprehensive statutory and regulatory programs. These requirements include extensive monitoring requirements that further validate that ongoing oil and gas production activity in the planning area are not creating widespread impacts to water or air resources. Furthermore, industry standards and practices work in combination with federal and state regulations to provide an additional layer of environmental protection. Formulated by the industry’s standard-setting program, these recommended practices cover all aspects of the industry’s work and are consistently updated as a part of the industry’s ongoing effort toward continued improvement of operations.	Thank you for your comment, no specific additional information/references or recommendations are provided in the comment.
		American Petroleum Institute	Water Resources	Hydraulic fracturing in the United States has been conducted for over six decades. During this time industry has developed techniques for improving well drilling, cementing, and casing to protect freshwater sources, restrict fluids to the intended zone, and enable efficient hydrocarbon production. The primary means of ensuring that underground sources of drinking water are protected is by carefully casing the well with steel pipe and cementing it into place to create a tight seal. Several redundant layers of steel casings and cement sheaths are sequentially installed to provide additional layers of protection. After installation, the cement is tested to evaluate its strength and seal. (See provided attachment with comments citation #8) Well integrity is a top priority for the industry in protecting subsurface water resources.	Refer to Section 3.6 (Water Resources) which describes these general/required practices for casing of well bores to reduce the potential for inadvertent releases of fracking fluids and associated impacts to water resources.

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		American Petroleum Institute	Water Resources	Industry also carefully manages surface water at all stages of operations. This applies throughout the water cycle and includes sourcing, transportation, and use as well as treatment, reuse, or disposal. Technological, and in certain cases, state regulatory advances have allowed producers to minimize use of fresh water sources in favor of non-potable, lower quality water, or produced water. The increase in water reuse within the oil and natural gas industry is also encouraging development of more efficient, more mobile water treatment technologies that would eventually be scaled and utilized by other industries.	Refer to Section 3.6 (Water Resources) which describes the State of Ohio regulatory framework associated with disposal of produced water via underground injection. In addition, Section 3.6 (Water Resources) describes the increasing trend towards treatment and reuse of wastewater.
		American Petroleum Institute	Appendix E – Legal and Regulatory Authorities	The federal government creates framework environmental laws that often prescribe regulatory minimum thresholds for states to follow. For example, the Clean Water Act (“CWA”) applies to oil and natural gas operations, particularly where water resource protection, and in certain cases, restoration is concerned. The CWA allows for the establishment of the National Pollutant Discharge Elimination System (“NPDES”), which, in most states, regulates how oil and natural gas operators manage stormwater and other wastewater discharges from their sites. Operators must seek coverage under construction and operating permits; prepare compliant Stormwater Pollution Prevention Plans (“SWPPP”); and implement best management plans (“BMPs”) and controls (including routine inspections and testing of upstream discharge points) to prevent impacts to receiving water bodies. The NPDES program further requires permits and engineering and other controls (including routine inspections and testing) for any discharge of wastewater from oil and natural gas sites. Further, a separate provision of the CWA, the Oil Spill Prevention, Control, and Countermeasures (“SPCC”) Regulation requires oil and natural gas operators to prepare SPCC plans, implement controls, and establish BMPs to prevent impacts to receiving water bodies from tanks and other structures that hold oil on site. Under the federal structure, states are authorized to be the primary stewards and regulators of their water. Most states have extensive water quality and quantity regulations overseen by a wide range of agencies. For example, Ohio’s Environmental Protection Agency (“OEPA”) Division of Surface Water (“DSW”) includes six key program areas that support the CWA’s “fishable, swimmable” goals for all surface waters in the state. These programs assess the quality of the surface waters, set standards for protection of the waters, and establish plans to bring impaired waters back into attainment with water quality goals.	Additional text has been added to Appendix E (Legal and Regulatory Authorities) to further describe State of Ohio regulations and guidelines associated with permitting and development of oil and gas resources in the state. Refer to Appendix E (Legal and Regulatory Authorities) that cites the CWA and other federal legal authorities and regulations associated with water resources. In addition, refer to Section 3.6 (Water Resources) which describes and analyzes federal and state regulatory authorities that are in place to protect water resources.
		American Petroleum Institute	Appendix E – Legal and Regulatory Authorities	Further, ODNR protects Ohio's groundwater resources by regulating the disposal of brine and other wastes produced from the drilling, stimulation, and production of oil and natural gas in the state. ODNR received primacy of its Underground Injection (“UIC”) Program from EPA in 1983 – and manages brine injection wells, annular disposal wells, and enhanced oil recovery injection wells. Enhanced recovery injection wells are used to increase production of hydrocarbons from nearby producing wells.	Refer to Section 3.6 (Water Resources) which describes the State of Ohio regulatory framework associated with disposal of produced water via underground injection. Additional text has been added to Appendix E (Legal and Regulatory Authorities) to further describe State of Ohio regulations and guidelines associated with permitting and development of oil and gas resources in the state.
		American Petroleum Institute	Appendix E – Legal and Regulatory Authorities	ODNR’s UIC personnel are responsible for reviewing construction specifications, engineering, geological data, and issuing permits for Class II wells used to inject fluids, primarily oil-field brine, into deep, underground geological formations for disposal or for secondary oil recovery. (See provided attachment with comments citation #9) ODNR also regulates the hauling and spreading of brine. Brine haulers in Ohio are required to be formally registered, bonded, and insured.	Refer to Section 3.6 (Water Resources) which describes the State of Ohio regulatory framework associated with disposal of produced water via underground injection. Additional text has been added to Appendix E (Legal and Regulatory Authorities) to further describe State of Ohio regulations and guidelines associated with permitting and development of oil and gas resources in the state.

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		American Petroleum Institute	Appendix E – Legal and Regulatory Authorities	Approximately 99.5 percent of the contents of most hydraulic fracturing fluid systems are well-known and widely disclosed: water (90 percent by volume) and a proppant (typically sand or other non-toxic material, which constitutes 9.5 percent by volume). The substances that are most commonly found in the additional 0.5 percent of hydraulic fracturing fluid systems are also commonly found in food, cosmetics, detergents and other household products. (See provided attachment with comments citation #10) These substances are essential for efficient delivery of the proppant to the rock fractures, reduction of friction, which in turn reduces the energy required to pump, and in the prevention of corrosion and scale build up, which is detrimental to equipment and overall production. The combination of chemicals used by certain service companies, who typically carry out the actual fracturing operations, can be of a proprietary nature and receive similar protections from disclosure offered to other industries. The industry generally protects specific ingredients within additives that commonly represent less than a thousandth of a percent (0.001 percent) of the total hydraulic fracturing fluid volume. Even in those narrow circumstances, where precise chemical identification is not publicly released, the industry typically provides chemical category information that allows the public to identify the class and function of the chemical. Further, several states require that the precise identity of these ingredients be disclosed to regulators, physicians, and emergency personnel. As a part of stakeholder engagement and to maintain a high level of transparency with communities, companies report specific information about fracturing fluid used at an individual well via a voluntary, publicly accessible website: FracFocus.org. This chemical disclosure registry was developed in 2011 by the Groundwater Protection Council (“GWPC”) and the Interstate Oil and Gas Compact Commission (“IOGCC”), two organizations comprised of state regulators that oversee the oil and natural gas industry. FracFocus.org also serves as a reporting method to meet state disclosure for 26 states including: Alabama, Alaska, Arizona, Arkansas, California(See provided attachment with comments citation #11), Colorado, Idaho, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, Nebraska, New Mexico, Nevada, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Texas, Tennessee, Utah, and West Virginia. To date, chemical information on over 190,000 wells is contained within the registry.(See provided attachment with comments citation #12) Further, Ohio has strong disclosure requirements which apply during all aspects of the initial drilling process and during hydraulic fracturing. Finally, safety data sheets (“SDSs”) contain safety, health, and environmental information for ingredients of the products used (including those denoted as proprietary). SDS documents must be available onsite for the substances used in the hydraulic fracturing process as required by the Occupational Safety and Health Administration (“OSHA”).	Additional text has been added to Section 3.6 (Water Resources) regarding disclosure of chemical constituents of fracking fluids and BLM’s lack of authority to require these disclosures. The additional text also notes that FracFocus serves as a voluntary reporting mechanism for specific information on fracking fluid at individual well sites. In addition, text has been added to Appendix E (Legal and Regulatory Authorities) to describe Ohio regulations and guidelines associated with permitting and development of oil and gas resources in the state.

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		American Petroleum Institute	Air Resources	The oil and natural gas industry is mindful of the value of improving air quality, and the expanding role that natural gas has provided in supporting a national trend of emissions reduction. From an operations perspective, the production segment of the industry has been subject to a series of federal Clean Air Act regulatory programs over the past several years, which should be recognized as contributing to the positive story of reductions in greenhouse gases and overall emissions. According to EPA, between 1970 and 2022, the combined emissions of the six common pollutants (PM2.5 and PM10, SO2, NOx, VOCs, CO and Pb) dropped by 78 percent. This progress occurred while the U.S. economy continued to grow, while Americans drove more miles and while the population and energy use increased. (See provided attachment with comments citation #13) In addition, natural gas is the major reason the U.S. has reduced GHG emissions more than any other nation between 2005 and 2021 according to United Nations (“UN”) data, even while producing the most oil and natural gas. (See provided attachment with comments citation #14) Overall, the increased use of natural gas in generating electricity is a key reason U.S. CO2 emissions have fallen to generational lows, accounting for more than 60% of CO2 emission reductions in that sector since 2005.	The BLM reviewed the provided references and determined that the EA includes an adequate quantification and assessment of air emissions associated with the proposed action. Refer to Section 3.3 (Air Resources), Section 3.4 (Climate Impacts), and Appendix I (Air Quality and Climate Impacts) for the estimated emissions and impacts to air quality.
		American Petroleum Institute	Air Resources	Since 2012, new sources of emissions from the oil and natural gas sector have been regulated by EPA’s New Source Performance Standards at 40 CFR 60, Subpart OOOO (“NSPS OOOO”). The 2012 rule regulated emissions of volatile organic compounds (“VOCs”), with the co-benefit of reducing methane emissions. In 2014, the Obama Administration published its Methane Strategy, which directed multiple federal agencies to consider action to reduce methane emissions. In 2016, the Obama Administration expanded the 2012 rule to cover additional sources and added methane as a regulated pollutant in the regulations at 40 CFR 60, Subpart OOOOa (“NSPS OOOOa”). Due to further Trump Administration actions, in 2020 additional amendments to NSPS OOOOa were adopted via two rulemakings. Under the Biden Administration, in December of 2023, EPA issued another final rulemaking to sharply reduce emission of methane and other harmful pollutants from oil and gas operations -- from new, modified, and existing sources. The rule includes Emissions Guidelines, which set procedures for states to follow as they develop plans to limit methane from existing sources. The rule went into effect on May 7, 2024. During much of this extended rulemaking activity, to demonstrate industry’s commitment to addressing emissions, API launched and administered a voluntary program, The Environmental Partnership (“TEP”), for oil and natural gas production companies to continually improve their environmental performance. (See provided attachment with comments citation #15) With over 85 participating companies, representing over 70% of the total U.S. onshore oil and natural gas production, the immediate focus of the program is on actions to further reduce methane and VOC emissions using proven cost-effective technologies in upstream and midstream operations. Industry-led initiatives like The Environmental Partnership, have helped reduce methane emissions from production 37% since 2015 while energy production increased 39% in the largest U.S. basins and is an example of our forward-looking commitment to delivering on a continuous cycle of learning, collaborating, and taking action.	The BLM reviewed the provided references and determined that the EA includes an adequate quantification and assessment of air emissions associated with the proposed action. Refer to Section 3.3 (Air Resources), Section 3.4 (Climate Impacts), and Appendix I (Air Quality and Climate Impacts) for the estimated emissions and impacts to air quality.

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		American Petroleum Institute	Terrestrial Wildlife - Special Status Species	It is important to note that many industry operators implement conservation measures, including training employees, and contractors on the biology of the species, activities that may affect it, and ways to avoid or minimize impacts; conducting pre-activity surveys by trained biologists; adhering to timing restrictions on clearing, side trimming, and herbicide applications; and avoiding work during the pup season, where feasible. Operators also maintain adequate distance from hibernacula buffer zones, particularly during roosting or breeding periods; preserve key summer habitat features such as dead snags; install artificial roosts to replace removed habitat; and improve nearby habitat. Others have dedicated substantial grants to fund research and efforts related to solving the root cause of white-nose syndrome. The combination of industry conservation best management practices and the low potential for occurrence of the Indiana bat in the Marietta Unit directly address the hydraulic fracturing impact concerns of the federal court. The BLM should move forward with leasing of the proposed parcels in the WNF immediately.	The BLM would further assess the application of appropriate Best Management Practices, standards, and other measures when reviewing site-specific APDs during the stage 3 environmental review. No specific changes needed based on this comment.
		American Petroleum Institute	Appendix B – References	Since 1924, API has led in the establishment, maintenance, and dissemination of hundreds of standards to ensure the safe and sustainable development of oil and natural gas in the U.S. and across the world. The process to create and manage the standards has been accredited by the American National Standards Institute (“ANSI”), the body that accredits similar programs at several U.S. national laboratories. This method brings together academics, government regulators and industry experts to improve and advance the safety of energy development. Each standard is reviewed at least every five years to maintain its integrity. API’s standards represent industry safety practices based on the best available science and research. This is one reason they are widely cited, and often incorporated, in federal and state regulations. International regulators often reference the standards in their country’s regulations, as well. As these standards are implemented and their effects measured, they add to the body of knowledge of industry best practices and lessons learned, and deliver significant improvements to system integrity, reliability, and integrated safety. API maintains a portfolio of more than 700 standards that cover all aspects of the oil and natural gas industry, including 260 focused specifically on exploration and production activities. In our on-going effort toward continuous improvement of operations and building on existing API standards and practices pertaining to oil and natural gas extraction, API developed a set of 5 documents which specifically address the risk management issues accompanying well construction and management. First completed in 2011 and revised in 2013 under API’s accredited consensus-based standards development process, this robust “Hydraulic Fracturing Series” helps to protect the public by providing a blueprint for strong, carefully constructed wells. The standards were created to convey proven industry practices while remaining flexible enough to accommodate the variations in state and regional regulatory frameworks that often occur due to fundamental differences in regional geology and other factors, and to also serve as a reference for federal, state, and international regulators.	The BLM would further assess the application of appropriate Best Management Practices, standards, and other measures when reviewing site-specific APDs during the stage 3 environmental review. No specific changes needed based on this comment.

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		American Petroleum Institute	Appendix B – References	ANSI/API RP 100-1 -- Well Integrity and Fracture Containment, 1st Edition, October 2015 • Highlights practices for onshore well construction and fracture stimulation design and execution relating to well integrity and fracturing containment. • Identifies actions to protect and isolate useable quality groundwater through application of appropriate barriers and controlled fracture design and execution practices. ANSI/API RP 100-2 -- Managing Environmental Aspects Associated with Exploration and Production Operations Including Hydraulic Fracturing, 1st Edition, August 2015 • Provides proven practices applicable for the planning and operation of wells, including hydraulic fracturing. It includes topics on managing environmental aspects during site planning; site selection; logistics; mobilization; rig up and demobilization; and stimulation operations. ANSI/API RP 100-3 -- Community Engagement, 2nd Edition, April 2024 • Provides a framework to assess, plan, and implement effective and meaningful stakeholder engagement strategies that are aligned with community values and priorities throughout every phase of onshore development. RP 100-3 helps to ensure that safe and responsible development of oil and natural gas resources is achieved with community and stakeholder input. The recommended practice follows five guiding principles: respect, integrity, safety, environmental responsibility, and transparent and responsive communication. API Standard 65 Part 2 – Isolating Potential Flow Zones During Well Construction, 2nd Edition, December 2010 • Helps ensure the well is properly designed and constructed to contain the hydrocarbons through the well bore and isolate them from ground water aquifers. This is accomplished through the use of casing, cement, and mechanical barriers. • Includes information on industry cementing practices. A well-designed cement job optimizes cement placement through considerations such as laboratory tested slurry design, honoring pore pressure/fracture gradient window, use of spacers/pre-flushes, proper density and rheological hierarchy, fluid compatibility and adequate centralization. API RP 51R – Environmental Protection for Onshore Oil and Gas Production Operations and Leases, 1st Edition, July 2009 • Provides environmentally sound practices for domestic onshore oil and gas production operations, including fracturing. Applies to all production facilities, including produced water handling facilities. Operational coverage begins with the design and construction of access roads and well locations, and includes reclamation, abandonment, and restoration operations.	The BLM would further assess the application of appropriate Best Management Practices, standards, and other measures when reviewing site-specific APDs during the stage 3 environmental review. No specific changes needed based on this comment.
		American Petroleum Institute	Terrestrial Wildlife	In addition, to the fracturing series, in November of 2022, API released its first standard on species and habitat conservation supporting the planning and execution of onshore oil and natural gas projects for conventional and shale (hydraulic fracturing) operations in the U.S. API Bulletin 4565 – Species and Habitat Conservation: Industry Fundamentals, 1st Edition, November 2022 • Focused on species and habitat conservation practices, Bulletin 4565 provides strategies focused on landscape level planning, site specific wildlife assessment, operational practices in conjunction with environmental site screening and baseline surveys to identify and mitigate adverse at the entry, exploration, development, production, and exit phases of oil and natural gas development.	The BLM would further assess the application of appropriate Best Management Practices, standards, and other measures when reviewing site-specific APDs during the stage 3 environmental review. No specific changes needed based on this comment.

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		American Petroleum Institute	Socioeconomic Resources and Environmental Justice	America’s oil and natural gas powers every sector of the U.S. economy and reaches every facet of our lives, from heating our homes and fueling transportation to supporting the manufacture of products we use every single day. Across the country, 10.8 million jobs are supported by U.S. natural gas and oil, which represents 5.4% of the nation’s total employment. The economic benefits provided by a healthy oil and natural gas industry in the Appalachian Basin are obvious. A Price Waterhouse Coopers study, released by API in 2023, showed Ohio’s oil and natural gas supports more than 351,000 jobs, provides over \$25 billion in wages and contributes more than \$55 billion to the state’s economy. This includes direct industry jobs as well as jobs in the wholesale/retail, construction, manufacturing, and other sectors. (See provided attachment with comments citation #16)	Section 3.10.1 (Affected Environment) of the SEA has been updated with a discussion about the oil and gas industry and its relationship to current economic conditions in the socioeconomic Analysis Area, including the current share of employment and average wages in the oil and gas industry compared to other industries. Sections 3.10.2.2 (Impacts of Alternative B – Proposed Action) and 3.10.3 (Cumulative Impacts) of the EA acknowledge that the workforce may be affected by the Proposed Action but do not predict whether these impacts would be negative, positive, or neutral. Section 3.10.2.2 has been updated with more current oil and gas development data and a quantitative workforce assessment has been included. However, specific workforce impacts would depend on the specific development locations proposed during the APD stage.
		American Petroleum Institute	Decisions to be Made	API urges BLM to fully consider the scientific data, the available studies, state and federal regulatory frameworks, industry best practices, and the significant technology and engineering advancements in this industry that make safe and responsible oil and natural gas development possible. Upon having considered the information in an unbiased manner, you must conclude that existing controls (both mandatory and voluntary) are more than adequate to protect human health and the environment, both now and in the future, particularly as industry technologies and management practices advance.	No specific changes/additions needed in the EA based on this comment. The BLM would consider the analysis contained in the 2016 EA, this SEA, and other relevant information to inform its decision.
		American Petroleum Institute	Purpose and Need	Decisions to preclude or slow resource development in one unit of the WNF as a trade-off for allowing continued development in another unit is not in line with an agency mission of making mineral resources available for development to meet national, regional, and local needs. Instead, thoughtful consideration must be given to what resource needs may exist in the future for the nation and a final Supplemental EA be developed that encourages safe energy resource development in all three units of the Wayne National Forest.	No specific changes/additions needed in the EA based on this comment. The BLM would consider the analysis contained in the 2016 EA, this EA, and other relevant information to inform its decision.
Francis	Lea		Water Resources	Now that the Ohio Oil and Gas Commission has upheld the suspension of three Athens County fracking waste injection wells due to threats to drinking water, where would the millions of gallons of fracking water come from and where would it end up after it has become "waste," and may contain PFAS, radioactivity, and proprietary chemicals we are not allowed to know.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate.
Baxter	Foskuhl	And others: Baxter Foskuhl, David Vandendorpe, Dr. Lauren Logan, Not Provided Not Provided, Olivia Davis	Water Resources	The Study referenced in 3.6 of the 2016 EA BLM is 8 years out of date and doesn’t capture the already occurring watershed effects. I refer to Logan and Harmon, 2023 (see attached) which works directly with the Muskingum watershed among others. The findings from this paper show that new wells continue to pose a risk and that the reduction to the water shed is under realized in part due to a lack of reporting of multiple wells operating at less than 100,000 gallons per day which does not need permitting. In that sense, the statement in the EA BLM about no reported water usage in some wells is pertinently false and misleading and instead should be read as operating at 99,999 Gallons of usage per day, as these in production wells are actually performing at. Discussing no use of water during low flow periods as is done in the proposal is missing the point and too little too late if things have happened at that point.	Additional information has been added to Section 3.6 (Water Resources) to note that the water withdrawal data presented in the EA is associated with water withdrawals that are reported with reporting requirements applying to facilities and operations that have capacity to withdraw more than 2 million gallons of water per day (60 million gallons per month) and indicating that operators and facilities that consume and have a capacity less than 2 million gallons a day would also be withdrawing surface water from the Little Muskingum–Middle Island HUC-8 watershed which would increase the total water withdrawals beyond what is presented in the EA. The BLM reviewed the Logan and Harmon paper and believe that the content in the EA characterizes the information/content. Additional Avoidance and Minimization measures have been added to EA and Appendix G (Wayne National Forest Oil and Gas Leasing Biological Assessment) intended specifically to avoid/reduce potential impacts to flows in the Little Muskingum River including prohibiting water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future.

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Baxter	Foskuhl	And others: Baxter Foskuhl, David Vandendorpe, Dr. Lauren Logan, Not Provided Not Provided, Olivia Davis	Scope of Analysis	Furthermore, all of this environmental impact statements from the BLM and projections you are working off of, in addition to being out of date, does not capture the reality of the trade secret nature of the brine mixtures at use (see attached Underhill).	In Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) the EA refers to the potential increase in impacts on water resources from accidental spills or contamination due to increased development under the Proposed Action, including brine laden water. Additional text was added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) further describing the potential impacts associated with the disposal of wastewater and referencing the potential for these impacts to increase if they are not effectively regulated under ODNR’s Class II injection regulations. As described in Section 3.6 (Water Resources) of the EA, the ODNR regulates the disposal of brine and other wastes produced from the drilling, simulation, and production of oil and natural gas in Ohio. During the APD process, the BLM would encourage operators to identify the chemical constituents of hydraulic fracturing fluids. However, the BLM does not currently have the authority to require operators to identify the chemicals used in hydraulic fracturing. Oil and gas operators are encouraged to report specific information about fracturing fluid used at an individual well via a voluntary, publicly accessible website: FracFocus.org. FracFocus.org serves as a reporting method to meet state disclosure for 26 states including, including Ohio. In addition, safety data sheets (“SDSs”) contain safety, health, and environmental information for ingredients of the products used (including those denoted as proprietary). SDS documents must be available onsite for the substances used in the hydraulic fracturing process as required by the Occupational Safety and Health Administration (“OSHA”). In addition, the State of Ohio requires that all intervals drilled prior to reaching an underground source of drinking water (USDW) protective depth shall be drilled with air, fresh water, a freshwater based drilling fluid, or a combination of the above. Only additives suitable for drilling through potable water supplies may be used while drilling these intervals (OAC 1501:9).
Baxter	Foskuhl	And others: Baxter Foskuhl, David Vandendorpe, Dr. Lauren Logan, Not Provided Not Provided, Olivia Davis	Scope of Analysis	Finally, dangers and destruction due to fracking is well documented, with all of the discussion on surface disturbance the true issue is due to the deeper disruptions with trade secret brine, the hazardous byproduct, issues with containment and simple removal of the water from the watershed and ecosystem. The hazards of the byproducts of fracking is not adequately discussed in any of the proposals. Please see attached Gopal, particularly page 55 for a discussion of these issues.	In Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) the EA refers to the potential increase in impacts on water resources from accidental spills or contamination due to increased development under the Proposed Action, including brine laden water. Additional text was added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) further describing the potential impacts associated with the disposal of wastewater and referencing the potential for these impacts to increase if they are not effectively regulated under ODNR’s Class II injection regulations. As described in Section 3.6 (Water Resources) of the EA, the ODNR regulates the disposal of brine and other wastes produced from the drilling, simulation, and production of oil and natural gas in Ohio. During the APD process, the BLM would encourage operators to identify the chemical constituents of hydraulic fracturing fluids. However, the BLM does not currently have the authority to require operators to identify the chemicals used in hydraulic fracturing. Oil and gas operators are encouraged to report specific information about fracturing fluid used at an individual well via a voluntary, publicly accessible website: FracFocus.org. FracFocus.org serves as a reporting method to meet state disclosure for 26 states including, including Ohio. In addition, safety data sheets (“SDSs”) contain safety, health, and environmental information for ingredients of the products used (including those denoted as proprietary). SDS documents must be available onsite for the substances used in the hydraulic fracturing process as required by the Occupational Safety and Health Administration (“OSHA”). In addition, the State of Ohio requires that all intervals drilled prior to reaching an underground source of drinking water (USDW) protective depth shall be drilled with air, fresh water, a freshwater based drilling fluid, or a combination of the above. Only additives suitable for drilling through potable water supplies may be used while drilling these intervals (OAC 1501:9).
Baxter	Foskuhl	And others: Baxter Foskuhl, David Vandendorpe, Dr. Lauren Logan, Not Provided Not Provided, Olivia Davis	Purpose and Need	Finally as to the discussion of the loss of possible royalties due to development of the deposits from nearby wells, this is directly in contrast to the mandate of the parks, which should be to protect and complicate any development of these resources so as to ensure that the parks remain as envisioned, contributing to the health of the nation. While adjoining areas might be able to develop these resources, further locations deeper into the park would be protected by not moving ahead with this reckless, ill considered plan.	Access to federal minerals (either from private land or federal land) requires acquisition/issuance of a lease for the federal minerals (the action covered in the EA) and subsequent submittal of a project-specific proposal (Application for permit to drill) to develop those federal minerals. Operators who secure a lease and who propose development of those leases to access federal minerals (whether from private land or federal land) would be required to provide applicable royalty, rental, and other payments for access to federal minerals in accordance with the Mineral Leasing Act and 43 CFR Part 3100.

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
Worried about the climate crisis	Not Provided		Climate	At the outset, I believe that this and other federal planning and NEPA analysis processes should actively consider how the proposed action and alternatives may add to or help solve the climate and extinction crises. These overlapping crises pose an existential threat to humanity and the health of the biosphere. On the climate crisis, please review the attached IPPC report.	Chapter 3 of the EA does consider climate and wildlife impacts. Information from the 2023 IPCC Synthesis Report provided by the commenter is already included and referenced in Appendix I (Air Quality and Climate Impacts Impacts).
Val	Bader	North Country Trail Association	Appendix E – Legal and Regulatory Authorities	The North Country Trail Association and National Park Service (NCNST Trail Administrator) have a MOU with the USFS outlining the management of the NCNST on National Forest Lands. It is our desire that the NCNST is managed in accordance with the direction outlined in the MOU. This project has the potential to adversely impact the NCNST and it is our expectation that those impacts are considered and that the trail and trail experience are protected and that the trail remain open and undisturbed from this project.	It is not possible at this programmatic scale of analysis to meaningfully assess potential impacts to the North Country Trail as the specific location, extent, and type of development are not known at this time. During site-specific permitting of individual projects, the BLM would assess the location and impacts of proposed development in relation to the North Country Tail and would work with the NPS, the North Country Trail Association, and other appropriate stakeholders to assess potential impacts and to apply appropriate protection measures based on the MOU and other trail guidance documents.
Roselie	Bright		Socioeconomics Resources and Environmental Justice	Many aspects of Alternative B that would harm human health were analyzed in the Draft Environmental Impact Statement (DEIS), including: - direct, local impacts of drilling, various stages of production, and combustion. - long term impacts of increased greenhouse gases. (By the way, I don't think it's relevant to the DEIS to claim that Alternative B is acceptable because the adverse impacts on private lands would be worse than Alternative B on federal lands.) The described additional impacts on human health were calculated as "acceptable" because they would be "small". The aspects of Alternative B that would harm human health that were left out of the DEIS were noise and indirect impacts of environmental degradation. Noise at the local, production, and combustion sites has been documented to adversely affect human health [1-43], as well as wildlife [44-46]. Damage to ecosystems in parks has been shown to adversely affect human health [47-54]. These problems need to be added to the calculations in the Final Environmental Impact Statement (FEIS). An environmental health epidemiologist with a doctoral degree in the subject would be useful for generating a comprehensive analysis (my references are not exhaustive).	The EA considers noise impacts in Section 3.8.2.2 (Impacts of Alternative B – Proposed Action) for wildlife. Indirect impacts such as decreased air quality (Section 3.3, Air Resources), increased heavy-truck traffic and light pollution (Section 3.9, Transportation), and potential surface water and groundwater contamination (Section 3.6, Water Resources) were also analyzed. Noise impacts, in particular, are highly location-dependent and would be assessed in greater detail during the APD stage. The BLM acknowledges that the scope of specific impacts may vary depending on the exact development locations, which would be further evaluated during the APD stage. The BLM acknowledges that it is not within the subject matter expertise of the BLM socioeconomics program to conduct a comprehensive health impact analysis. However, future APD projects would be required to contract specialized support to ensure such analyses are conducted appropriately and thoroughly. The BLM would continue to incorporate relevant data and research in future reviews to ensure a comprehensive analysis.
Roselie	Bright		Climate	Adding up all projected direct, indirect, local, global, short-term and long-term adverse human health impacts may still equate to a fairly "small" amount due to Alternative B. However, part of taking the climate crisis seriously is recognizing that it is driven by small contributions from many sources. All of the small contributions have generated an acceleration in climate change that would be difficult to reverse, or even stall, if all US combustion were stopped today. That doesn't mean we should just ignore the multiplicity of small impacts and keep combusting as if everything would be fine. It would be irresponsible to "pass the buck" to the other federal agencies and economic sectors to be the ones to stop aggravating the climate crisis. The responsible action is to at least stop any federal approval of new fossil fuel projects (Alternative A, No Action), which would avoid all adverse impacts of Alternative B.	Thank you for your comment. No specific changes/revisions needed to the EA based on this comment.
Roselie	Bright		Purpose and Need	There is no real need for new fossil fuel projects. One "need" listed in the DEIS, that some companies want the right to extract fossil fuel from federal land, is not the larger public's need. Another "need", discussed starting on page 3-28 of the DEIS, is the US needs a large fossil fuel supply to offset the volatility of the global supply of fossil fuels. I argue that the preferred way to address global volatility is to have a larger stable domestic supply of alternative energy.	As described in Section 1.2 (Purpose and Need) of the EA the BLM’s purpose is to respond to Expressions of Interest to lease federal oil and gas resources through a competitive leasing process. The need for leasing of federal minerals is established by the Mineral Leasing Act of 1920, the Mineral Leasing Act for Acquired Lands of 1947, the Federal Land Policy and Management Act of 1976, and the Energy Policy Act of 2005. These regulations establish the BLM’s mission to provide opportunities for multiple use of BLM-administered resources (including mineral development) and require the BLM to make available federal mineral resources

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					for development to meet national, regional, and local needs. The EA recognizes the need for the BLM to promote the responsible development of oil and gas resources which is accomplished through multiple stages of environmental review as described in Section 1.2.1 (Actions to be Taken); application of legal and regulatory authorities (Appendix E, Legal and Regulatory Authorities); application of standard lease terms that require lessees to minimize environmental impacts; and application of appropriate avoidance, minimization, mitigation, and monitoring measures as described throughout the EA and additional protection measures that would be applied during permitting of APDs based on the analysis of site-specific development impacts.
Stephanie	Kromer	Ohio Oil & Gas Association	Purpose and Need	Ohio is a leading producer of oil and gas, and that production has significantly increased in recent years in connection with the development of the Marcellus and Utica shale in Ohio, including development activities on federally owned lands and/or involving federal minerals managed by the BLM. OOGA members provide a supply of oil and gas resources that play a significant role in meeting the nation’s energy needs. Access to federally owned lands and minerals is critical to ensuring the long-term viability of the important service provided by OOGA’s members. Such access is important not only from a supply (volume) perspective, but it also facilitates the development of private mineral interests that, in many cases, cannot be developed without access to federal lands and/or federally owned minerals.	As described in Section 1.2 (Purpose and Need) of the EA the BLM’s purpose is to respond to Expressions of Interest to lease federal oil and gas resources through a competitive leasing process. The need for leasing of federal minerals is established by the Mineral Leasing Act of 1920, the Minerals Leasing Act for Acquired Lands of 1947, the Federal Land Policy and Management Act of 1976, and the Energy Policy Act of 2005. These regulations establish the BLM’s mission to provide opportunities for multiple use of BLM-administered resources (including mineral development) and require the BLM to make available federal mineral resources for development to meet national, regional, and local needs. The EA recognizes the need for the BLM to promote the responsible development of oil and gas resources which is accomplished through multiple stages of environmental review as described in Section 1.2.1 (Actions to be Taken); application of legal and regulatory authorities (Appendix E, Legal and Regulatory Authorities); application of standard lease terms that require lessees to minimize environmental impacts; and application of appropriate avoidance, minimization, mitigation, and monitoring measures as described throughout the EA and additional protection measures that would be applied during permitting of APDs based on the analysis of site-specific development impacts.
Stephanie	Kromer	Ohio Oil & Gas Association	Socioeconomi c Resources and Environmental Justice	In addition to providing for the nation’s energy needs, OOGA’s members are significant contributors to Ohio’s economy. The oil and gas industry has generated approximately \$103 Billion in investments in Ohio since 2012 and provides nearly 200,000 Ohio jobs.	Section 3.10.1 (Affected Environment) of the SEA has been updated with a discussion about the oil and gas industry and its relationship to current economic conditions in the socioeconomic Analysis Area, including the current share of employment and average wages in the oil and gas industry compared to other industries. Sections 3.10.2.2 (Impacts of Alternative B – Proposed Action) and 3.10.3 (Cumulative Impacts) of the EA acknowledge that the workforce may be affected by the Proposed Action but do not predict whether these impacts would be negative, positive, or neutral. Section 3.10.2.2 has been updated with more current oil and gas development data and a quantitative workforce assessment has been included. However, specific workforce impacts would depend on the specific development locations proposed during the APD stage.
Stephanie	Kromer	Ohio Oil & Gas Association	Appendix E – Legal and Regulatory Authorities	As it relates to the potential environmental impacts of oil and gas exploration and production operations in the WNF, the Association notes that these operations are subject to a comprehensive suite of federal and state regulations that ensure the safe and efficient development of Ohio’s oil and gas resources. Such regulations include environmental protection requirements relating to access, facilities, cultural and historical resources, fire prevention and control, fisheries, wildlife and plant habitat, soil erosion and sedimentation, safety, management of wastes, watershed protection and reclamation. Notably, recent regulatory reform has made requirements more protective of public health and the environment. USEPA finalized a rule earlier this year that would significantly reduce methane emissions from oil/gas sources. Ohio’s Division of Oil and Gas Resources Management has recently issued new and/or amended regulations governing well site construction, casing and cementing standards, and requirements for the storage, treatment, processing, and disposal of brine and other waste substances.	Text has been added to Appendix E (Legal and Regulatory Authorities) that further describes the State of Ohio's regulatory setting associated with oil and gas permitting and development, especially objectives and standards that are in place for the protection of natural resources.

First Name	Last Name	Organization	Comment Category	Comment Text	Response
Stephanie	Kromer	Ohio Oil & Gas Association	Proposed Action	Additionally, as noted in the Supplemental EA, advancements in horizontal drilling technology have allowed producers to maximize production potential at each well site, thereby requiring significantly fewer individual well sites to yield the same production as might be had through a conventional vertical well program. Although the total surface area of a horizontal well pad site is typically greater than that of a vertical well pad site, utilization of horizontal drilling (as opposed to strictly vertical drilling) would reduce WNF habitat fragmentation.	Thank you for your comment. No specific changes/additions needed in the EA based on this comment.
Stephanie	Kromer	Ohio Oil & Gas Association	Lease Sales, Leases Issued, Leases Remanded	The Association urges BLM to affirm its prior leasing decisions involving WNF Marietta Unit parcels, regardless of whether BLM decides to authorize future leasing in the Marietta Unit. OOGA members spent millions of dollars during the 2016 and 2017 BLM auctions to acquire leasing rights to thousands of acres of federally owned minerals in the WNF Marietta Unit and have invested significant resources since then to explore and develop their interests. These companies have current and future exploration and development plans for their investments in the WNF Marietta Unit leases, including the use of horizontal drilling and hydraulic fracturing as contemplated in the Supplemental EA. Anything short of BLM affirming its prior leasing decisions is not only unjustified based on the findings in the Supplemental EA but would result in the Association’s members incurring significant additional costs or potentially losing their investment altogether. In deciding whether to affirm its prior leasing decisions, the BLM must be cognizant of the fact that the leases at issue are not the only leases that OOGA members have in the WNF. Many companies have multiple leases on private land that would be in jeopardy of not being developed if the Marietta Unit leases are revised or invalidated. Such a decision by BLM would have deleterious consequences on the Association’s members’ businesses.	Thank you for your comment. No specific changes/additions needed in the EA based on this comment.
marie	Kocoshis	Miami Group Sierra Club Ohio	NEPA Adequacy	The latest FONSI assessment was seriously flawed and did not take into account the loss of significant habitat and recreational opportunities. Among the many environmental impacts of this action by BLM are methane emissions releases, toxic radioactive waste, hazardous air pollutants. and ecological fragmentation.	The EA includes a planning level analysis of the impacts referenced in this comment. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage, the specific locations of development, types of equipment/hours of operation, emissions associated with site-specific development, and other information is unknown. During the stage 3 environmental review of site-specific APDs, the BLM would further analyze potential impacts on wildlife, wildlife habitat, and air quality based on project-specific proposals once received at the APD stage.
marie	Kocoshis	Miami Group Sierra Club Ohio	Climate	This single oil and gas project and its greenhous gas emissions would cancel out all the Wayne National Forest carbon sequestration, a critical tool in our fight for climate change.	The BLM has accounted for both direct and indirect GHG emissions using the agencies lease sale emissions tool which can be provided upon request. The results of the GHG emissions assessment can be found in Section 3.4 (Climate Impacts) and Appendix I (Air Quality and Climate Impacts Impacts). There are no established thresholds, qualitative or quantitative, for NEPA analysis to assess the greenhouse gas emissions or social cost of an action in terms of the action’s effect on the climate, incrementally or otherwise. GHG emissions enter the atmosphere and mix with other emissions at a global scale, collectively influencing climate change. Discerning local effects from a given project is not possible. There is also no scientific data in the record, including scientific data submitted during the comment period for this lease action, that would allow the BLM, in the absence of an agency carbon budget or similar standard, to evaluate the significance of the greenhouse gas emissions from this proposed lease action.

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
marie	Kocoshis	Miami Group Sierra Club Ohio	NEPA Adequacy	A full NEPA environmental review is needed. We are in agreemnet with other major environmental groups such as Center for Biological Diversitiy, OEC and Heartwood that a full NEPA environmental review is necessary. We call upon the Bureau of Land Management to perform this review before taking any action on leasing proposal.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <u>Dakota Res. Council v. U.S. Dept. of the Interior</u> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Chris	Curran		NEPA Adequacy	It is astonishing and depressing to read the Bureau of Land Management's Finding of No Significant Impact. There MUST be a full Environmental Impact Statement and true assessment of all risks to human health and the environment prior to any leases and additional energy extraction in these precious lands.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <u>Dakota Res. Council v. U.S. Dept. of the Interior</u> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Chris	Curran		Scope of Analysis	Beyond the importance and value of the Wayne National Forest for recreation and ecology, the very nature of fracking produces unacceptable risks which have not been adequately addressed to date. These include: *emerging evidence that fracking increases birth defects Sources: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10114229/ and https://pubmed.ncbi.nlm.nih.gov/37076028/ *emerging evidence that fracking increases adverse health effects Sources: https://pubmed.ncbi.nlm.nih.gov/37813252/ https://pubmed.ncbi.nlm.nih.gov/36889860/ https://pubmed.ncbi.nlm.nih.gov/35767873/	Additional text has been added to Section 3.3 (Air Resources), Section 3.6 (Water Resources), and Section 3.10 (Socioeconomics and Local Economics) to further indicate the potential health impacts of oil and gas development and potential risks to populations and communities.
Chris	Curran		NEPA Adequacy	An impartial and thorough Environmental Impact Statement must be completed, and the preliminary conclusions rejected on both their moral and scientific insufficiency.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-

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					specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Ryan	Gilliom		Water Resources	The original EA was found by the court order to be insufficient in water resources impacts analysis. Section 3.6 (Water Resources) remains deficient in consideration of water quality impacts associated with hydraulic fracturing. Section 3.6.2.2. (Impacts of Alternative B – Proposed Action) states "Groundwater and surface water quality may be impacted because of increased potential for accidental spills and contamination, erosion, and runoff." Section 3.6.2.2. (Impacts of Alternative B – Proposed Action) then refers the reader to the 2016 EA for analysis of wastewater generation and disposal. In the 2016 EA, there is still not sufficient consideration of frack waste impacts to water quality. To aid in consideration of these impacts, here is a new scientific resource that I did not see in the references list of the original and supplemental EAs. It was published in 2016, the year the original EA was submitted. (See attachment provided with citations)	Additional text has been added to Section 3.6 (Water Resources) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Ryan	Gilliom		Analysis Methods and Assumptions	In the EA, these conditions are mitigated by the assumption of all best practices being followed. That is measurably unrealistic. "The following combinations of activities and factors are more likely than others to result in more frequent or more severe impacts: -- Water withdrawals for hydraulic fracturing in times or areas of low water availability, particularly in areas with limited or declining groundwater resources; --Spills during the management of hydraulic fracturing fluids and chemicals or produced water that result in large volumes or high concentrations of chemicals reaching groundwater resources; -- Injection of hydraulic fracturing fluids into wells with inadequate mechanical integrity, allowing gases or liquids to move to groundwater resources; --Injection of hydraulic fracturing fluids directly into groundwater resources; --Discharge of inadequately treated hydraulic fracturing wastewater to surface water resources; and -Disposal or storage of hydraulic fracturing wastewater in unlined pits, resulting in contamination of groundwater resources."	Additional text has been added to Section 3.6 (Water Resources) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Ryan	Gilliom		Water Resources	Ohio has numerous actively developing water resources crises resulting from hydraulic fracturing, specifically frack wastewater disposal, spills, and groundwater contamination from injection wells. Both the Supplemental EA (3.6.2.2) and the 2016 EA (4.6.2.2) describe Ohio's regulation of brine/waste disposal as protective of water quality, and list practices that *would* be implemented to minimize risk. Regrettably there is ample and mounting evidence that these regulations are not effective, or are insufficient, at minimizing the risks associate with frack wastewater.	Additional text has been added to Section 3.6 (Water Resources) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage). In addition, text has been added to Appendix E (Legal and Regulatory Authorities) that further describes the State of Ohio regulations and standards for permitting and development of oil and gas resources in the state.

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Ryan	Gilliom		Water Resources	In April 2024, OOGC suspended 3 fracking brine disposal in Athens County for improper and harmful operation, permanently destroying drinking water resources (See attment provided with citations). Ohio State Senator Brian Chavez, former OOGC commissioner, has a company called Genesis Resources that was responsible for injection wells disposing of frack waste in a manner that spread far beyond the permitted area (See attment provided with citations). Eruptions of frack wastewater have occurred in idle oil wells impacted by injections that traveled outside the permitted area. Currently, ODNR is not holding the injectors responsible for anything, instead holding the idle well owners responsible for these spills. Even though the injectors violated their operations permit, ODNR is not holding them responsible for the water resources damage. So, in relation to the Proposed Action--would frack waste disposal be completed with the most stringent best practices, or would this part of the frack water cycle be left to play out in the existing systems that are not functioning protectively?	Additional text has been added to Section 3.6 (Water Resources) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see Dakota Res. Council v. U.S. Dept. of the Interior, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage). In addition, text has been added to Appendix E (Legal and Regulatory Authorities) that further describes the State of Ohio regulations and standards for permitting and development of oil and gas resources in the state including OAC Chapter 15:9-1-04 that provides the State of Ohio standards and requirements for the location and spacing of well sites and well bores and OAC Chapter 1501:9-3 that regulates the location, spacing, and permitting of injection wells.
Ryan	Gilliom		Water Resources	The EA fails to address the reality of how fracking and waste disposal are carried out and the associated impacts. It's difficult to estimate the probability and magnitude of these risks due data gaps, uncertainties, illicit operations, and proprietary frack fluid recipes. That lack of quantification doesn't mean these risks are negligible. The catastrophic water quality impacts of these leases is a reasonably foreseeable outcome of the proposed action, and these impacts are an unacceptable risk. Frack wastewater produced at wells on these leases is a direct effect with reasonably foreseeable harm.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. In addition, text has been added to Appendix E (Legal and Regulatory Authorities) that further describes the State of Ohio regulations and standards for permitting and development of oil and gas resources in the state.
Ericka	Copeland	Sierra Club	NEPA Adequacy	As described below, the 2024 SEA acknowledges that the Proposed Action would have a number of significant and negative impacts on human health and the environment; the SEA therefore does not support a Finding of No Significant Impact (FONSI), and BLM should proceed with the preparation of a full Environmental Impact Statement (EIS) under NEPA.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see Dakota Res. Council v. U.S. Dept. of the Interior, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Ericka	Copeland	Sierra Club	Appendix C – CBD Decision Court Orders	The stated purpose for the Proposed Action “is to respond to Expressions of Interest (EOIs) to lease federal oil and gas resources” and to address 2020 and 2021 Court Orders derived from the CBD case. However, the SEA fails to adequately respond to the court’s orders. In particular, the SEA fails to adequately take a hard look at the reasonably foreseeable impacts of hydraulic fracturing operations in the WNF, including: (1) impacts of surface-area disturbance; (2) impacts on aquatic and terrestrial wildlife; (3) impacts on the Little Muskingum River and other local water sources; and (4) impacts on air quality.	The EA takes a hard look at the potential impacts of the leasing decision and the Reasonably Foreseeable Development of those leases focusing on the deficiencies identified in the court orders and impacts associated with hydraulic fracturing that were not adequately described in the 2016 EA. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on air quality, water resources, aquatic and terrestrial wildlife, and other applicable resources based on site-specific

FIRST NAME	LAST NAME	ORGANIZATION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
					development proposals. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Ericka	Copeland	Sierra Club	Purpose and Need	The purported need for the Proposed Action derives from BLM’s responsibilities under the federal Mineral Leasing Act of 1920 and the agency’s desire to promote the “sustainable” development of domestic oil and gas reserves. It should be noted, however, that it is impossible to develop domestic oil and gas reserves without incurring significant and negative impacts on human health and the environment. Any decision by BLM to allow these activities on public lands would have serious and irreversible consequences.	As described in Section 1.2 (Purpose and Need) of the EA the BLM’s purpose is to respond to Expressions of Interest to lease federal oil and gas resources through a competitive leasing process. The need for leasing of federal minerals is established by the Mineral Leasing Act of 1920, the Mineral Leasing Act for Acquired Lands of 1947, the Federal Land Policy and Management Act of 1976, and the Energy Policy Act of 2005. These regulations establish the BLM’s mission to provide opportunities for multiple use of BLM-administered resources (including mineral development) and require the BLM to make available federal mineral resources for development to meet national, regional, and local needs. The EA recognizes the need for the BLM to promote the responsible development of oil and gas resources which is accomplished through multiple stages of environmental review as described in Section 1.2.1 (Actions to be Taken); application of legal and regulatory authorities (Appendix E, Legal and Regulatory Authorities); application of standard lease terms that require lessees to minimize environmental impacts; and application of appropriate avoidance, minimization, mitigation, and monitoring measures as described throughout the EA and additional protection measures that would be applied during permitting of APDs based on the analysis of site-specific development impacts.
Ericka	Copeland	Sierra Club	Alternatives	NEPA requires agencies to consider a reasonable range of alternatives, beyond simply the No-Action Alternative and the Proposed Action. Among the alternatives to the Proposed Action, the No-Action alternative would result in the fewest impacts on air quality, water quality and wildlife. Other alternatives should also be preferred to the Proposed Action. For example, while the SEA stipulates otherwise, the No Surface Occupancy (NSO) alternative would fulfill the purpose and need described above. It is not possible to “sustainably” develop domestic oil and gas reserves, within any meaning of that word, but it is certainly more sustainable to protect undeveloped public lands that have been preserved from previous degradations.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The CEQ regulations do not include a requirement for a specific number of alternatives in an EA. The EA considers a reasonable range of alternatives representing a scenario of no leasing in the Marietta Unit (no-action alternative) and a scenario of maximum reasonably foreseeable leasing and development (proposed action). As such, the EA analyzes a range of development and associated impacts including no leasing and development across the Marietta Unit and leasing and development of the full amount of reasonably foreseeable development identified in the RFDS. The BLM did not identify any other reasonable alternatives for detailed analysis that would meet the purpose and need, would be consistent with existing policies and regulations, and would not be substantially similar in design and effects to an alternative that is already being analyzed. As discussed in Section 2.3 (Alternatives Considered but Eliminated from Detailed Analysis) the BLM did consider a No Surface Occupancy alternative, but that alternative was not carried forward for detailed analysis due to the reasons cited in Section 2.3 (Alternatives Considered but Eliminated from Detailed Analysis).
Ericka	Copeland	Sierra Club	Cumulative Impacts - General	While BLM argues that the relative consequence of drilling from private lands is greater than activities which occur closer to the wellhead, the agency’s position ignores the possibility that other harmful activities may occur on private land, without oversight from the BLM or any other agency, and in conjunction with drilling activities on public land, potentially exacerbating the overall consequences of leasing by exponential bounds.	The cumulative impacts analysis sections in Chapter 3 (Affected Environment and Environmental Impacts) have been revised to further describe the reasonably foreseeable development on private land and the associated impacts, specifically the scenario where an operator secures a lease and begins developing surface resources on private land prior to submitting an APD to the BLM.

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Ericka	Copeland	Sierra Club	Cumulative Impacts - General	NEPA requires consideration of all reasonably foreseeable cumulative impacts; in the context of this SEA, NEPA requires a harder look at the impacts of oil and gas leasing in other areas of the WNF.	The cumulative impacts analysis sections in Chapter 3 (Affected Environment and Environmental Impacts) have been revised to further describe the reasonably foreseeable development on private land and the associated impacts, specifically the scenario where an operator secures a lease and begins developing surface resources on private land prior to submitting an APD to the BLM. The EA includes an appropriate Cumulative Impact Analysis Area (CIAA) based on the anticipated impacts of the leasing decision and reasonably foreseeable development. For the majority of resource categories in this EA, the CIAA includes the Marietta Unit of the WNF and a 4-mile buffer surrounding the unit. This area encompasses the extent of where potential impacts associated with the Proposed Action would overlap impacts from reasonably foreseeable future actions and result in cumulative impacts (Figures H-1 and H-2 in Appendix H (Past, Present, and Reasonably Foreseeable Actions). Appendix H (Past, Present, and Reasonably Foreseeable Actions) identifies those actions in the CIAAs that would contribute to cumulative effects. Also, please note that certain resource categories, as specified in their respective discussions, include a larger CIAA based on the nature of potential impacts on that resource, such as water resources, which includes a CIAA that encompasses the extent of the Hydrologic Unit Code (HUC-) 12 watersheds that intersect the Action Area.
Ericka	Copeland	Sierra Club	Air Resources	The SEA does not adequately analyze the impacts of downstream emissions on air quality; NEPA requires a harder look at foreseeable impacts such as downstream emissions, whether they are regulated by BLM or some other authority.	Downstream emissions of GHGs have been quantified and discussed in the EA (See Section 3.3, Air Resources, and Appendix I, Air Quality and Climate Impacts Impacts). There is no way for the BLM to assess where downstream criteria pollutants would occur or the timing of such emissions. Criteria pollutants and the sources that emit them are numerous and varied, but more importantly, they are regulated, permitted and controlled through air quality permits issued by state regulatory agencies. The BLM acknowledges that development of the lease parcels would result in emissions, both direct and indirect, but downstream criteria pollutant emission impacts are not reasonably foreseeable at the lease sale stage due to these unknown factors.
Ericka	Copeland	Sierra Club	Air Resources	Emissions data in the SEA appears to use a faulty baseline, extrapolating data from more “traditional” vertical wells that does not match what can be expected from horizontal wells.	The emissions estimates are not based on vertical wells. They are based on representative wells for the region and the BLM lease sale emissions tool is designed to provide conservative estimates. Emissions data are based on “representative” well for a region in addition to actual “held-by-production” data and statistics that the BLM compiles.
Ericka	Copeland	Sierra Club	Climate	The Proposed Action should be rejected because of its significant impacts on global climate change, which are expected to exceed the comparable addition of more than 30,000 gas-powered vehicles to the nation’s roads.	The BLM has accounted for both direct and indirect GHG emissions using the agencies lease sale emissions tool which can be provided upon request. The results of the GHG emissions assessment can be found in Section 3.4 (Climate Impacts) and Appendix I (Air Quality and Climate Impacts). There are no established thresholds, qualitative or quantitative, for NEPA analysis to assess the GHG emissions or social cost of an action in terms of the action’s effect on the climate, incrementally or otherwise. There is also no scientific data in the record, including scientific data submitted during the comment period for this lease action, that would allow the BLM, in the absence of an agency carbon budget or similar standard, to evaluate the significance of the GHG emissions from this proposed lease action. These methodological shortcomings prevent BLM from qualitatively comparing alternatives, and BLM has therefore not exercised its discretion to tailor this proposed lease action to account for global climate change.
Ericka	Copeland	Sierra Club	Vegetation – General	The Proposed Action would have significant and negative impacts on vegetation and rare plants.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use the EA process to determine if significant impacts would result from the proposed action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not prepare a FONSI and should instead prepare an EIS.
Ericka	Copeland	Sierra Club	Water Resources	The 2024 SEA relies on information from the preceding 2016 Environmental Assessment that remains flawed and incomplete. For example, the 2016 EA did not contain an adequate analysis of impacts associated with wastewater generation and disposal activities; the SEA is similarly deficient.	Substantial updates to the analysis have been made in the EA compared to the 2016 EA to address the deficiencies identified by the court. Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate.

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Ericka	Copeland	Sierra Club	Water Resources	The SEA asserts on page 3-55 that it “unlikely” that operators would withdraw groundwater, and then concludes that impacts to groundwater would be “negligible,” but negligible and unlikely are two completely different things, and the document should include a more detailed analysis of the threats to groundwater.	As described in Section 3.6 (Water Resources), between 2017 and 2021 there were no reported groundwater withdrawals associated with hydraulic fracturing and mineral extraction within the Little Muskingum-Middle Island HUC 8 Watershed. Most groundwater drinking wells in the Action Area produce less than 10 gallons per minute and, because of this low production rate, it is unlikely operators involved in high-volume hydraulic fracturing would utilize groundwater wells and would instead use more economic and readily available water sources. As such, impacts on groundwater from withdrawals is expected to be negligible. Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Ericka	Copeland	Sierra Club	Aquatic Wildlife	The SEA acknowledges that the Proposed Action is likely to have significant impacts on aquatic wildlife species in the region; the SEA’s contrary assertion that impacts would be “minimal” is not supported by evidence in the record. BLM should prepare an EIS to further analyze these potential impacts.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Ericka	Copeland	Sierra Club	NEPA Adequacy	The SEA lists a number of potential significant impacts on wildlife that would occur due to the Proposed Action. These impacts must be further studied in an EIS, and along with additional measures to mitigate impacts.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).

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Ericka	Copeland	Sierra Club	NEPA Adequacy	The SEA describes significant impacts on transportation in and around the WNF that must be analyzed in an EIS.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see Dakota Res. Council v. U.S. Dept. of the Interior, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Ericka	Copeland	Sierra Club	NEPA Adequacy	BLM should complete consultation processes under the Endangered Species Act, such as a Biological Assessment (BA) and other laws before finalizing the SEA. Available data indicates that the Proposed Action would have a significant impact on vegetation and rare plants in the area, and on wildlife.	The BLM is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act, including the preparation of a Biological Assessment. The BLM would complete the Section 7 consultation process prior to preparing a Decision Record and the results of the consultation, including required avoidance and minimization measures, would be included in the Decision Record for the Project.
Ericka	Copeland	Sierra Club	Lease Sales, Leases Issued, Leases Remanded	Information found in the 2024 SEA should motivate BLM to revisit past determinations for more than 60 leases in the WNF. These leases should be terminated in the interim.	As described in Section 1.2 (Purpose and Need) the BLM’s purpose is to respond to Expressions of Interest (EOIs) to lease federal oil and gas resources through a competitive leasing process and to complete a EA address certain deficiencies identified in the CBD case. Consistent with the BLM’s statutory obligation to evaluate nominated parcels and hold quarterly competitive lease sales for available oil and gas parcels, this EA would be used as a basis for evaluation of future oil and gas leasing requests in the Marietta Unit and would serve as revised NEPA analysis of the agency actions that were remanded to the BLM and USFS by the CBD decision. Revisiting past determinations and actions for other leases in the WNF is beyond the scope of this EA.
Ericka	Copeland	Sierra Club	NEPA Adequacy	The SEA acknowledges that the Proposed Action is likely to have significant impacts on aquatic wildlife species in the region; the SEA’s contrary assertion that these and other impacts would be “minimal” is not supported by evidence in the record. BLM should prepare an EIS to further analyze potential impacts. The 2024 SEA does not support a Finding of No Significant Impact (FONSI) under NEPA or a decision to allow oil and gas development in the WNF, and the Proposed Action should be rejected because of its significant impacts on air quality, water quality, wildlife and global climate change.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see Dakota Res. Council v. U.S. Dept. of the Interior, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
Nathan	Johnson	Ohio Environmental Council	Appendix B – References	I submit the enclosed documents on behalf of OEC, CBD, et al. They accompany the group comment submitted today by OEC et al. in DOI-BLM-Eastern States-M000-2023-0005-EA. (See folder WNF-Draft-606-Attachment for documents mentioned in comment)	Thank you for your comment. No specific changes to the EA needed based on this comment.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	NEPA Adequacy	The Supplemental EA fails to take a hard look at the leasing plan’s surface disturbance and forest clearing impacts on sensitive wildlife dependent on interior forest; water depletion effects on the Little Muskingum’s stream flows and aquatic species; public health harms from fracking waste; disproportionate burdens on environmental justice communities; and air quality and climate impacts	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see Dakota Res. Council v. U.S. Dept. of the Interior, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Alternatives	The Supplemental EA fails to consider a reasonable range of alternatives, only considering the “no action”/no leasing alternative and the proposed action to open up the entire Marietta Unit to oil and gas leasing.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The CEQ regulations do not include a requirement for a specific number of alternatives in an EA. The EA considers a reasonable range of alternatives representing a scenario of no leasing in the Marietta Unit (no-action alternative) and a scenario of maximum reasonably foreseeable leasing and development (proposed action). As such, the EA analyzes a range of development and associated impacts including no leasing and development across the Marietta Unit and leasing and development of the full amount of reasonably foreseeable development identified in the RFDS. The BLM did not identify any other reasonable alternatives for detailed analysis that would meet the purpose and need, would be consistent with existing policies and regulations, and would not be substantially similar in design and effects to an alternative that is already being analyzed. As discussed in Section 2.3 (Alternatives Considered but Eliminated from Detailed Analysis) the BLM did consider a No Surface Occupancy alternative, but that alternative was not carried forward for detailed analysis due to the reasons cited in Section 2.3 3 (Alternatives Considered but Eliminated from Detailed Analysis).

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Forest Plan Conformance	Furthermore, the proposed action and Supplemental EA are inconsistent with the 2006 Land and Resource Management Plan (LRMP or Forest Plan) for the Wayne National Forest.	The National Forest Management Act (NFMA) consistency provision (16 USC 1604(i)) only applies to forest plan direction contained within the plan itself, not the accompanying NEPA document. NFMA and the implementing regulations’ consistency requirements operate as a prospective control on all Forest Service contracts, permits, licenses, resource plans and activities that arise in the planning area. Somewhat like a zoning ordinance, Forest Plans often declare land suitability for certain future uses or may prohibit some uses while establishing standards and guidelines that would control future discretionary resource decisions. For plans developed under pre-2012 planning regulations, as is the case with the Wayne National Forest Plan, the consistency requirement requires the Forest Service to measure proposed activities against the Forest Plan’s standards and guidelines. All discretionary Forest Service decisions on the Wayne NF are assessed for consistency and the responsible officials may approve consistent projects, deny inconsistent projects, or amend the plan for the individual project or all future projects (essentially granting a project-specific “variance” or general amendment). It is important to note, however, that the choice amongst these options is wholly discretionary on the part of the line officer. In this situation, the new RFDS information has now been assessed; but that environmental analysis does not constitute an amendment altering the binding management direction of the forest plan, nor does that analysis compel an amendment of the forest plan. Instead, the RFDS constitutes environmental information that would continue to be used to inform future decision-making. At play here is the difference between the FS “authorizing a use” – consenting to BLM offering leases for sale, and the FS “approving a use” – issuing an approval to carry out lease activities on National Forest System land. The proposed action is for BLM to offer leases for sale in areas designated within the project area granting “exclusive rights to develop federally owned oil and gas resources”. There would be no disturbance of National Forest System surface approved from the action of leasing. Any subsequent approvals to carry out surface disturbing activities on National Forest System land would require additional administrative actions, plans, permitting, and environmental analyses by both BLM and the FS to consider the effects of those activities prior to surface disturbance occurring on the landscape. The Proposed Action is the same Proposed Action considered in the 2016 BLM EA. If the BLM approves the Proposed Action and decides to offer federal minerals in the Marietta Unit for lease, and later requests FS authorization to offer specific leases for sale (sometimes referred to as consent to leasing), the FS would consider how to respond at that time, including confirming Forest Plan consistency under 36 CFR 228.102(e). Additionally, after a lease is sold, if any lease development proposes to disturb National Forest System surface, consistency with Forest Plan direction would be further considered during the Stage 3 project-specific analysis, when design features, Conditions of Approval (COAs), and BMPs that would be applied to a site-specific project (which would include standards and guidelines from the Forest Plan) would be finalized. Should a lessee submit a detailed plan for oil and gas development on National Forest System surface, then the BLM and USFS would conduct appropriate site-specific environmental analyses and any additional required consultations. Proposals for development on NFS surface lands must be consistent with the applicable Forest Plan standards and guidelines described in Appendix F (Existing Stipulations, Notifications, Guidelines, and Standards) of the EA.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	NEPA Adequacy	Otherwise, BLM must prepare an Environmental Impact Statement (EIS) to allow the decisionmakers and public a fuller opportunity to consider and weigh in on this controversial plan.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use the EA process to determine if significant impacts would result from the proposed action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not prepare a FONSI and would instead prepare an EIS.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix D – Reasonably Foreseeable Development Scenario	The Court’s ruling in the Wayne leasing litigation faulted the 2012 SIR and Leasing EA for failing to analyze the impacts from pipeline disturbance, in either a quantitative or qualitative analysis. Specifically, the Court held that BLM failed to take a hard look at surface disturbance impacts because it only considered impacts from fracking well pads and failed to consider other relevant sources of disturbance, including “larger gathering lines.” The Supplemental EA likewise fails to meaningfully consider larger gathering lines as part of its surface disturbance analysis.	The surface disturbance estimates included in the RFDS (Appendix D) and the EA are based on a hard look projection of a possible scenario of future development of oil and gas in the Marietta Unit. The potential surface disturbance estimates in the RFDS and the EA considered pipelines (including gathering, transmission and distribution lines). The RFDS estimated surface disturbance based not on the actual width of a pipeline but rather the anticipated right-of-way (ROW) width that would be necessary to install the potential pipelines. Accordingly, small, medium and larger pipelines are included in the estimated surface disturbance presented in the RFDs as the various sized lines would all be constructed within the width of the corridors and their disturbance included in the RFDS. Surface disturbance projections in the RFDS were determined from a variety of resources, including previous oil and gas environmental assessments, recent drilling permits applications, discussion with state oil and gas personnel, discussion with a prominent operator in the WNFs, and document reviews. In response to public comment on a Draft Environmental Assessment, BLM and Ohio Department of Natural Resources (ODNR) records were reviewed to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects remain valid. Accordingly, no change to the RFDS modeled projection is necessary at this time.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix D – Reasonably Foreseeable Development Scenario	Extensive networks of gathering pipelines are required for fracking operations. Gathering pipelines “transport gases and liquids from the commodity's source - like rock formations located far below the drilling site - to a processing facility, refinery or a transmission line.” (See Attachment 2 provided with comments for citation #2)As a result of ongoing drilling activity and future growth projections, state and federal safety officials have identified new gathering pipelines associated with shale development as a potential public safety risk (See Attachment 2 provided with comments for citation #3). Some of the new gathering pipelines have larger diameters and operate at higher pressures, similar to transmission pipelines, thus posing a greater risk of explosion and catastrophic consequences in the event of an accident. According to the U.S. Government Accountability Office, “[t]he increased extraction of oil and natural gas from shale deposits poses an increased risk to the public, partly because of the development of new and larger gathering pipeline infrastructure.”(See Attachment 2 provided with comments for citation #4)	A well pad/site does not require an extensive network of gathering lines. Typically, there is one gathering pipeline for each well that transports product from the wellhead to where the commodity is being processed. Gathering lines do not go all the way down the well to the reservoir. The surface disturbance estimates included in the RFDS and the EA are based on a hard look projection of a possible scenario of future development of oil and gas in the Marietta Unit. The potential surface disturbance estimates in the RFDS and the EA considered pipelines (including gathering, transmission and distribution lines). The RFDS estimated surface disturbance based not on the actual width of a pipeline but rather the anticipated ROW width that would be necessary to install the potential pipelines. Accordingly, small, medium and larger pipelines are included in the estimated surface disturbance presented in the RFDs as the various sized lines would all be constructed within the width of the corridors and their disturbance included in the RFDS. Surface disturbance projections in the RFDS were determined from a variety of resources, including previous oil and gas environmental assessments, recent drilling permits applications, discussion with state oil and gas personnel, discussion with a prominent operator in the WNFs, and document reviews. In response to public comment on a Draft Environmental Assessment, BLM and Ohio Department of Natural Resources (ODNR) records were reviewed to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects remain valid. Accordingly, no change to the RFDS modeled projection is necessary at this time. Any safety concerns associated with pipelines proposed in site-specific permits would be addressed during the Stage 3 environmental review of APDs or the ROW applications for pipelines at the site-specific level.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix D – Reasonably Foreseeable Development Scenario	While the 2020 RFDS mentions that new and larger pipelines may be needed to service horizontal development, it nonetheless continues to assume that existing small-diameter gathering lines would minimize the need for new gathering line construction: Hydrocarbons are transported from the wellbore to the production equipment by means of varying lengths of 2-inch diameter pipe. [...] Given the long history of gas production in the WNF, there is already a well-developed pipeline infrastructure in place which should minimize the need for lengthy gathering lines to service new wells. 2020 RFDS at 30. The above is a direct quotation from the 2006 Forest Plan’s outdated FEIS at Appendix G (USFWS Recommended Measures for Avoiding and Minimizing Adverse Impacts to Federally Listed Species), page G-8. See also 2020 RFDS at 28 (stating that the surface disturbance evaluation is based on, inter alia, an assumption that existing pipelines would be used). It is unlikely, however, that existing gathering line infrastructure on the Wayne would accommodate future horizontal operations. For example, field studies conducted by The Nature Conservancy show that “the supporting infrastructure [for horizontal operations] is much larger in scale (24” diameter pipelines to gather gas from wells versus 2” or 4” pipelines in shallow fields).” (See Attachment 2 provided with comments for citation #5)And in its 2020 forest plan revision Assessment document, the Forest Service noted the likely increase in pipeline development due to increased fracking activities and larger-scale development. It also acknowledged that pipeline construction is the largest source of fracking related landscape-scale impacts: · While access roads contribute to fragmentation, pipeline construction itself causes the greatest landscape-scale impacts by creating more forest edge and reducing interior forest habitat.” (See Attachment 2 provided with comments for citation #6) · “Much of the existing oil and gas infrastructure is aging and needs replacement. In addition to new development, the Wayne is experiencing more frequent and large scale special use projects and requests associated with the replacement of old infrastructure.” (See Attachment 2 provided with comments for citation #7) · “Proliferation of higher-volume extraction coupled with the need to upgrade and replace aging utility infrastructure would place pressure on companies to invest in corridors and pipelines, which would result in increased requests for special use permits and potential for surface disturbance.” (See Attachment 2 provided with comments for citation #8)	A well pad/site does not require an extensive network of gathering lines. Typically, there is one gathering pipeline for each well that transports product from the wellhead to where the commodity is being processed. Gathering lines do not go all the way down the well to the reservoir. The surface disturbance estimates included in the RFDS and the EA are based on a hard look projection of a possible scenario of future development of oil and gas in the Marietta Unit. The potential surface disturbance estimates in the RFDS and the EA considered pipelines (including gathering, transmission and distribution lines). The RFDS estimated surface disturbance based not on the actual width of a pipeline but rather the anticipated ROW width that would be necessary to install the potential pipelines. Accordingly, small, medium and larger pipelines are included in the estimated surface disturbance presented in the RFDs as the various sized lines would all be constructed within the width of the corridors and their disturbance included in the RFDS. Surface disturbance projections in the RFDS were determined from a variety of resources, including previous oil and gas environmental assessments, recent drilling permits applications, discussion with state oil and gas personnel, discussion with a prominent operator in the WNFs, and document reviews. In response to public comment on a Draft Environmental Assessment, BLM and Ohio Department of Natural Resources (ODNR) records were reviewed to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects remain valid. Accordingly, no change to the RFDS modeled projection is necessary at this time.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix D – Reasonably Foreseeable Development Scenario	In addition, the “Rolland” well pad contains two horizontal wells that have already been drilled into federal subsurface. Notably, at PDF page 29, the Rolland well APDs list the short-term disturbance from the Rolland Pad’s new gathering lines as 68.87052 acres and the long-term disturbance as 34.43526 acres.	In response to public comment on a Draft Environmental Assessment, BLM and Ohio Department of Natural Resources (ODNR) records were reviewed to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects remain valid. Accordingly, no change to the RFDS modeled projection is necessary at this time.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix D – Reasonably Foreseeable Development Scenario	In light of the foregoing, the agencies’ continued assumption that aging, small-diameter gathering lines would minimize new gathering line construction surface disturbance is unsupported, and prevents the agencies from taking the required NEPA hard look at possibly the largest source of surface disturbance impacts caused by this project. The agencies should revisit this important factor with meaningful NEPA analysis.	The surface disturbance estimates included in the RFDS and the EA are based on a hard look projection of a possible scenario of future development of oil and gas in the Marietta Unit. The potential surface disturbance estimates in the RFDS and the EA considered pipelines (including gathering, transmission and distribution lines). The RFDS estimated surface disturbance based not on the actual width of a pipeline but rather the anticipated ROW width that would be necessary to install the potential pipelines. Accordingly, small, medium and larger pipelines are included in the estimated surface disturbance presented in the RFDs as the various sized lines would all be constructed within the width of the corridors and their disturbance included in the RFDS. Surface disturbance projections in the RFDS were determined from a variety of resources, including previous oil and gas environmental assessments, recent drilling permits applications, discussion with state oil and gas personnel, discussion with a prominent operator in the WNFs, and document reviews. In response to public comment on a Draft Environmental Assessment, BLM and Ohio Department of Natural Resources (ODNR) records were reviewed to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects remain valid. Accordingly, no change to the RFDS modeled projection is necessary at this time.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix D – Reasonably Foreseeable Development Scenario	The leasing of approximately 40,000 acres of WNF subsurface would likely result in significant surface impacts from new drilling and hydraulic fracturing – the amount and nature of which the agency has not adequately examined. The NEPA documentation for the proposed leasing fails to accurately estimate the total surface disturbance associated with each well pad, including gathering lines, thereby precluding a complete analysis and disclosure of soil, water quality, vegetation, and wildlife impacts.	The RFDS follows BLM policy and guidance and a careful projection of possible future activities, based on specific assumptions including geology, resource occurrence potential, past and current leasing, past and current exploration and development activity, and engineering technology available at the time of analysis. The RFDS process included information acquisition from federal and state agency databases and other sources, information compilation, analysis including modeling by a BLM economist, and peer review. A RFDS is a technical report and not a planning decision and is intended to inform the NEPA process, providing technical information needed in the review and evaluation of management direction and alternatives for land use planning. In response to public comment on a Draft Environmental Assessment, BLM reviewed its own records and records of the Ohio Department of Natural Resources (ODNR) to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects in the EA remain valid. Accordingly, no change to the RFDS projection is necessary at this time.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix D – Reasonably Foreseeable Development Scenario	The Draft Supplemental EA, relying on the 2020 Reasonably Foreseeable Development Scenario (RFDS), estimates that up to 29 horizontal well pads would be constructed and up to 81 horizontal wells would be drilled within the Action Area between 2020 and 2034. Draft Supplemental EA at 2-4. The Draft Supplemental EA estimates that horizontal well pads in southeastern Ohio have ranged in disturbance acreage from 6 to 35 acres, including access roads and pipelines. Id. And the Draft Supp. EA estimates that, after regrading and seeding, horizontal well pads have a “long-term” surface disturbance of 3 to 10 acres. (See Attachment 2 provided with comments for citation #8). However, no data is cited in support of these figures, and as discussed above, the agency’s figures likely substantially underestimate surface disturbance from new gathering line construction. Moreover, the acreage disturbance ranges postulated by the agencies are directly contradicted by evidence before them. Specifically, existing federal horizontal leases from the Action Area demonstrate a far larger surface disturbance footprint than the Draft Supplemental EA’s estimates. For example, Applications for Permits to Drill (APDs) for the two Rolland Wells show that the combined short-term disturbance from the Rolland pad, road, and pipeline totals 103.460526 acres, and the combined long-term disturbance totals 69.02526 acres. (See Attachment 2 provided with comments for citation #9). The agencies must account for this contradictory information and adjust their surface disturbance estimates accordingly.	The RFDS follows BLM policy and guidance and a careful projection of possible future activities, based on specific assumptions including geology, resource occurrence potential, past and current leasing, past and current exploration and development activity, and engineering technology available at the time of analysis. The RFDS process included information acquisition from federal and state agency databases and other sources, information compilation, analysis including modeling by a BLM economist, and peer review. A RFDS is a technical report and not a planning decision and is intended to inform the NEPA process, providing technical information needed in the review and evaluation of management direction and alternatives for land use planning. In response to public comment on a Draft Environmental Assessment, BLM reviewed its own records and records of the Ohio Department of Natural Resources (ODNR) to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects in the EA remain valid. Accordingly, no change to the RFDS projection is necessary at this time.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Forest Plan Conformance	Based on its individual well pad disturbance estimates, the DSEA further estimates that leasing federal minerals would result in total surface disturbance of between 171 and 998 new acres of initial disturbance and 86 to 285 acres of longer-term disturbance remaining after interim reclamation and until final reclamation of the pad, access roads, and other infrastructure is complete. DSEA at 2-5. As outlined above, these figures likely substantially underestimate the potential extent of surface disturbance associated with the Proposed Action. Even if taken at face value, however, these figures show that the Proposed Action is inconsistent with the 2006 Forest Plan.	The RFDS follows BLM policy and guidance and a careful projection of possible future activities, based on specific assumptions including geology, resource occurrence potential, past and current leasing, past and current exploration and development activity, and engineering technology available at the time of analysis. The RFDS process included information acquisition from federal and state agency databases and other sources, information compilation, analysis including modeling by a BLM economist, and peer review. A RFDS is a technical report and not a planning decision and is intended to inform the NEPA process, providing technical information needed in the review and evaluation of management direction and alternatives for land use planning. In response to public comment on a Draft Environmental Assessment, BLM reviewed its own records and records of the Ohio Department of Natural Resources (ODNR) to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects in the EA remain valid. Accordingly, no change to the RFDS projection is necessary at this time. The NFMA’s consistency provision (16 USC 1604(i)), only applies to forest plan direction contained within the plan itself, not the accompanying NEPA document. NFMA and the implementing regulations’ consistency requirements operate as a prospective control on all Forest Service contracts, permits, licenses, resource plans and activities that arise in the planning area. Somewhat like a zoning ordinance, LMPs often declare land suitability for certain future uses or may prohibit some uses while establishing standards and guidelines that would control future discretionary resource decisions. For plans developed under pre-2012 planning regulations, as is the case with the Wayne LMP, the consistency requirement requires the Forest Service to measure proposed activities against the LMP’s standards and guidelines. All discretionary Forest Service decisions on the Wayne NF are assessed for consistency and the responsible officials may approve consistent projects, deny inconsistent projects, or amend the plan for the individual project or all future projects (essentially granting a project-specific “variance” or general amendment). It is important to note, however, that the choice amongst these options is wholly discretionary on the part of the line officer. In this situation, the new RFDS information has now been assessed; but that environmental analysis does not constitute an amendment altering the binding management direction of the forest plan, nor does that analysis compel an amendment of the forest plan. Instead, the RFDS constitutes environmental information that would continue to be used to inform future decision-making. There is a difference between the FS “authorizing a use” – consenting to BLM offering leases for sale, and the FS “approving a use” – issuing an approval to carry out lease activities on National Forest System land. The proposed action is for BLM to offer leases for sale in areas designated within the project area granting “exclusive rights to develop federally owned oil and gas resources”. There would be no disturbance of National Forest System surface approved from the action of leasing. Any subsequent approvals to carry out surface disturbing activities on National Forest System land would require additional administrative actions, plans, permitting, and environmental analyses by both BLM and the FS to consider the effects of those activities prior to surface disturbance occurring on the landscape. The Proposed Action is the same Proposed Action considered in the 2016 BLM EA. If the BLM approves the Proposed Action and decides to offer federal minerals in the Marietta Unit for lease, and later requests FS authorization to offer specific leases for sale (sometimes referred to as consent to leasing), the FS would consider how to respond at that time, including confirming Forest Plan consistency under 36 CFR 228.102(e). Additionally, after a lease is sold, if any lease development proposes to disturb National Forest System surface, consistency with Forest Plan direction would be further considered during the Stage 3 project-specific analysis, when design features, COAs, and BMPs that would be applied to a site-specific project (which would include standards and guidelines from the Forest Plan) would be finalized (Draft EA, p. 1-8). Should a lessee submit a detailed plan for oil and gas development on National Forest System surface, then the BLM and USFS would conduct appropriate site-specific environmental analyses and any additional required consultations. Proposals for development on NFS surface lands must be consistent with the applicable Forest Plan standards and guidelines (Draft EA, p. 10-11).

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Forest Plan Conformance	The 2006 Forest Plan and Final EIS estimated 135 acres of short-term disturbance and 59 acres of long-term, post-reclamation disturbance from oil and gas well sites in the Marietta Unit. (See Attachment 2 provided with comments for citation #10) These estimates are far lower than those now advanced in the DSEA. As former Wayne National Forest Supervisor Anne Carey noted in the 2012 SIR, an accurate surface disturbance analysis is critical because the validity of the Forest Plan and Forest Plan EIS hang on that analysis and the upper limits of disturbance considered therein: Per the 2012 SIR, it is unlikely that, for the foreseeable future, drilling disturbance would exceed the acreage envisioned in the existing analysis. This is important, since the biological documents for the Forest Plan (EIS Appendices F1-F3) considered the effects of oil and gas activities on wildlife and plant resources up to the projected acres. (See Attachment 2 provided with comments for citation #11) In other words, the biological analyses that the 2006 plan was in substantial part based on were themselves based on these pre-horizontal drilling estimates. As noted in the 2012 SIR, the 2006 Forest Plan and EIS considered the forest-wide 272 acres of initial disturbance and 121 acres of disturbance after site reclamation to be the “upper limits for the first decade of the Forest Plan [2006-2016].” (See Attachment 2 provided with comments for citation #12)	A SIR is a document the Forest Service can use to determine whether additional NEPA analysis is needed. The 2012 SIR was not itself a NEPA analysis; it was a review of existing documentation that led to a conclusion that no further NEPA analysis needed to be undertaken when high-volume hydraulic fracturing became economically viable on the Wayne National Forest. What former Forest Supervisor Carey wrote was: ““It is unlikely that, for the foreseeable future, drilling disturbance would exceed the acreage envisioned in the existing analysis. This is important, since the biological documents for the Forest Plan (see Forest Plan EIS Appendices F1-F3) considered the effects of oil and gas activities on wildlife and plant resources up to the projected acres.” The commenter also notes that Supervisor Carey stated that the decision not to perform further analysis would be revisited if development levels approached those discussed in the 2004 RFDS. However, this discussion in the wake of the 2012 SIR is no longer relevant. The Court has now directed that additional analysis of HVHF is needed. The current EA and BA are undertaking that analysis. At the time the SIR was written, Supervisor Carey referred to additional NEPA analysis being undertaken as part of a Forest Plan revision. But the agencies’ current approach is to perform a EA separate from the Plan to take a hard look at HVHF and use that EA to support BLM’s consideration of whether to approve the Proposed Action of offering leasing and the Forest Service’s consideration of any future requests for authorization to offer specific leases under 36 CFR 228.102(e). Supervisor Carey’s statements in reference to the 2012 SIR do not call into question the validity of the Forest Plan or its EIS. Rather, they emphasize the importance of having accurate information when performing project-level, environmental effects analyses prepared under the framework and guidance of the Forest Plan. The difference between the 2020 RFDS’s updated estimates of surface disturbances for the coming years and the 2004 RFDS’s estimates for the first 10 years of the 2006 Forest Plan does not automatically drive a need for a Plan revision or amendment. The surface disturbance acreage estimates contained in the plan’s 2006 Final EIS were used to conduct the environmental impact analysis and for the FWS ESA consultation for the 2006 plan revision. Over the life of the Forest Plan, numerous projects and activities are proposed and executed over the years to implement the direction within the Plan. In cases where a project may potentially cause environmental effects outside of the maximum range of the impacts evaluated within the Plan’s Final EIS, these projects are subjected to additional analysis at the planning area scale and they are further consulted upon with the FWS. The Draft EA has evaluated the potential environmental effects at a landscape scale using more up-to-date information than was available at the time of the 2006 plan revision, and consultation was reinitiated with the FWS on the Proposed Action. It is true the projection of total potential acreage affected in the 2020 RFDS (for 2020 - 2034) is higher than that predicted in the 2004 RFDS (for its subsequent 10 years) and discussed in the Plan’s EIS. It would be an incorrect assumption that all future disturbed acres would be on NFS surface. This assumption is incorrect as the disturbance totals estimated within the 2020 RFDS are the total surface disturbances anticipated from all future well drilling within the Action Area, including that done on private land, state land, and USFS land. (In contrast, the 2004 RFDS projection for surface disturbance was for federal surface only.) Almost all wells projected in the 2020 RFDS are anticipated to be horizontally drilled gas wells built on non-federal surface. Forest Plan direction applies only to NFS surface within the plan area. Surface disturbance on NFS lands is expected to be well below the total amount of estimated surface disturbance within the Draft EA, as well as below the upper limits referenced in the Forest Plan’s Final EIS.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Forest Plan Conformance	The Draft Supplemental EA fails to acknowledge or consider the disconnect between the upper limit estimates that informed the Forest Plan and the acreage findings of the 2020 RFDS (175 to 998 acres versus 135 acres of “short-term” disturbance, and 86 to 285 acres versus 59 acres of “long-term” disturbance in the Marietta Unit). The agencies must acknowledge and fully address this inconsistency. 36 C.F.R. § 228.102(e) (“If there is inconsistency with the Forest land and resource management plan, no authorization for leasing shall be given unless the plan is amended or revised.”). This prospect was expressly advanced in the 2012 SIR: If the combination of horizontal and vertical well activity approaches the analyzed acreage totals (272 acres and 121 acres), or the potential effects of specific well proposals are outside of those predicted in the existing EIS, I would then determine whether to suspend leasing activity, revise the Forest Plan EIS or amend the Forest Plan. (See Attachment 2 provided with comments for citation #13)	The RFDS is a predictive analytical tool the FS and BLM use to assess potential future development, but it does not constitute or operate as a substantive limitation under the Mineral Leasing Act, National Forest Management Act or NEPA. The Forest Plan did not restrict development to the amounts projected in the RFDS, nor did the FEIS state the analysis would become invalid should development exceed the RFDS projections in the future. The updated 2020 RFDS contains revised projections for 2020 to 2034. This is not an inconsistency with the 2004 RFDS; rather, it simply reflects updated information. To the extent additional analysis is needed considering the new RFDS estimates, it has been considered in the current EA, BA, and consultation with FWS. The NFMA’s consistency provision (16 USC 1604(i)), only applies to forest plan direction contained within the plan itself, not the accompanying NEPA document. NFMA and the implementing regulations’ consistency requirements operate as a prospective control on all Forest Service contracts, permits, licenses, resource plans and activities that arise in the planning area. Somewhat like a zoning ordinance, LMPs often declare land suitability for certain future uses or may prohibit some uses while establishing standards and guidelines that would control future discretionary resource decisions. For plans developed under pre-2012 planning regulations, as is the case with the Wayne LMP, the consistency requirement requires the Forest Service to measure proposed activities against the LMP’s standards and guidelines. All discretionary Forest Service decisions on the Wayne NF are assessed for consistency and the responsible officials may approve consistent projects, deny inconsistent projects, or amend the plan for the individual project or all future projects (essentially granting a project-specific “variance” or general amendment). It is important to note, however, that the choice amongst these options is wholly discretionary on the part of the line officer. In this situation, the new RFDS information has now been assessed; but that environmental analysis does not constitute an amendment altering the binding management direction of the forest plan, nor does that analysis compel an amendment of the forest plan. Instead, the RFDS constitutes environmental information that would continue to be used to inform future decision-making. A key consideration is the difference between the FS “authorizing a use” – consenting to BLM offering leases for sale, and the FS “approving a use” – issuing an approval to carry out lease activities on National Forest System land. The proposed action is for BLM to offer leases for sale in areas designated within the project area granting “exclusive rights to develop federally owned oil and gas resources”. There would be no disturbance of National Forest System surface approved from the action of leasing. Any subsequent approvals to carry out surface disturbing activities on National Forest System land would require additional administrative actions, plans, permitting, and environmental analyses by both BLM and the FS to consider the effects of those activities prior to surface disturbance occurring on the landscape. The Proposed Action is the same Proposed Action considered in the 2016 BLM EA. If the BLM approves the Proposed Action and decides to offer federal minerals in the Marietta Unit for lease, and later requests FS authorization to offer specific leases for sale (sometimes referred to as consent to leasing), the FS would consider how to respond at that time, including confirming Forest Plan consistency under 36 CFR 228.102(e). Additionally, after a lease is sold, if any lease development proposes to disturb National Forest System surface, consistency with Forest Plan direction would be further considered during the Stage 3 project-specific analysis, when design features, COAs, and BMPs that would be applied to a site-specific project (which would include standards and guidelines from the Forest Plan) would be finalized (Draft EA, p. 1-8). Should a lessee submit a detailed plan for oil and gas development on National Forest System surface, then the BLM and USFS would conduct appropriate site-specific environmental analyses and any additional required consultations. Proposals for development on NFS surface lands must be consistent with the applicable Forest Plan standards and guidelines (Draft EA, p. 10-11).

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix D – Reasonably Foreseeable Development Scenario	The 2020 RFDS and the Supplemental EA substantially underestimate the number of wells per well pad. The 2020 RFDS assumes an average of three wells per well pad for recently drilled gas wells in the area, based on a review of ODNR and AFMSS data. 2020 RFDS at 36, citing Ohio Department of Natural Resources Division of Oil and Gas Resources Management (ODNR), 2019c, 2018 Ohio Oil and Gas Summary; (AFMSS, 2020) Automated Fluid Mineral Support System (AFMSS), 2020, BLM well Data inquiry. Elsewhere, however, the 2020 RFDS notes that unconventional well pads in the area of the WNF may contain up to eighteen or more wells. 2020 RFDS at 28. See also Mineral Resources Assessment Supplemental Report, at 4 (“Well pads to support unconventional wells are typically larger, ranging from 20 up to 35 acres in size. Pad size is location dependent, and the pads can support multiple wells (up to about 20).”). At page 36 the 2020 RFDS explains its three well per pad assumption: This forecast assumes three producing wells (three wells for predictive modelling although technology may result in additional wells from a single pad) would be located on each new drilling site and one of these wells would include Federal minerals. This is the average number of wells per well pad for recently drilled gas wells in the area based on review of ODNR and AFMSS data (see section 6.2). We recently reviewed the ODNR data and the AFMSS database referenced in the above quotation from the 2020 RFDS. Per our recent search of BLM’s Automated Fluid Mineral Support System (AFMSS), there are 6 producing horizontal wells that have been drilled into federal (national forest) subsurface in the Action Area. The corresponding AFMSS spreadsheet is included with this filing. These 6 horizontal wells are split between two well pads, “Forni” and “Rolland,” for an average of 3 “federal” wells per pad. However, our review of the State of Ohio’s online Oil & Gas Well Locator (See Attachment 2 provided with comments for citation #14) shows that the Rolland pad contains 6 horizontal wells and the Forni pad contains 5 horizontal wells in total. The same database also shows a total of 117 horizontal well pads in Monroe County with an average of slightly over 5 wells per pad. A corresponding spreadsheet and illustrative map are included with this filing. See Attachment 2 provided with comments for citation #15)	The RFDS follows BLM policy and guidance and a careful projection of possible future activities, based on specific assumptions including geology, resource occurrence potential, past and current leasing, past and current exploration and development activity, and engineering technology available at the time of analysis. The RFDS process included information acquisition from federal and state agency databases and other sources, information compilation, analysis including modeling by a BLM economist, and peer review. A RFDS is a technical report and not a planning decision and is intended to inform the NEPA process, providing technical information needed in the review and evaluation of management direction and alternatives for land use planning. In response to public comment on a Draft Environmental Assessment, BLM reviewed its own records and records of the Ohio Department of Natural Resources (ODNR) to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects in the EA remain valid. Accordingly, no change to the RFDS projection is necessary at this time.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix D – Reasonably Foreseeable Development Scenario	In addition to the AMFSS, the 2020 RFDS also cites the 2018 Ohio Oil and Gas Summary as support for the 3 wells per pad assumption. However, we were unable to glean any wells per pad information from this document. The 2018 Summary does, however, mention that the lengths of horizontal well laterals “keep increasing,” with the longest well in Ohio’s history being drilled in Monroe County in 2018: The lengths of horizontal wells keep increasing. There were 149 horizontal wells drilled greater than 20,000 feet, compared to 125 wells in 2017. In 2018, three wells were drilled greater than 30,000 feet. In Monroe County, a horizontal well (D. Roth #8H, Permit # 24812) was drilled 30,676 feet into the Point Pleasant Shale, making it the longest well ever drilled in Ohio. The former longest well was 28,843 in Belmont County in 2017. The 2020 Ohio Oil and Gas Summary (which appears to be the most recent report in the series) reports that the trend of longer wells continued, with a new Monroe County well topping the 2018 record holder for the longest well ever drilled in Ohio: Longer horizontal wells continued to be drilled. There were 113 horizontal wells drilled greater than 20,000 feet, compared to 146 wells in 2019. In 2020, one well was drilled greater than 30,000 feet. In Monroe County, a horizontal well (Weflers# U1H, Permit # 24889) was drilled 31,036 feet into the Point Pleasant Shale, making it the longest well ever drilled in Ohio. The previous longest well was 30,676 feet in Monroe County in 2018.The Accordingly, the 2020 RFDS’s estimate of 3 wells per pad is outdated and inaccurate. The most recent data shows that the local average is 5 horizontal wells per pad. The 2020 RFDS’s low well per pad estimate and modelling assumption likely skews the Supplemental EA’s water, air, climate, and biological impact estimates substantially lower than they actually would be. BLM should prepare an updated RFDS with the new information available to it and revisit and update the Supplemental EA accordingly.	The RFDS follows BLM policy and guidance and a careful projection of possible future activities, based on specific assumptions including geology, resource occurrence potential, past and current leasing, past and current exploration and development activity, and engineering technology available at the time of analysis. The RFDS process included information acquisition from federal and state agency databases and other sources, information compilation, analysis including modeling by a BLM economist, and peer review. A RFDS is a technical report and not a planning decision and is intended to inform the NEPA process, providing technical information needed in the review and evaluation of management direction and alternatives for land use planning. In response to public comment on a Draft Environmental Assessment, BLM reviewed its own records and records of the Ohio Department of Natural Resources (ODNR) to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects in the EA remain valid. Accordingly, no change to the RFDS projection is necessary at this time.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife – Special Status Species	The EA notes that a number of federally protected terrestrial species potentially occur in the action area, including the ESA-listed endangered Indiana bat and Northern long-eared bat; the tricolored bat, a species proposed for listing as endangered; the monarch butterfly, a candidate species for listing; and the Bald Eagle, which is protected under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. In addition, a number of Regional Forester Sensitive Terrestrial Species have the potential to occur in the action area: Eastern Whip-poorwould, Ruffed Grouse, Northern Bobwhite, Red-headed Woodpecker, Prairie Warbler, Eastern Meadowlark, Grasshopper Sparrow, Henslow’s Sparrow, Cerulean Warbler, Hoary Bat, Little Brown Bat, Timber Rattlesnake, Northern Metalmark, and Appalachian Grizzled Skipper. The EA, however, fails to take a hard look at the proposed Leasing Plan’s impacts on these protected species. The EA fails to conduct baseline studies to determine the extent of these species’ occurrence or their habitat in the Wayne; limits its analysis to the effects of direct habitat loss without analyzing the potential for indirect habitat loss from habitat fragmentation; fails to meaningfully analyze effects on particularly sensitive species like the Cerulean Warbler, Indiana Bat, and Northern Long-Eared Bat; and fails to address both potential conflicts with Forest Plan management goals, objectives, and standards to protect these species and how those conflicts would be reconciled. Further, the proposed Leasing Plan would result in “take” of the listed and candidate bat species. Take is a risk especially because the Leasing Plan would induce development on private surface that would not be subject to any concrete standards aimed at avoiding and minimizing take. BLM admits that it would have no ability to control private development to access federal minerals, and that no Section 7 consultation would occur if that private development occurs before the operator applies for an APD.	The BLM is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act, including the preparation of a Biological Assessment. The BLM intends to complete the Section 7 consultation process prior to preparing a Decision Record and the results of the consultation, including required avoidance and minimization measures, would be included in the Decision Record. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage, the specific locations of development and the associated site-specific disturbance/impacts are unknown and conducting comprehensive surveys for wildlife, bats, mussels, and other resources across the entirety of the approximately 267,961-acre Marietta Unit (64,659 acres of Forest Service surface) is not reasonable or feasible. For leases that proceed to development, developers or operators who secured leases are required to submit APDs to the BLM as part of the Stage 3 environmental review and analysis, which typically include on-the-ground, site-specific field evaluation and surveys by BLM, and USFS if the project is on NFS surface. During the Stage 3 environmental review of APDs, and once proposed development locations are known, the BLM would require appropriate site-specific surveys for wildlife, bats, and other resources to inform the site-specific Stage 3 environmental review and to understand project-specific impacts and their significance. Depending on the site-specific surveys and analysis in the Stage 3 environmental review, the BLM may consider and apply additional alternatives, design features, best management practices, mitigation, and monitoring that would be required as part of the APD authorization process to avoid, reduce, and minimize potential impacts to the range of resources. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife – General	The EA fails to document any site-specific surveys to determine where wildlife and other bat species or suitable habitat are located in the Wayne National Forest. In order to properly assess the potential environmental impacts of a proposed action, it is first necessary to assess the affected environment. See 40 C.F.R. § 1502.15. Without this analysis, the EA cannot inform the public regarding which specific areas terrestrial species occur or are likely to occur and need protection, and what protections are needed on specific lands proposed for lease. For example, without surveys the Forest Service cannot fairly and accurately conclude that no bat maternity colonies are present or whether lease stipulations to protect those areas should be required. But the EA states without explanation that “suitable habitat for the bat species has not been delineated in the Action Area.” (See Attachment 2 provided with comments for citation #16)	As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage, the specific locations of development and the associated site-specific disturbance/impacts are unknown and conducting comprehensive surveys for wildlife, bats, mussels, and other resources across the entirety of the approximately 267,961-acre Marietta Unit (64,659 acres of Forest Service surface) is not reasonable or feasible. For leases that proceed to development, developers or operators who secured leases are required to submit APDs to the BLM as part of the Stage 3 environmental review and analysis, which typically include on-the-ground, site-specific field evaluation and surveys by BLM, and USFS if the project is on NFS surface. During the Stage 3 environmental review of APDs, and once proposed development locations are known, the BLM would require appropriate site-specific surveys for wildlife, bats, and other resources to inform the site-specific Stage 3 environmental review and to understand project-specific impacts and their significance. Depending on the site-specific surveys and analysis in the Stage 3 environmental review, the BLM may consider and apply additional alternatives, design features, best management practices, mitigation, and monitoring that would be required as part of the APD authorization process to avoid, reduce, and minimize potential impacts to the range of resources. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	NEPA Adequacy	Mitigation measures, while necessary, are not alone sufficient to meet an agency’s NEPA obligations to determine the project’s impacts before a project is approved. (See Attachment 2 provided with comments for citation #17) Although they may help alleviate impacts after the project is implemented, they do not help to evaluate and understand the impact before the project occurs. (See Attachment 2 provided with comments for citation #18) By not obtaining and disclosing information about bat maternity colonies and other habitat prior to implementing the project and instead relying on mitigation measures that may or may not occur in the future, BLM has not given the Leasing Plan the necessary “hard look” under NEPA.	As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage, the specific locations of development and the associated site-specific disturbance/impacts are unknown and conducting comprehensive surveys for wildlife, bats, mussels, and other resources across the entirety of the approximately 267,961-acre Marietta Unit (64,659 acres of Forest Service surface) is not reasonable or feasible. For leases that proceed to development, developers or operators who secured leases are required to submit APDs to the BLM as part of the Stage 3 environmental review and analysis, which typically include on-the-ground, site-specific field evaluation and surveys by BLM, and USFS if the project is on NFS surface. During the Stage 3 environmental review of APDs, and once proposed development locations are known, the BLM would require appropriate site-specific surveys for wildlife, bats, and other resources to inform the site-specific Stage 3 environmental review and to understand project-specific impacts and their significance. Depending on the site-specific surveys and analysis in the Stage 3 environmental review, the BLM may consider and apply additional alternatives, design features, best management practices, mitigation, and monitoring that would be required as part of the APD authorization process to avoid, reduce, and minimize potential impacts to the range of resources. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife - General	The EA minimizes the potential for habitat loss, noting that short-term disturbance from the Leasing Plan would only affect 998 acres or 0.2 percent of the Action Area. It projects long-term disturbance—the disturbance remaining after interim reclamation and lasting over 20 to 30 years—would affect 0.05 percent of the Action Area.(See Attachment 2 provided with comments for citation #19) The EA calls this habitat loss and the effects on terrestrial species “minimal.” However, not only does the EA underestimate the Plan’s surface disturbance effects, as described above, it entirely fails to acknowledge the potential for significant indirect habitat loss from habitat fragmentation and edge effects. One recent study found that direct habitat loss in interior forests from shale gas development in West Virginia resulted in indirect habitat loss of more than 40 times the direct habitat loss: The majority of development in our study area occurred since 2010 (Slonecker et al., 2013) resulting in almost 4% loss of core forest within 6 years. Similar to other studies, we found that while a small portion of the total land area (<0.1%) was directly converted for infrastructure, indirect impacts caused by habitat fragmentation were far greater (Racicot et al., 2014; Moran et al., 2015; Slonecker and Milheim, 2015). (See Attachment 2 provided with comments for citation #20) Another analysis that we have previously raised shows that 9 acres of direct habitat loss from well pads and other infrastructure, would result in indirect habitat loss from edge effects averaging 21 acres—or a total of 30 acres of habitat loss.” (See Attachment 2 provided with comments for citation #21) Further, each mile of a 100-foot right-of-way directly disturbs 528,000 square feet or approximately 12 acres and creates an additional 72 acres of new forest edges. (See Attachment 2 provided with comments for citation #22) This indirect habitat loss results from interior forest species avoiding areas close to roads or other development, and preferring areas buffered by forest (at least 100 meters). (See Attachment 2 provided with comments for citation #23) The study found that the greatest source of these fragmentation effects were pipelines, but the EA fails to even acknowledge the potential for the Leasing Plan to induce additional gathering line development. Pipeline right-of ways are particularly fragmenting because they are generally wider than roads. In one study researchers observed that birds crossed forest roads more frequently than pipelines along roads “indicating the expanded corridor fragmented habitat more than narrow forest roads.” (See Attachment 2 provided with comments for citation #24)	Additional text has been added to Section 3.8 (Terrestrial Wildlife) in the EA indicating the potential for impacts to wildlife due to habitat fragmentation and edge effects. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with habitat fragmentation and edge effects based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u> Regarding the disturbance from gathering lines, the potential surface disturbance estimates in the RFDS and the EA considered pipelines (including gathering, transmission and distribution lines). The RFDS estimated surface disturbance based not on the actual width of a pipeline but rather the anticipated ROW width that would be necessary to install the potential pipelines. Accordingly, small, medium and larger pipelines are included in the estimated surface disturbance presented in the RFDS as the various sized lines would all be constructed within the width of the corridors and their disturbance included in the RFDS. Surface disturbance projections in the RFDS were determined from a variety of resources, including previous oil and gas environmental assessments, recent drilling permits applications, discussion with state oil and gas personnel, discussion with a prominent operator in the WNF, and document reviews. In response to public comment on a Draft Environmental Assessment, BLM and Ohio Department of Natural Resources (ODNR) records were reviewed to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects remain valid. Accordingly, no change to the RFDS modeled projection is necessary at this time.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife - General	The EA’s failure to consider fragmentation and edge effects results in the failure to analyze a host of other fragmentation-related effects. Forest edges created by pipeline/utility corridors or roads can cause higher rates of predation compared to interior forest for some species; create barriers that birds or other wildlife would not cross, restricting movement; alter home ranges; reduce gene flow and genetic diversity; and facilitate invasion of exotic species in previously inaccessible areas. (See Attachment 2 provided with comments for citation #25) Contrary to the EA’s suggestion that habitat loss would only last up to 30 years, these losses are likely to be permanent. “For example, pipeline rights-of-way are regularly mowed to prevent tree and shrub growth that may damage buried pipes. Similar to conventional gas development that is still evident on the landscape after many decades (Slonecker and Milheim, 2015), the persistence of land cover change and great dissimilarity between developed areas and the surrounding forest results in a low probability that disturbed areas would revert back to a natural state in the near future (Marzluff and Ewing, 2001).” (See Attachment 2 provided with comments for citation #26) The potential for permanent direct habitat loss to cause significant indirect habitat loss must be addressed in an EIS.	Additional text has been added to Section 3.8 (Terrestrial Wildlife) in the EA indicating the potential for impacts to wildlife due to habitat fragmentation and edge effects. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with habitat fragmentation and edge effects based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife – General	The EA makes no effort to address the unique biological needs of individual terrestrial wildlife species, their life cycles, their specific habitat needs, past, present, and future threats, or population trends. No consideration is given to how the leasing proposal may impact local populations and habitat even if the project would result in removal of a comparatively small amount of the entire forest cover.	As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage, the specific locations of development and the associated site-specific disturbance/impacts to biological resource are unknown and conducting comprehensive surveys for wildlife, bats, mussels, and other resources across the entirety of the approximately 267,961-acre Marietta Unit (64,659 acres of Forest Service surface) is not reasonable or feasible. For leases that proceed to development, developers or operators who secured leases are required to submit APDs to the BLM as part of the Stage 3 environmental review and analysis, which typically include on-the-ground, site-specific field evaluation and surveys by BLM, and USFS if the project is on NFS surface. During the Stage 3 environmental review of APDs, and once proposed development locations are known, the BLM would require appropriate site-specific surveys for wildlife, bats, and other resources to inform the site-specific Stage 3 environmental review and to understand project-specific impacts to specific wildlife locations/habitat and their significance. Depending on the site-specific surveys and analysis in the Stage 3 environmental review, the BLM may consider and apply additional alternatives, design features, best management practices, mitigation, and monitoring that would be required as part of the APD authorization process to avoid, reduce, and minimize potential impacts to the range of resources. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife – General	In addition, the EA must address how the leasing plan would conflict with the forest’s goals and objectives for managing these species (terrestrial species) and how management of these species fits within larger national forest system and other federal plans and policies for wildlife management.	The Record of Decision approving the Forest Plan made all federally owned minerals in the WNF administratively available to be leased (EA, p. 1-6). National Forests are managed under a multiple use requirement (36 CFR 219.10), and oil & gas development is one of many potential uses of NFS lands that the Wayne National Forest is required to consider (see p. E-1 of the Draft EA for list of authorities). Because of this multiple use requirement, it is unlikely, and therefore not required, that all proposed actions be consistent with every Forest Plan goal or objective. Not every acre of the forest needs to meet all Plan goals and objectives. Proposed activities can deviate from Plan goals and objectives if they can still be achieved over the long term. In addition, the Forest Plan contains other goals illustrating that development of mineral commodities is not inconsistent with the Plan. For example, Goal 10.1 – Provide mineral commodities – reads as follows: “Provide a supply of mineral commodities for current and future generations, while protecting the long-term health and biological diversity of ecosystems. Facilitate the orderly exploration, development, and production of mineral and energy resources on land open to these activities.” Forest Plan direction constrains only the Forest Service and applies to only NFS lands. There is no indication that the Proposed Action, as evaluated within the Draft EA, would have significant adverse effects to the “long-term health and biological diversity of ecosystems” on the Wayne National Forest or otherwise be inconsistent with the Forest Plan. If the BLM decides to proceed with the leasing proposed in the Proposed Action, and later requests FS authorization for the leasing of specific lands (sometimes referred to as consent), determining consistency with the Forest Plan would be part of the FS review of that request. See 36 C.F.R, § 228.102(e). If surface development is proposed on NFS surface, further analysis would occur. The EA states that in the event of a proposal for NFS surface development, consistency with Forest Plan direction would be further considered during the Stage 3 project-specific analysis, when design features, COAs, and BMPs that would be applied to a site-specific project (which would include standards and guidelines from the Forest Plan) would be finalized (EA, pps. 1-8 to 1-9). Management on all units within the National Forest System are directed by their respective forest plans. Forest plans are developed to conform with the requirements of the National Forest Management Act of 1976 which directs that “[i]n developing, maintaining, and revising plans for units of the National Forest System pursuant to this section, the Secretary shall assure that such plans provide for multiple use and sustained yield of the products and services obtained therefrom in accordance with the Multiple-Use, Sustained-Yield Act of 1960, and in particular, include coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness; and timber, watershed, wildlife and fish, and wilderness” (NFMA Sec. 6(e)(1)). Thus, resource management, including of at-risk species, described in this project proposal and within the Wayne Forest Plan aligns with management regulations within the broader National Forest System.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife – Special Status Species	With respect to cerulean warbler in particular, the EA fails to acknowledge the potential for fracking in the Wayne to significantly reduce forest interior habitat and compound the species’ marked decline over the last few decades. The loss of interior forest habitat from unconventional oil and gas development is particularly concerning because most bird species that depend on interior forest habitat are species of conservation concern, (See Attachment 2 provided with comments for citation #27) including the cerulean warbler. The cerulean warbler has a high potential to occur in the Wayne National Forest. (See Attachment 2 provided with comments for citation #28). One study found some interior forest specialists avoid shale gas development. The cerulean warbler, however, was attracted to these sites, because they specialize in small canopy openings in interior forest. The study’s author called this an “ecological trap . . . attracting susceptible birds to poor quality habitat.” (See Attachment 2 provided with comments for citation #29) At one site that was studied, cerulean warblers declined 35% in 10 years, compared to a 20% decline across the broader Central Appalachian region. (See Attachment 2 provided with comments for citation #30) Thus, cerulean warbler may not only lose intact mature forest habitat in the Wayne, but even where suitable habitat may be available, they may fall into the ecological trap of selecting lower quality habitat near oil and gas development, which would result in local population declines. The EA must analyze these effects in light of other threats to the warbler. The primary driver of the species’ ongoing population declines appears to be habitat loss and degradation. As the U.S. Fish & Wildlife Service notes, over 50 percent of the historical forests within the species’ breeding range have been cleared and replaced. (See Attachment 2 provided with comments for citation #31). Where they do remain, they lack suitable habitat, including structurally diverse canopy and the larger mature trees that they prefer. (See Attachment 2 provided with comments for citation #32)	Section 3.8 (Terrestrial Wildlife) identifies the cerulean warbler as a Regional Forester Sensitive Species and analysis of impacts to this species is grouped in with impacts to other wildlife species. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage, the specific locations of development and the associated site-specific disturbance/impacts are unknown and conducting comprehensive surveys for cerulean warbler across the entirety of the approximately 267,961-acre Marietta Unit (64,659 acres of Forest Service surface) is not reasonable or feasible. For leases that proceed to development, developers or operators who secured leases are required to submit APDs to the BLM as part of the Stage 3 environmental review and analysis, which typically include on-the-ground, site-specific field evaluation and surveys by BLM, and USFS if the project is on NFS surface. During the Stage 3 environmental review of APDs, and once proposed development locations are known, the BLM would require appropriate site-specific surveys for wildlife, bats, and other resources to inform the site-specific Stage 3 environmental review and to understand project-specific impacts and their significance. Depending on the site-specific surveys and analysis in the Stage 3 environmental review, the BLM may consider and apply additional alternatives, design features, best management practices, mitigation, and monitoring that would be required as part of the APD authorization process to avoid, reduce, and minimize potential impacts to the range of resources. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife – Special Status Species	The impacts to the population of cerulean warblers resulting from habitat loss may be further exacerbated by the effects of climate change. The species has experienced a 98% loss of its historical range in the Midwest, mid-Atlantic, and Southeast, and its range appears to be shifting north into New England and Canada due to climate change induced weather patterns such as spring heat waves, increased precipitation, and wildfires. (See Attachment 2 provided with comments for citation #33)	Refer to the cumulative impacts analysis for terrestrial wildlife species in Section 3.8.3 (Cumulative Impacts), which indicates that climate change would exacerbate and contribute to impacts on terrestrial wildlife species.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife – Special Status Species	The Cerulean Warbler is also a Regional Forester sensitive species. The EA must address the Leasing Plan’s conflict with the Forest Plan’s directive that the Forest Service “[p]rotect and improve occupied Regional Forester sensitive species habitat” under standard SFW-TES-32. (See Attachment 2 provided with comments for citation #34) See 40 C.F.R. § 1502.16(a)(5) (requiring that the “environmental consequences” section include a discussion of “[p]ossible conflicts between the proposed action and the objectives of Federal, regional, State, Tribal, and local land use plans, policies and controls for the area concerned”); see also id. § 1506.2(d) (requiring a discussion of “any inconsistency of a proposed action with any approved State, Tribal, or local plan or law (whether or not federally sanctioned)”). Because the Leasing Plan would cause direct and indirect habitat loss for many Regional Forester sensitive species, including cerulean warbler, in violation of the Forest Plan, the BLM and Forest Service must prepare an EIS to address this significant habitat loss and land management conflict.	The potential presence of RFSS and their habitats, including cerulean warbler, is disclosed in Section 3.5 (Vegetation and Rare Plants), 3.7 (Aquatic Wildlife), and 3.8 (Terrestrial Wildlife) of the EA. The EA also analyzes and discloses that potential future proposed surface disturbance on NFS lands would result in removal of habitat suitable for RFSS (p. 3-79). However, the Proposed Action of BLM offering leases for sale does not conflict with Forest Plan Standard SFW-TES-32, as leasing does not directly result in surface disturbance on NFS lands. Additionally, the Plan does not prohibit loss of RFSS habitat. Rather, the Forest Plan Standard SFW-TES-32 directs the forest to protect and improve occupied RFSS habitat [emphasis added]. The EA notes that site-specific surveys within habitat on NFS lands may be required for RFSS as part of the APD process (p. 3-80). When specific lands are being considered for leasing, for example, Stipulation #13 (“Controlled Surface Use – Known Locations of Regional Forester Sensitive Species”) would enable the Forest Service to “determine the need for any setbacks or restrictions, or the need for timing-related stipulation in accordance with the aquatic and terrestrial wildlife and botanical resources standards and guidelines” to ensure protection of occupied RFSS habitat (original EA, p. 101 and 138). The Record of Decision approving the 2006 Forest Plan made all federally owned minerals in the WNF administratively available to be leased (Draft EA, p. 1-6). As noted above, Forest Plan direction applies to only NFS lands. If surface development is proposed on NFS surface, further analysis would occur, including the FS review of a proposed Surface Use Plan of Operations submitted by an operator, which includes determining that the proposed surface use complies with the Forest Plan. The Draft EA states that in the event of a proposal for NFS surface development, design features, COAs, and BMPs that would be applied to a site-specific project (which would include standards and guidelines from the Forest Plan related to RFSS) would be finalized during Stage 3 project-specific analyses (Draft EA, p. 1-8). Additionally, when land management plans are developed, the responsible official “review[s] the planning and land use policies of federally recognized Indian Tribes (43 U.S.C. 1712(b)), Alaska Native Corporations, other Federal agencies, and State and local governments, where relevant to the plan area (36 CFR 219.4(b)(2)). Thus, the site-specific actions, which would conform to the requirements of the Wayne NF land management plan per 36 CFR 219, would fit within the context of other federal plans and policies for wildlife management. In accordance with CEQ Regulations (40 CFR 1501.5, revised in 2020) and the BLM NEPA Handbook (H-1790-1), the BLM would use the EA process to determine if significant impacts would result from the proposed action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not prepare a FONSI and would instead prepare an EIS.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife – Special Status Species	Again, the EA concludes that the potential for take or harm of listed and sensitive bat species, would be minimal in light of the relatively small percentage of forest that would be cleared.(See Attachment 2 provided with comments for citation #35) The EA, however, underestimates the total footprint from development and fails to consider that the indirect habitat loss from fragmentation effects would extend many acres beyond the footprint of well pads, roads, and pipelines, as discussed above.	The BLM is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act, including the preparation of a Biological Assessment. The BLM intends to complete the Section 7 consultation process prior to preparing a Decision Record and the results of the consultation, including required avoidance and minimization measures, would be included in the Decision Record. Additional text has been added to Section 3.8 (Terrestrial Wildlife) in the EA indicating the potential for impacts to wildlife due to habitat fragmentation and edge effects. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with habitat fragmentation and edge effects based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife – Special Status Species	Forest fragmentation tends to restrict Northern Long-Eared Bat (NLEB) mobility and foraging patterns to forested patches, and has been identified as a contributing factor in the decline of the species.(See Attachment 2 provided with comments for citation #36) NLEB avoid clearings greater than 20 acres, while the Indiana bat avoids clearings greater than 10 acres. (See Attachment 2 provided with comments for citation #37) Development of pipelines roads, and well pads would cut these species off from large swaths of forest. BLM’s conclusion that impacts to the listed bat species would be “minimal” relies on the assumption that various measures would apply to reduce those impacts, including: - “USFWS Recommended Measures for Avoiding and Minimizing Adverse Impacts to Federally Listed Species,” which an operator would only be required to comply with if it proposes development on federal surface, if it wanted to avoid formal Section 7 consultation; - unidentified Forest Plan “stipulations and notifications”; and - additional unidentified “resource protection measures” that BLM would apply at the drill permit stage. (See Attachment 2 provided with comments for citation #38)	The BLM is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act, including the preparation of a Biological Assessment. The BLM intends to complete the Section 7 consultation process prior to preparing a Decision Record and the results of the consultation, including required avoidance and minimization measures, would be included in the Decision Record. The analysis of impacts to bats has been revised in Section 3.8 (Terrestrial Wildlife) based on additional coordination with the USFWS and information and analysis that was completed as part of the Biological Assessment.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix G – Wayne National Forest Oil and Gas Leasing Biological Assessment	However, the analysis fails to acknowledge that these measures would only apply in the unlikely scenario that (1) drillers developed well pads or other infrastructure on federal surface; or (2) drillers applied for a drill permit from BLM before completing the necessary development on private surface to access federal minerals. (See Attachment 2 provided with comments for citation #39) Thus, if drillers applied for a drill permit to access federal minerals after all private surface development was in place, that development would entirely escape federal standards for habitat protection, including the USFWS Recommended Measures, and ESA Section 7 consultation. In light of BLM’s acknowledgement that operators prefer to develop on private surface, the EA’s assumption that any of the USFWS Recommended Measures would apply to minimize habitat impacts or avoid take of federally listed bat-species is unsupported. The EA notes that in circumstances where BLM or the Forest Service would not impose any controls on private surface development, an operator “may . . . contact [] FWS for technical assistance under Section 9 of the Endangered Species Act (ESA) and FWS may . . . provide[] recommendations for avoiding take of Federally listed species.” (See Attachment 2 provided with comments for citation #40) But there is no legal assurance this would happen before private surface development occurs.	As described in Section 2.2.3.2 (Avoidance and Minimization Measures for Species Protected under the Endangered Species Act), the identified avoidance and minimization measures are all required measures for federal permit applications and approvals and the BLM would require that they be applied as COAs during the APDs process, including for proposed surface development on private land to access federal minerals. As part of the APD process, the BLM also has the authority to require additional COAs to avoid and minimize environmental impacts or to deny APDs to access federal minerals if significant environmental impacts would occur on private land. The BLM’s Section 6 lease terms (see Section 2.2.3 in the EA, Environmental Protection Measures, Lease Stipulations, and Avoidance and Minimization Measures) also requires operators to conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Under the Section 6 lease terms, the lessee agrees to minimizing environmental impacts and the BLM has authority as the lessor to require the lessee to do so. Inventories and technical studies may be requested by the BLM to ensure impacts are minimized and BLM may require that operations be suspended if sensitive resources are identified and are impacted. The cumulative analysis sections in Chapter 3 of the EA have been updated to further describe potential cumulative impacts associated with development of private surface prior to submitting APDs to the BLM. In the scenario where operators secure federal oil and gas leases under the Proposed Action and those operators begin developing private surface to access federal minerals prior to submitting APDs to the BLM, the BLM and USFS have limited authority to require avoidance, minimization, and mitigation measures for private surface development prior to submittal of APDs. However, in this scenario operators are still subject to the State of Ohio permit requirements, disclosures, and environmental protection mandates described in the Ohio Administrative Code (OAC 1501:9) and Ohio Revised Code (ORC 1509). The State of Ohio has a variety of regulatory requirements and standards intended to minimize potential impacts to natural resources from development on private surface. Appendix E (Legal and Regulatory Authorities) has been revised to further describe the State of Ohio permitting process and requirements and guidance that is in place for the protection of natural resources. For example, as part of the State of Ohio permitting process, the ODNR DOGRM would conduct a site review meeting at proposed well sites on private land. At the site review meeting, the DOGRM may conduct a physical review of the proposed well site, discuss the application, identify items that are necessary to ensure compliance with state regulations, identify site-specific terms and conditions that may be attached to a permit that approves an application to construct a well site, and identify site-specific terms and conditions that may be attached to a permit to drill a well, such as Best Management Practices identified in the ODNR’s Best Management Practices for Oil and Gas Well Site Construction. For example, during the DOGRM site review meeting, if it is determined that suitable bat habitat exists or if

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					hibernaculum or roosts are present at or near the proposed well site, the DOGRM may require specific terms and conditions as part of the permit to minimize impacts to the species. In addition, oil and gas operators developing private surface are subject to other applicable federal regulations that protect natural resources such as Section 9 of the Endangered Species Act that makes it illegal to harass, hunt, shoot, capture, trap, kill, collect, wound, or harm (i.e., “take”) any ESA-listed species or to pursue/attempt any of these activities
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix G - USFWS Avoidance and Minimization Measures	Accordingly, the direct, indirect, and cumulative impacts of oil and gas development in the Wayne National Forest would result in significant, unmitigated impacts to listed bat species, including prohibited take. Appendix G (USFWS Recommended Measures for Avoiding and Minimizing Adverse Impacts to Federally Listed Species) explains that avoidance and minimization measures that would apply to federal surface activities are necessary to avoid significant impacts to listed bats. For example, it states: - restricting clearing or cutting of trees to October 1 through March 31 would avoid “direct impacts” to bats - restricting clearing or cutting of mature trees to 10 acres or less would avoid removing “a substantial portion of a maternity roost area or key foraging habitat” (more than ten acres) - requiring a closed system for produced water would minimize exposure of contaminants to bats - prohibiting disturbance within a quarter mile of potential hibernacula would avoid disturbance of roosting bats. But because these measures would not apply to the areas where BLM says most surface development would occur in the Wayne, the Leasing Plan threatens substantial loss of bat habitat and take of individual bats. BLM itself acknowledges that activities on private land “would include removal of unknown occupied roost trees that, depending on the season would result in the death of flightless pups or other individuals unable to flee in time,” and “remov[al] of a portion of a bat or maternity colony’s home range or key foraging habitat.”(See Attachment 2 provided with comments for citation #41) “Over time such undocumented and unknown losses may contribute to cumulative impacts on local bat populations in the [cumulative impacts analysis area].”(See Attachment 2 provided with comments for citation #42)	The BLM is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act, including the preparation of a Biological Assessment. The BLM intends to complete the Section 7 consultation process prior to preparing a Decision Record and the results of the consultation, including required avoidance and minimization measures, would be included in the Decision Record. The analysis of impacts to bats has been revised in Section 3.8 (Terrestrial Wildlife) based on additional coordination with the USFWS and information and analysis that was completed as part of the Biological Assessment. As described in Section 2.2.3.2 (Avoidance and Minimization Measures for Species Protected under the Endangered Species Act), the identified avoidance and minimization measures are all required measures for federal permit applications and approvals and the BLM would require that they be applied as COAs during the APDs process, including for proposed surface development on private land to access federal minerals. As part of the APD process, the BLM also has the authority to require additional COAs to avoid and minimize environmental impacts or to deny APDs to access federal minerals if significant environmental impacts would occur on private land

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Forest Plan Conformance	The EA also should address the Leasing Plan’s conflict with the Forest Plan’s management direction under Goal 5.1.1 that the Forest Service “[r]etain or develop Indiana bat roosting and foraging habitat; protect all known Indiana bat hibernacula.” (See Attachment 2 provided with comments for citation #43) Opening up the Wayne to fracking and the potential for loss of “substantial” areas of maternity roost areas and key foraging habitat would conflict with this Forest Plan goal.	The potential presence of and likely impacts to Indiana bat hibernacula are addressed in the EA in Section 3.6 (Terrestrial Wildlife) and the BA. There are no documented occurrences of Indiana bat and no documented hibernacula within the Marietta Unit. Therefore, the proposed project does not conflict with the goal to “protect all known Indiana bat hibernacula” as no known Indiana bat hibernacula on NFS land would be affected. Leasing does not directly result in surface disturbance on NFS land. If hibernacula are discovered on NFS land in the future, and surface development on NFS land is proposed, the avoidance and minimization measures and stipulations described in the Draft EA would be applied, and the Forest Service would undertake review of a Surface Use Plan of Operations.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	NEPA Adequacy	BLM must prepare an EIS to address these significant direct, indirect, and cumulative impacts and land-use conflicts.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see Dakota Res. Council v. U.S. Dept. of the Interior, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Terrestrial Wildlife - Special Status Species	Likewise, U.S. Fish and Wildlife Service’s biological opinion must consider the potential for the Leasing Plan to induce unchecked habitat loss and degradation of private surface forest.	The cumulative impacts analysis sections in Chapter 3 (Affected Environment and Environmental Impacts) have been revised to further describe the reasonably foreseeable development on private land and the associated impacts, especially the scenario where an operator secures a lease and begins developing surface resources on private land prior to submitting an APD to the BLM. The BLM is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act, including the preparation of a Biological Assessment. The BLM intends to complete the Section 7 consultation process prior to signing a Decision Record and the results of the consultation, including required avoidance and minimization measures, would be included in the Decision Record.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA fails to take a hard look at the potential for massive water depletions from fracking to significantly reduce streams flows in the Little Muskingum River and its tributary streams, and the resulting effects on aquatic ecosystems. The EA underestimates water depletions from fracking; arbitrarily averages out the effects of depletions on annual stream flows instead of analyzing their impact on stream flows during the period that depletions would actually occur; focuses narrowly on depletion effects on the entire Little Muskingum River basin, ignoring impacts on smaller sub-watersheds and the Little Muskingum’s upstream headwaters; and fails to show that the state’s water permitting scheme or other mitigation measures would meaningfully reduce or mitigate depletion effects. These errors infect the EA’s direct, indirect, and cumulative effects analysis. The EA therefore cannot support a “finding of no significance.” Rather, the best available science shows that high-volume water depletions would significantly impact stream flows, aquatic species, and aquatic ecosystems in the Wayne.	The EA takes a hard look at the potential impacts to water resources that would result from the leasing decision and subsequent reasonably foreseeable development, focusing on impacts to the Little Muskingum River and the Little Muskingum-Middle Island HUC 8 watershed in accordance with the CBD case court order. In addition, the EA does identify the potential for various harmful impacts if extreme withdrawals were to occur from at the wrong time and in the wrong place. Attempting to further quantify these potential impacts would not identify any new impacts. It would only either confirm their potential or possibly indicate they are not that likely. Even if such analyses confirmed the likely risk of these impacts under the hypothesized scenarios, that still would not mean the impact is likely as they would be avoided through planning and agency oversight. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <i>see Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage). As indicated under other more specific water-related comments, the EA has been revised to 1.) further clarify that the BLM would not approve APDs that result in water withdrawals that would lead to significant impacts to water resources or aquatic wildlife, 2.) further detailing the State of Ohio regulatory process for permitting water withdrawals and the ability of the State to deny a permit if it water withdrawals over 2 million gallons per day would endanger environmental resources, and 3.) including additional avoidance and minimization measures to protect water quantity. Additional Avoidance and Minimization measures have been added to EA and Appendix G (USFWS Avoidance and Minimization Measures for Listed Species) intended specifically to avoid/reduce potential impacts to flows in the Little Muskingum River including BLM not permitting water withdrawals from the Little Muskingum River when the daily flow is less than 11 cubic feet/second and requirements for the BLM to track annual water withdrawals to ensure annual impacts are below the threshold of water use/impacts analyzed in the EA. In accordance with CEQ Regulations (40 CFR 1501.5, revised in 2020) and the BLM NEPA Handbook (H-1790-1), the BLM would use the EA process to determine if significant impacts would result from the proposed action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not prepare a FONSI and would instead prepare an EIS.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA acknowledges that fracking horizontal wells in and around the Wayne National Forest uses vast amounts of water. “Horizontal wells in Monroe, Washington, and Noble Counties have been reported to require approximately 19 [million gallons] to 27 [million gallons] of water to drill and complete each well.”(See Attachment 2 provided with comments for citation #44) “In addition, during operations, horizontal wells have been found to use between 2 and 6 Mgal of water per well [annually] (University of Michigan 2013).”(See Attachment 2 provided with comments for citation #45) The EA further notes that, collectively, wells that are fracked consume massive amounts of water in the Little Muskingum River basin. Between 2017 and 2021, average surface water depletions in the Little Muskingum-Middle Island HUC-8 watershed totaled 1.571 billion gallons per year, with 58 percent used for mineral extraction and 35 percent—or 555 million gallons— for fracking.(See Attachment 2 provided with comments for citation #46) These figures are likely underestimates. Reporting requirements only apply to facilities with a capacity to withdraw more than 100,000 gallons of water per day.(See Attachment 2 provided with comments for citation #47) Accordingly, BLM must take into account depletions caused by facilities withdrawing less than 100,000 gallons per day. FracFocus reports the total volume of water used for each well reported in its database.(See Attachment 2 provided with comments for citation #48) That database may provide a fuller picture of how much water is used for fracking throughout the Little Muskingum River watershed. An accurate understanding of existing water uses is critical to understanding the cumulative impact of water depletions from BLM’s proposed leasing plan in connection with these past and present uses. In addition, the EA underestimates water use that would result from the Leasing Plan because it has underestimated the total number of wells that would be developed in the Wayne. As explained above, well pads are likely to have more than three wells per pad.	Added text to Section 3.6 (Water Resources) noting that the data presented only applies to reportable quantities of withdrawals and the operators and facilities the withdraw less than reportable quantities would also be withdrawing from the watersheds which would increase the total water withdrawals beyond what is presented. The RFDS followed BLM policy and guidance and modeled a hard look projection of a possible scenario of future activities based on specific assumptions including geology, resource occurrence potential, past and current leasing, past and current exploration and development activity, and engineering technology available at the time of analysis. The RFDS process included information acquisition from federal and state agency databases and other sources, information compilation, analysis including modeling by a BLM economist, and peer review. A RFDS is a technical report and not a planning decision and is intended to provide a NEPA process with technical information needed in the review and evaluation of management direction and alternatives for land use planning. In response to public comment on a Draft Environmental Assessment, BLM and Ohio Department of Natural Resources (ODNR) records were reviewed to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-estimated disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects in the EA remain valid. Accordingly, no change to the RFDS modeled projection is necessary at this time.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA also suggests that water depletions may be limited in the analysis area if drillers are trucking in water from another source or using recycled water. But there is no evidence that drillers in the Wayne are trucking in water from other watersheds, or using recycled water when they have cheap access to freshwater in the Wayne. Harmon 2023 notes that recycled water use is less than 5 percent in the Ohio River Basin. (See Attachment 2 provided with comments for citation #49).	As described in Section 3.6 (Water Resources), the EA assesses potential impacts on surface water, groundwater and wetlands and riparian areas in the Analysis Area based on an assumption that all water needed for hydraulic fracturing would be withdrawn from surface water sources within the Analysis Area consistent with recent trends of water use/sources in the WNF. The text in Section 3.6 (Water Resources) regarding the potential for treatment and re-use is presented as a scenario that would reduce surface water withdrawals beyond what is analyzed in the EA.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	In assessing the impact of these massive water withdrawals, the EA arbitrarily compares total water depletions from BLM’s leasing plan to yearly stream flows at a single location in the Wayne National Forest and concludes that the impact would be “minimal”: Projected surface-water usage during well drilling and development based on development estimates in the 2020 RFDS (Appendix D) is approximately 114 to 162 Mgal of water needed annually. Based on the average streamflow rate of 284.1 ft3/sec, the Little Muskingum River carries about 183.6 Mgal per day (approximately 67,020.8 Mgal per year). If all the water required for proposed horizontal drilling and hydraulic fracturing in the 2020 RFDS (Appendix D) were withdrawn directly from the Little Muskingum River, then this use would equate to approximately 0.17 to 0.24 percent of the river’s average annual water total. In 1999, the year with the lowest annual mean streamflow rate (150.7 ft3/sec) over the past 63 years, approximately 35,551.0 Mgal passed through the Little Muskingum River. If all the water for horizontal drilling and hydraulic fracturing were withdrawn from the Little Muskingum River, then projected surface-water usage would equate to removing about 0.32 to 0.46 percent of the river’s water in the lowest streamflow year. Removal of this percentage of the river’s water, even during low-streamflow years, is anticipated to have minimal impacts on the Little Muskingum River’s streamflow given the total streamflow in the river. (See Attachment 2 provided with comments for citation #50) There are several problems with the EA’s analysis. First, water withdrawals totaling tens of millions of gallons for one well would occur over a much shorter time frame, and not over the course of an entire year. Drilling typically takes five days, (See Attachment 2 provided with comments for citation #51) and fracking a single well only takes days depending on the length of the borehole. (See Attachment 2 provided with comments for citation #52) It is unclear whether water would be extracted all at once and stored onsite, or would be continuously piped or trucked during operations—but “[o]nce drilling commences activities are continuous until the well is completed.” (See Attachment 2 provided with comments for citation #53) That means all water to drill and frack a well would have to be extracted and used over the course of a few days or weeks—not an entire year. (See Attachment 2 provided with comments for citation #54) In addition, “[m]ultiple wells may be drilled in succession increasing the number of consecutive drilling days,” thereby increasing the amount of water used in one continuous period. Instead of averaging the impact of total water withdrawals wells over yearly stream flows, the EA must evaluate the impact of water depletions during the much shorter time frame that water would be withdrawn, or else explain why annualizing the effects is justified.	The text in Section 3.6 (Water Resources) regarding impacts being “minimal” has been revised based on this and other comments to: Since these low flow events are infrequent, potential impacts on water resources, wetlands, and riparian areas from poorly timed withdrawals are possible but not unavoidable. The EA takes a hard look at the potential impacts to water resources that would result from the leasing decision and subsequent reasonably foreseeable development, focusing on impacts to the Little Muskingum River and the Little Muskingum-Middle Island HUC 8 watershed in accordance with the CBD case court order. In addition, the EA does identify the potential for various harmful impacts if extreme withdrawals were to occur from at the wrong time and in the wrong place. Attempting to further quantify these potential impacts would not identify any new impacts. It would only either confirm their potential or possibly indicate they are not that likely. Even if such analyses confirmed the likely risk of these impacts under the hypothesized scenarios, that still would not mean the impact is likely as they would be avoided through planning and agency oversight. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	An assessment of the impact during active operations would provide a more realistic picture of how water depletions would impact streams and would be consistent with Harmon 2023. That study, which the EA cites, evaluates depletion impacts from fracking on stream flows in the Ohio River Basin over the actual period that streams would be depleted. As a result, in about half of all watersheds analyzed over a ten-year period (2009-2019), it found that stream flows declined by greater than 10% and 20% on “8.8 % and 2.4 % of active days” of hydraulic fracturing operations, respectively. (See Attachment 2 provided with comments for citation #56) In some instances, streams “were found to surpass both flow reduction thresholds on 100% of active days” of fracking operations, with the potential for “the stream ecosystem [to be] severely impacted” during these periods. (See Attachment 2 provided with comments for citation #57) “Further, even though “[c]ontinuous high withdrawals [were] infrequent,” the study found “that they can and do occur and would likely disrupt the aquatic ecosystem, with lasting consequences for the biota.” (See Attachment 2 provided with comments for citation #58) Ohio experienced a relatively higher proportion of watersheds with significant flow reductions, compared to other states in the Ohio River Basin: 28% of HUC12 watersheds in which fracking occurred experienced at least 10% flow reduction on 20 or more days. This is compared to only 17% in both Pennsylvania and West Virginia. (See Attachment 2 provided with comments for citation #59) This difference is likely due to the “higher threshold for water withdrawal permitting in Ohio” compared to these other states. (See Attachment 2 provided with comments for citation #60)	The text in Section 3.6 (Water Resources) regarding impacts being “minimal” has been revised based on this and other comments to: Since these low flow events are infrequent, potential impacts on water resources, wetlands, and riparian areas from poorly timed withdrawals are possible but not unavoidable. The EA takes a hard look at the potential impacts to water resources that would result from the leasing decision and subsequent reasonably foreseeable development, focusing on impacts to the Little Muskingum River and the Little Muskingum-Middle Island HUC 8 watershed in accordance with the CBD case court order. In addition, the EA does identify the potential for various harmful impacts if extreme withdrawals were to occur from at the wrong time and in the wrong place. Attempting to further quantify these potential impacts would not identify any new impacts. It would only either confirm their potential or possibly indicate they are not that likely. Even if such analyses confirmed the likely risk of these impacts under the hypothesized scenarios, that still would not mean the impact is likely as they would be avoided through planning and agency oversight. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	BLM’s annualized analysis also obscures that impacts may vary based on the timing of diversions. Harmon 2023 found that stream declines exceeding the 10% and 20% stream flow reduction thresholds were more likely to occur in the summer, when baseflows are lower. It concluded “low baseflow greatens the risk of excessive flow reduction, especially if and when well activity is high during the summer low-flow season.” (See Attachment 2 provided with comments for citation #61) Second, BLM compares total water depletions from fracking to total flows in the Little Muskingum River but fails to analyze impacts at the smaller sub-watershed-scale. Harmon 2023, in fact, noted that “[m]ost [unconventional] wells draw water from small streams (Kondash and Vengosh 2015), which are much more susceptible to change than larger streams and rivers.” (See Attachment 2 provided with comments for citation #62) It further observed that “[t]ypically assessments of the risks of withdrawals from streams do not account for the size of the watershed nor the flow regime (Kondash and Vengosh, 2015). . . Shrestha et al. (2017) found that as watershed area decreases, the risk for withdrawal related issues increases, further demonstrating the need for analysis of hydraulic fracturing water use across the continuum of stream and watershed size.” (See Attachment 2 provided with comments for citation #63)	Additional text was added to Section 3.7 (Aquatic Wildlife) expanding on the types of impacts indicated in this comment. In addition, text was added to Section 3.6 (Water Resources) indicating that “Smaller streams, tributaries, and drainages would have lower flows and would be affected more by changes in flows due to water use from reasonably foreseeable development of the leases. Similarly larger streams and waterways such as the Ohio River would have larger flows and would likely be less affected by changes in flows due to water use from reasonably foreseeable development of the leases. The EA takes a hard look at the potential impacts to water resources and associated aquatic habitat and species that would result from the leasing decision and subsequent reasonably foreseeable development, focusing on impacts to the Little Muskingum River and the Little Muskingum-Middle Island HUC 8 watershed in accordance with the CBD case court order. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity and associated aquatic habitat and species based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	Accordingly, the study models historical streamflows at the HUC-12 watershed scale and estimates that “ >10 % and >20 % reductions in streamflow occurred at least episodically in 53 % and 42 % of the HUC12 watersheds analyzed.”(See Attachment 2 provided with comments for citation #64) Impacts to smaller streams would be particularly significant for sensitive aquatic species like ESA-protected mussels. Specifically: Because withdrawals can more easily cause excessive flow reduction in smaller streams, negative impacts such as higher sediment loads, decreased oxygen levels, lower water velocity, higher water temperature, and algal blooms are more likely to occur (Mosley et al., 2012). Additionally, habitat fragmentation from land clearing for pipelines and other essential hydraulic fracturing operations can exacerbate stream impacts (Caldwell et al., 2022). In aggregate, the impacts of [unconventional oil and gas] operations can be detrimental to the species living in the stream that are sensitive to habitat changes. For example, the Eastern Hellbender (<i>Cryptobranchus alleganiensis alleganiensis</i>), which is endangered in Ohio, is dependent on cool water and a limited range of conductivity, pH, and dissolved oxygen (Smeenk et al., 2021). Increasing withdrawals have the potential to accelerate the rate at which the population of Eastern Hellbenders is decreasing in Ohio. A variety of other aquatic biota, although not classified as endangered, face a similar increase in the chance for habitat loss from excessive withdrawals. Smaller catchments host a distinct set of habitats and community structures compared to larger watersheds with higher flow (Finn et al., 2011; Finn and Poff, 2005; Vannote et al., 1980). Well construction and operation not only reduces the total flow of a stream, but also reduces the total available habitat area in the stream ecosystem, with smaller catchments having disproportionately larger changes (Gowan, 1984). Not only is the habitat reduced, but the existing habitat is more susceptible to change. This causes species to compete for preferred water conditions (Logan and Stillwell, 2018) and can cause harm to individual species as well as the stream ecosystem. In some watersheds, the 7Q10 [i.e., the lowest seven day flow with a 10-year recurrence rate] would be reduced to zero if new fracking activity continues, and mean annual flows would decrease by 9 % or more (Shrestha et al., 2017). Considering that many wells are located within headwater catchments, such reductions would be detrimental to the aquatic ecosystem. A chronic 9% or greater reduction in baseflow would completely change the aquatic habitat in smaller streams, and render spaces uninhabitable for many of the species which live there presently. (See Attachment 2 provided with comments for citation #65) Further, “[a]s stream flows respond to increased withdrawal rates, changes in water temperature (i.e., due to point source pollution from power plants, climate change, etc.) can produce undesired ecosystem effects, whereby organisms compete for preferred temperature zones within waterways (Logan and Stillwell, 2018), further harming fish with additional indirect effects (e.g., increased disease rates) (Snieszko, 1974).” (See Attachment 2 provided with comments for citation #66)	Additional text was added to Section 3.7 (Aquatic Wildlife) expanding on the types of impacts indicated in this comment and noting that aquatic wildlife in smaller streams and drainages would be more susceptible to impacts. The EA takes a hard look at the potential impacts to water resources and associated aquatic habitat and species that would result from the leasing decision and subsequent reasonably foreseeable development, focusing on impacts to the Little Muskingum River and the Little Muskingum-Middle Island HUC 8 watershed. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity and associated aquatic habitat and species based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	Third, the EA only analyzes the impact of water depletions at the most downstream end of the Little Muskingum River in the Wayne’s Marietta Unit at Little Muskingum River Site 03115400 (see Fig. 1 below), where flows would be greater than at the river’s headwaters. The EA does not adequately explain why streamflow data from this site is “a representative case study for surface waters in the HUC-8.” (See Attachment 2 provided with comments for citation #67) Instead, the EA states that this is an appropriate representative site, because “this monitoring site provides the largest available dataset, with measurements taken from October 1958 through September 1981, and from October 1995 to today. Other surface-water monitoring stations only provide data from as early as 2012.” (See Attachment 2 provided with comments for citation #68) But analyzing the impact on sites further upstream would provide a more realistic assessment of water depletion impacts at the smaller watershed scale. Harmon 2023 also demonstrates that modeling flows is possible where historical stream flow data is lacking. (See Attachment 2 provided with comments for citation #69)	Additional text was added to Section 3.7 (Aquatic Wildlife) expanding on the types of impacts indicated in this comment and noting that aquatic wildlife in smaller streams and drainages would be more susceptible to impacts. Additional text was added to Section 3.6 (Water Resources) indicating: smaller streams, tributaries, and drainages would have lower flows and would be affected more by changes in flows due to water use from reasonably foreseeable development of the leases. Similarly larger streams and waterways such as the Ohio River would have larger flows and would likely be less affected by changes in flows due to water use from reasonably foreseeable development of the leases. It is also important to note that the location of the gauge, is not at the outlet of the Little Muskingum or the downstream end of the Marietta Unit, it’s near the middle of both the Little Muskingum River and the Marietta Unit. The EA takes a hard look at the potential impacts to water resources and associated aquatic habitat and species that would result from the leasing decision and subsequent reasonably foreseeable development, focusing on impacts to the Little Muskingum River and the Little Muskingum-Middle Island HUC 8 watershed in accordance with the CBD case court order. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity and associated aquatic habitat and species based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	As the Forest Plan notes, both headwater and mainstem streams provide important aquatic habitat: “[A]quatic biodiversity cannot be maintained only by focusing on the mainstem of the larger streams; we must account for the entire drainage network that begins in the headwaters.” (See Attachment 2 provided with comments for citation #71) The Forest Plan therefore aims to enhance management “along all perennial, intermittent, and ephemeral streams to better maintain and improve habitat quality for aquatic and riparian-dependent species.” (See Attachment 2 provided with comments for citation #72) Dozens of headwater or tributary streams flow into the Little Muskingum River, so a singular focus on its mainstem would ignore substantial areas of aquatic habitat. (See Attachment 2 provided with comments for citation #73)	Additional text was added to Section 3.7 (Aquatic Wildlife) expanding on the types of impacts indicated in this comment and noting that aquatic wildlife in smaller streams and drainages would be more susceptible to impacts. Additional text was added to Section 3.6 (Water Resources) indicating: smaller streams, tributaries, and drainages would have lower flows and would be affected more by changes in flows due to water use from reasonably foreseeable development of the leases. Similarly larger streams and waterways such as the Ohio River would have larger flows and would likely be less affected by changes in flows due to water use from reasonably foreseeable development of the leases. The EA takes a hard look at the potential impacts to water resources and associated aquatic habitat and species that would result from the leasing decision and subsequent reasonably foreseeable development, focusing on impacts to the Little Muskingum River and the Little Muskingum-Middle Island HUC 8 watershed in accordance with the CBD case court order. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity and associated aquatic habitat and species based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	Headwater streams are also more sensitive to water depletions. Harmon 2023 found that headwaters tended to experience greater flow reductions than “larger catchments”: “Among the HUC12 watersheds with reported water withdrawals due to [unconventional oil and gas] development, 47.7% were headwater catchments” that “do not receive water from any other watershed.” (See Attachment 2 provided with comments for citation #74) These catchments experienced the “highest flow reductions . . . with 63.8% . . . having ≥10 % reduction for 25 days or more (Fig. 6) during operational days through the years 2011–2019.” (See Attachment 2 provided with comments for citation #75) On the other hand, “[l]arger catchments did not generally show major flow reductions in excess of 10 % during active days, with 80 % not exceeding 10 % reduction during active hydraulic fracturing operations.” (See Attachment 2 provided with comments for citation #76) Although this analysis concerns sub-watersheds at the HUC-12 level, it indicates that BLM’s focus on only the Little Muskingum’s downstream end, and not its headwaters, overlooks potentially significant impacts to the river’s headwaters.	Additional text was added to Section 3.7 (Aquatic Wildlife) expanding on the types of impacts indicated in this comment and noting that aquatic wildlife in smaller streams and drainages would be more susceptible to impacts. Additional text was added to Section 3.6 (Water Resources) indicating: smaller streams, tributaries, and drainages would have lower flows and would be affected more by changes in flows due to water use from reasonably foreseeable development of the leases. Similarly larger streams and waterways such as the Ohio River would have larger flows and would likely be less affected by changes in flows due to water use from reasonably foreseeable development of the leases. The EA takes a hard look at the potential impacts to water resources and associated aquatic habitat and species that would result from the leasing decision and subsequent reasonably foreseeable development, focusing on impacts to the Little Muskingum River and the Little Muskingum-Middle Island HUC 8 watershed in accordance with the CBD case court order. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity and associated aquatic habitat and species based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA takes the same flawed approach in analyzing water depletions from production and operations, which would total 16.2 million gallons per year if production lasts 30 years and 24 million gallons per year if production lasts 20 years. (See Attachment 2 provided with comments for citation #77) It additionally minimizes these depletions, stating that “water needs associated with operation of a well are generally concentrated in the early stage of production and decline with a well’s production age (Table 3-2) and thus the minimal streamflow impacts during operation would further decline with time.” (See Attachment 2 provided with comments for citation #78) That depletions may decrease over time does not mean that depletions in the early stages of a well would not contribute to or prolong significant flow declines, especially if those depletions occur immediately after fracking operations are completed. The EA should analyze the aggregate impact of water depletions from all oil-and-gas related water use, and during the stage of peak water use, rather than considering the impacts of each category of depletion in isolation. The EA’s assessment of the impact of depletions on daily stream flows during a low-flow period is also misleading. This analysis fails to capture the potential for significant impacts from depletions. The EA states: The Little Muskingum River experienced the lowest mean streamflow for a 7-consecutive-day period in 1999, at 0.047 ft3/sec (Table 3-17). This streamflow equates to approximately 0.03 Mgal per day, which is not enough water to support the 0.31 Mgal to 0.44 Mgal required per day (based on 114 to 162 Mgal per year) for horizontal drilling and hydraulic fracturing. As seen in Table 3-17, these lowflow events are infrequent, with 90 percent of water years experiencing streamflow above 4.80 ft3/sec, totaling 1,132.3 Mgal through the river per year. Although withdrawals are unlikely during these low-flow events due to the decreased quantity of flowing of water, if withdrawals did occur, streamflow reductions in the Little Muskingum River and other surrounding surface waters within the Little Muskingum–Middle Island HUC-8 would occur. Poorly timed water withdrawal, such as extreme withdrawals during drought or low-flow periods, would deplete minimum flows or shorten the duration of periods of inundation for wetlands, and lower levels in lakes, ponds, and reservoirs. This would impact ecosystem functions like primary productivity and leaf litter processing (Poff et al. 1997). Increased water withdrawals would also create “simplified” streams and rivers by reducing flow in one or several sites, resulting in the loss of branches and stream features in riparian areas. Simplified streams lose their ability to adapt to disturbances like floods, fires, or landslides (Penaluna et al. 2017). However, as noted above these low flow events are infrequent and as such the potential impacts on water resources, wetlands, and riparian areas from poorly timed withdrawals is expected to be minimal. (See Attachment 2 provided with comments for citation #79) Again, the EA averages the impact of total depletions over the entire year rather than the actual time period in which depletions would occur, and it ignores the potential impact on stream flows at the sub-watershed level (HUC-12). It also assumes that the only times when potentially serious impacts to stream flows would occur are when there are “low flow events,” and then dismisses those impacts as “minimal” given that “low flow events are infrequent.” But it fails to explain why potentially significant impacts would not occur during non-low-flow periods. Harmon 2023 discusses the potential for significant impacts on aquatic species when flows decline by more than ten percent over a continuous period in smaller streams. Accordingly, the EA should identify a threshold at which depletions would be significant and determine whether depletions within a sub-watershed would exceed that threshold during a period of active fracking operations and/or subsequent operations. Alternatively, BLM would identify the minimum stream flows required to maintain healthy aquatic habitat or sensitive species in each HUC-12 watershed that water depletions would occur in or otherwise affect, and	The approach to estimating potential water depletions over time and the data sources cited are appropriate for this programmatic level NEPA analysis of the lease sale action. At this programmatic lease sale stage, the BLM does not know exactly where water would be sourced, how much water would be used during various stages of development of leases, and the timing of water withdrawals for each individual development project. This information would be included in APDs and the BLM would analyze potential impacts during the stage 3 environmental review of site-specific applications. During site-specific permitting, the BLM would apply COAs to protect water resources and aquatic wildlife based on the analysis of individual development proposals. The following text has been added to Section 3.7 (Aquatic Wildlife) to reflect this: During site specific permitting, the BLM would review the proposed source, timing, and amount of water use and wastewater disposal and would apply appropriate COAs to avoid impacts to water resources that would jeopardize aquatic wildlife. This would include ensuring that streams maintain the minimum flow necessary to support the mussel species by limiting requested withdrawals in streams during drought or low-flow conditions, requiring operators to install additional stream gauge monitors, and proper disposal of wastewater to avoid aquatic habitat quality effects. Additional Avoidance and Minimization measures have been added to EA and Appendix G (USFWS Avoidance and Minimization Measures for Listed Species) intended specifically to avoid/reduce potential impacts to flows in the Little Muskingum River by prohibiting water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future. Additional text has been added to Section 3.7 (Aquatic Wildlife) that clarifies some of the issues identified in this comment including that impacts from changes in water quality and quantity would be especially pronounced in smaller streams, tributaries, and drainages that are more susceptible to impacts. The text in Section 3.6 (Water Resources) that the commenter references regarding impacts from depletions being “minimal” has been revised and now reads: Since these low flow events are infrequent, potential impacts on water resources, wetlands, and riparian areas from poorly timed withdrawals are possible but not unavoidable. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quantity based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

First Name	Last Name	Organization	Comment Category	Comment Text	Response
				analyze whether depletions would cause stream flows to fall below those minimum flow requirements.	

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA’s cumulative impacts analysis acknowledges that the potential increase in water depletions from the Little Muskingum River Basin would amount to “a 10 percent increase in cumulative water withdrawals in the watershed”—“a notable increase in total water use in the watershed”—but repeats the same analytical errors discussed above. (See Attachment 2 provided with comments for citation #80)	The approach to estimating potential water depletions over time and the data sources cited are appropriate for this programmatic level NEPA analysis of the lease sale action. At this programmatic lease sale stage, the BLM does not know exactly where water would be sourced, how much water would be used during various stages of development of leases, and the timing of water withdrawals for each individual development project. This information would be included in APDs and the BLM would analyze potential impacts during the stage 3 environmental review of site-specific applications. During site-specific permitting, the BLM would apply COAs to protect water resources and aquatic wildlife based on the analysis of individual development proposals. NAs noted in the EA, while there is an estimated 10 percent increase in water withdrawals due to reasonably foreseeable development of the leases, the estimated cumulative water use from the Little Muskingum River would still equate to approximately 0.17 to 0.24 percent of the river’s average annual water total. As noted in Section 3.6 (Water Resource), removal of this percentage of the river’s water, even during low-streamflow years, is anticipated to have minimal impacts on the Little Muskingum River’s streamflow given the total streamflow volumes in the river. Additional Avoidance and Minimization measures have been added to EA and Appendix G (USFWS Avoidance and Minimization Measures for Listed Species) intended specifically to avoid/reduce potential impacts to flows in the Little Muskingum River by prohibiting water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	BLM must revise the EA to provide a meaningful analysis of how water depletions for fracking and other oil and gas activities would harm water resources, aquatic species, and aquatic habitat.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) to further describe potential impacts and to respond to the specific comments provided above. The EA takes a hard look at the potential impacts to water resources that would result from the leasing decision and subsequent reasonably foreseeable development, focusing on impacts to the Little Muskingum River and the Little Muskingum-Middle Island HUC 8 watershed in accordance with the CBD case court order. In addition, the EA does identify the potential for various harmful impacts if extreme withdrawals were to occur from at the wrong time and in the wrong place. Attempting to further quantify these potential impacts would not identify any new impacts. It would only either confirm their potential or possibly indicate they are not that likely. Even if such analyses confirmed the likely risk of these impacts under the hypothesized scenarios, that still would not mean the impact is likely as they would be avoided through planning and agency oversight. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u> The following text has been added to Section 3.7 (Aquatic Wildlife) to reflect this: During site-specific permitting, the BLM will review the proposed source, timing, and amount of water use and wastewater disposal and would apply appropriate COAs to avoid impacts on water resources that would jeopardize aquatic wildlife or result in the take of federally protected mussel species or eastern hellbender. This would include ensuring that streams maintain the minimum flow necessary to support the mussel species and eastern hellbender by prohibiting water withdrawals from the Little Muskingum River, Muskingum River,

First Name	Last Name	Organization	Comment Category	Comment Text	Response
					and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA also minimizes the impacts of water depletions by pointing to state regulations and other measures that would supposedly reduce depletion impacts. First, it notes that any facility with the capacity to withdraw 2 million gallons per day averaged over any 30-day period (or 60 million gallons per month) must obtain a permit under ORC § 1521.23. It then reasons that due to the 19 to 27 Mgal of water required for each horizontal well, “it is possible that wells projected in the 2020 RFDS would trigger the requirement for a consumptive use permit.” (See Attachment 2 provided with comments for citation #81) However, where a facility would have the capacity to withdraw water just below the 60 million gallons per month threshold (e.g., 59.5 million gallons per month), a permit would not be required, even though the impacts of those depletions would still be significant depending on when and where they occur.	As the commenter noted, there is potential for water withdrawals to not require a state consumptive use permit if below the 60 million gallons per day threshold. This is referenced in the EA in Section 3.6 (Water Resources). Additional text has been added to Section 3.6 (Water Resources) to further expand on this issue and potential effects: Where a facility would withdraw water below the 60 million gallons per month threshold a permit may not be required, even though the impacts of those depletions would contribute to overall water depletions in the analysis area. These potential impacts would be exacerbated under a scenario where multiple facilities that withdraw less than 60 million gallons per year are developed to provide water for reasonably foreseeable development of the leases.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	Further, the permitting process would not necessarily result in the protection of aquatic wildlife. The criteria for denial of a permit do not appear to include criteria for the protection of aquatic species. Rather the grounds for permit denial are centered around the protection of human uses, focusing on whether “public water rights in navigable water would be adversely affected”; whether the withdrawal and consumptive use “do not reasonably promote the protection of the public health, safety, and welfare”; whether the withdrawal “would have a significant detrimental effect on the quantity or quality of water resources and related land resources in this state”; whether the withdrawal “is inconsistent with regional or state water resources plans”; or whether “[i]nsufficient water is available for the withdrawal and other existing legal uses of water resources are not adequately protected.” ORC § 1521.29(A)(1), (4)-(7). (See Attachment 2 provided with comments for citation #82) The EA should clarify whether the state would (or is required to) deny a	Text has been added to Appendix E (Legal and Regulatory Authorities) describing the permitting process for water withdrawals in the State of Ohio, including the conditions under which a permit would be denied. As noted in the added text, the State would deny a permit if “The applicant has not demonstrated that reasonable efforts have been made to develop and conserve water resources in the importing basin and that further development of those resources would engender overriding, adverse economic, social, or environmental impacts.” Text has been added to Section 3.7 (Aquatic Wildlife) confirming that the BLM would not permit/approve APDs that include water withdrawals that would jeopardize aquatic wildlife and would apply COAs during site-specific permitting; During site specific permitting, the BLM would review the proposed source, timing, and amount of water use and wastewater disposal and would apply appropriate COAs to avoid impacts to water resources that would jeopardize aquatic wildlife. Additional Avoidance and Minimization measures have been added to EA and Appendix G (USFWS Avoidance and Minimization Measures for Listed Species) intended specifically to avoid/reduce potential

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
				permit on the basis that a proposed withdrawal would adversely affect aquatic species and ecosystems.	impacts to flows in the Little Muskingum River by prohibiting water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA also notes that under “Stipulation GFW-WSH-1” of the Wayne Forest Plan, “water should not be diverted from streams, lakes, or springs when instream flow needs or waterlevel assessments indicate that diversion would impact stream processes, aquatic and riparian habitats and communities, or recreational and aesthetic values (Appendix F, Existing Stipulations, Notifications, Guidelines, and Standards, Reference Number GFW-WSH-1).” (See Attachment 2 provided with comments for citation #83) But according to the 2012 SIR, this “stipulation” is only a “guideline.” (See Attachment 2 provided with comments for citation #84) It is unclear whether the guideline requires that the Forest Service reduce or deny an operator’s proposed water diversion when it would cause adverse impacts. In addition, this guideline only applies to water withdrawals on Forest Service surface. Elsewhere the EA states that “USFS does not have the ability to prevent surface water or groundwater withdrawals occurring on non-NFS lands, even if the oil or gas well were located on NFS surface and would access federal minerals.” (See Attachment 2 provided with comments for citation #85) Moreover, “[t]he USFS would not be involved with further analysis if a proposed development plan involves privately held surface not administered by the USFS.” (See Attachment 2 provided with comments for citation #86) As BLM observes, any oil and gas activities in the Wayne are more likely to occur on private surface than federal surface, (See Attachment 2 provided with comments for citation #87) so this guideline would not likely apply to most water depletions for fracking operations in the Wayne.	As described in Section 2.2.3 (Environmental Protection Measures, Lease Stipulations, and Avoidance and Minimization Measures). If an operator desires to depart from a notification or stipulation, an analysis, and a signed decision by a USFS Responsible Official would be required. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity and associated aquatic habitat and species based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u> Text has been added to Appendix E (Legal and Regulatory Authorities) describing the permitting process for water withdrawals in the State of Ohio, including the conditions under which a permit would be denied. As noted in the added text, the State would deny a permit if “The applicant has not demonstrated that reasonable efforts have been made to develop and conserve water resources in the importing basin and that further development of those resources would engender overriding, adverse economic, social, or environmental impacts.” In addition, text has been added to Section 3.7 (Aquatic Wildlife) confirming that the BLM would not permit/approve APDs that include water withdrawals that would jeopardize aquatic wildlife and would apply COAs during site-specific permitting: During site specific permitting, the BLM would review the proposed source, timing, and amount of water use and wastewater disposal and would apply appropriate COAs to avoid impacts to water resources that would jeopardize aquatic wildlife. The most effective way for the BLM to ensure that oil and gas development of federal minerals is not causing a negative effect to mussel populations or eastern hellbenders is by prohibiting the withdrawal of water from the waterways that harbor listed mussel populations and eastern hellbenders. As such, the BLM has developed an AMM that prohibits water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future (see Appendix G of this EA). With application of this AMM there would be limited effects on federally protected mussel species or eastern hellbender from water withdrawals associated with reasonably foreseeable development of federal leases.

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA also vaguely suggests that BLM may impose other mitigation measures under “BLM’s Section 6 lease term,” which “requires that adverse impacts on water resources, including water quality and quantity, be minimized.” (See Attachment 2 provided with comments for citation #88) But BLM does not point to any specific measures that would allow it to limit the amount or rate of water depletions or control the timing or location of withdrawals. Nor does it speak to whether it would impose such measures if water withdrawals occurred on private surface. It is also unclear how the requirement that an operator “immediately contact the BLM” if operations “result[] in substantial unanticipated environmental impacts” would mitigate the impact of water depletions. (See Attachment 2 provided with comments for citation #89) The EA does not establish what would constitute a “substantial” unanticipated impact on water resources, or indicate that BLM would order the operator to halt or reduce water withdrawals or change their timing, rate, or location in those circumstances.	Text has been added to Appendix E (Legal and Regulatory Authorities) describing the permitting process for water withdrawals in the State of Ohio, including the conditions under which a permit would be denied. As noted in the added text, the State would deny a permit if “The applicant has not demonstrated that reasonable efforts have been made to develop and conserve water resources in the importing basin and that further development of those resources would engender overriding, adverse economic, social, or environmental impacts.” Text has been added to Section 3.6 (Water Resources) confirming that the BLM would not permit/approve APDs that include water withdrawals that would jeopardize water resources and would apply COAs during site-specific permitting: “Application of the measures, standards, and practices described above would be effective tools to reduce the potential for impacts on water resources. During the Stage 3 environmental review of site-specific APDs, the BLM would review the proposed source, timing, and amount of water use and wastewater disposal and would apply appropriate COAs to avoid, minimize, and reduce impacts on water resources that would affect other beneficial uses and aquatic wildlife. This would include ensuring that streams maintain the minimum flow necessary to support the mussel species by prohibiting water withdrawals in mussel and hellbender streams (see Appendix G of this EA, Aquatic AMM 6) and proper disposal of wastewater to avoid impacts on water quality. Application of site-specific measures based on individual APDs would be effective at further avoiding, minimizing, and reducing impacts on water resources.” The Section 6 lease terms that the commenter references provides further basis for the BLM to deny APDs if proposed development and withdrawals would affect water resources, beneficial uses of those water resources, or aquatic wildlife within those water resources. Additional Avoidance and Minimization measures have been added to EA and Appendix G (USFWS Avoidance and Minimization Measures for Listed Species) intended specifically to avoid/reduce potential impacts to flows in the Little Muskingum River by prohibiting water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	BLM also points to “USFWS recommended avoidance and minimization measures” that prohibit water withdrawals “from the Little Muskingum River, Muskingum River, and certain other streams during drought conditions that exceed a severe drought category.” (See Attachment 2 provided with comments for citation #90) But the EA fails to establish that the only conditions under which the depletion of tens of millions of gallons of water over a few days would significantly reduce stream flows and harm aquatic species is during a “severe drought.”	As indicated in Section 3.6 (Water Resources) of the EA, the BLM recognizes that increased water required for horizontal drilling and hydraulic fracturing would impact water resources by increasing withdrawals of surface water and groundwater and may reduce available quantities of water for wetlands and riparian areas, public drinking water, aquatic habitat, and recreational uses and takes a hard look at quantifying potential water use and associated impacts on stream flows in the Little Muskingum River. As noted in Section 3.6 (Water Resources) of the EA, while there is an estimated 10 percent increase in water withdrawals due to reasonably foreseeable development of the leases, the estimated cumulative water use from the Little Muskingum River would still equate to approximately 0.17 to 0.24 percent of the river’s average annual water total. As noted in Section 3.6 (Water Resource), removal of this percentage of the river’s water, even during low-streamflow years, is anticipated to have minimal impacts on the Little Muskingum River’s streamflow given the total streamflow volumes in the river. Text has been added to Section 3.6 (Water Resources) confirming that the BLM would not permit/approve APDs that include water withdrawals that would jeopardize water resources and would apply COAs during site-specific permitting: “Application of the measures, standards, and practices described above would be effective tools to reduce the potential for impacts on water resources. During the Stage 3 environmental review of site-specific APDs, the BLM would review the proposed source, timing, and amount of water use and wastewater disposal and would apply appropriate COAs to avoid, minimize, and reduce impacts on water resources that would affect other beneficial uses and aquatic wildlife. This would include ensuring that streams maintain the minimum flow necessary to support the mussel species by prohibiting water withdrawals in mussel and hellbender streams (see Appendix G of this EA, Aquatic AMM 6) and proper disposal of wastewater to avoid impacts on water quality. Application of site-specific measures based on individual APDs would be effective at further avoiding, minimizing, and reducing impacts on water resources.”

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	In sum, the measures that BLM claims would avoid or reduce water depletion effects do not support a finding of no significant impact.	As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and quantity based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u> As indicated under other more specific water-related comments, the EA has been revised to 1.) further clarify that the BLM would not approve APDs that result in water withdrawals that would lead to significant impacts to water resources or aquatic wildlife, 2.) further detailing the State of Ohio regulatory process for permitting water withdrawals and the ability of the State to deny a permit if it water withdrawals would endanger environmental resources, and 3.) including additional avoidance and minimization measures to protect water quantity. Additional Avoidance and Minimization measures have been added to EA and Appendix G (USFWS Avoidance and Minimization Measures for Listed Species) intended specifically to avoid/reduce potential impacts to flows in the Little Muskingum River by prohibiting water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA fails to take a hard look at the impacts of fracking development on water quality. Many of the EA’s flaws are discussed in our comments on the EA’s analysis of aquatic species impacts, below, but a few overarching issues are noted here. First, the EA underestimates the total surface disturbance that is likely to occur in the analysis area, as described above, and therefore fails to accurately portray the full extent of potential water quality impacts from runoff and sedimentation.	The EA takes a hard look at the potential water resource impacts that is appropriate at this programmatic lease sale stage. As described in Section 1.2.1 (Actions to be Taken) this EA like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and aquatic resources based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Scope of Analysis	Second, the EA estimates an extraordinarily large range of existing surface disturbance from existing oil and gas wells in the cumulative impacts analysis area—“anywhere between 11,988 acres and 171,250 acres of existing surface disturbance depending on whether these wells were horizontally or vertically drilled.” (See Attachment 2 provided with comments for citation #91) The EA must more precisely define baseline surface disturbance, including total surface disturbance in the Wayne. The Wayne National Forest's Marietta Unit itself totals over 268,000 acres (including private lands within its proclamation boundary). Whether existing surface disturbance from oil and gas wells is 11,988 acres or 171,250 acres within the Marietta Unit and the surrounding 4-mile area makes a meaningful difference when assessing whether the impacts of additional disturbance are cumulatively significant for water quality. If such a large proportion of the watershed (approximately 171,250 acres) is already disturbed, the watershed is likely already significantly impaired and any incremental contribution in disturbance would exacerbate that impairment. BLM should use aerial maps or satellite imaging to estimate total surface disturbance within the cumulative impacts analysis area. Otherwise, BLM must explain why it cannot gather this information or more precisely estimate surface disturbance, pursuant to 40 C.F.R. § 1502.21, which requires that an agency obtain missing information if it is “essential to a reasoned choice” and “the overall costs of obtaining it are not unreasonable”; or it must summarize the available scientific evidence relevant to the impacts at issue, and evaluate the impacts “based upon theoretical approaches or research methods generally acceptable in the scientific community.” 40 C.F.R. § 1502.21.	The BLM has updated the estimates of existing surface disturbance/development throughout the EA using Landfire data that provides a more specific, quantifiable, and GIS-based assessment of disturbance/development. The estimates of existing development using the Landfire data has been added to Appendix H (Past, Present, and Reasonably Foreseeable Actions) and the cumulative impacts analysis in each resource section in the EA has been updated accordingly.

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	Third, the EA inappropriately minimizes the potential water quality effects of surface disturbance from BLM’s proposed leasing plan by comparing the additional increase caused by the plan to existing total surface disturbance within the cumulative impacts analysis area. The EA concludes that “the Proposed Action would contribute to a minimal incremental increase in surface disturbance and associated erosion, runoff and sedimentation to waterways due to the limited amount of surface disturbance in relation to the total cumulative disturbance.” (See Attachment 2 provided with comments for citation #92) BLM fails to explain why this is a valid methodology for analyzing the plan’s cumulative impacts. The EA must instead first describe existing surface disturbance and water quality conditions in the cumulative impacts analysis area and define a scientifically based threshold for assessing the significance of additional surface disturbance, such as road or surface disturbance density per square mile, and determine whether additional disturbance would exceed that threshold or compound existing exceedances of that threshold. Indeed, the EA makes clear that the potential for additional surface disturbance to compound existing water quality problems is more than a mere speculative possibility: [T]he majority of watersheds within the Analysis Area are not currently meeting water quality standards set under section 303(d) of the CWA due to bacteria and other microbes, metals, polychlorinated biphenyls, and low oxygen. Developing up to 29 well pads and up to 81 wells in the Action Area would further contribute to these watersheds (including the Little Muskingum) not meeting water quality standards due to potential impacts described above. For the five watersheds in the Analysis Area meeting water quality standards, or the 12 watersheds fully supporting designated uses, developing up to 29 well pads in the Analysis Area would pose a risk to these watersheds of retaining their functional status, especially if accidental spills of hydraulic fracturing fluid and wastewater occur that can have high heavy metal concentrations. Potential spills and contamination would impact water quality in the Little Muskingum River if they were to occur close to the river or upstream of the river. The Little Muskingum River bisects the Action Area in the northeast/southwest direction (Figure 8). During site-specific permitting of APDs, further analysis of potential impacts on the Little Muskingum River would be conducted based on the specific location of proposed development, especially if development is proposed in close proximity to or upstream of the river. Decreases in water quality can impact wetlands and riparian areas by degrading water quality and affecting the vegetative and biological health of these areas. (See Attachment 2 provided with comments for citation #93)	Comparing the incremental contribution of project-related surface disturbance to the total amount of existing disturbance is an appropriate analysis approach at this programmatic lease sale stage. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water quality and aquatic resources based on specific development proposals that identify locations of development, how much water would be used, the duration of water use during construction and completions, where water would come from, how water would be disposed of, and other project-specific information. The administrative act of issuing leases does not authorize any construction, development, or surface disturbance and at this stage the specific locations of development and the associated site-specific disturbance/impacts are unknown. As such it is not possible to assess potential site-specific impacts of development of the leases against specific significance thresholds with any degree of certainty. During the Stage 3 environmental review of APDs, the BLM would identify specific thresholds of significance based on policy, guidance, and science that is current at the time of the site-specific permitting. During the Stage 3 environmental review the BLM would be able to accurately quantify potential impacts of project-specific development proposals in relation to specific thresholds of significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	Moreover, the EA recognizes that additional surface disturbance “may lead to a measurable increase in total dissolved solids (TDS) and total suspended solids (TSS) in water resources throughout the Analysis Area, indicating a decline in water quality that would also affect wetlands and riparian areas.” (See Attachment 2 provided with comments for citation #94)	As described in Section 3.6 (Water Resources), the comment is correct that sedimentation, erosion, and movement of soils during storm events may lead to a measurable increase in total dissolved solids (TDS) and total suspended solids (TSS) in water resources throughout the Analysis Area. During the stage 3 environmental review of site-specific APDs, the BLM would further assess the potential for erosion and sedimentation from projects when specific locations, development, and surface disturbances are known in relation to identified water resources. Based on the site-specific analysis of APDs, the BLM would require additional best management practices, mitigation, and monitoring to reduce potential impacts on water quality associated with sedimentation and erosion. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	Fourth, the EA’s conclusion that any sedimentation and runoff impacts to water resources would be “minimal” runs counter to the evidence that water quality would “measurabl[y]” worsen and compound existing water quality violations, and that such pollution would largely go unmitigated, if development were to occur on private surface—where, according to BLM, operators would most likely site well pads and other infrastructure to access federal minerals. (See Attachment 2 provided with comments for citation #95) None of the Forest Plan’s measures would apply to private surface lands. Although the EA states that “[o]perators developing wells on private or NFS surface lands must include in drilling plans preventive measures for stormwater runoff and erosion from well-pad construction activities,” it also makes clear that if well pads were to be developed on private surface before an operator applied to BLM for a site-specific drilling permit, BLM would not have the ability to impose conditions on that private surface development. (See Attachment 2 provided with comments for citation #96) Thus, BLM’s leasing plan, by opening up federal minerals, would induce significant areas of private surface development, but that private surface development would entirely escape BLM and Forest Service regulation.	The cumulative impacts sections in each resource section in Chapter 3 have been revised to further describe potential impacts from development on private surface. As described in Section 2.2.3.2 (Avoidance and Minimization Measures for Species Protected under the Endangered Species Act), those identified avoidance and minimization measures are all required measures for federal permit applications and approvals and the BLM would require that they be applied as COAs during the APDs process, including for proposed surface development on private land to access federal minerals. As part of the APD process, the BLM also has the authority to require additional COAs to avoid and minimize environmental impacts or to deny APDs to access federal minerals if significant environmental impacts would occur on private land. The BLM’s Section 6 lease terms (see Section 2.2.3 in the EA, Environmental Protection Measures, Lease Stipulations, and Avoidance and Minimization Measures) also requires operators to conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Under the Section 6 lease terms, the lessee agrees to minimizing environmental impacts and the BLM has authority as the lessor to require the lessee to do so. Inventories and technical studies may be requested by the BLM to ensure impacts are minimized and BLM may require that operations be suspended if sensitive resources are identified and are impacted. Additional text has been added to Appendix E (Legal and Regulatory Authorities) to describe the State of Ohio regulations and standards for permitting and developing oil and gas resources in the state, focusing on objectives and requirements intended for the protection of natural resources. In the scenario where operators secure federal oil and gas leases under the Proposed Action and those operators begin developing private surface to access federal minerals prior to submitting APDs to the BLM, the BLM and USFS have limited authority to require avoidance, minimization, and mitigation measures for private surface development prior to submittal of APDs. However, in this scenario operators are still subject to the State of Ohio permit requirements, disclosures, and environmental protection mandates described in the Ohio Administrative Code (OAC 1501:9) and Ohio Revised Code (ORC 1509). The State of Ohio has a variety of regulatory requirements and standards intended to minimize potential impacts to natural resources from development on private surface. For example, as part of the State of Ohio permitting process, the ODNR DOGRM would conduct a site review meeting at proposed well sites on private land. At the site review meeting, the DOGRM may conduct a physical review of the proposed well site, discuss the application, identify items that are necessary to ensure compliance with state regulations, identify site-specific terms and conditions that may be attached to a permit that approves an application to construct a well site, and identify site-specific terms and conditions that may be attached to a permit to drill a well, such as Best Management Practices identified in the ODNR’s Best Management Practices for Oil and Gas Well Site Construction. For example, during the DOGRM site review meeting, if it is determined that suitable bat habitat exists or if hibernaculum or roosts are present at or near the proposed well site, the DOGRM may require specific terms and conditions as part of the permit to minimize impacts to the species. In addition, oil and gas operators developing private surface are subject to other applicable federal regulations that protect natural resources such as Section 9 of the Endangered Species Act that makes it illegal to harass, hunt, shoot, capture, trap, kill, collect, wound, or harm (i.e., “take”) any ESA-listed species or to pursue/attempt any of these activities

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	In any event, the EA does not describe the specific measures that would apply to private or federal surface development or analyze their effectiveness. Instead, it vaguely refers to measures in the Forest Plan with only a bare description (GFW-WSH-11 “to plan for and implement erosion control measures for management activities that create bare mineral soil conditions”; and measures SFW-WSH-6, GFW-WSH-7, and GFW-WSH-8 requiring “stabilization of disturbed areas”). (See Attachment 2 provided with comments for citation #97) The EA further strongly suggests that meaningful state controls would not apply to well pad and other development (whether on federal or private surface) because surface disturbance from oil and gas activities would largely not be subject to regulation under the Clean Water Act: “Certain oil and gas exploration, production, processing, or treatment operations or transmission facilities are conditionally exempt from construction and industrial stormwater permitting requirements under the CWA’s National Pollutant Discharge Elimination System (NPDES).” (See Attachment 2 provided with comments for citation #98) Although the EA mentions limited situations under which an NPDES permit or stormwater pollution prevention plan would be required, (See Attachment 2 provided with comments for citation #99) it fails to address whether any of these provisions would apply to operators in the Wayne. Ohio EPA, however, generally exempts from stormwater permitting most development for oil and gas extraction, including well pads, access roads, gathering lines, utility lines, compressor stations, tanks, and injection wells. (See Attachment 2 provided with comments for citation #100) Thus, most oil and gas activities in the Wayne would not be subject to a stormwater permit.	Section 2.2.3.1 (Environmental Protections Required for a Federal Minerals Lessee Applying to Drill on NFS Lands) and Appendix F (Existing Stipulations, Notifications, Guidelines, and Standards) describes the protection measures that would be required for development on NFS surface. Text has been added to Section 2.2.3.2 (Avoidance and Minimization Measures for Species Protected under the Endangered Species Act (Applicable to All Lands)) that clarifies that the avoidance and minimizations measures would be applied to all federal permit applications and approvals from the BLM, including scenarios where operators submit APDs to access federal minerals from private surface. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts of individual development projects and would require appropriate COAs for the protection of sensitive resources. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u> As described in Section 3.6 (Water Resources) oil and gas activities are generally exempt under the CWAs NPDES permitting process. However, operators would be required to acquire a stormwater permit if there is a discharge of stormwater that results in reportable quantity of oil or other hazardous substances and if a discharge results in a violation of a water quality standard or if an operator has a general permit for oil and gas operations that requires operators to develop and implement a stormwater pollution prevention plan. These operators must include in drilling plans measures to prevent and control discharge of pollution to stormwater, and OEPA must review and approve the stormwater pollution prevention plan before operations can begin (OEPA 2022). Additionally, operators developing wells on private or NFS lands must include in drilling plans preventive measures for stormwater runoff and erosion from well-pad construction activities. It is not possible at this time to know if stormwater permit exemptions would apply to reasonably foreseeable development associated with the Proposed leasing action. The application of CWA stormwater permitting and potential exemptions would be assessed by the State of Ohio and other regulatory agencies during site-specific permitting when specific development proposals are known.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	Elsewhere, the EA vaguely notes that “[o]perators developing wells on private land must also include preventative measures for stormwater runoff and erosion from well-pad construction activities in drilling plans they submit to ODNR.” (See Attachment 2 provided with comments for citation #101) But ODNR well pad construction permits do not appear to place any meaningful quantitative controls on pollution discharges or performance standards on those controls.	As described in Section 3.6 (Water Resources) of the EA as part of the general permit requirements the State of Ohio requires operators to develop a stormwater pollution prevention plan and include in drilling plans measures to prevent and control discharge of pollution to stormwater, and OEPA must review and approve the stormwater pollution prevention plan before operations can begin.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA thus falls far short of assuring the public and decisionmakers that water quality impacts from increased surface disturbance, and concomitant runoff and sedimentation, would not be significant.	In accordance with CEQ Regulations (40 CFR 1501.5, revised in 2020) and the BLM NEPA Handbook (H-1790-1), the BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife - Special Status Specis	Numerous aquatic species occur in the Wayne, including ESA-protected mussels. Mussel species that have the potential to occur in the Analysis Area include: clubshell, fanshell, northern riffleshell, pink mucket pearlymussel, purple cat’s paw, round hickorynut, salamander mussel, sheepnose mussel, and snuffbox mussel. BLM and USFS are conducting ESA Section 7 consultation with USFWS concerning the federally listed species. (See Attachment 2 provided with comments for citation #102) BLM, however, should thoroughly analyze the Leasing Plan’s effects on these species in the EA. “Continued water pollution and habitat changes have caused mussels to become one of the most rapidly declining animal groups in the United States. Of nearly 300 species of mussels native to North America, more than 70 percent are considered imperiled and around 35 are presumed extinct. Healthy and diverse mussel populations indicate good water quality and ecosystem health.” (See Attachment 2 provided with comments for citation #103) BLM must fully analyze and implement management standards that would not only prevent reductions in or extirpation of local populations but would also allow for their recovery.	Refer to Section 3.7 (Aquatic Wildlife) in the EA for the analysis of potential impacts to mussel species. The BLM/FS are also consulting with the USFWS under Section 7 of the Endangered Species Act to identify potential impacts to federally listed species and their habitat, including the preparation of a Biological Assessment (BA). The USFWS is the responsible lead agency for identifying management standards, protection measures, recovery, and reintroduction activities for federally listed species. The USFWS would utilize the BA to inform the preparation of a Biological Opinion or concurrence determination regarding potential impacts on federally listed species and critical habitat and which would include required mitigation measures to be considered and applied in APD approvals. The Biological Opinion or concurrence determination would provide a tiered approach to the ESA Section 7 consultation that can be applied during subsequent site-specific development proposals and associated consultation at the APD stage.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	Oil and gas exploration and extraction can result in accidental spills, discharges, and increased sedimentation, degrading aquatic habitat or causing habitat loss. (See Attachment 2 provided with comments for citation #104) In addition, water withdrawals for fracking can reduce stream flows, reducing available aquatic habitat. The EA fails to take a hard look at these threats to aquatic species, as well as their cumulative impacts in connection with climate change and pollutants from other activities. The EA also fails to demonstrate that proposed mitigation measures would effectively protect local populations.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. The EA takes a hard look at the potential impacts of the leasing decision and the Reasonably Foreseeable Development of those leases focusing on the deficiencies identified in the court orders and impacts associated with hydraulic fracturing that were not adequately described in the 2016 EA. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on air quality, water resources, aquatic and terrestrial wildlife, and other applicable resources based on site-specific development proposals. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	The EA’s analysis of aquatic species impacts must begin by describing and analyzing baseline conditions for aquatic species habitat in the Wayne National Forest. The EA fails to acknowledge the high-quality aquatic habitat found in the Wayne’s Marietta Unit. As the Ohio EPA has explained: The Little Muskingum River watershed is one of the highest quality watersheds in the state of Ohio and would be a candidate for state Scenic River status if there was local public support. The Little Muskingum River flows through densely wooded areas of Wayne National Forest and has a total of 73 species of fish including breeding populations of Muskellunge, a state listed Species of Concern. There are also populations of state endangered Ohio lamprey and numerous species that are sensitive to pollution including bigeye chub, black redhorse, river redhorse, silver shiner, rosyface shiner, mimic shiner, channel shiner, stonecat madtom, brindled madtom, slenderhead darter, dusky darter, blackside darter, sand darter, variegate darter, banded darter and bluebreast darter. A total of 22 species of mussels have been documented from the Little Muskingum River watershed including two species listed by Ohio DNR as Species of Concern (salamander mussel and deertoe) and one listed as State Threatened (threehorn wartyback) (Hoggarth, 1999). (See Attachment 2 provided with comments for citation #105) The EA should not just describe how likely aquatic species are to occur in the Wayne, it also should detail where in the Marietta Unit suitable habitat and individual populations occur. That way, if there are particularly sensitive habitats or important refugia, BLM can consider alternatives that place those areas off limits to leasing or development. This analysis must rely on the best available information, which would be on-the-ground surveys. There is no indication in the EA that any such surveys have occurred, or even what method BLM used to analyze each species’ “potential to occur” in the Wayne. If such surveys cannot be completed, BLM must explain why it cannot obtain the missing baseline information pursuant to 40 C.F.R. § 1502.21.	Additional text has been added to Section 3.7.1 (Aquatic Wildlife - Affected Environment) describing the high-quality nature of the Little Muskingum Watershed based on the source provided in this comment. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage, the specific locations of development and the associated site-specific disturbance/impacts are unknown and conducting comprehensive surveys for wildlife, bats, mussels, and other resources across the entirety of the approximately 267,961-acre Marietta Unit (64,659 acres of Forest Service surface) is not reasonable or feasible. For leases that proceed to development, developers or operators who secured leases are required to submit APDs to the BLM as part of the Stage 3 environmental review and analysis, which typically include on-the-ground, site-specific field evaluation and surveys by BLM, and USFS if the project is on NFS surface. During the Stage 3 environmental review of APDs, and once proposed development locations are known, the BLM would require appropriate site-specific surveys for wildlife, bats, and other resources to inform the site-specific Stage 3 environmental review and to understand project-specific impacts and their significance. Depending on the site-specific surveys and analysis in the Stage 3 environmental review, the BLM may consider and apply additional alternatives, design features, best management practices, mitigation, and monitoring that would be required as part of the APD authorization process to avoid, reduce, and minimize potential impacts to the range of resources. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	The EA also refers to “mussel streams” occurring in the Wayne but fails to explain what a mussel stream is or identify where they occur. The EA should clarify the definition. BLM seems to be referring to ODNR’s Ohio Mussel Survey Protocol and stream classification system, which divides streams into Groups 1-4 and specifies “reconnaissance guidelines” for each mussel stream group, before a proposed stream disturbance occurs: • Group 1: Small to mid-sized streams, [federally listed mussel species (FLS)] not expected. • Group 2: Small to mid-sized streams, FLS expected. • Group 3: Large Rivers, FLS not expected. • Group 4: Large Rivers, FLS expected. (See Attachment 2 provided with comments for citation #106) BLM should inventory all mussel streams in the EA and show where they occur in relation to lease parcels. This is necessary to understanding how much mussel habitat would be impacted in the Wayne and the potential severity of impacts.	As described in Appendix G (USFWS Avoidance and Minimization Measures for Listed Species) of the EA, mussel streams are defined in Appendix A of the 2023 Ohio Mussel Survey Protocol. The USFWS determined that Group 2 and 4 mussel streams are the best targets for applying this measure and that the greatest effects to these streams likely occur when water withdrawals coincide with drought conditions. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage, the specific locations of development and the associated site-specific disturbance/impacts are unknown and conducting comprehensive surveys for wildlife, bats, mussels, and other resources across the entirety of the approximately 267,961-acre Marietta Unit (64,659 acres of Forest Service surface) is not reasonable or feasible. For leases that proceed to development, developers or operators who secured leases are required to submit APDs to the BLM as part of the Stage 3 environmental review and analysis, which typically include on-the-ground, site-specific field evaluation and surveys by BLM, and USFS if the project is on NFS surface. During the Stage 3 environmental review of APDs, and once proposed development locations are known, the BLM would require appropriate site-specific surveys for wildlife, bats, and other resources to inform the site-specific Stage 3 environmental review and to understand project-specific impacts and their significance. Depending on the site-specific surveys and analysis in the Stage 3 environmental review, the BLM may consider and apply additional alternatives, design features, best management practices, mitigation, and monitoring that would be required as part of the APD authorization process to avoid, reduce, and minimize potential impacts to the range of resources. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	The EA fails to take a hard look at the impact that increased surface disturbance from oil and gas development in the Wayne would have on aquatic ecosystems and freshwater mussels. The EA must fully analyze how increased sedimentation from the construction of well pads, roads, and pipelines would degrade aquatic habitat.	Section 3.7 (Aquatic Wildlife) in the EA indicates that potential impacts to aquatic systems and freshwater mussels would occur and would cause declines in suitable habitat and reduction in habitat quality. Section 3.7 (Aquatic Wildlife) further details the types of impacts on aquatic species and mussels that would result from sedimentation. During site-specific permitting, the BLM would further analyze potential impacts to aquatic habitat and mussels based on proposed development locations, project-specific disturbance, proposed water withdrawal volumes, water sources, and other information. Based on project-specific impacts the BLM would require application of best management practices, mitigation, and monitoring as part of the APD process to protect aquatic resources.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	Sedimentation poses a significant threat to aquatic species. As the EA notes: “Sedimentation of waterways is one of the most harmful impacts on aquatic wildlife species, causing smothered eggs, young, and habitat, which can result in a loss of viability of the population.” (See Attachment 2 provided with comments for citation #107) Alterations in landscapes can negatively impact aquatic ecosystems if sediment loads are high enough to alter channel formation and/or stream productivity, which degrades freshwater biota. (See Attachment 2 provided with comments for citation #108) The EA notes that mussels, in particular, are sensitive to sedimentation: “Sediment entering streams in the Analysis Area would potentially alter the survival of mussels by disrupting filter-feeding, burying them, or displacing suitable habitat by filling in the interstitial spaces between stable substrates . . . Mussels, such as round hickorynut, salamander mussel, sheepnose and others, that rely on sight-feeding organisms as part of their life cycles are especially sensitive to sedimentation of habitat because cloudy water at critical reproductive periods (late spring to early summer) may affect reproductive success.” (See Attachment 2 provided with comments for citation #109) The EA, however, fails to recognize many other ways in which mussels are sensitive to sedimentation. As the Ohio Division of Wildlife has noted: Mussels are sedentary and are not able to move long distances to more suitable areas in response to heavy silt loads . . . Siltation has been documented to adversely affect native freshwater mussels both directly and indirectly. Siltation degrades water and substrata quality, limiting the available habitat for freshwater mussels (and their fish hosts), thereby limiting their distribution and potential for expansion and maintenance of their populations. It also irritates and clogs the gills of filter-feeding mussels, resulting in reduced feeding and respiration, and smothers mussels if sufficient accumulation occurs. Siltation increases the potential exposure of the mussels to other pollutants...Sediment accumulations that are less than lethal to adults may adversely affect or prevent recruitment of juvenile mussels into the population. Also, sediment loading in rivers and streams during periods of high discharge is abrasive to mussel shells. Erosion of the outer shell allows acids to each and corrode underlying layers. (See Attachment 2 provided with comments for citation #110). As a result, many mussels “are intolerant of changes in water quality and habitat and are among the first to respond to these problems. A river devoid of mussels is probably a river that needs to be investigated and monitored.” (See Attachment 2 provided with comments for citation #111).	As the commenter notes, Section 3.7.2 (Aquatic Wildlife - Environmental Consequences) indicates potential impacts to mussel species from sedimentation. Additional text describing some of the specific impacts noted in this comment has been added to Section 3.7.2 (Environmental Impacts) of the EA including impacts of siltation, sedimentation, and associated effects on water and substrata quality that can limit available habitat for freshwater mussels.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	Sedimentation is caused by anthropogenic activities, which have led to the decline of mussel populations. “Anthropogenic sources of sediment include agriculture, logging, mining, urbanization, and hydrological alteration.” (See Attachment 2 provided with comments for citation #112) The construction of well pads, pipelines, and access roads would generate sedimentation and suspended sediments that lead to declines in mussel populations. (See Attachment 2 provided with comments for citation #113) For example, “[t]he impact of pipelines crossing mussel streams through open-trenching, the preferred industry method, increases sediment load and contributes to a loss of mussel habitat through sedimentation, and the covering of appropriate substrates.” (See Attachment 2 provided with comments for citation #114) Roads are another significant source of sedimentation. The best available science shows that roads cause significant adverse impacts to aquatic resources. (See Attachment 2 provided with comments for citation #115) The construction and presence of forest roads can significantly change the hydrology and geomorphology of a forest system, leading to reductions in the quantity and quality of aquatic habitat. Compacted roadbeds reduce rainfall infiltration, intercept and concentrate water, and contribute more sediment to streams than any other land management activity. (See Attachment 2 provided with comments for citation #116) These impacts are chronic: “Every time it rains, sediment from the road surface and from cut-and fill-slopes is picked up by rainwater that flows into and on roads (fluvial erosion). The sediment that is entrained in surface flows are often concentrated into road ditches and culverts and directed into streams. The degree of fluvial erosion varies by geology and geography and increases with increased motorized use (Robichaud et al. 2010).” (See Attachment 2 provided with comments for citation #117) Further, increased truck traffic in the Wayne along access roads and existing roads has the potential to worsen sedimentation. “Closed roads produce significantly less sediment than open drivable roads.” (See Attachment 2 provided with comments for citation #118) Catastrophic road bed failure and massive sedimentation events are also a risk: Roads also precipitate catastrophic failures of road beds and fills (mass wasting) during large storm events leading to massive slugs of sediment moving into waterways (Gucinski et al. 2000, Endicott 2008). This typically occurs when culverts are undersized and cannot handle the volume of water funneled through them, or they simply become plugged with debris and sediment. The saturated roadbed can fail entirely and result in a landslide, or the blocked stream crossing can erode the entire fill down to the original stream channel. (See Attachment 2 provided with comments for citation #119)	Section 3.7 (Aquatic Wildlife) in the EA indicates that potential impacts to aquatic systems and freshwater mussels would occur and would cause declines in suitable habitat and reduction in habitat quality. Section 3.7 (Aquatic Wildlife) further details the types of impacts on aquatic species and mussels that would result from sedimentation. During site-specific permitting, the BLM would further analyze potential impacts to aquatic habitat and mussels based on proposed development locations, project-specific disturbance, proposed water withdrawal volumes, water sources, and other information.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	Climate change can exacerbate the impacts of roads, as roads designed for storms and water flows typical of past decades may be unable to handle the effects of more extreme weather events such as increased flood severity, more frequent landslides, and changes in sedimentation rates and delivery processes. (See Attachment 2 provided with comments for citation #120) This increased sedimentation would have a profound impact on fish and aquatic habitat, as it has been linked to decreased fry emergence, decreased juvenile densities, loss of winter carrying capacity, increased predation of fish, and reductions of macro-invertebrate populations that are a food source to many species. (See Attachment 2 provided with comments for citation #121) Mussels would be impacted in the same way and/or harmed by the decline in fish species, as they are dependent on fish for development and dispersal of juveniles. (See Attachment 2 provided with comments for citation #122)	Additional text has been added to Section 3.7.3 (Aquatic Wildlife - Cumulative Impacts) noting how climate change would exacerbate sedimentation and associated impacts to water resources and aquatic wildlife.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	Despite these potentially significant effects, the EA minimizes them on the same flawed grounds discussed in the above section concerning water resource impacts. That analysis is unsupported for the same reasons discussed above—i.e., the EA underestimates the total surface disturbance that would result from the Leasing Plan; fails to meaningfully assess baseline surface disturbance; minimizes the potential water quality impact by dismissing the increase in surface disturbance as a “limited amount” in relation to the total cumulative disturbance; and fails to consider that most development would likely occur on private surface, thereby avoiding Forest Service and BLM requirements and meaningful regulation of runoff and erosion control. Further, the EA fails to identify the amount of surface disturbance or sedimentation in the Little Muskingum watershed that local mussel populations would be expected to tolerate, or at what point development impacts would lead to significant impacts such as population declines, reduced population viability, or significant habitat loss. Given the extreme sensitivity of mussels to erosion and sedimentation from landscape alterations, the EA should consider an alternative that prohibits any development in watersheds where mussels or their suitable habitat occurs.	The EA takes a hard look at the potential impacts of the leasing decision and the Reasonably Foreseeable Development of those leases focusing on the deficiencies identified in the court orders and impacts associated with hydraulic fracturing that were not adequately described in the 2016 EA. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water resources and aquatic wildlife and would apply appropriate COAs for the protection of sensitive mussel and other aquatic species. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u> Conducting site-specific surveys for mussel species is not appropriate as part of this programmatic NEPA review of the lease sale action as specific development locations are unknown at this time. Depending on the site-specific surveys and analysis in the Stage 3 environmental review, the BLM may consider and apply additional alternatives, design features, best management practices, mitigation, and monitoring that would be required as part of the APD authorization process to avoid, reduce, and minimize potential impacts to the range of resources.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife – Special Status Species	The EA fails to take a hard look at the impacts of contaminants from fracking activities on mussel populations. USFWS has identified contaminants as one of several primary threats to salamander mussels (a species with “high” potential to occur in the Wayne) (See Attachment 2 provided with comments for citation #123) “As sedentary benthic feeders, mussels are exposed to toxic pollutants that enter aquatic environments through surface water runoff carrying sediment and pollutants into the stream from anthropogenic or human caused activities (e.g., development, agriculture, industrial and municipal processes), decomposition of organic nitrogen, and through atmospheric deposition from precipitation and domestic livestock. . . .” (See Attachment 2 provided with comments for citation #124) “Population and individual impacts and response can vary based on the magnitude, proximity to the contaminant source, sensitivity of host species, and mussel life stage exposed.” (See Attachment 2 provided with comments for citation #125)“Contaminants impact surface and pore water chemistry, sediment composition, and host species fitness and survival. All stages of freshwater mussels are directly exposed to contaminants when present in the system.” (See Attachment 2 provided with comments for citation #126) Oil and gas development can be particularly harmful to mussels. Fracking fluid and produced water spills from trucks, pipelines, tanks, or underground migration from leaky wells all pose a threat to water quality. “Extraction of petroleum produces water with high chlorine concentrations, to which all stages of freshwater mussels are highly sensitive. The degradation of water quality as a result of land-based oil and gas drilling activities is a significant adverse effect on freshwater mussels.” (See Attachment 2 provided with comments for citation #127) The release of drilling mud through fracturing is an additional potential impact to rivers and streams, as well as spill of frack fluids used in the well drilling process, which are high in chlorides and other chemicals. (See Attachment 2 provided with comments for citation #128)	Section 3.7.2 (Aquatic Wildlife - Environmental Impacts) describes the potential for impacts to aquatic wildlife from accidental spills and contamination. Additional text has been added to this section to further describe potential impacts from wastewater disposal/injection and impacts from brine laden wastewater. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts on water resources and aquatic wildlife and would apply appropriate COAs for the protection of sensitive mussel and other aquatic species. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	The EA fails to analyze the cumulative impacts of oil and gas spills and leaks in connection with other sources of contamination. “Sources of contaminants can include point (for example, wastewater treatment and industrial effluents, targeted lampricide treatment) and nonpoint (for example, runoff comprised of fertilizer, pesticide, road salts, grease, and oil) sources resulting from urbanization, agriculture, toxic spills, aquatic invasive species treatments, and resource extraction and mining.”(See Attachment 2 provided with comments for citation #129)	Text has been added to Section 3.7.2 (Aquatic Wildlife - Cumulative Impacts) that notes the potential for cumulative impacts from point and nonpoint sources as indicated in this comment.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	In addition, the EA fails to discuss site-specific impacts and their potential severity to the Little Muskingum River’s high-quality aquatic habitat. The Little Muskingum River bisects the Action Area in the northeast/southwest direction, and many tributaries flow into the river. (See Attachment 2 provided with comments for citation #130) The EA must analyze the potential for a spill or contamination event to affect this relatively small river system, and the potential for permanent or long-term loss of aquatic habitat or mussel populations.	Section 3.7 (Aquatic Wildlife) in the EA indicates that potential impacts to aquatic systems and freshwater mussels would occur and would cause declines in suitable habitat and reduction in habitat quality. Section 3.7 (Aquatic Wildlife) further details the types of impacts on aquatic species and mussels that would result from sedimentation. During site-specific permitting, the BLM would further analyze potential impacts to aquatic habitat and mussels based on proposed development locations, project-specific disturbance, proposed water withdrawal volumes, water sources, and other site and project-specific information.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	For the same reasons described above, that BLM’s analysis of its proposed leasing plan’s water withdrawal impacts on stream flows is flawed, BLM’s analysis of the plan’s impacts on aquatic habitat is flawed.	Section 3.7 (Aquatic Wildlife) in the EA indicates that potential impacts to aquatic systems and freshwater mussels would occur and would cause declines in suitable habitat and reduction in habitat quality. Section 3.7 (Aquatic Wildlife) further details the types of impacts on aquatic species and mussels that would result from sedimentation. During site-specific permitting, the BLM would further analyze potential impacts to aquatic habitat and mussels based on proposed development locations, project-specific disturbance, proposed water withdrawal volumes, water sources, and other site and project-specific information.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	The EA fails to take a hard look at the cumulative impacts of climate change in conjunction with BLM’s leasing proposal on aquatic species, including mussels. Its analysis is limited to merely noting the potential for more severe or frequent floods and ignores the myriad other ways climate change is likely to degrade habitat for aquatic species.	Additional text has been added to Section 3.7.2 (Aquatic Wildlife - Cumulative Impacts) to describe further how climate change would exacerbate cumulative impacts, as noted in this comment.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife – Special Status Species	One of the greatest threats to freshwater mussel ecosystems is alteration of natural stream temperatures, which would be exacerbated by climate change. (See Attachment 2 provided with comments for citation #131) Changing climate conditions that can influence freshwater mussels include increasing or decreasing water temperatures and precipitation patterns that increase flooding, as well as changes in salinity levels. (See Attachment 2 provided with comments for citation #132) Specifically, “[i]ncreased surface temperatures and decreases in precipitation would likely lead to elevated stream temperature and decreases in flow. Water temperature and flow are key variables in maintaining riverine biota and if altered can strongly impact the distribution and ecology of freshwater mussels.” (See Attachment 2 provided with comments for citation #133) Warmer water temperatures affect mussel physiological processes, disrupting energy balance, growth, and reproduction. Freshwater mussels need flowing water to survive. While mussels have evolved in habitats that experience seasonal fluctuations in stream flows, climate change would alter the normal seasonal range in variability. (See Attachment 2 provided with comments for citation #134) Even though storms and flooding may become more frequent in Appalachia in springs and winters, hotter and drier summers would result in more drought periods during the non-rainy season. “Prolonged stream drying occurs during periods of extreme drought as a result of climate change and may occur across river systems at varying levels depending on the rate in which climatic impacts are accelerated, but can also occur as a result of land use activities such as water withdrawal for oil and gas extraction, irrigation for agriculture, and other municipal/industrial purposes.” (See Attachment 2 provided with comments for citation #135) “Mussels may survive short periods of low flow, but if low flows persist, mussels face oxygen deprivation, increased water temperature, and, ultimately, stranding, reducing survivorship, reproduction, and recruitment in the population.” (See Attachment 2 provided with comments for citation #136)	Additional text has been added to Section 3.7.2 (Aquatic Wildlife - Cumulative Impacts) to describe further how climate change would exacerbate cumulative impacts, as noted in this comment.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	These climate change impacts on aquatic systems can lead to population-level and ecosystem-level impacts, as well as other impacts that would be unpredictable, in the following ways: · Increases in water temperatures that may alter fundamental ecological processes, thermal suitability of aquatic habitats for resident species, and their geographic distribution, thus increasing the likelihood of species extinction and loss of biodiversity. · Changes and shifts in seasonal patterns of precipitation and runoff which can alter the hydrology of stream systems, affecting species composition and ecosystem productivity. Aquatic organisms are sensitive to changes in frequency, duration, and timing of extreme precipitation events such as floods or droughts, potentially resulting in interference of reproduction. Further, increased water temperatures and seasonally reduced streamflow can alter many ecosystem processes, including increases in nuisance algal blooms. · Cumulative or synergistic impacts that can occur when considering how climate change may be an additional stressor to sensitive freshwater systems, which are already adversely affected by a variety of other human impacts, such as altered flow regimes and deterioration of water quality. · Adapting to climate change may be limited for some aquatic species depending on their life history characteristics and resource needs. Reducing the likelihood of significant impacts would largely depend on human activities that reduce other sources of ecosystem stress to ultimately enhance adaptive capacity, which would include, but not be limited to: maintaining riparian forests, reducing nutrient loading, restoring damaged ecosystems, minimizing groundwater and stream withdrawal, and strategically locating any new reservoirs to minimize adverse effects. · Changes in presence or combinations of native and nonnative, invasive species would result in specific ecological responses to changing climate conditions that cannot be easily predicted at this time. These types of changes (e.g., increased temperatures that are more favorable to a non-native, invasive species compared to a native species) can result in novel interactions or situations that may necessitate adaptive management strategies. · Shifts in mussel community structure which can stem from climate-induced changes in water temperatures since sedentary freshwater mussels have limited refugia from disturbances such as droughts and floods, and since they are thermo-conformers whose physiological processes are constrained by water temperature within species-specific thermal preferences (Galbraith et al. 2010, p. 1,176). (See Attachment 2 provided with comments for citation #137) The EA must analyze the incremental impact of the leasing proposal in connection with the full range of threats that climate change poses to the affected mussel species.	Additional text has been added to Section 3.7.2 (Aquatic Wildlife - Cumulative Impacts) to describe further how climate change would exacerbate cumulative impacts, as noted in this comment.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife	The EA fails to provide any analysis of the effectiveness of proposed measures to reduce aquatic habitat impacts, and thus fails to establish that those impacts would be reduced to less than significant levels.	Additional text has been added to the end of the environmental impacts sections in Chapter 3 assessing the potential effectiveness of avoidance, minimization, and other mitigation measures identified in the EA, particularly the avoidance and minimization measures for species protected under the Endangered Species Act (see Section 2.2.3.2 in the EA, Avoidance and Minimization Measures for Species Protected under the Endangered Species Act (Applicable to All Lands)). However, as described in Section 1.2.1 (Actions to be Taken) the EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning and at this stage the specific locations of development and the associated site-specific disturbance/impacts are unknown. As a result, it is not possible to accurately predict the effectiveness of mitigation measures in avoiding and minimizing potential impacts from development until the proposed development is known. During the stage 3 environmental review of APDs, the BLM would further assess the effectiveness of measures carried forward in the Decision Record for the lease action based on the site-specific development proposals and associated impacts, as well as the effectiveness of additional protection measures, COAs, and monitoring that the BLM may apply during the permitting of APDs to address identified site-specific impacts. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024

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					U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife - Special Status Species	BLM proposes in the EA two buffer zones to protect “mussel streams.” The first proposed buffer zone would “establish 300-foot no-disturbance buffers along each side of mussel streams (no access roads within this buffer).” (See Attachment 2 provided with comments for citation #138) But the EA does not explain how it selected the buffer width and why this distance is appropriate, or why a larger buffer zone (discussed below) should only apply to well pads and not to roads. Further, even if a road is sited further away from a stream, the runoff is still likely to end up in streams: “the sediment that is entrained in surface flows are often concentrated into road ditches and culverts and directed into streams.” (See Attachment 2 provided with comments for citation #139) In addition, the proposed buffer may not be sufficient to protect aquatic habitat from landdisturbing activities, especially as storm events become more powerful and carry more sediment into waterways due to climate change, and existing infrastructure is not built to prevent potentially catastrophic consequences in Appalachia’s steep terrain. (See Attachment 2 provided with comments for citation #140) BLM should explain how it determined this is an appropriate width for buffers along mussel streams and analyze the buffer’s effectiveness in the specific conditions found in the Wayne.	As described in Appendix G (USFWS Recommended Measures for Avoiding and Minimizing Adverse Impacts to Federally Listed Species), the 300-foot disturbance buffer is a measure recommended by the USFWS as part of the Section 7 consultation process and this buffer width was determined to be an appropriate and reasonable area to restrict disturbance along mussel streams.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife - Special Status Species	Second, the EA states that BLM would prohibit the construction of well pads within 1,000 feet of a mussel stream. (See Attachment 2 provided with comments for citation #141) Again, the EA fails to explain why a 1,000-foot buffer is appropriate. The EA also fails to demonstrate that the proposed no-disturbance buffers are adequate to avoid or minimize contamination from spills and leaks. The EA does not discuss whether these buffers would be sufficient to prevent a major spill into the river or its tributary streams or minimize the chances of a spill reaching streams, in light of the steep terrain in the Wayne. It is also unclear whether exceptions to these buffers would be allowed. BLM should require that these buffers be continuous and not fragmented. “Riparian buffers that are effective in maintaining species diversity are often wider than those required to reduce sedimentation. Width is not the only factor that determines buffer effectiveness; buffers that are continuous around the perimeter or along the length of a sensitive habitat area can be more effective than fragmented buffers in providing fish and wildlife habitat and preserving ecosystem health.” (See Attachment 2 provided with comments for citation #142)	As described in Appendix G (USFWS Recommended Measures for Avoiding and Minimizing Adverse Impacts to Federally Listed Species), this measure was recommended by the USFWS as part of the Section 7 consultation process and this buffer width was determined to be an appropriate and reasonable area to restrict the development of new well pads along mussel streams. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts to water resources and aquatic wildlife and would apply additional COAs to protect sensitive resources. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife - Special Status Species	The best available science suggests that limiting road and other infrastructure density would be an important way to protect aquatic species: A number of studies show that higher road densities also impact aquatic habitats and fish (Table 3). Carnefix and Frissell (2009) provide a concise review of studies that correlate cold water fish abundance and road density, and from the cited evidence concluded that . . . [“no truly ‘safe’ threshold road density exists, but rather negative impacts begin to accrue and be expressed with incursion of the very first road segment; and 2) highly significant impacts (e.g., threat of extirpation of sensitive species) are already apparent at road densities on the order of 0.6 km/km2 (1.0 mi/mi²) or less, (Carnefix and Frissell (2009), p. 1).[”] (See Attachment 2 provided with comments for citation #143) In any event, larger buffers would further limit sedimentation and provide other important benefits for the ecological health of the aquatic system. “Loss of vegetated riparian buffers along streams, lakes and wetlands can result in a loss of flood retention and base flow regulation. Without adequate vegetated buffers, the ability of floodplains to store flood flows associated with major storm events and wet seasons might be significantly reduced, resulting in increased flooding and scour.” (See Attachment 2 provided with comments for citation #144) Additionally, “[f]orested riparian buffers provide shade, which can help maintain stream temperatures, as well as food and cover for many aquatic species. For headwaters, creeks and small rivers, a riparian buffer that does not extend shade to at least half of the stream or wetland might increase risk to the temperature regime, impacting fish and invertebrate communities.” (See Attachment 2 provided with comments for citation #145)	As described in Appendix G (USFWS Recommended Measures for Avoiding and Minimizing Adverse Impacts to Federally Listed Species), the USFWS has recommended and the BLM has adopted a variety of avoidance and minimization measures that reduce roads, well pads, and other infrastructure along mussel streams. During site-specific permitting, the BLM would assess the potential impacts associated with site-specific development proposals and additional protection measures may be applied to reduce potential impacts to aquatic wildlife.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	In addition, BLM should require monitoring of buffered streams to ensure that buffers are effective in avoiding sedimentation and water pollution from oil and gas activities.	The BLM would consider the need for monitoring water quality in streams based on the site-specific environmental review of development proposals during the stage 3 environmental review process associated with APDs.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The EA should detail and discuss the effectiveness of other best management practices that would be used to avoid and reduce sedimentation. “General maintenance [best management practices] are usually vegetative practices used to contain polluted runoff . . . from erosion and sedimentation generated at small construction sites. A variety of practices are used at construction sites to control both erosion and polluted runoff.” (See Attachment 2 provided with comments for citation #146) The Forest Plan’s guidelines for managing disturbed areas simply provide a list of general measures without any performance standards for ensuring that sedimentation is avoided or minimized. (See Attachment 2 provided with comments for citation #147) GFW-WSH-8: When stabilizing disturbed areas, give priority to stabilizing areas that are discharging soil into watercourses, especially in municipal and recreational impoundment watersheds. Techniques may include: • Placing straw bales in ditch lines and small drainages • Leaving berms in road embankments during construction • Constructing diversion ditches • Hand placing slash and unmerchantable logs across slopes and trails • Installing check dams and ditch lines • Excavating sediment detention basins. (See Attachment 2 provided with comments for citation #148) BLM should consider several other stabilization measures, including: seeding and revegetation to promote strong growth and stabilization of exposed surfaces, silt fences for the perimeter to provide sediment control, and stabilized entrances to reduce the amount of sediment carried off the construction site. (See Attachment 2 provided with comments for citation #149) In addition, BLM should require monitoring of erosion control practices and stream conditions to ensure adequate soil stabilization.	Additional text has been added to the end of the environmental impacts sections in Chapter 3 assessing the potential effectiveness of avoidance, minimization, and other mitigation measures identified in the EA, particularly the avoidance and minimization measures for species protected under the Endangered Species Act (see Section 2.2.3.2 in the EA). However, as described in Section 1.2.1 (Actions to be Taken) the EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning and at this stage the specific locations of development and the associated site-specific disturbance/impacts are unknown. As a result, it is not possible to accurately predict the effectiveness of mitigation measures in avoiding and minimizing potential impacts from development until the proposed development is known. During the stage 3 environmental review of APDs, the BLM would further assess the effectiveness of measures carried forward in the Decision Record for the lease action based on the site-specific development proposals and associated impacts, as well as the effectiveness of additional protection measures, COAs, and monitoring that the BLM may apply during the permitting of APDs to address identified site-specific impacts.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife – Special Status Species	The EA states that “[p]rohibiting in-water work in Group 2 and 4 mussel streams or requiring a mussel survey prior to in-water work would reduce direct mortality of mussels through crushing, would reduce the generation of silt and sedimentation that can suffocate mussels, and would reduce the destruction and degradation of in-stream mussel habitat.” (See Attachment 2 provided with comments for citation #150) The EA does not establish that State or federally protected mussels do not occur in non-Group 2 or 4 streams. BLM should prohibit in-water work in any stream that provides suitable habitat for mussels. At a minimum, BLM should require that mussel surveys occur in any stream where inwater work is proposed to occur, and, if so, prohibit such work in those streams.	The BLM would consider the need for additional best management practices, mitigation measures, and monitoring based on the site-specific environmental review of development proposals during the stage 3 environmental review process associated with APDs.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Aquatic Wildlife - Special Status Species	The EA states that BLM would “[p]rohibit water withdrawals from Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future during drought conditions that exceed the severe drought category, according to the U.S. Drought monitor. Before any water withdrawals are initiated the applicant would check the U.S. Drought Monitor website. OH to confirm that the source water does not exceed the D2 Severe Drought designation (i.e., no water withdrawal are allowed from areas experiencing “extreme drought” or “exceptional drought”).”(See Attachment 2 provided with comments for citation #151) In addition, FWS would encourage recycled water usage to minimize water withdrawals from surface sources. (See Attachment 2 provided with comments for citation #152) The EA fails to identify which streams qualify for Group 2 or 4 protections. It is also unclear why these restrictions should only apply to the identified rivers and Group 2 or 4 streams, or why they should only apply during severe drought conditions. Withdrawals from areas upstream of these rivers or a Group 2 or 4 stream would still significantly reduce stream flows in these water bodies. In addition, as described above, given the potential for high-volume withdrawals exceeding millions of gallons in a short	As described in Appendix G (USFWS Recommended Measures for Avoiding and Minimizing Adverse Impacts to Federally Listed Species) of the EA, mussel streams are defined in Appendix A of the 2023 Ohio Mussel Survey Protocol. The USFWS determined that Group 2 and 4 mussel and eastern hellbender streams are the best targets for applying this measure and that the greatest effects to these streams likely occur when water withdrawals coincide with drought conditions. Thus, an additional Avoidance and Minimization measure has been added to the EA and Appendix G (USFWS Avoidance and Minimization Measures for Listed Species) intended specifically to avoid/reduce potential impacts to flows in the Little Muskingum River by prohibiting water withdrawals from the Little Muskingum River, Muskingum River, and any other Group 2 and 4 streams that may be identified in the future or additional hellbender streams that may be identified in the future.

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
				time period, and the potential for such withdrawals to affect smaller streams, stream flows would severely decline even in nondrought conditions.	
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	BLM acknowledges that horizontal wells use between 19-27 million gallons per well during drilling and completion, and 2-6 million additional gallons during operations. (See Attachment 2 provided with comments for citation #153) These millions of gallons of fluids used for fracking result in millions of gallons of waste—over 1 trillion gallons annually in the U.S. (See Attachment 2 provided with comments for citation #154) The SEA downplays the risk of oil and gas waste to the environment and community around the Marietta Unit of WNF. By deferring to Ohio’s permitting and enforcement authority for Class II injection wells to manage risk, it fails to take a hard look at the true risks of fracking waste. Finally, BLM must conduct a cumulative impact assessment specific to fracking waste because Ohio is overburdened by oil and gas waste.	Additional text has been added to Section 3.6 (Water Resources) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	Fracking waste is a grave threat to Ohioans and their environment and natural resources. The SEA does not include a new section about fracking waste, and the sections of the 2016 EA that it incorporated by reference simply concluded that risk is low for releases of waste and acknowledged the exemption to the Resource Conservation and Recovery Act for oil and gas waste. (See Attachment 2 provided with comments for citation #155) This analysis is insufficient and is a failure of BLM to take a hard look at the reasonably foreseeable results of fracking in the WNF in violation of the CBD order and NEPA.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Scope of Analysis	Oil and gas waste, and particularly fracking waste, is a burgeoning environmental and public health crisis. Oil and gas waste from the Appalachian Basin tends to be highly toxic and radioactive. In particular, wastewater from the Marcellus and Utica shales has higher salinities and radioactivity than waste originating elsewhere, with radioactivity levels found to be 3,600 times above EPA’s safe drinking water limit. (See Attachment 2 provided with comments for citation #156) EPA has also found benzene, phenanthrene, lead, arsenic, barium, antimony, fluoride, and uranium in oil and gas waste at levels that exceed 100 times EPA’s health-based standards. (See Attachment 2 provided with comments for citation #157). Additional constituents of fracking waste that are harmful to human health and the environment include per- and polyfluoroalkyl substances (PFAS) and hydrogen sulfide. (See Attachment 2 provided with comments for citation #158) Exposure to these chemicals and metals is associated with poor health outcomes, including cancer, respiratory issues, skin lesions, reproductive problems, and even the impairment of vaccine effectiveness. (See Attachment 2 provided with comments for citation #159) Ohio’s gross natural gas withdrawals from shale gas wells have far exceeded 2 million cubic feet annually since 2018, and therefore many local producers dispose of fracking waste in Ohio. (See Attachment 2 provided with comments for citation #160) However, Ohio has also become a dumping ground for all the waste in the region (due in no small part to its lax rules and enforcement for Class II injection wells, as discussed further below). Out-of-state waste has accounted for approximately 43-48% of the waste disposed in Class II injection wells in Ohio. (See Attachment 2 provided with comments for citation #161) The amount of waste disposed in Ohio has continued to increase, with the volume of wastewater disposed in injection wells increasing from 690 million gallons in 2013 to 12.7 billion gallons in 2020. (See Attachment 2 provided with comments for citation #162) As of May 2020, Ohio had 226 active injection wells, 57 additional wells permitted, and 8 wells being drilled. (See Attachment 2 provided with comments for citation #163) Neither the 2016 EA nor the SEA analyzed water pollution caused by fluid migration from Class II injection wells. Ohio has recently experienced several alarming incidents of wastewater migrating out of injection zones and surfacing. In 2019, oil and gas waste injected into the Redbird #4 disposal well in Washington County surfaced through conventional oil and gas wells located 5 miles away from the injection site. (See Attachment 2 provided with comments for citation #164) In a separate incident, in August of 2021, fluid identified as likely oil and gas waste spewed from an abandoned oil and gas well near the shore of Veto Lake in Washington County. (See Attachment 2 provided with comments for citation #165) The abandoned well is located approximately 1 mile from three injection wells (Redbird #2, #4, and #5 wells) and in between the Redbird #5 well and the Redbird wells #2 and #4. (See Attachment 2 provided with comments for citation #166) In January 2021, oil and gas waste surfaced through an idle production well owned by Genesis Resources in Noble County. The source of the waste was two injection wells located approximately 2.5 miles from the idle well and owned by Deeprock Disposal Solutions, Travis Unit SWIW #7 (API # 34121240860000) and the Warren Drilling Co SWIW #6 (API # 34121239950000). (See Attachment 2 provided with comments for citation #167) For four days, the idle production well spewed over 40,000 barrels of waste across the ground and into a nearby stream, killing approximately 500 fish and aquatic species. (See Attachment 2 provided with comments for citation #168) These and other incidents of fluid migration from Class II wells impose a risk to human health and the environment that warranted discussion in the SEA.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Analysis Methods and Assumptions	The SEA and 2016 EA improperly minimized the seismicity impacts of injection wells. In particular, BLM relied on seismic activity data from before 2003—before the widespread adoption of fracking—to infer that seismic activity is not a problem in Ohio, despite noting that seismic activity is associated with injection wells. (See Attachment 2 provided with comments for citation #169) In fact, Ohio has recently experienced a dramatic increase in seismic activity associated primarily with Class II injection wells. (See Attachment 2 provided with comments for citation #170) Studies highlight both the increased frequency and increased magnitude of earthquakes in areas with high injection well disposal.(See Attachment 2 provided with comments for citation #171) One Class II disposal well alone in Mahoning County was responsible for approximately 12 earthquakes between 2011 and 2012, with one measuring as a 4.0 magnitude earthquake. (See Attachment 2 provided with comments for citation #172) Prior to these earthquakes, there had been no seismic activity recorded in Mahoning County. (See Attachment 2 provided with comments for citation #173)	Added text to Section 3.6.2 (Water Resources - Environmental Impacts) mentioning the potential for increased volumes of wastewater injection to induce small magnitude seismic events reference the citations that were noted in this comment.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The SEA claims that because wastewater can be reused, this would reduce the environmental burden of fracking waste, and of fracking in the WNF in general. (See Attachment 2 provided with comments for citation #174) In addition to downplaying the threat of fracking to the environment, this statement also downplays the dangers of the treatment of fracking waste, as well as the general failure of industry to repurpose waste large-scale. A facility that was supposed to convert fracking waste to food-grade salt and recycled fracking fluid in Fairmont, West Virginia—approximately 60 miles from the Ohio border—shuttered after less than six years of operation, during which time the facility was likely shipping much of the waste it received to out-of-state landfills. (See Attachment 2 provided with comments for citation #175) Teeming with brine, wastewater, and treatment residue, the site experienced a fire and explosion in May 2023, after which “off the scales” radioactivity was detected throughout the site. (See Attachment 2 provided with comments for citation #176) In late 2023, after local activists exposed that the site was being used as a party spot for local teenagers, EPA finally took action, conducting data analysis and minimal steps to secure the site. (See Attachment 2 provided with comments for citation #177) In addition, the state of Ohio recently initiated legal action against Austin Master Services, a disposal company in Martins Ferry, Ohio, whose storage of excessive amounts of oil and gas waste contaminated drinking water. (See Attachment 2 provided with comments for citation #178) Sites like these are sprinkled throughout Ohio and West Virginia and woefully underregulated, resulting in regular releases to the environment and communities. Large amounts of fracking waste are also going to Ohio’s landfills, again, without reasonable regulatory oversight. (See Attachment 2 provided with comments for citation #179) Constituents of this waste, including radionuclides, can then enter local waterways through landfill leachate discharges. (See Attachment 2 provided with comments for citation #180) Landfill discharge permits currently do not include protective limits to address most oil and gas waste constituents. Therefore, this waste has contributed to elevated radioactivity level in streams sediments and has interfered with the ability of wastewater treatment plants to operate. (See Attachment 2 provided with comments for citation #181). An SEA compliant with the CBD order and with NEPA would require a detailed and accurate discussion of the health and environmental risks of fracking waste, its danger to Ohioans, public safety issues imposed by injection wells in Ohio, and the dangers of waste processing.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources. Additional text has been added to Section 3.6 regarding impacts to human health from wastewater and water contamination. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The SEA acknowledges that essentially all fracking waste—98%—is disposed in Class II injection wells. (See Attachment 2 provided with comments for citation #182) In response to concerns about the new volumes of fracking waste that would be produced if BLM leases the Marietta Unit of WNF, the agency says that Ohio has it under control, claiming: “The risk of groundwater contamination through [disposal in Class II injection wells] is minimized by the regulations pertaining to underground injection wells.” (See Attachment 2 provided with comments for citation #183) BLM cites Ohio Administrative Code 1501:9-3-06, the regulations for Ohio’s Class II injection well program, and declares that Ohio’s area of review and reporting requirements manage the risks of disposing oil and gas waste underground. (See Attachment 2 provided with comments for citation #184) However, Ohio’s Class II permitting program, rules, and regulations have failed to protect underground sources of drinking water (USDWs), human health, and the environment. Ohio has consistently failed to enforce the law or otherwise deter violations of the law for Class II injection wells. Further, Ohio’s program fails to address risks that have endangered USDWs in violation of the Safe Drinking Water Act. Due to these failures, there is a petition pending before EPA to revoke Ohio’s Class II primary enforcement authority, which the Commenters attach and incorporate by reference herein. (See Attachment 2 provided with comments for citation #185)	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources and aquatic wildlife. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. As noted in the comment, the State of Ohio regulates the disposal of wastewater in Class II injection wells and revision or update to the State of Ohio regulations is beyond the scope of this project. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	Ohio’s Class II injection well program does not adequately deter violations at Class II wells. When EPA last reviewed Ohio’s Program in 2015, following the submission of a citizen’s audit that highlighted problems regarding the Ohio Department of Natural Resources (ODNR) enforcement of its Class II program, EPA expressed serious concerns regarding Ohio’s enforcement effort, stating that Ohio should improve its program by: (1) “[i]dentifying operator reporting gaps or inaccuracies and taking enforcement actions for reporting violations,” and (2) “[e]scalating enforcement for recalcitrant and repeat violators.” (See Attachment 2 provided with comments for citation #186) In response to the Travis Wells incident, ODNR relied on a voluntary suspension of operations for those wells. For Redbird #4, ODNR has taken no enforcement action, despite a determination that it caused oil and gas waste surface expressions in Washington County. Instead, ODNR relied on voluntary compliance to prevent future issues with Redbird #4. In addition, as of May 2020, ODNR lists only two of Ohio’s injection wells as plugged, despite many wells either having plugging orders in place or having been inactive for over five years. (See Attachment 2 provided with comments for citation #187) It is clear that this lackluster enforcement does very little to encourage injection well operators to comply with the law and maximize protections to public health and the environment in Ohio, given the frequency of spill and migration events. (See Attachment 2 provided with comments for citation #188)	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources and aquatic wildlife. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. As noted in the comment, the State of Ohio regulates the disposal of wastewater in Class II injection wells and revision or update to the State of Ohio regulations is beyond the scope of this project. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	Ohio’s Class II program is inadequate to ensure suspension of operations or revocation of permits even when ODNr makes findings that these actions are necessary to protect USDWs. Ohio’s Class II program provides ODNr with no unilateral authority to issue administrative penalty orders. While Ohio Rev. Code Ann. § 1509.04 gives ODNr the authority to suspend or revoke injection well permits, the agency’s implementing regulations limit the agency to ordering only temporary suspension of operations. (See Attachment 2 provided with comments for citation #189) Operators can resume injection after submitting a corrective action plan approved by ODNr—even before the operator takes that corrective action and while serious risks remain. ODNr’s attempts to use even temporary suspension orders to address public health and safety issues at Class II wells have been ineffective in part because Ohio’s courts have found that reasonable suspension orders may constitute the taking of an operator’s property.(See Attachment 2 provided with comments for citation #190) The rules provide that if the chief determines a Class II disposal well may be “impacting wells or impacting public health, safety, or the environment . . . the chief may modify a permit order and require a new area of review to be conducted. . . .” (See Attachment 2 provided with comments for citation #191) According to the language of the rule, even if the Chief does in fact determine a well is impacting public health, safety, or the environment, the Chief may choose not to modify the permit to correct the violations.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources and aquatic wildlife. As noted in the comment, the State of Ohio regulates the disposal of wastewater in Class II injection wells and revision or update to the State of Ohio regulations is beyond the scope of this project. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix E – Legal and Regulatory Authorities	Due in no small part to the Class II Petition, ODNr’s Division of Oil and Gas Resources Management (DOGRM) recently exercised its authority to suspend operations at Class II injection wells based on endangerment to public health and the environment. The Division received complaints that waste from three Class II injection wells owned by K&H Partners, LLC, was flowing into nearby production wells. In June 2023, the Chief of DOGRM issued an order suspending injection activity at the K&H wells due to evidence of brine migration. (See Attachment 2 provided with comments for citation #192) The Ohio Oil & Gas Commission affirmed the order on April 18, 2024, finding that brine was “migrating outside of the permitting zone of injection” for the K&H Wells and that “continued injection operations would be reasonably anticipated to cause damage or injury to public health, safety, or to the environment.” (See Attachment 2 provided with comments for citation #193) This rare exercise of DOGRM’s suspension authority based on endangerment is hardly a basis for the conclusion that Ohio’s enforcement of its program would minimize risks from fracking waste in the WNF.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources and aquatic wildlife. As noted in the comment, the State of Ohio regulates the disposal of wastewater in Class II injection wells and revision or update to the State of Ohio regulations is beyond the scope of this project. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix E – Legal and Regulatory Authorities	Ohio’s Class II program also fails to comply with the Safe Drinking Water Act due to a variety of other deficiencies, including: (See Attachment 2 provided with comments for citation #194) · Ohio’s fixed radius method for establishing an area of review endangers USDWs and the environment. · Ohio’s permissiveness of injecting waste into low-permeability shale formations unsuitable for permanent disposal endangers USDWs and the environment. · Operators are not required to determine the extent of USDWs before the permit is issued, which endangers USDWs. · An applicant for a permit to inject in Ohio is not required to provide critical geological data on the injection zone, including identification and descriptions of the injection formation and confining layer, endangering USDWs and the environment. · Ohio does not require characterization of waste being injected, which means that neither state and federal officials nor ordinary Ohioans can assess the risk of waste being disposed. · Ohio’s program does not require periodic review or expiration of permits to inject, which can allow constant injection as well conditions, or regulations, change. Rather than relying on Ohio’s program to downplay risks from fracking waste, the SEA	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources and aquatic wildlife. As noted in the comment, the State of Ohio regulates the disposal of wastewater in Class II injection wells and revision or update to the State of Ohio regulations is beyond the scope of this project. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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				should have accounted for the particular risks of fracking waste disposal in Ohio due to the failures of Ohio’s Class II well permitting program.	
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Water Resources	The SEA acknowledged that there are seven Class II injection wells within the Marietta Unit of the WNF and cited the (inadequate) Ohio regulations regarding the siting and safety requirements for Class II injection wells. (See Attachment 2 provided with comments for citation #195) This is where BLM’s analysis of waste issues particular to the Marietta Unit concluded. Fracking waste clearly imposes a unique danger to Ohioans, due to fracking activity in Ohio, due to the quantity of waste from throughout the Ohio River Valley being injected into Class II wells in Ohio, and due to the poor track record of Ohio’s Class II well permitting program. Despite this, the BLM failed to conduct a cumulative impacts analysis particular to fracking waste storage and disposal issues. BLM should include a cumulative impacts assessment specific to oil and gas waste disposal issues for the SEA to comply with NEPA and the CBD ruling, because waste is an essential part of assessing the impacts of fracking in the WNF and surrounding communities.	Additional text has been added to Section 3.6 (Water Resources) and Section 3.7 (Aquatic Wildlife) indicating that the Proposed Action would increase the volume of wastewater that must be disposed of and that if there are spills of wastewater or if wastewater is not properly disposed of there would be impacts to water resources and aquatic wildlife. As noted in the comment, the State of Ohio regulates the disposal of wastewater in Class II injection wells and revision or update to the State of Ohio regulations is beyond the scope of this project. During the stage 3 environmental review of site-specific APDs, the BLM would further assess potential impacts associated with the generation and disposal of wastewater based on the specific development proposals and identify additional mitigation and monitoring measures based on project-specific impacts, as appropriate. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	In the Supplemental EA, BLM fails to apply its own guidance for addressing environmental justice in NEPA documents. Instead, BLM uses an inappropriate and unjustified methodology that fails to identify environmental justice communities in the impacted area. BLM’s analysis fails to address the disproportionate environmental harms the Proposed Action would inflict upon these environmental justice communities. Further, BLM failed to provide meaningful opportunities for these environmental justice communities to participate in decision making. Executive Order 12898, issued under the authority of the Title VI Civil Rights Act, requires that: Each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States . . . (See Attachment 2 provided with comments for citation #196) Further, Executive Order 14008, issued by President Biden in 2021, states that “[a]gencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities” (See Attachment 2 provided with comments for citation #197) “[S]ecurin[g] environmental justice . . . for disadvantaged communities that have been historically marginalized and overburdened by pollution,” is a part of this policy. (See Attachment 2 provided with comments for citation #198) Finally, Executive Order 13390, signed in 2021, states that it is the policy of the executive branch to “prioritize both environmental justice and the creation of . . . well-paying union jobs.” (See Attachment 2 provided with comments for citation #199) In order to achieve these directives, both state and federal agencies implementing federal permits programs are required to conduct an environmental justice analysis and consider environmental justice issues in permitting decisions. (See Attachment 2 provided with comments for citation #200) BLM is bound by executive orders to the same degree it is bound by statute, so it is obligated to enforce these executive orders. (See Attachment 2 provided with comments for citation #201)	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	EPA defines environmental justice as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.” (See Attachment 2 provided with comments for citation #202) Fair treatment means that “no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental and commercial operations or programs and policies.” (See Attachment 2 provided with comments for citation #203) Meaningful involvement means that: (1) potentially affected populations have an appropriate opportunity to participate in decisions about a proposed activity that would affect their environment and/or health; (2) the public’s contribution can influence the regulatory Agency’s decision; (3) the concerns of all participants involved would be considered in the decision-making process; and (4) the rule-writers and decision-makers seek out and facilitate the involvement of those potentially affected. (See Attachment 2 provided with comments for citation #204) It is BLM’s formal policy that it would “actively fulfill its environmental justice responsibilities by following the principles and practices in Addressing Environmental Justice in NEPA Documents: Frequently Asked Questions” (2022, Attachment 1 to Instruction Memorandum IM2022-059). (See Attachment 2 provided with comments for citation #205) BLM notes that “this document establishes minimum requirements while recognizing that the diversity of communities, projects, and processes requires the	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.

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				flexibility to adopt multiple approaches or select more sensitive or context-specific approaches.” (See Attachment 2 provided with comments for citation #206)	
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	BLM defines low-income individuals as individuals whose income is less than or equal to 200% of the federal poverty level. (See Attachment 2 provided with comments for citation #207) To find low-income populations, BLM guidance requires that there is a study area and a reference area. (See Attachment 2 provided with comments for citation #208) Once the study area and reference areas have been selected, BLM guidance provides three screening methods “to identify low-income populations in the study area, the 50% Threshold Analysis, the Low-Income Threshold analysis, and local data and information.” (See Attachment 2 provided with comments for citation #209) The 50% Threshold Analysis requires BLM to identify what percent of people in the study area are living at or below 200% of the poverty line. (See Attachment 2 provided with comments for citation #210) If that percentage is at or greater than 50, the area contains a low-income environmental justice community. (See Attachment 2 provided with comments for citation #211) Under the low-income threshold analysis, any study area that has a low-income percentage of the population equal to or higher than the reference area is identified as having a low income environmental justice community. (See Attachment 2 provided with comments for citation #212) Lastly, if neither the 50% Threshold Analysis nor the low-income threshold analysis identify low-income environmental justice communities, the guidance instructs BLM to consult additional sources including local data and information to assess whether a low-income environmental justice community is indeed present. BLM did not follow this guidance in conducting its environmental justice analysis. Instead, BLM first used EJScreen, which alerted the agency to the presence of low-income environmental justice communities given that the “majority of the Marietta Unit falls within, at minimum, the 60th percentile for low income,” with significant swaths falling within the 70-80th percentile, and multiple areas within the impacted area ranking in the 80-90th percentile for lowincome individuals. (See Attachment 2 provided with comments for citation #213)	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	BLM proceeded to unjustifiably apply a “meaningfully greater” standard to identify low income environmental justice communities. Notably, BLM’s use of the meaningfully greater standard is contrary to BLM guidance, which only lists the meaningfully greater standard for use in identifying minority populations not for identifying low-income populations. BLM selected the Marietta Unit plus a 4 mile buffer as the study area, and the State of Ohio as the reference area. (See Attachment 2 provided with comments for citation #214) Under the meaningfully greater standard, BLM identified those census tracts with a percent of the population in poverty that was 10% greater than the percent in poverty for the State of Ohio. (See Attachment 2 provided with comments for citation #215) Using this method, BLM identified three census tracts as low-income environmental justice communities. (See Attachment 2 provided with comments for citation #216) BLM further provided a misleading map in Figure 14 of the Supplemental EA where it labeled these three census tracts “Low Income” and the remainder of the study area “Not Low Income.” BLM’s depiction is contrary to the data and erases low-income populations throughout the study area. Had BLM applied a low-income threshold analysis, it would have found that 18 of the 26 census tracts within the Action Area adjacent counties evaluated in Table 3-29 of the Supplemental EA have a low-income population percent that exceeds the low-income population percent for the reference area. See Table 1 infra. Simply looking at poverty levels alone, 17 of the 26 census tracts have a higher percentage of individuals living below the poverty line than the reference area. Thus, most of the study area consists of low-income environmental justice communities under BLM’s own guidance for identifying low-income environmental justice communities.	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	BLM provides no justification for its decision to shirk its own guidance and apply the inappropriate “meaningfully greater” standard to identify low-income environmental justice communities. BLM’s environmental justice analysis wrongfully fails to consider most low-income communities that the Proposed Action would affect.	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	Further, BLM guidance also has the agency ask “[a]re there groups outside the socioeconomic study area that may use the lands and resources in question?” (See Attachment 2 provided with comments for citation #218) BLM does not even consider this question. In the case of the Wayne National Forest’s Marietta Unit, there are numerous groups, including low-income individuals and communities, who rely on this forest for recreation, sustenance, and health. BLM makes no line of inquiry to understand those outside the study area who rely on the lands and resources of the Marietta Unit.	The 2016 EA that was incorporated by reference discusses populations that utilize the Marietta Unit in multiple sections of the document. Specifically, the 2016 EA discusses visitors from surrounding population centers who may travel to the study area for various purposes, including recreation, sightseeing, and exploring cultural history (refer to Sections 3.10 and 3.14 of the 2016 EA). The commenter claims that low-income or minority individuals and communities outside the study area rely on the forest but does not identify specific communities. USDA data shows that 96.8% of visitors to the Wayne National Forest are there for recreation, bathroom use, commute, or passing through, while the remaining 3.2% are there for “some other reason”, which is unspecified (USDA Forest Service National Visitor Use Monitoring 2019a Purpose of Visit by Visitors Who Agreed to be Interviewed). Additionally, the socioeconomic analysis within the 2016 EA in Section 3.15 provides a comprehensive examination of all counties that are either within or adjacent to the Marietta Unit: Monroe, Noble, and Washington Counties in Ohio, as well as Pleasants and Tyler Counties in West Virginia. This analysis describes the socioeconomic and demographics characteristics of individuals in closest proximity to the Marietta Unit, which is the group most likely to visit the area according to the USDA (USDA Forest Service National Visitor Use Monitoring 2019b Distance Traveled). The Analysis Area in the EA was revised to include four additional counties to ensure additional impacts were evaluated. However, the five counties analyzed in the 2016 EA are those within or adjacent to the Marietta Unit. As such, the 2016 EA descriptions of the socioeconomic and demographics characteristics of individuals in the Marietta Unit have been incorporated by reference into the EA.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	Moreover, as discussed, supra, BLM makes no effort to identify those environmental justice communities to be impacted by the additional waste created by the Proposed Action, many of which are likely to be outside the study area. To comply with environmental justice mandates, BLM must conduct a thorough environmental justice analysis that identifies all low-income environmental justice communities in the study area and those beyond the study area who are likely to be impacted by the Proposed Action.	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	Because the Supplemental EA fails to consider numerous low-income environmental justice communities that the Proposed Action would impact, as discussed supra, it does not address the disproportionate impact to environmental justice communities. Therefore, it fails to meet BLM’s responsibilities under Executive Orders 12898, 14008, and 13390. Further, the Supplemental EA fails to address numerous environmental justice indices that should have been considered, especially because of the known, clearly identifiable presence of low-income environmental justice communities.	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	The EJScreen Community Report for the Action Area shows numerous environmental justice indicators of concern. (See Attachment 2 provided with comments for citation #219) Highlights from the report include that the area is in the 83rd percentile for the state for air toxics cancer risk, the 60th percentile for air toxics respiratory hazards, the 53rd percentile for lead paint, the 68th percentile for superfund proximity, and the 61st percentile for wastewater discharge. (See Attachment 2 provided with comments for citation #220) These percentiles only increase if one includes additional socioeconomic factors such as percent with less than high-school school education, percent unemployed, and low life expectancy with these environmental indicators (air toxics cancer risk: 84th percentile; air toxics respiratory hazards: 64th percentile; traffic proximity: 50th percentile; lead paint: 58th percentile; hazardous waste proximity: 53rd percentile; wastewater discharge: 73rd percentile). (See Attachment 2 provided with comments for citation #221) In addition, the region has a high flood risk (90th percentile for the US and 95th for Ohio).	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	The EJScreen Community Report also shows multiple health indicators of concern in the Action Area. Notably, the Action Area has a low life expectancy (69th percentile for the US and 54th percentile for Ohio), high rates of heart disease (92nd percentile for US and 86th percentile for Ohio), high rates of Asthma (73rd percentile for US and 60th percentile for Ohio), and high rates of cancer (81st percentile for US and 75th percentile for Ohio). The Action Area also has a higher rate of individuals with disabilities (85th percentile for US and 79th percentile Ohio).	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	Lastly, the communities in the action areas already suffer a disproportionate lack of critical services. The Action Area is in the 73rd percentile in the US for Broadband Internet gaps (72nd percentile for Ohio) and 57th percentile in the US for lack of health insurance (72nd percentile for Ohio).	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	The Supplemental EA does not account for any of these existing burdens, and thus does not account for the environmental justice implications of the Proposed Action.	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	BLM did not conduct outreach to the low-income environmental justice communities to ensure their meaningful participation in decision-making. BLM held all of two virtual public meetings regarding the Proposed Action where the communities that would be impacted have significant gaps in access to high-speed internet. (See Attachment 2 provided with comments for citation #222) To Commenters’ knowledge, BLM did not engage in in-person outreach to those communities that stand to be impacted, conduct outreach to community leaders, or ensure publication of outreach materials in media that would be likely to reach the low-income environmental justice communities of concern.	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	The Supplemental EA states that BLM did not engage in any public scoping “because the general scope and purpose of the Supplemental EA is the same as for the 2016 EA.” (See Attachment 2 provided with comments for citation #223) This is an abrogation of BLM’s responsibilities to prioritize environmental justice in their actions. Those communities that the Proposed Action would impact are entitled to the opportunity to review and weigh-in on the additional environmental impacts the court ordered BLM to assess. BLM provides no justification as to why it believes its environmental justice responsibilities do not include outreach to low-income environmental justice communities about these previously undisclosed and unconsidered environmental impacts when these are the very environmental impacts the Proposed Action would inflict on these environmental justice communities. Further, the 2016 EA was issued eight years ago. During that time, there is likely to be new relevant information regarding the communities in the Action Area; demographics can and do change, as do environmental burdens. BLM’s failure to prioritize public involvement and meaningful engagement of known and readily identifiable low-income environmental justice communities violates BLM’s own guidance on addressing environmental justice in NEPA documents and its legal responsibilities under Executive Orders 12898, 14008, and 13390.	Comments relating to environmental justice (EJ) are not addressed for the reasons stated in the EA in section 3.10.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	The proposed leasing at issue is only happening due to “expressions of interest” from companies who intend to develop the leases in order to produce oil and gas. Development, therefore, is not speculative. As the agencies note, leasing conveys a “right” for a private company to develop a lease. EA at 2-3; see also 43 C.F.R. § 3101.1-2 (holding a lessee has the “right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove, and dispose of all the leased resource in a leasehold[.]”). Unless the agencies impose stipulations pursuant to 43 C.F.R. § 3101.1-3 that provide complete discretion for the agencies to deny any and all future development of the proposed leases on the basis of environmental impacts, then a full analysis and assessment of air quality	As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage, the specific locations of development, types of equipment/hours of operation, emissions associated with site-specific development, and other information is unknown. During the stage 3 environmental review of site-specific APDs, the BLM would further analyze potential impacts on air quality based on project-specific emissions. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the</i>

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
				impacts is necessary at this stage. Neither the BLM nor the USFS have proposed such a stipulation, meaning a complete and robust analysis is required at this point.	<u>Interior</u> , 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	We appreciate the BLM and USFS acknowledging that oil and gas leasing poses reasonably foreseeable air quality impacts associated with future oil and gas development. Unfortunately, however, the agencies have not conducted a complete and robust analysis and assessment of air quality impacts in this case. To this end, the agencies have not demonstrated that impacts to air quality would not be significant.	The administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases does not authorize development to occur. Timing, scale of development, and site specific and operator input are not known at the leasing stage. However, reasonable development estimates have been made in this EA to better inform decision makers and the public of potential impacts on air quality if the leases were developed. The BLMs analysis of potential air quality effects for the leasing action are appropriate and sufficient for the NEPA analysis and the administrative act of offering the leases for sale.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	To begin with, we are concerned that the BLM and USFS have not taken a rigorous and methodological approach to analyzing and assessing air quality impacts related to reasonably foreseeable oil and gas development in the Wayne National Forest. The agencies appear to have developed crude emission estimates that are belied by a lack of detailed information regarding potential development, activity levels, emission factors, and other information necessary to develop reasonable estimates of potentially significant impacts. Further, while acknowledging the existence of ambient air quality standards meant to protect public health and welfare, there is no effort to analyze potential impacts in the context of these standards.	BLM Air Resource Specialists use a comprehensive lease sale emissions tool to calculate conservative estimates for proposed leases using appropriate emission factors (AP-42 and other approved sources) and development and activity levels based on historical data. Impacts to air quality can only be assessed through air quality modeling, which is not performed at the leasing stage since the decision does not authorize development to occur, but only authorizes the sale of the proposed parcels for future development that would be analyzed in subsequent NEPA.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	The agencies’ approach to air quality is confusing because the BLM generally undertakes detailed, quantitative, and well-supported analyses of impacts when it comes to oil and gas development. In Colorado, for example, the BLM prepared and has continued to update the Colorado Air Resources Management Modeling Study, known as CARMMS, which discloses in detail potential emissions and air quality impacts tied to reasonably foreseeable oil and gas development in the state. The latest version of CARMMS presents emission estimates for oil and gas development in various regions of the state and models the potential air quality impacts associated with this development. (See Attachment 2 provided with comments for citation #224) The CARMMS report has informed numerous project and planning-level decisions in Colorado related to the management of oil and gas resources. It is not clear why the agencies in this case are not conducting a similarly complete analysis and assessment of air quality impacts associated with reasonably foreseeable oil and gas development. As currently presented, the analysis of air quality impacts falls incredibly short of providing information needed to ensure a well-informed decision. The Supplemental EA certainly does not provide a level of detail and accuracy necessary to support any assertion that the impacts of the proposed oil and gas leasing would not be significant.	CARMMS is a state-wide, RMP-level modeling effort undertaken in Colorado that modeled RFD. The results are incorporated into Colorado NEPA assessments. BLM Eastern States is unable to complete the same level of analysis due to lack of budget and the high cost of completing a photochemical grid modeling analysis in addition to the time required to run such a model. Colorado also has significant air quality issues with nonattainment areas and several Class I areas that may be impacted by oil and gas development in the state which is on a far greater scale than the level of oil and activity analyzed in this EA. While the CARMMS modeling is a useful tool for the BLM Colorado to incorporate by reference into their NEPA analyses, BLM Eastern States does not have the budget or capacity to complete such a modeling analysis.

First Name	Last Name	Organization	Comment Category	Comment Text	Response
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	We are first concerned that it is not clear how the agencies estimated reasonably foreseeable emissions associated with the proposed leasing. The EA presents a range of estimated “on-lease” emissions for particulate matter less than 10 microns in diameter (“PM10”), particulate matter less than 2.5 microns in diameter (“PM2.5”), volatile organic compounds (“VOCs”), nitrogen dioxide, carbon monoxide, sulfur dioxide (“SO2”), and hazardous air pollutants (“HAPs”). See EA at 3-15. Unfortunately, it is not clear how these emissions were estimated and whether they accurately reflect potential direct and indirect emissions associated with reasonably foreseeable oil and gas development. In support of their estimates, the agencies cite “BLM Lease Sale Emissions Tool,” but it is not clear what this tool actually is. It is also not clear what inputs the BLM utilized to calculate potential emissions, what activity levels the agency assumed, what emission factors were utilized, and whether these emission factors are reflective of potential emissions from development in this region of Ohio. For instance, potential VOC emissions depend on the specific hydrocarbon composition of liquids and gases produced at well sites in the area. Similarly, nitrogen dioxide and carbon monoxide emissions depend upon the type of equipment G135utilized to develop oil and gas and what emission controls may or may not be utilized for engines. Neither the EA nor Appendix I (Air Quality and Climate Impacts Impacts) provide any detail on how the agencies actually calculated potential emissions and what assumptions were relied upon.	The BLM can provide the lease sale emissions tool used for all BLM lease sales upon request. The emissions for a lease sale are not project-specific since the BLM does not have development details as noted in the comment such as the gas composition analysis, the equipment being used, nor the timing and extent of development. Emissions are calculated using a representative well for a particular region and were estimated based on the number of wells specified in the Proposed Action.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	We are also concerned that the presented emissions estimates do not reflect all reasonably foreseeable direct and indirect emissions associated with development of the proposed oil and gas leases. The EA states that the estimates are of “on-lease” emissions, which we presume means only emissions that may occur on land above the proposed leases. However, emissions are likely from activities off of the proposed leases, including on other nearby leases and/or rights-of-way. The proposed federal leases are not single, isolated contiguous parcels of mineral ownership. Rather, the federal leases are adjacent to other parcels of mineral ownership and if leased, would facilitate development of a much more extensive reservoir of oil and gas. As the 2020 RFDS notes, “Federal minerals are likely to be accessed in the subsurface through private minerals.” 2020 RFDS at 1. This means that development of federal minerals is likely to involve development on off-lease lands, including potentially private lands, which would lead to more than “on-lease” emissions.	Federal minerals cannot be accessed from private land without BLM authorization. Further development on private land to access private mineral rights is not reasonably foreseeable or known to the BLM and would not be known unless Federal minerals are being accessed, which would require an APD and subsequent NEPA analysis. Federal minerals, whether accessed from private or federal surface, is accounted for in the RFDS for the lease sale.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	With regards to off-lease development, it is not clear whether the agencies accounted for the reasonably foreseeable development of gas and/or liquid gathering pipeline systems, compressor stations, and/or central tank batteries and their associated emissions. The agencies assert they cannot accurately estimate midstream or downstream emissions,. Even if that were true, gathering systems, compressor stations, and central tank batteries are not midstream facilities, but rather are oil and gas production facilities.	None of the mentioned emissions sources are reasonably foreseeable at the leasing stage. It is not reasonable for the BLM to speculate site-specific development at this stage. Without an actual proposal for development, the BLM cannot assume that additional facilities would be added to support the development. Particularly given the relatively small number of wells analyzed in the EA, their locations, and whether development would even occur, it is likely that existing facilities supporting oil and gas activities in the area would be sufficient to handle additional throughput from new wells.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	We are also concerned that the emissions estimates do not account for truck and heavy equipment emissions. These emissions would occur both on-lease and off-lease. It is not clear whether these emissions were considered.	Truck traffic and heavy equipment emissions for a representative well are accounted for in the emission estimates. The BLM Lease Sale Emissions Tool is an Excel-based application that allows the user to select a specific well type (deep oil, shallow gas, etc.) for specific geographic areas to develop per-well emissions for construction, development and operation (post-development) phases in a typical oil and gas well's "life". The Excel-based tool is a simple application with an input / summary spreadsheet that is linked to other "calculator" Worksheets that estimate emissions based on user selection for location and well-type. The Tool's calculators estimate emissions for a wide-range of equipment and activities including road, pipeline and pad construction, drilling and hydraulic fracturing, operations phase activities including product storage, well head engines, and pneumatics, and all traffic associated with development and operations. These emissions estimates are made using EPA's AP-42 guidance and factors, MOVES and NONROAD emissions factors for vehicle traffic and heavy equipment, and inputs (gas profiles, equipment counts, production and flow rates, etc.) are based on several studies and datasets including EPA's 2017 NEI oil and gas tool, Utah VOC Study,

First Name	Last Name	Organization	Comment Category	Comment Text	Response
					WRAP, CENSARA and TCEQ Studies for preparing western, central and eastern U.S. oil and gas emissions inventories.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	Finally, we are concerned over the Supplemental EA’s estimate of potential HAPs emissions. To begin with, HAPs are a category of toxic air pollutants that are particularly harmful to human health and welfare. They include a number of substances that impact health and welfare in different ways based on different levels and intensities of exposure. See 42 U.S.C. § 7412(b)(1). We are concerned that the agencies do not appear to have estimated potential emissions of individual HAPs, but rather developed an aggregate estimate. This does not provide sufficient insight or information regarding the potentially significant air quality impacts. We are particularly concerned that the agencies have not quantified emissions of benzene, toluene, ethylbenzene, and xylene, all of which are exceptionally poisonous pollutants that are tied to oil and gas development. Benzene in particular is a known carcinogen. An estimate of aggregate HAPs emissions is not an analysis of air quality impacts. To justify any finding of no significant impact, the agencies must analyze reasonably foreseeable emissions of individual HAPs in order to justify any assessment of impacts related to HAPs emissions.	The calculated aggregate Hazardous Air Pollutant (HAP) estimate includes benzene, toluene, ethylbenzene, and xylene and n-hexane, which are the most common HAPs associated with oil and gas development. The aggregate is derived from HAPs emissions for a representative well. A detailed HAPs analysis requires analysis and specification of the actual gas stream and details regarding the development, which is not available at the leasing stage.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	Most concerning is that the agencies have not analyzed or assessed how projected emissions would actually impact ambient air quality. Although the EA acknowledges that future development would lead to emissions of harmful pollutants and impact ambient air quality, the agencies make no attempt to actually analyze exactly how emissions would impact ambient air quality. This is a major omission.	Leasing does not authorize development to occur. If the parcels are leased and subsequently developed, the proponent would be required to submit an APD which would require a separate site and operation-specific NEPA analysis during which impacts would be further assessed and appropriate mitigation applied if necessary.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	The EA acknowledges the U.S. Environmental Protection Agency (“EPA”) has established national ambient air quality standards (“NAAQS”) to assure protection of public health and welfare from a number of dangerous air pollutants. In Appendix I (Air Quality and Climate Impacts Impacts), the agencies note the EPA has established quantitative NAAQS for, among other pollutants, carbon monoxide, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide. See EA at I-2. (See Attachment 2 provided with comments for citation #225) However, the agencies make no attempt to analyze how air emissions from the proposed leasing would impact air quality in relation to these quantitative NAAQS.	Impacts to the NAAQS cannot be assessed without a modeling analysis which is not completed at the lease sale stage since development is not authorized. The lease sale quantifies estimated emissions, using very broad assumptions since development specifics are unknown at the lease sale stage. The BLM also provides appropriate explanation and context for the analysis.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	For carbon monoxide, which is a byproduct of combustion, the EA states that reasonably foreseeable development would lead to the release of as much as 118.6 tons per year. Although Appendix I (Air Quality and Climate Impacts Impacts) discloses that NAAQS for carbon monoxide limit concentrations in the ambient air to no more than 9 parts per million (“ppm”) over an eight-hour period and 35 ppm over a one-hour period, the EA does not actually analyze how anticipated carbon monoxide emissions would affect ambient concentrations. With no analysis of ambient air quality impacts, the EA falls short of analyzing and assessing air quality impacts.	Impacts to the NAAQS cannot be assessed without a modeling analysis which is not completed at the lease sale stage since development is not authorized. The lease sale quantifies estimated emissions using very broad assumptions since development specifics are unknown at the lease sale stage. The estimates are intended to be conservative and provide an assessment of maximum emissions if all lease parcels are sold and developed. The BLM also provides appropriate explanation and context for the analysis included in the EA. Furthermore, NAAQS criteria pollutants are regulated by state agencies and the EPA and sources would require emission controls in order to minimize emissions and protect public health.

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	For nitrogen dioxide, which is also a byproduct of combustion, the EA states that reasonably foreseeable development would lead to the release of as much as 152.2 tons per year. Although Appendix I (Air Quality and Climate Impacts Impacts) discloses that NAAQS for nitrogen dioxide limit concentrations in the ambient air to no more than 53 parts per billion (“ppb”) over a one-year period and 100 ppb over a one-hour period, the EA does not actually analyze how anticipated nitrogen dioxide emissions would affect ambient concentrations. With no analysis of ambient air quality impacts, the EA falls short of analyzing and assessing air quality impacts.	Impacts to the NAAQS cannot be assessed without a modeling analysis which is not completed at the lease sale stage since development is not authorized. The lease sale quantifies estimated emissions using very broad assumptions since development specifics are unknown at the lease sale stage. The estimates are intended to be conservative and provide an assessment of maximum emissions if all lease parcels are sold and developed. The BLM also provides appropriate explanation and context for the analysis included in the EA. Furthermore, NAAQS criteria pollutants are regulated by state agencies and the EPA and sources would require emission controls in order to minimize emissions and protect public health.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	The failure to analyze and assess the impacts of carbon monoxide and nitrogen dioxide emissions to ambient air quality is especially problematic. NAAQS for both pollutants are shortterm in nature, meaning annual emissions estimates are not indicative of impacts to the NAAQS. For example, EPA has established a one-hour NAAQS for both carbon monoxide and nitrogen dioxide, meaning that hourly emission rates, not annual rates, are indicative of potentially significant impacts. However, the EA only estimates annual emissions. Additionally, because of the short-term nature of the NAAQS for these pollutants, they are impacted more by localized sources of emissions, such as large engines or drilling rigs, and less so by cumulative, landscapelevel development. Further, short-term carbon monoxide and nitrogen dioxide concentrations are influenced by engine exhaust stack height. The failure to analyze and assess air quality impacts in relation to the short-term NAAQS for carbon monoxide and nitrogen dioxide means the EA fails to demonstrate that short-term air quality impacts would not exceed and/or violate the NAAQS.	Impacts to the NAAQS cannot be assessed without a modeling analysis which is not completed at the lease sale stage since development is not authorized. The lease sale quantifies estimated emissions using very broad assumptions since development specifics are unknown at the lease sale stage. The estimates are intended to be conservative and provide an assessment of maximum emissions if all lease parcels are sold and developed. The BLM also provides appropriate explanation and context for the analysis included in the EA. As the commentor points out, short-term standard require development-specific information such as type of drill rig used, stack heights, engine Tier rating, and other information that is not known at the lease sale stage. Should a parcel be developed and an APD submitted, the operator would be required to provide this information for the APD NEPA analysis and a site-specific impact assessment and NAAQS compliance would be completed at that time.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	For particulate matter, the EA states that reasonably foreseeable development would lead to the release of as much as 501.4 tons of PM10 and 81.9 tons of PM2.5 annually. Although Appendix I (Air Quality and Climate Impacts Impacts) discloses the NAAQS for both PM10 and PM2.5, the EA does not actually analyze how anticipated particulate matter emissions would affect ambient concentrations. With no analysis of ambient air quality impacts, the EA falls short of analyzing and assessing air quality impacts.	Impacts to the NAAQS cannot be assessed without a modeling analysis which is not completed at the lease sale stage since development is not authorized. The lease sale quantifies estimated emissions using very broad assumptions since development specifics are unknown at the lease sale stage. The estimates are intended to be conservative and provide an assessment of maximum emissions if all lease parcels are sold and developed. The BLM also provides appropriate explanation and context for the analysis included in the EA. Furthermore, NAAQS criteria pollutants are regulated by state agencies and the EPA and sources would require emission controls in order to minimize emissions and protect public health.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	We are also concerned that the EA does not accurately address potential PM2.5 emissions and potential impacts. PM2.5 is not only released directly, but it forms via secondary atmospheric reactions. (See Attachment 2 provided with comments for citation #226) It is not clear whether the estimated PM2.5 emissions account for secondary particulate matter. If not, then the emission estimates are flawed and provide no basis for analyzing and assessing impacts in the context of the particulate matter NAAQS.	Impacts to the NAAQS cannot be assessed without a modeling analysis which is not completed at the lease sale stage since development is not authorized. The lease sale quantifies estimated emissions using very broad assumptions since development specifics are unknown at the lease sale stage. The estimates are intended to be conservative and provide an assessment of maximum emissions if all lease parcels are sold and developed. The BLM also provides appropriate explanation and context for the analysis included in the EA. Furthermore, NAAQS criteria pollutants are regulated by state agencies and the EPA and sources would require emission controls in order to minimize emissions and protect public health.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	For SO2, which is a byproduct of flaring oil and gas, the EA states that reasonably foreseeable development would lead to the release of as much as 0.753 tons per year. Appendix I (Air Quality and Climate Impacts Impacts) discloses that NAAQS for SO2 limit concentrations in the ambient air to no more than 75 ppb over a one-hour period and 0.5 ppm over a three-hour period, the EA does not actually analyze how anticipated SO2 emissions would affect ambient concentrations. With no analysis of ambient air quality impacts, the EA falls short of analyzing and assessing air quality impacts.	Impacts to the NAAQS cannot be assessed without a modeling analysis which is not completed at the lease sale stage since development is not authorized. The lease sale quantifies estimated emissions using very broad assumptions since development specifics are unknown at the lease sale stage. The estimates are intended to be conservative and provide an assessment of maximum emissions if all lease parcels are sold and developed. The BLM also provides appropriate explanation and context for the analysis included in the EA. Furthermore, NAAQS criteria pollutants are regulated by state agencies and the EPA and sources would require emission controls in order to minimize emissions and protect public health.

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	We are also concerned that the EA only presents annual estimates of SO2 emissions, not hourly estimates. As with nitrogen dioxide and carbon monoxide, impacts to ambient concentrations of SO2 are often short-term in nature, resulting from intense but short periods of oil and gas flaring. Annual emissions of SO2 provide no indication as to whether the short-term NAAQS would be exceeded and do not demonstrate that air quality impacts would not be significant. Additionally, SO2 emissions are dependent upon concentrations of hydrogen sulfide in any flared oil and gas. The EA does not disclose the hydrogen sulfide content of oil and gas or estimate potential hydrogen sulfide emissions. This is problematic not only in the context of potentially significant SO2 impacts, but in the context of potential health and welfare impacts associated with reasonably foreseeable air pollution. Hydrogen sulfide is a known toxic gas. While it is not listed as a HAP under the Clean Air Act, it is well known and understood that hydrogen sulfide gas is dangerous and can even be lethal.	Impacts to the NAAQS cannot be assessed without a modeling analysis which is not completed at the lease sale stage since development is not authorized. The lease sale quantifies estimated emissions using very broad assumptions since development specifics are unknown at the lease sale stage. The estimates are intended to be conservative and provide an assessment of maximum emissions if all lease parcels are sold and developed. The BLM also provides appropriate explanation and context for the analysis included in the EA. Furthermore, NAAQS criteria pollutants are regulated by state agencies and the EPA and sources would require emission controls in order to minimize emissions and protect public health.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	For ozone, the EA does not actually analyze or assess any impacts. While the EA discloses potential emissions of ozone precursors, including VOCs and nitrogen dioxide, the EA does not analyze how these emissions would actually translate into impacts to ambient ozone concentrations. Although Appendix I (Air Quality and Climate Impacts Impacts) identifies the ozone standard as an applicable air quality requirement, neither Appendix I (Air Quality and Climate Impacts Impacts) nor the EA actually analyze impacts to ozone concentrations.	Impacts to the NAAQS cannot be assessed without a modeling analysis which is not completed at the lease sale stage since development is not authorized. The lease sale quantifies estimated emissions using very broad assumptions since development specifics are unknown at the lease sale stage. The estimates are intended to be conservative and provide an assessment of maximum emissions if all lease parcels are sold and developed. The BLM also provides appropriate explanation and context for the analysis included in the EA. Furthermore, NAAQS criteria pollutants are regulated by state agencies and the EPA and sources would require emission controls in order to minimize emissions and protect public health.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	We are also concerned that there appears to be no recognition that HAP emissions can lead to ambient concentrations that are harmful to public health and welfare. Although the EPA has not established NAAQS for HAPs, there are established exposure limits for a number of HAPs. For example, the Occupational Safety and Health Administration has established an occupational exposure limit for benzene of 1 ppm over an eight-hour period and 5 ppm over a 15-minute period. See 29 C.F.R. § 1910.1028(c). The Centers for Disease Control has information regarding health exposure limits for a number of HAPs, including benzene (https://www.cdc.gov/niosh/npg/npgd0049.html), toluene (https://www.cdc.gov/niosh/npg/npgd0619.html), ethylbenzene (https://www.cdc.gov/niosh/npg/npgd0264.html), and xylene (https://www.cdc.gov/niosh/idlh/95476.html). To ensure an adequate analysis under NEPA and a legitimate basis for assessing air quality impacts, agencies must analyze how potential HAP emissions would affect ambient air quality and potential exposure.	Additional text has been added to Section 3.3 and Section 3.10 impacts to human health from increased air pollution. Impacts to the NAAQS cannot be assessed without a modeling analysis which is not completed at the lease sale stage since development is not authorized. The lease sale quantifies estimated emissions using very broad assumptions since development specifics are unknown at the lease sale stage. The estimates are intended to be conservative and provide an assessment of maximum emissions if all lease parcels are sold and developed. The BLM also provides appropriate explanation and context for the analysis included in the EA. Furthermore, NAAQS criteria pollutants are regulated by state agencies and the EPA and sources would require emission controls in order to minimize emissions and protect public health. If the parcels are leased and subsequently developed, the proponent would be required to submit an APD which would require a separate site and operation-specific NEPA analysis during which impacts would be further assessed, and appropriate mitigation applied if necessary.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	Finally, it is concerning that BLM’s assessment of the significance of air quality impacts appears to be based on whether or not an area is designated as “nonattainment” by the EPA. This is not an appropriate measure of potentially significant impacts. To begin with, a “nonattainment” designation is a regulatory term that the EPA uses to establish applicable requirements under the Clean Air Act for protection of the NAAQS. It only relates to pollutants for which the EPA has established NAAQS, so not HAPs, hydrogen sulfide, or other harmful pollutants. Further, a “nonattainment” designation does not reflect present or reasonably foreseeable air quality. A “nonattainment” area can have air quality that does not violate the NAAQS or air quality that does violate the NAAQS. Conversely, an area that is not designated “nonattainment” can still have air quality that is violating the NAAQS. Additionally, under EPA’s regulations, an area can exceed the NAAQS, which poses serious public health impacts, but not violate the NAAQS. EPA’s regulatory scheme is such that only areas experiencing prolonged periods of excessive air pollution are designated nonattainment. In other words, a region must experience numerous exceedances to violate, even if just a single exceedance of the NAAQS is cause for health concern. This is because a “nonattainment”	The BLM does not characterize significance of air quality based on the attainment designation of the area. It is provided for disclosure purposes to describe the affected environment. Attainment areas also represent areas where additional incremental pollution is allowed, and controlled, through regulatory permitting process. A nonattainment area would automatically require additional analysis by the BLM for General Conformity and have stricter emission controls than an attainment area. The BLM acknowledges that if development were to occur, additional pollutants would be emitted. The EA has quantified an estimated worst case scenario of air pollutant emissions, however the timing and location of the release of those pollutants in unknown at the lease sale stage and not reasonably foreseeable.

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
				designation is only meant to spur regulatory action and is not meant to be the sole indicator of potential health concern.	
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	Most importantly, whether an area is currently designated as “nonattainment” has no bearing on whether an area would exceed and/or violate the NAAQS in the future. While a “nonattainment” designation has bearing on past and present impacts, it has little bearing on reasonably foreseeable impacts. To this end, any attempt by the agencies to rely on “nonattainment” designations to assess the significance of reasonably foreseeable air quality impacts is flawed and contrary to NEPA.	The BLM does not characterize significance of air quality based on the attainment designation of the area. It is provided for disclosure purposes to describe the affected environment. Attainment areas also represent areas where additional incremental pollution is allowed, and controlled, through regulatory permitting process. A nonattainment area would automatically require additional analysis by the BLM for General Conformity and have stricter emission controls than an attainment area. The BLM acknowledges that if development were to occur, additional pollutants would be emitted. The EA has quantified an estimated worst case scenario of air pollutant emissions, however the timing and location of the release of those pollutants in unknown at the lease sale stage and not reasonably foreseeable.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	The agencies’ assessment of cumulative air quality impacts is thoroughly flawed. To begin with, the analysis of air quality impacts only focuses on emissions and not on actual air quality. See EA at 3-16—3-18. An analysis of emissions alone does not provide sufficient information on the past, present, and reasonably foreseeable state of air quality and potentially significant impacts to public health and welfare. The cumulative impacts analysis provides no information on background air quality that is necessary to inform an assessment of cumulative effects.	Additional information, including current air quality conditions and monitoring data is discussed in Appendix I (Air Quality and Climate Impacts Impacts). Existing monitoring data and design values are representative of the current air quality conditions for the area.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	Although the agencies attempt to provide context around cumulative emissions, ultimately the EA’s analysis and assessment is flawed. The agencies attempt to compare reasonably foreseeable emissions from leasing and oil and gas development with broader regional emissions and emissions from other sources. See EA at Table 3-4 at 3-18. These comparisons, while interesting, are arbitrary and shed no light on the potential significance of reasonably foreseeable emissions. The agencies appear to be attempting to make a point that emissions from reasonably foreseeable oil and gas development would be smaller than other emission sources, such as all oil and gas emissions in Ohio. These distinctions shed no light on potential significance. Further, the distinctions are arbitrary. One would point out that reasonably foreseeable emissions are much higher than emissions from a single vehicle. Based on the agencies’ logic, this would mean the emissions are significant because they are bigger. Obviously, this is not a helpful or valid means of assessing the significance of	The comparisons are made to provide necessary context of the proposed action emissions to existing emissions at the state level. Cumulative impacts can only be assessed through a modeling analysis that determines pollutant concentrations and then assesses against the NAAQS. The BLM does not do air quality modeling for EA-level lease sales as it would be costly, time-consuming and not represent actual development if it does occur. The BLM has explained this reasoning in the EA.

First Name	Last Name	Organization	Comment Category	Comment Text	Response
				cumulative impacts. By the same token, neither is the agencies’ approach in the EA.	
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Air Resources	To properly assess cumulative air quality impacts, the agencies must analyze and assess actual air quality impacts. This must include an analysis and assessment of current air quality, which should utilize modeling, and an analysis of how reasonably foreseeable emissions would affect this air quality. The agencies must also discuss and disclose to decisionmakers and the public whether these impacts are significant and why.	Modeling analyses are not conducted at the lease sale stage since the lease is not authorizing development. Current air quality conditions have been presented and a quantitative and qualitative assessment has been completed for the air quality analysis.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Climate	We are concerned that it is not clear how the agencies estimated reasonably foreseeable greenhouse emissions associated with the proposed leasing. Tables 3-5, 3-6, and 3-7 estimated greenhouse gas emissions related to the proposed leasing action, but it is not clear how these emissions were estimated and whether they reflect all potential greenhouse gas emissions associated with reasonably foreseeable development of the leases and resulting processing and consumption of oil and gas. It is not clear whether the BLM accounted for all direct and indirect sources of greenhouse emissions, including trucks and drilling rig engines, as well as calculated emissions based on the type of hydrocarbon production. We are concerned that BLM has not accounted for greenhouse gas emissions associated with hydrocarbon liquids (i.e., oil) production associated with gas production, as well as the attendant trucking, refining, and consumption of any produced liquids. Neither the EA nor Appendix I (Air Quality and Climate Impacts Impacts) provide details as to how the agencies’ greenhouse gas estimates were calculated, what assumptions were made, and what relevant inputs were considered.	The BLM has accounted for both direct and indirect GHG emissions using the agencies lease sale emissions tool which can be provided upon request. Refer to Section 3.3 (Air Resources) and Appendix I (Air Quality and Climate Impacts) for the estimated emissions.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Climate	In support of its estimates, the agencies cite “BLM 2023,” but it is not clear what this source actually is. BLM 2023 is not identified in the EA’s list of references. It also does not appear to be Appendix I (Air Quality and Climate Impacts Impacts) as this appendix does not present any greenhouse gas emissions data. Given this, we are concerned that the EA does not provide sufficient information upon which to provide meaningful and helpful comments related to the climate impacts of the proposed leasing. We urge the agencies to revise the EA and recirculate a draft for further review and public comment.	The BLM has accounted for both direct and indirect GHG emissions using the agencies lease sale emissions tool which can be provided upon request. Refer to Section 3.3 (Air Resources) and Appendix I (Air Quality and Climate Impacts) for the estimated emissions. The BLM Lease Sale Emissions Tool can be provided for review upon request. As described in Section 4.2 (Public Involvement) of the EA, the BLM held a 55-day public comment period on this EA from March 20, 2024, through May 17, 2024, and two virtual public meetings. The BLM has updated certain portions of this EA to address concerns raised in public comments and is not required to offer an additional comment period on those changes.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Climate	While it is not clear exactly how the agencies assess climate impacts in the Supplemental EA, the assessment of significance appears premised upon the conclusion that greenhouse gas emissions from the proposed leasing would be smaller than emissions from a number of other sources and activities, including all federal onshore oil and gas development and all U.S. oil, gas, and coal development. See e.g. EA at 3-23, Table 3-8. This is a flawed approach to assessing the climate impacts.	The information is provided for disclosure and to provide necessary context of the magnitude of emissions compared to existing emissions in the state and nation. The BLM is not attempting to assess the significance of potential emissions from the proposed action by disclosing state, regional, and national levels of GHG emissions.

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Climate	For one, the agency’s approach to assessing significance is not supported or justified in the EA. Arbitrarily comparing potential greenhouse gas emissions from the proposed leasing to other larger sources does not demonstrate insignificance. If anything, the agencies’ comparison of potential emissions only highlights the nature of the climate crisis, which is that numerous small sources of greenhouse gas emissions are cumulatively causing global temperatures to rise and fueling extreme climate changes. Simply comparing potential emissions from the proposed leasing to other larger sources provides no meaningful context or understanding of the true climate impacts of the agencies’ proposal. See, e.g., Sw. Elec. Power Co. v. EPA, 920 F.3d 999, 1032 (5th Cir. 2019) (“a ‘very small portion’ of a gargantuan source of ... pollution” may “constitute[] a gargantuan source of ... pollution on its own terms”). It certainly provides no basis to assess the significance of impacts.	There are no established thresholds, qualitative or quantitative, for NEPA analysis to assess the GHG emissions or social cost of an action in terms of the action’s effect on the climate, incrementally or otherwise. There is also no scientific data in the record, including scientific data submitted during the comment period for this lease action, that would allow the BLM, in the absence of an agency carbon budget or similar standard, to evaluate the significance of the GHG emissions from this proposed lease action. These methodological shortcomings prevent BLM from qualitatively comparing alternatives, and BLM has therefore not exercised its discretion to tailor this proposed lease action to account for global climate change.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Climate	The agencies attempt to further arbitrarily minimize the potentially significant climate impacts by highlighting an assessment of emissions from the federal fossil fuel program and the impacts on global temperature increase. See EA at 3-24. The agencies appear to attempt to argue that that because this report found that emissions from all federal fossil fuel production would increase temperatures a small amount, that emissions from the proposed leasing are presumed to have an even smaller impact. Again, this logic simply highlights the nature of the climate crisis. There is no one single large source of greenhouse emissions that is responsible for increasing global temperatures, it is an accumulation of all sources, including federal fossil fuel production. While federal fossil fuel production may have a small impact on global temperature, this is because all sources of greenhouse gases individually have a small impact on global temperature, but cumulatively have large impacts. The agencies’ logic, that direct and indirect greenhouse gas emissions from the proposed leasing are comparably lower than other sources, is not relevant to an assessment of the significance of the proposed leasing.	The comparison is not arbitrary and is based on actual federal fossil fuel data and accepted scientific models. The BLM does not imply or present the information as a means to determine the relative significance of the proposed action in terms of GHG emissions but to provide the reader with different levels of context and a cumulative look at federal fossil fuel leasing program.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Climate	Although the agencies present an analysis of the social cost of carbon associated with the proposed leasing, it is not clear how the agencies are using this analysis to assess the significance of the project's climate impacts. The EA discloses that potential carbon costs would be substantial, perhaps upwards of hundreds of millions of dollars. See EA at 3-25, Tables 3-9 and 3-10. In spite of this, there appears to be no assessment of the significance of these costs in the EA, or how the agencies used these numbers to inform its analysis. The Council on Environmental Quality has stated the social cost of GHGs can and should be used to “allow decision makers and the public to make comparisons, help evaluate the significance of an action’s climate change effects, and better understand the tradeoffs associated with an action and its alternatives.” Council on Environmental Quality, National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change, 88 Fed. Reg. 1196, 1198 (Jan. 9, 2023). By all measures, the potential carbon costs associated with the proposed leasing appear to be substantial. If the agencies believe that imposing hundreds of millions of dollars in climate costs on society is not significant, the agencies must rationally explain why.	Comments relating to social cost of carbon (SCC) are not addressed for the reasons stated in the EA in section 3.4.3.

FIRST NAME	LAST NAME	ORGANIZA-TION	COMMENT CATEGORY	COMMENT TEXT	RESPONSE
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	NEPA Adequacy	If the agencies’ position is that they cannot identify thresholds of significance from which to assess the significance of the proposed action, then a FONSI is not warranted and the agencies must prepare an EIS.	There are no established thresholds, qualitative or quantitative, for NEPA analysis to assess the GHG emissions or social cost of an action in terms of the action’s effect on the climate, incrementally or otherwise. There is also no scientific data in the record, including scientific data submitted during the comment period for this lease action, that would allow the BLM, in the absence of an agency carbon budget or similar standard, to evaluate the significance of the GHG emissions from this proposed lease action. These methodological shortcomings prevent BLM from qualitatively comparing alternatives, and BLM has therefore not exercised its discretion to tailor this proposed lease action to account for global climate change. As described in Section 1.2.1 (Actions to be Taken) the EA, like the 2016 EA it supplements, was conducted at a level of analysis appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. The administrative act of issuing leases does not authorize any construction, development, or surface disturbance and at this stage the specific locations of development and the associated site-specific disturbance/impacts are unknown. As such it is not possible to assess potential site-specific impacts of development of the leases against specific significance thresholds with any degree of certainty. During the Stage 3 environmental review of APDs, the BLM would identify specific thresholds of significance based on policy, guidance, and science that is current at the time of the site-specific permitting. During the Stage 3 environmental review the BLM would be able to accurately quantify potential impacts of project-specific development proposals in relation to specific thresholds of significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Alternatives	The alternatives analysis is the heart of a NEPA document because “[w]ithout substantive, comparative environmental impact information regarding other possible courses of action, the ability of [a NEPA analysis] to inform agency deliberation and facilitate public involvement would be greatly degraded.” New Mexico ex el. Richardson, 565 F.3d at 683, 708. The Supplemental EA must cover a reasonable range of alternatives so that the agencies can make an informed choice from the spectrum of reasonable options.	The CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), the Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1) do not include a requirement for a specific number of alternatives in an EA. The EA considers a reasonable range of alternatives representing a scenario of no leasing in the Marietta Unit (no-action alternative) and a scenario of maximum reasonably foreseeable leasing and development (proposed action). As such, the EA analyzes a range of development and associated impacts including no leasing and development across the Marietta Unit and leasing and development of the full amount of reasonably foreseeable development identified in the RFDS. The BLM did not identify any other reasonable alternatives for detailed analysis that would meet the purpose and need, would be consistent with existing policies and regulations, and would not be substantially similar in design and effects to an alternative that is already being analyzed. As discussed in Section 2.3 (Alternatives Considered but Eliminated from Detailed Analysis) the BLM did consider a No Surface Occupancy alternative but that alternative was not carried forward for detailed analysis due to the reasons cited in Section 2.3 (Alternatives Considered but Eliminated from Detailed Analysis).

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Alternatives	When an agency considers reasonable alternatives, it “ensures that it has considered all possible approaches to, and potential environmental impacts of, a particular project; as a result, NEPA ensures that the most intelligent, optimally beneficial decision would ultimately be made.” (See Attachment 2 provided with comments for citation #227) In determining whether an alternative is “reasonable,” and thus requires detailed analysis, courts look to two guideposts: “First, when considering agency actions taken pursuant to a statute, an alternative is reasonable only if it falls within the agency’s statutory mandate. Second, reasonableness is judged with reference to an agency’s objectives for a particular project.” (See Attachment 2 provided with comments for citation #228) Any alternative that is unreasonably excluded would invalidate the NEPA analysis. The agency’s obligation to consider reasonable alternatives applies to citizen-proposed alternatives. (See Attachment 2 provided with comments for citation #229) Courts have held that an alternative may not be disregarded merely because it does not offer a complete solution to the problem. (See Attachment 2 provided with comments for citation #230) Even if additional alternatives would not fully achieve the project’s purpose and need, NEPA “does not permit the agency to eliminate from discussion or consideration a whole range of alternatives, merely because they would achieve only some of the purposes of a multipurpose project.” (See Attachment 2 provided with comments for citation #231) If a different action alternative “would only partly meet the goals of the project, this may allow the decision maker to conclude that meeting part of the goal with less environmental impact may be worth the tradeoff with a preferred alternative that has greater environmental impact.” (See Attachment 2 provided with comments for citation #232)	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The CEQ regulations do not include a requirement for a specific number of alternatives in an EA. The EA considers a reasonable range of alternatives representing a scenario of no leasing in the Marietta Unit (no-action alternative) and a scenario of maximum reasonably foreseeable leasing and development (proposed action). As such, the EA analyzes a range of development and associated impacts including no leasing and development across the Marietta Unit and leasing and development of the full amount of reasonably foreseeable development identified in the RFDS. The BLM did not identify any other reasonable alternatives for detailed analysis that would meet the purpose and need, would be consistent with existing policies and regulations, and would not be substantially similar in design and effects to an alternative that is already being analyzed. As discussed in Section 2.3 (Alternatives Considered but Eliminated from Detailed Analysis) the BLM did consider a No Surface Occupancy alternative, but that alternative was not carried forward for detailed analysis due to the reasons cited in Section 2.3 (Alternatives Considered but Eliminated from Detailed Analysis).
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Alternatives	The EA states that BLM considered a No Surface Occupancy alternative, but eliminated it from detailed analysis: Offering all leases with an NSO stipulation was suggested during internal discussions between the agencies. Such stipulations would prohibit the surface use of USFS lands to access federal minerals. As indicated in the BLM Planning Handbook (BLM 2005; H-1624-1) designating an area as NSO is a land use planning decision. The Forest Plan did not designate the Action Area as NSO and as such an NSO designation alternative for the area would not conform to the Forest Plan and would require a Forest Plan amendment. This alternative would also not fulfill the purpose and need described in Chapter 1 for two reasons. First, requiring all future drilling to take place off the federal surface may force operators to use locations that result in greater adverse impacts on natural resources compared to impacts on the federal surface. The leasing stipulations provided in the Forest Plan (USFS 2006a) would mitigate impacts from oil and gas development on federal surface. Second, the federal government has more authority to protect natural resources on federal lands than on private lands. As nominated parcels are reviewed, the BLM, in coordination with USFS, determines which stipulations and notices must be attached to approved lease parcels, including, where appropriate, NSO stipulations. EA at 2-7. While the undersigned view the No Action Alternative as the best alternative and urge BLM to adopt it, we also respectfully request that BLM consider a No Surface Occupancy (NSO) alternative in detail. Doing so would provide the agencies with a spectrum of action choices. While the choice of an NSO alternative would result in many of the same impacts associated with the Preferred Action, it would meaningfully differ by ensuring the national forest’s surface is spared from scarring by horizontal shale industry well pads, access roads, and gathering lines. This is a meaningful difference, in no small part, because the Wayne National Forest is public land that offers all people access to the outdoors. It may go without saying that open access to nature is a valuable resource well worth protecting. This holds especially true in Ohio, where public lands are in relative short supply on both a general and per capita basis.	As described in Section 2.3 (Alternatives Considered but Eliminated from Detailed Analysis) the BLM did consider a No Surface Occupancy Alternative. This alternative was dismissed from further analysis due to the reasons cited.

First Name	Last Name	Organization	Comment Category	Comment Text	Response
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Alternatives	The EA’s stated reasons for dismissing the NSO Alternative are arbitrary and capricious. First, the EA dismissed the alternative on the ground that it would require a forest plan amendment. Even assuming it is true that a forest plan amendment would be required, the EA advances no reasons for why such an amendment would be unreasonable or infeasible, or otherwise render an NSO alternative unreasonable or infeasible. In fact, forest plan amendments are intended to be used to keep plans current and help national forests adapt to new information and changing conditions. (See Attachment 2 provided with comments for citation #233) Consideration of a forest plan amendment would be reasonable, at the very least, given the Forest Plan and its EIS did not even contemplate horizontal shale development, but instead based their biological analyses on an estimate of between 59 and 135 acres of surface disturbance in the Marietta Unit resulting from conventional oil and gas operations.	Designating all NFS lands as NSO is a land management planning decision (on the part of the Forest Service) and not a leasing decision, therefore such considerations are outside the scope of this NEPA. As indicated in the BLM Planning for Fluid Mineral Resources Handbook (BLM 2013; H-1624-1)), designating an area as NSO is a land use planning decision. There is no current blanket NSO designation in the Forest Plan. Such a NSO designation to be applied across all NFS lands would necessitate a Forest Plan amendment, which is not under consideration at this time. As stated in Chapter 2 of the EA, “This alternative would also not fulfill the purpose and need described in Error! Reference source not found. for two reasons. First, this alternative would severely constrain oil and gas occupancy, especially in this highly fragmented landscape, where the ability to cross federal land may be critical to enabling an operator to develop minerals. Second, requiring all future drilling to take place off the federal surface may force operators to use locations that result in greater adverse impacts on natural resources compared to impacts on the federal surface. The leasing stipulations provided in the Forest Plan would mitigate impacts from oil and gas development on federal surface. Second, the federal government has more authority to protect natural resources on federal lands than on private lands. As nominated parcels are reviewed, the BLM and the USFS determine which stipulations and notices must be attached to approved lease parcels, including, where appropriate, NSO stipulations.” Additionally, as stated on p. 29 of the 2016 Oil and Gas Leasing EA: “Offering all leases with a no-surface-occupancy (NSO) stipulation was suggested through public comment. However, this alternative would not fulfill the purpose and need described in Chapter 1. This alternative would unnecessarily constrain oil and gas occupancy, especially in this highly fragmented landscape, where the ability to cross federal land may be critical to enabling an operator to develop.” It is not arbitrary or capricious for the Forest Service to decline to pursue a path that would limit surface development to private land when that route would result in larger overall surface impacts and where development on NFS surface would result in the application of additional conservation requirements contained in Forest Plan direction. Additionally, the 2020 RFDS predicts that most new wells would occur on non-federal surface (see EA Appendix. D, 2020 RFDS,).
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Alternatives	Second, the EA states that an NSO alternative would not fulfill the purpose and need of this action. But the reasons the EA offers are arbitrary and capricious. The EA states that the BLM’s purpose is to “respond to Expressions of Interest (EOIs) to lease federal oil and gas resources through a competitive leasing process and to address certain deficiencies identified in the CBD case.” Draft Supplemental Environmental Assessment at 1-7. And the EA states that the need for the action is established by “the court’s ruling” and “the BLM’s responsibility [...] to promote the exploration and development of oil and gas on the public domain.” Id. Notably, however, there is nothing in law that requires BLM to lease the federal acres contemplated in this action.	As described in Section 1.2 (Purpose and Need) of the EA the BLM’s purpose is to respond to Expressions of Interest to lease federal oil and gas resources through a competitive leasing process. The need for leasing of federal minerals is established by the Mineral Leasing Act of 1920, the Mineral Leasing Act for Acquired Lands of 1947, the Federal Land Policy and Management Act of 1976, and the Energy Policy Act of 2005. These regulations establish the BLM’s mission to provide opportunities for multiple use of BLM-administered resources (including minerals) and require the BLM to make available federal mineral resources for development to meet national, regional, and local needs. The EA recognizes the need for the BLM to promote the responsible development of oil and gas resources which is accomplished through multiple stages of environmental review as described in Section 1.2.1 (Actions to be Taken); application of legal and regulatory authorities (Appendix E, Legal and Regulatory Authorities); application of standard lease terms that required lessees to minimize environmental impacts; and application of appropriate avoidance, minimization, mitigation, and monitoring measures as described throughout the EA.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Alternatives	The EA goes on to state that an NSO alternative would be contrary to the stated purpose and need because “requiring all future drilling to take place off the federal surface may force operators to use locations that result in greater adverse impacts on natural resources compared to impacts on the federal surface.” EA at 2-7. But this is mere speculation. Nor does this stated reason appear to have any direct bearing on the BLM’s stated purpose and need. The EA also states that an NSO alternative would not fulfill the action’s purpose and need because “the federal government has more authority to protect natural resources on federal lands than on private lands.” Id. But, again, the EA does not articulate how the agency’s greater authority over federal surface means that an NSO approach would frustrate or conflict with the stated purpose of responding to EOIs and the Court’s order. Nor does the EA articulate how an NSO approach would frustrate or conflict with the stated need of responding to the court’s ruling and of BLM satisfying its general statutory responsibilities. In short, the EA’s conclusion that an NSO alternative would not fulfill the action’s purpose and need simply does not follow from the stated reasons the agency provides.	As described in Section 2.3 (Alternatives Considered, but Eliminated from Detailed Analysis), the BLM Planning for Fluid Mineral Resources Handbook (BLM 2005; H-1624-1) indicates that designating an area as NSO is a land use/programmatic planning decision. The Forest Plan did not designate the Action Area as NSO.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Alternatives	Again, while the undersigned view the No Action Alternative as the best alternative and urge BLM to adopt it, we also respectfully request that BLM consider a No Surface Occupancy (NSO) alternative in detail. Even though an NSO alternative would not prevent many of the harmful impacts of the Preferred Action, it would at least spare federal public surface from industrial development.	As described in Section 2.3 (Alternatives Considered, but Eliminated from Detailed Analysis), the BLM did consider a NSO alternative, but the alternative was dismissed from detailed analysis for the reasons cited in the EA.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Alternatives	To ensure it considers a reasonable range of alternatives, BLM should also consider an alternative that excludes all current NSO and Controlled Surface Use (CSU) parcels from leasing altogether, and that extends NSO status to all other federal parcels that are part of BLM’s stated 40,000-acre review. These “No Lease” parcels should include Future Old Forest areas, Research Natural Areas, Special Interest Areas, Developed Recreation Areas, and Timbre Ridge Lake, as well as “controlled surface use” areas. Controlled surface uses include sensitive areas with moderate or high scenic value, known locations of federally threatened or endangered species or Regional Forester sensitive species, managed wildlife openings, riparian areas (including the River Corridor Management Area), portions of floodplains outside of riparian areas and slopes between 35 and 55 percent.” (See Attachment 2 provided with comments for citation #234) The Forest Service has previously determined that disturbance is not consistent with Forest Plan goals and objectives for these areas. In addition, it has never considered the compatibility of unconventional oil and gas development on or near these sensitive areas And, considering this alternative in detail along with the above requested NSO alternative, the no action alternative, and the proposed action would give BLM and USFS a meaningful range of distinct choices to consider.	There is a difference between surface use/administration and leasing of subsurface federal minerals. The Forest Plan identifies those areas where surface use is either prohibited (NSO) or controlled (CSU), but the underlying federal minerals generally remain open/available for leasing in accordance with the authorities established by the Mineral Leasing Act of 1920, the Mineral Leasing Act for Acquired Lands of 1947, the Federal Land Policy and Management Act of 1976, and the Energy Policy Act of 2005. These regulations establish the BLM’s mission to provide opportunities for multiple use of BLM-administered resources (including minerals) and require the BLM to make available federal mineral resources for development to meet national, regional, and local needs. In addition, as indicated in the BLM Planning for Fluid Mineral Resources Handbook (BLM 1990; H-1624-1) designating an area as NSO or CSU is a land use planning decision and not appropriate for a lease-sale specific alternative. As such, designating new NSO and CSU areas is beyond the scope of this lease sale action.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix E – Legal and Regulatory Authorities	We respectfully request that BLM confirm that it would apply the 2024 Update to the CEQ NEPA rules to this Supplemental EA. Our understanding is that BLM would apply the 2024 Update to this document and action. The ePlanning FAQ page for the Supplemental EA states that the document “would comply with all current enacted law, regulation and policy[.]” and that “[t]he document would be updated if changes to law, regulation or policy occur while moving forward in the planning process.” (See Attachment 2 provided with comments for citation #235) The Phase II Update to the CEQ NEPA regulations takes effect on July 1, 2024. 40 C.F.R. §1506.12 (2024) provides that the update applies “to any NEPA process begun after July 1, 2024” and that “[a]n agency may apply the regulations in this subchapter to ongoing activities and environmental documents begun before July 1, 2024.”	As noted in Chapter 1 (<i>Introduction and Purpose and Need</i>) in this EA, in February 2025, the Council on Environmental Quality (CEQ) promulgated an interim final rule removing its NEPA regulations, 40 CFR 1500-1508, from the Code of Federal Regulations. <i>See</i> 90 Fed. Reg. 10610, <i>Removal of National Environmental Policy Act Implementing Regulations</i> (Feb. 25, 2025). The rule, which is effective April 11, 2025, cited recent Executive Order (E.O.) 14154, <i>Unleashing American Energy</i> (Jan. 20, 2025), which expressly revoked E.O. 11991. 42 Fed. Reg. 26967 (May 25, 1977). The latter had directed CEQ to promulgate the original NEPA regulations and required federal agencies to comply with those regulations. The Interim Final Rule explained that removal of the CEQ regulations “does not strip agencies of discretion to continue following similar procedures” including their own “NEPA implementing procedures.” <i>Id.</i> at 10614-10615. Shortly after issuance of EO 14154, the Court of Appeals for the District of Columbia Circuit denied a petition to reconsider its November 2024 decision in <i>Marin Audubon Society v. Federal Aviation Administration</i> , 121 F.4th 902 (D.C. Cir. 2024), <i>reh’g en banc denied</i> , 2025 WL 374897 (Jan. 31, 2025) (NEPA challenge to an FAA “Air Tour Management Plan” for certain national parks). The court held that CEQ’s NEPA regulations are <i>ultra vires</i> because the agency lacks statutory authority to promulgate binding regulations. Three days later, on February 3, 2025, the United States District Court for the District of North Dakota similarly concluded that CEQ lacks authority to promulgate rules implementing NEPA and vacated the challenged 2024 amendments to CEQ’s 2020 NEPA regulations. <i>State of Iowa v. Council on Env’l Quality</i> , Dkt. 145, No. 24-cv-89 (D.N.D. 2024) (reinstating 2020 regulations).

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix E – Legal and Regulatory Authorities	Among other things, the 2024 regulations updated the 2020 version of 40 C.F.R. § 1501.3 (“Determine the appropriate level of NEPA review”). The 2024 version of the regulations reinstate much of CEQ’s longstanding approach to agency significance determinations, and they include an emphasis on communities with environmental justice concerns. Another reason for BLM to apply the most current CEQ NEPA regulations is that any future lease sales related to this Supplemental EA would have to comply with the most current regulations. BLM should apply the 2024 Update to the CEQ NEPA rules to this Supplemental EA to ensure robust environmental review, consistency of related environmental reviews, and appropriate emphasis on communities with environmental justice concerns. We respectfully request that BLM provide the public with confirmation that it would do so.	As noted in Chapter 1 (Introduction and Purpose and Need) in this EA, in February 2025, the Council on Environmental Quality (CEQ) promulgated an interim final rule removing its NEPA regulations, 40 CFR 1500-1508, from the Code of Federal Regulations. See 90 Fed. Reg. 10610, Removal of National Environmental Policy Act Implementing Regulations (Feb. 25, 2025). The rule, which is effective April 11, 2025, cited recent Executive Order (E.O.) 14154, Unleashing American Energy (Jan. 20, 2025), which expressly revoked E.O. 11991. 42 Fed. Reg. 26967 (May 25, 1977). The latter had directed CEQ to promulgate the original NEPA regulations and required federal agencies to comply with those regulations. The Interim Final Rule explained that removal of the CEQ regulations “does not strip agencies of discretion to continue following similar procedures” including their own “NEPA implementing procedures.” Id. at 10614-10615. Shortly after issuance of EO 14154, the Court of Appeals for the District of Columbia Circuit denied a petition to reconsider its November 2024 decision in <i>Marin Audubon Society v. Federal Aviation Administration</i>, 121 F.4th 902 (D.C. Cir. 2024), reh’g en banc denied, 2025 WL 374897 (Jan. 31, 2025) (NEPA challenge to an FAA “Air Tour Management Plan” for certain national parks). The court held that CEQ’s NEPA regulations are ultra vires because the agency lacks statutory authority to promulgate binding regulations. Three days later, on February 3, 2025, the United States District Court for the District of North Dakota similarly concluded that CEQ lacks authority to promulgate rules implementing NEPA and vacated the challenged 2024 amendments to CEQ’s 2020 NEPA regulations. <i>State of Iowa v. Council on Env’l Quality</i>, Dkt. 145, No. 24-cv-89 (D.N.D. 2024) (reinstating 2020 regulations).

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	NEPA Adequacy	NEPA requires that a federal agency prepare an EIS before taking a “‘major [f]ederal action[] significantly affecting the quality’ of the environment.” Kern v. U.S. Bureau of Land Mgmt., 284 F.3d 1062, 1067 (9th Cir. 2002). In order to determine whether a project’s impacts may be “significant,” an agency may first prepare an Environmental Assessment (“EA”). 40 C.F.R. §§ 1501.4, 1508.9. If the EA reveals that “the agency’s action may have a significant effect upon the . . . environment, an EIS must be prepared.” Nat’l Parks & Conservation Ass’n v. Babbitt, 241 F.3d 722, 730 (9th Cir. 2001) (internal quotations omitted). If the agency determines that no significant impacts are possible, it must still adequately explain its decision by supplying a “convincing statement of reasons” why the action’s effects are insignificant. Blue Mountains Biodiversity Project v. Blackwood, 161 F.3d 1208, 1212 (9th Cir. 1998). Further, an agency must prepare all environmental analyses required by NEPA at “the earliest possible time.” 40 C.F.R. § 1501.2. “NEPA is not designed to postpone analysis of an environmental consequence to the last possible moment,” but is “designed to require such analysis as soon as it can reasonably be done.” Kern, 284 F.3d at 1072. BLM is therefore required under NEPA to prepare an EIS to support this proposed project. This is especially true in light of the likelihood that fracking would occur on the leases. CBD, 937 F. Supp. 2d at 1155-59 (holding that oil and gas leases were issued in violation of NEPA where BLM failed to prepare an EIS and failed to properly address the significance factors for context and intensity). In considering whether the proposed oil and gas leasing would have significant effects on the environment, NEPA’s regulations require BLM to examine both the context of the action and the intensity of the effect. 40 C.F.R. § 1501.3(d) (2024). When analyzing context, agencies should consider the characteristics of the geographic area, such as “proximity to unique or sensitive resources or communities with environmental justice concerns.” 40 C.F.R. § 1501.3(d)(1). 40 C.F.R. § 1501.3(d)(2) requires federal agencies to “analyze the intensity of effects considering [several enumerated] factors, as applicable to the proposed action and in relationship to one another.” Several of the 40 C.F.R. § 1501.3(d)(2) “intensity factors” are implicated in this proposed action and clearly warrant the preparation of an EIS, including: (i) The degree to which the action may adversely affect public health and safety; (ii) The degree to which the action may adversely affect unique characteristics of the geographic area such as historic or cultural resources, parks, Tribal sacred sites, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas; (iii) Whether the action may violate relevant Federal, State, Tribal, or local laws or other requirements or be inconsistent with Federal, State, Tribal, or local policies designed for the protection of the environment; (iv) The degree to which the potential effects on the human environment are highly uncertain; (vi) The degree to which the action may adversely affect an endangered or threatened species or its habitat, including habitat that has been determined to be critical under the Endangered Species Act of 1973; and, (vii) The degree to which the action may adversely affect communities with environmental justice concerns. 40 C.F.R. § 1501.3(d)(2)(i)-(iv), (vi)-(vii). Here, individually and considered as a whole, there is no doubt that significant effects may result from this proposal; thus, NEPA requires that BLM must prepared an EIS for the action.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <u><i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	As discussed in detail above, the oil and gas activities that would occur as a result of the proposed leasing would cause significant impacts to public health and safety. This proposed action would pose serious risks to the region’s water resources, harm air quality, pose seismic risks, negatively affect wildlife, and fuel climate change. To the extent not already discussed above, we here provide additional information (most of it newly available since the 2016 EA) regarding public health risks associated with unconventional oil and gas production (UOG). UOG is associated with: dangerous levels of hazardous air pollutants, including carcinogenic and endocrine disrupting chemicals; childhood leukemia; increased mortality in elderly populations; more heart attacks; birth defects, low birth weight and extreme premature births; asthma attacks; and headaches and fatigue. The Draft Supplemental EA does not consider these numerous significant public health risks, and BLM must evaluate in an EIS the risks to the Wayne’s surrounding communities.	Additional text has been added to Section 3.3.2 (Air Resources - Environmental Impacts) to note the types of health effects indicated in this comment. As described in Section 3.10 (Socioeconomic and Environmental Justice) the EA indicates that impacts on social and economic conditions would result from decreased air quality, traffic and light pollution, and increased potential for surface water and groundwater contamination associated with the Proposed Action, which can result in possible health and safety concerns. Health impacts are described in more detail in Section 3.3 (Air Resources). As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage the specific locations of development; specific types of equipment and hours of use; sources of water and quantities of use; methods and locations of wastewater disposal; vehicle use and routes; and other details are unknown. As a result, it is not possible to quantify with any degree of certainty how subsequent development of the leases would affect specific populations or specific health outcomes. The BLM acknowledges that the scope of specific impacts may vary depending on the exact development locations, which would be further evaluated during the APD stage. The BLM acknowledges that it is not within the subject matter expertise of the BLM socioeconomics program to conduct a comprehensive health impact analysis. However, future APD projects would be required to contract specialized support to ensure such analyses are conducted appropriately and thoroughly. The BLM would continue to incorporate relevant data and research in future reviews to ensure a comprehensive analysis. During the stage 3 environmental review of APDs, the BLM would further assess potential health and safety impacts based on specific development proposals.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	Dangerous Levels of Hazardous Air Pollution A 2019 meta-analysis on the links between hazardous air pollutants (HAPs) and oil and gas development showed that HAPs linked to numerous cancerous and non-cancerous health conditions are found in the vicinity of production sites at concentrations exceeding health safety thresholds (Garcia-Gonzales 2019). (See Attachment 2 provided with comments for citation #236) A 2018 meta-analysis of endocrine-disrupting air pollutants revealed that there are more than 200 airborne chemicals associated with unconventional oil and gas development, including 26 known endocrine-disrupting chemicals and 8 suspected endocrine-disrupting chemicals (Bolden 2018). (See Attachment 2 provided with comments for citation #237) A 2014 study identified eight highly toxic chemicals in air samples collected near fracking and associated infrastructure sites across five states, including Ohio. The most common airborne chemicals detected included two proven human carcinogens (benzene and formaldehyde) and two potent neurotoxins (hexane and hydrogen sulfide). In 29 out of 76 samples, concentrations far exceeded federal health and safety standards, sometimes by several orders of magnitude (Macey 2014). (See Attachment 2 provided with comments for citation #238)	Additional text has been added to Section 3.3.2 (Air Resources - Environmental Impacts) to note the types of health effects indicated in this comment. Health and safety concerns are described at the level of detail appropriate for this stage of analysis. The BLM acknowledges that the scope of specific impacts may vary depending on the exact development locations, which would be further evaluated during the APD stage. The BLM acknowledges that it is not within the subject matter expertise of the BLM socioeconomics program to conduct a comprehensive health impact analysis. However, future APD projects would be required to contract specialized support to ensure such analyses are conducted appropriately and thoroughly. The BLM would continue to incorporate relevant data and research in future reviews to ensure a comprehensive analysis. The BLM would further assess air emissions and potential health effects during the stage 3 environmental review of site-specific APDs when specific development proposals, and their associated air emissions, are known. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	Childhood Leukemia A research study conducted over several years and published in 2022 revealed that children living within a 2-kilometer radius of at least one unconventional oil and gas well at the time of their birth were almost twice as likely to be diagnosed with acute lymphoblastic leukemia (Clark 2022). (See Attachment 2 provided with comments for citation #239)	Additional text has been added to Section 3.3.2 (Air Resources - Environmental Impacts) to note the types of health effects indicated in this comment. The BLM acknowledges that the scope of specific impacts may vary depending on the exact development locations, which would be further evaluated during the APD stage. The BLM acknowledges that it is not within the subject matter expertise of the BLM socioeconomics program to conduct a comprehensive health impact analysis. However, future APD projects would be required to contract specialized support to ensure such analyses are conducted appropriately and thoroughly. The BLM would continue to incorporate relevant data and research in future reviews to ensure a comprehensive analysis. Health and safety concerns are described at the level of detail appropriate for this stage of analysis. The BLM would further assess air emissions and potential health effects during the stage 3 environmental review of site-specific APDs when specific development proposals, and their associated air emissions, are known. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82</u>

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					(D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	Increased Mortality in Elderly Populations A study conducted in 2022 indicated that air contaminants stemming from unconventional oil and gas operations would be linked to negative health impacts in elderly individuals. The investigation discovered that older people residing close to or in the direction of the wind from these unconventional oil and gas extraction sites faced an increased likelihood of early death compared to their counterparts dwelling upwind (Li 2022). (See Attachment 2 provided with comments for citation #240) More Heart Attacks A 2021 research study established a connection between unconventional natural gas production and heart-related health risks. The study uncovered higher rates of hospitalization due to acute myocardial infarction, commonly known as a heart attack, in middle-aged and elderly men, as well as older women, residing in Pennsylvania counties located above the Marcellus Shale (Denham 2021). (See Attachment 2 provided with comments for citation #241)	Additional text has been added to Section 3.3.2 (Air Resources - Environmental Impacts) to note the types of health effects indicated in this comment. The BLM acknowledges that the scope of specific impacts may vary depending on the exact development locations, which would be further evaluated during the APD stage. The BLM acknowledges that it is not within the subject matter expertise of the BLM socioeconomics program to conduct a comprehensive health impact analysis. However, future APD projects would be required to contract specialized support to ensure such analyses are conducted appropriately and thoroughly. The BLM would continue to incorporate relevant data and research in future reviews to ensure a comprehensive analysis. Health and safety concerns are described at the level of detail appropriate for this stage of analysis. The BLM would further assess air emissions and potential health effects during the stage 3 environmental review of site-specific APDs when specific development proposals, and their associated air emissions, are known. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	Increased Risks to Babies A study published in 2023 reviewed a registry-based cohort of 965,236 live births in Ohio from 2010 to 2017. It found that the odds of any structural defect were higher in Ohio children born to mothers living within 10 km of UOG than those born to unexposed mothers, and that the risks were elevated for neural tube defects, limb reduction defects, and spina bifida. (See Attachment 2 provided with comments for citation #242) A 2020 study found that expectant mothers residing close to active oil and gas wells faced a higher risk of giving birth to babies with low birth weight (Tran 2020). (See Attachment 2 provided with comments for citation #243) A 2018 study of women living near fracking sites in Texas found a risk of extreme preterm birth (Whitworth 2018). (See Attachment 2 provided with comments for citation #244)	Additional text has been added to Section 3.3.2 (Air Resources - Environmental Impacts) to note the types of health effects indicated in this comment. The BLM acknowledges that the scope of specific impacts may vary depending on the exact development locations, which would be further evaluated during the APD stage. The BLM acknowledges that it is not within the subject matter expertise of the BLM socioeconomics program to conduct a comprehensive health impact analysis. However, future APD projects would be required to contract specialized support to ensure such analyses are conducted appropriately and thoroughly. The BLM would continue to incorporate relevant data and research in future reviews to ensure a comprehensive analysis. Health and safety concerns are described at the level of detail appropriate for this stage of analysis. The BLM would further assess air emissions and potential health effects during the stage 3 environmental review of site-specific APDs when specific development proposals, and their associated air emissions, are known. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Socioeconomic Resources and Environmental Justice	Asthma Attacks, Headaches, and Fatigue A 2017 research study involving approximately 24,000 primary care patients from central and northeast Pennsylvania found that living near unconventional natural gas development sites was associated with symptoms like nasal and sinus issues, migraines, and increased fatigue (Tustin 2017). (See Attachment 2 provided with comments for citation #245) A 2016 study examined the medical records of over 35,000 patients with asthma who resided in proximity to unconventional natural gas production sites in Pennsylvania. The study concluded that UOG operations close to the patients’ homes were correlated with a higher likelihood of experiencing mild, moderate, and severe intensification of asthma symptoms. Those living near active gas wells are 1.5 to 4 times more likely to suffer from asthma attacks than those living farther away, with the closest group having the highest risk (Rasmussen 2016). (See Attachment 2 provided with comments for citation #246)	Additional text has been added to Section 3.3.2 (Air Resources - Environmental Impacts) to note the types of health effects indicated in this comment. The BLM acknowledges that the scope of specific impacts may vary depending on the exact development locations, which would be further evaluated during the APD stage. The BLM acknowledges that it is not within the subject matter expertise of the BLM socioeconomics program to conduct a comprehensive health impact analysis. However, future APD projects would be required to contract specialized support to ensure such analyses are conducted appropriately and thoroughly. The BLM would continue to incorporate relevant data and research in future reviews to ensure a comprehensive analysis. Health and safety concerns are described at the level of detail appropriate for this stage of analysis. The BLM would further assess air emissions and potential health effects during the stage 3 environmental review of site-specific APDs when specific development proposals, and their associated air emissions, are known. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix B – References	UOG Causes Stress and Reduces Quality of Life and Public Safety In a 2018 study of residents of Ohio’s Guernsey and Noble Counties, every participant reported experiencing negative impacts on their quality of life from unconventional natural gas development. Types of psychological stress reported included stress from noise or light pollution; feeling frustrated and manipulated after interactions with the oil and gas industry; general stress and uncertainty about the future. Researchers found that experiences of social stress extended to include divisions among family or community; fears of, or direct experiences of, environmental health harms; observing dying, unhealthy trees; and traffic-related effects. Nearly all residents interviewed had experienced dangerous encounters with oil and gas truck drivers and observed that damaged roads had become increasingly common. (See Attachment 2 provided with comments for citation #247) A 2015 study in Pennsylvania found vehicle crash rates to be substantially higher in counties with notable oil and gas drilling; while heavy truck crash rates were 61 to 65% higher. (See Attachment 2 provided with comments for citation #248)	As described in Section 3.10 (Socioeconomic and Local Economics) the EA indicates that impacts on social and economic conditions would result from decreased air quality, increased traffic and light pollution, deterioration of road conditions, and increased potential for surface water and groundwater contamination associated with the Proposed Action, which can result in possible health and safety concerns. As described in Section 1.2.1 (Actions to be Taken) this EA, like the 2016 EA it supplements, was conducted at a level of detail appropriate for land-use-planning. Environmental analysis and authorization of oil and gas leasing and development of federal mineral estate occurs in multiple stages with the analysis and description of environmental impacts scaled to the level of NEPA review. This EA completes the Stage 2 environmental review for the WNF Marietta Unit for future BLM lease sales and for the BLM lease sales challenged in the CBD case. At this stage the specific locations of development; specific types of equipment and hours of use; sources of water and quantities of use; methods and locations of wastewater disposal; vehicle use and routes; and other details are unknown. As a result, it is not possible to quantify with any degree of certainty how subsequent development of the leases would affect specific populations or specific health outcomes. During the stage 3 environmental review of APDs, the BLM would further assess potential health and safety impacts based on specific development proposals.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Cumulative Impacts - General	The Wayne National Forest is by far the largest public land in a state with very low public land acres available per capita and highly fragmented forests, generally; protecting the Marietta Unit’s acreage from additional fragmentation, pollution, and degradation is therefore especially valuable and important for ecosystem and outdoor recreation services. The WNF, at approximately 244,000 acres of federal surface, is the only national forest in Ohio and by far the largest public forest in the state by acreage. By contrast, Shawnee State Forest is Ohio’s largest state forest and totals approximately 64,000 acres in size; Cuyahoga Valley National Park is Ohio’s only national park and totals approximately 33,000 acres; Salt Fork State Park is Ohio’s largest state park at approximately 20,000 acres. For added context, the 40,000 national forest acres contemplated by this action for lease are the acreage equivalent of 30,303 football fields (1.32 acres per football field). Ohio ranks seventh in the nation in resident population, but near the bottom of the fifty states in acres of public land available per capita (44th out of 50). Only 4.4% of Ohio land is publicly owned. And only 15% of Ohio’s forested acres are publicly owned (combined total of state, federal, and local public ownership). (See Attachment 2 provided with comments for citation #249) Ohio’s forests are fragmented, and additional fragmentation is occurring. The rate of conversion of forest land to wildland urban interface (WUI) is greater in Ohio than any other state in the USDA Forest Service’s Region 9 (20 Northeastern and Midwestern states), with an average of 7.5% of forest land becoming WUI each decade. (See Attachment 2 provided with comments for citation #250) As of 2000, 77 percent of Ohio’s forest land was within 1,310 feet of a road, and 44 percent was within 650 feet. (See Attachment 2 provided with comments for citation #251)	The BLM and USFS recognize the importance of the public lands in the Wayne National Forest. No specific changes to the EA needed based on this comment.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Climate	Furthermore, this proposed action threatens to effectively sideline Ohio’s largest public forest in the fight against climate change for a generation or more. Table 3-5 of the Supplemental EA lists the estimated GHG emissions from well development, well production, midstream, and downstream consumption/end use in metric tons (MT) for the subject leases over the average 30- year production life of the lease as well as the CO2 equivalent (CO2e) for all GHG emissions. Table 3-5 lists the total high scenario CO2e (100 yr) emissions for the proposed action as 6,016,620 metric tonnes. The USEPA GHG equivalency calculator can be used to express the potential average-year GHG emissions on a scale relatable to everyday life. For example, the proposed action’s projected 6,016,620 metric tonnes total high scenario CO2e emissions for the proposed action is equivalent to carbon sequestered by 7,024,581 acres of U.S. forests in one year. ²⁵² Dividing this 7,024,581 figure by 30 (to prorate the total project emissions over the assumed 30-year producing life of the wells) results in the equivalent of 234,152.7 acres of U.S. forest carbon sequestration in one year. The Wayne is approximately 244,000 acres in size. In other words, <i>the Supplemental EA’s own estimates show that this single proposed action has the potential to effectively cancel out the entirety of the WNF’s carbon sequestration services over a 30-year period.</i> This is significant environmental impact in the local and regional contexts by any reasonable measure.	The BLM has accounted for both direct and indirect GHG emissions using the agencies lease sale emissions tool which can be provided upon request. The results of the GHG emissions assessment can be found in Section 3.4 (Climate Impacts) and Appendix I (Air Quality and Climate Impacts). There are no established thresholds, qualitative or quantitative, for NEPA analysis to assess the GHG emissions or social cost of an action in terms of the action’s effect on the climate, incrementally or otherwise. There is also no scientific data in the record, including scientific data submitted during the comment period for this lease action, that would allow the BLM, in the absence of an agency carbon budget or similar standard, to evaluate the significance of the GHG emissions from this proposed lease action. These methodological shortcomings prevent BLM from qualitatively comparing alternatives, and BLM has therefore not exercised its discretion to tailor this proposed lease action to account for global climate change.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix E – Legal and Regulatory Authorities	As detailed throughout this comment, this proposed action is fraught with threatened violations of federal law, including violations of NEPA, the ESA, and the APA; it is inconsistent with the Wayne National Forest’s 2006 Forest Plan; and it conflicts with federal environmental justice policies and Executive Orders.	Thank you for your comment. Please refer to comment responses that are specific to the issues identified in this comment.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Forest Plan Conformance	Since 2010, Ohio has experienced a 30-fold increase in natural gas production due to the advent and development of unconventional horizontal shale drilling and fracking in the state. Much of the Wayne’s Marietta Unit is squarely in the specific area of Ohio that is the focus of unconventional drilling. The scale and intensity of the harmful impacts generated by unconventional shale operations are magnitudes greater than the impacts associated with historical, conventional drilling operations. Nevertheless, the Forest Service has never amended or revised the 2006 Forest Plan to account for the accompanying major shift in facts, information, and conditions.	Revision to the 2006 Forest Plan is beyond the scope of this EA and the original EA which it supplements.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	Appendix D – Reasonably Foreseeable Development Scenario	As discussed in these comments above, the 2020 RFDS is outdated and inaccurate in several respects. As a result, and because of numerous data gaps outlined and discussed supra, the findings of the Supplemental EA do not provide the agencies with a reasonable basis for decision-making. These fundamental flaws in the Supplemental EA’s analysis raise substantial questions about the proposed action’s potential effects. Anglers of the Au Sable v. United States Forest Serv., 565 F. Supp. 2d 812 (E.D. Mich. 2008) (finding several effects of the directional oil and gas drilling project were highly uncertain).	The RFDS followed BLM policy and guidance and modeled a hard look projection of a possible scenario of future activities based on specific assumptions including geology, resource occurrence potential, past and current leasing, past and current exploration and development activity, and engineering technology available at the time of analysis. The RFDS process included information acquisition from federal and state agency databases and other sources, information compilation, analysis including modeling by a BLM economist, and peer review. A RFDS is a technical report and not a planning decision and is intended to provide a NEPA process with technical information needed in the review and evaluation of management direction and alternatives for land use planning. In response to public comment on a Draft Environmental Assessment, BLM and Ohio Department of Natural Resources (ODNR) records were reviewed to evaluate whether documented oil and gas activities in the Wayne National Forest since the RFDS analysis was completed exceed the RFDS-proposed disturbances. Based on reviewed records, the possible surface activities projected in the RFDS have not been exceeded and the projected environmental effects remain valid. Accordingly, no change to the RFDS modeled projection is necessary at this time.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	NEPA Adequacy	An EIS must be prepared when an action’s effects are “highly uncertain or involve unique or unknown risks.” 40 C.F.R. § 1508.27(b)(5). As the Ninth Circuit has held, “[p]reparation of an EIS is mandated where uncertainty may be resolved by further collection of data, or where the collection of such data may prevent speculation on potential . . . effects.” Native Ecosystems Council v. U.S. Forest Serv., 428 F.3d 1233, 1240 (9th Cir. 2005) (internal citations omitted); Blue Mtns. Biodiversity, 161 F.3d at 1213-1214 (finding “EA’s cursory and inconsistent treatment of sedimentation issues . . . raises substantial questions about . . . the unknown risks to” fish populations). As one court recently explained regarding oil and gas leasing that may facilitate fracking, “BLM erroneously discounted the uncertainty from fracking that may be resolved by further data collection. ‘Preparation [of an EIS] is mandated where uncertainty may be resolved by further collection of data, or where collection of such data may prevent speculation on potential effects.’” CBD, 937 F. Supp. 2d at 1159 (quoting Native Ecosystems Council v. U.S. Forest Serv., 428 F.3d 1233, 1240 (9th Cir. 2005)). The EA must disclose and analyze the specific pathways through which harm may occur and the potential degree of harm that may result. Additional information is needed, for example, about the surface footprints of well pads and pipelines, the extent of habitat for federally listed bats in the Wayne, possible rates of natural gas leakage, the potential for fluids to migrate through the ground in and around the parcels, the safety of various fracking chemicals, the potential for drilling and wastewater injection to affect local and regional faults, and harmful impacts to communities with environmental justice concerns. NEPA dictates that the way to address such uncertainties is through the preparation of an EIS.	This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u> Refer to previous comment responses for the individual issues raised in this comment.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	NEPA Adequacy	The proposed action would adversely affect federally listed species, including the Indiana Bat, Northern Long-eared Bat, Tricolored Bat, Pink Mucket Pearlymussel, Northern Riffleshell, Fanshell, Clubshell, Purple Cat’s Paw, Round Hickorynut, Sheepnose Mussel, and Snuffbox Mussel species and their habitat. In addition, two species proposed for listing would be adversely affected—the Tricolored Bat and Salamander Mussel. An EIS may also be required when an action “may adversely affect an endangered or threatened species or its habitat.” 40 C.F.R. § 1508.27(b)(9). Although a finding that a project has “some negative effects does not mandate a finding of significant impact,” an agency must nonetheless fully and closely evaluate the effects on listed species and issue an EIS if those impacts may be significant. Klamath-Siskiyou Wildlands Ctr. v. U.S. Forest Serv., 373 F. Supp. 2d 1069, 1081 (E.D. Cal. 2004) (finding agency’s conclusion that action “may affect, is likely to adversely affect” species due to “disturbance and disruption of breeding” and “degradation” of habitat is “[a]t a minimum, . . . an important factor supporting the need for an EIS”). As discussed above, opening the Wayne to fracking would result in direct take of endangered and threatened species and substantial loss of their habitat.	As described in Section 4.1.2 (Endangered Species Act Section 7 Consultation) the BLM and USFS are conducting consultation with USFWS under ESA Section 7 with respect to federally listed species. The USFWS would utilize the Biological Assessment to inform the preparation of a Biological Opinion or concurrence determination regarding potential impacts on federally listed species and critical habitat and which would include required mitigation measures to be considered and applied in APD approvals. The Biological Opinion or concurrence determination would provide a tiered approach to the ESA Section 7 consultation that can be applied during subsequent site-specific development proposals and associated consultation at the APD stage.
		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	NEPA Adequacy	As discussed supra, the Supplemental EA defies BLM’s own guidance and Executive Orders on environmental justice by failing to identify all environmental justice communities, address serious and disproportionate environmental harms to those communities, and provide meaningful opportunities to participate in decision-making. The context of the proposed action and the intensity of its effects clearly demonstrate that the proposed action would significantly affect the environment. The BLM must prepare a full NEPA EIS if it intends to pursue the proposed action further.	Executive Order 14154, Unleashing American Energy (Jan. 20, 2025), and a Presidential Memorandum, Ending Illegal Discrimination and Restoring Merit-Based Opportunity (Jan. 21, 2025), require the Department to strictly adhere to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq. Further, such Order and Memorandum repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023). Because Executive Orders 12898 and 14096 have been repealed, complying with such Orders is a legal impossibility. The BLM verifies that it has complied with the requirements of NEPA, including the Department’s regulations and procedures implementing NEPA at 43 CFR Part 46 and Part 516 of the Departmental Manual, consistent with the President’s January 2025 Order and Memorandum. However, impacts were analyzed and published in the Draft EA (March 2024) and impacts were raised in public comments, which the final EA addresses in Section 3.10.

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		Center for Biological Diversity, OEC, Sierra Club, and Heartwood	NEPA Adequacy	The Supplemental EA fails to take a hard look at surface disturbance impacts; fails to take a hard look at the leasing plan’s Impacts on sensitive wildlife, including federally protected bat species; fails to take a hard look at the impacts of water depletions from fracking on stream flows in the Little Muskingum River Basin; fails to take a hard look at the impacts of fracking on water quality; fails to take a hard look at leasing impacts on aquatic species, including sensitive mussel species; fails to address the far-reaching environmental and public health harms of fracking waste; defies BLM’s own guidance and executive orders on environmental justice; fails to adequately analyze air quality impacts; and, fails to appropriately analyze and assess climate impacts. Furthermore, the 2020 RFDS is outdated and inaccurate, and the proposed action and Supplemental EA are inconsistent with the 2006 LRMP for the Wayne National Forest. Should BLM wish to proceed, the proposed action would require the preparation of a full NEPA Environmental Impact Statement (EIS). We request that BLM adopt a no action alternative. We also request that BLM consider an NSO alternative and a “partial lease and NSO” alternative in detail.	Thank you for your comment. Please refer to previous comment responses that are specific to the issues identified in this comment. This EA was prepared in accordance with the CEQ implementing regulations for NEPA (40 CFR 1500 – 1508, revised in 2020), Department of Interior NEPA regulations (43 CFR Part 46) and the BLM NEPA Handbook (H-1790-1). The BLM would use this EA process to determine if significant impacts would result from the Proposed Action. If significant impacts are identified that cannot be adequately mitigated, the BLM would not issue a FONSI and would instead prepare an EIS. It is important to note that the administrative act of offering parcels for oil and gas leasing and the subsequent issuing of leases would have no direct impacts. There would be no surface disturbance authorized or any direct impacts resulting from the action of leasing, but this EA analyzes reasonably foreseeable impacts of estimated future oil and gas development to determine whether significant environmental impacts would require further environmental analysis in the form of an EIS, or whether a FONSI may be issued. If leases are proposed for development, during the Stage 3 environmental review of site-specific development proposals (APDs), the BLM would further assess site-specific impacts of proposed development and would conduct an appropriate scale of NEPA review based on the potential impacts and their significance. Refer to Section 1.2.1 (Actions to be Taken) in the EA that describes the Stage 3 environmental review of site-specific APDs, Also, <u>see <i>Dakota Res. Council v. U.S. Dept. of the Interior</i>, 2024 U.S. Dist. LEXIS 51013, *81, 82 (D.D.C. Mar. 22, 2024) (sustaining a BLM oil and gas lease-sale decision that postponed site-specific review to the APD stage).</u>