

**BIOLOGICAL EVALUATION,
MIGRATORY BIRD, AND
SPECIES OF LOCAL CONCERN REPORT
FOR THE
BERLAIMONT ACCESS ROAD PROJECT
EAGLE COUNTY, COLORADO**

Prepared for:

U.S. Forest Service

White River National Forest
Holy Cross Ranger District
P.O. Box 190
Minturn, Colorado 81645

and

SE Group

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Frisco, Colorado 80443

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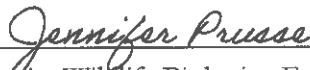
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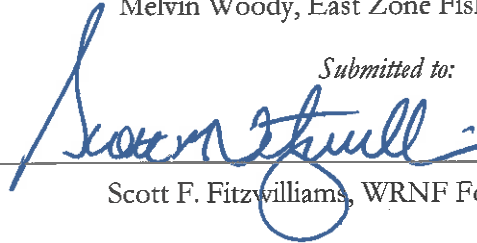
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1.0 INTRODUCTION

The purpose of this biological evaluation is to analyze and determine the likely effects of the alternatives on Forest Service sensitive species, species of local concern, and migratory birds (FSM 2670.31-2670.32). Plants are in the Berlaimont botany report.

2.0 ALTERNATIVES

The following narrative provides a summary of the No Action and the Proposed Action Alternatives. For further detail, refer to the associated Environmental Impact Statement (EIS) for this project.

2.1 ALTERNATIVE 1 – NO ACTION

As required by NEPA, a No Action Alternative has been included in this analysis for review alongside the Action Alternatives (40 CFR 1502.14(d)). The No Action Alternative provides a baseline for comparing the effects of the Action Alternatives. By definition, the No Action Alternative represents a continuation of existing management practices without changes, additions, or upgrades to existing conditions as a result of this NEPA analysis.

As indicated in the 2002 WRNF Land and Resource Management Plan (Forest Plan), NFS lands near the private property are within two Management Areas (M.A.): M.A. 5.41 – Deer and Elk Winter Range and M.A. 8.32 – Designated Utility Corridors. Current management includes providing for wildlife habitat, livestock grazing, and recreation opportunities. Roads in M.A. 5.41 are subject to seasonal closures for motor vehicles consistent with management for deer and elk winter range. Therefore, under the No Action Alternative any development of the private property would be subject to current M.A. direction including seasonal closures.

At this time, it is assumed that no development of the Berlaimont Estates' private property would occur solely by use of existing Forest Service Roads (FSRs). The existing road has not been evaluated for consistency with Eagle County road standards. Although some speculation exists that FSRs (774 and 780) may meet Eagle County "driveway" standards, which would allow the development of up to three homes on the Berlaimont Estates' private property, at no time has Berlaimont Estates ever discussed or proposed this development to the WRNF.

Although this alternative is a true No Action Alternative and was included in this analysis for comparison with the Action Alternatives, approval of this alternative would not meet the requirements of the Forest Service ANILCA determination. The WRNF has determined that the Applicant's desire to develop 19 homesites, each on 35 acres, is a reasonable use and therefore access must 1) reach the upper, developable portion of the property and 2) be accessible year- round by highway-legal wheeled vehicles" (16 USC 3210, Title I, §1323).

2.2 ALTERNATIVE 2 – PROPOSED ACTION

Alternative 2 is the preferred alternative and would require issuance of a permanent easement to improve, construct, maintain and use existing roads on NFS land and Berlaimont Estates' private property. It would also require construction of a new road on Berlaimont Estates' private property (Figure 2-1).

Activities occurring on private lands are considered “connected actions” in accordance with NEPA (40 CFR 1508.25). All portions of the access route are “interdependent parts of a larger action.” Therefore, the road alignment on NFS and private land is described and analyzed as part of the alternative but distinguished by impacts to NFS or private land.

Alternative 2 maximizes use of existing FSRs while minimizing the distance traveled across NFS land. The access route easement would be for improvement, maintenance and use of two existing FSRs: FSR 774 and FSR 780. Under all Alternatives, approximately 3.2 miles of FSR 774 and FSR 780 would be slightly different than the current road prism, and the road would be widened from a road ranging between 12 to 20 feet wide dirt road to a 20-foot wide road with 2 3-foot gravel shoulders. The road would be paved up to the Berlaimont property boundary, and Berlaimont property roads would be paved as well. The easement would begin at the intersection of FSR 774 and Moonridge Drive, and would follow FSR 774 north until its intersection with FSR 780.

From there, the access route easement would follow FSR 780 northwest onto the southeastern leg of Berlaimont Estates' private property, at which point a newly constructed road would depart, heading northwards by switchbacking (approximately six switchbacks would be required) up the hillside. Due to the topography of the eastern leg of the Berlaimont Estates' private property, this alignment would require a large amount of cut and fill and retaining walls to provide an adequate road base. Total disturbance for the alignment under Alternative 2 includes 33.2 acres on NFS land and 37.2 acres on Berlaimont Estates' private land.

Berlaimont Estates Access Route EIS

Figure 2: The Action Alternatives

Existing

- Roads
- Multi-Use Trail
- Berlaimont Estates' Private Property
- NFS Boundary

Proposed

- All Alternatives
- Alternative 2
- Alternative 3
- Alternative 4
- Recreation Mitigation Trail
- Platted Berlaimont Property Road
- North Parking Lot
- South Parking Lot
- Residential Access Gate Alternative 2
- Residential Access Gate Alternative 3
- Residential Access Gate Alternative 4
- Winter Access Gate

Map labels: FSR 481, FSR 780, FSR 778, FSR 780, FSR 774, NFS Private, Edwards, 70, SE GROUP, Date: October 2017, Prepared by: SE GROUP.

2.3 ALTERNATIVE 3

Like Alternative 2, Alternative 3 would require issuance of a permanent reciprocal easement to improve, construct, maintain, and use new and existing FSRs on NFS land and Berlaimont Estates' private property. The alignment described in Alternative 3 was developed by the Applicant as the route to the property that would take advantage of the existing topography of the area, and thus have the least construction issues (switchbacks, retaining walls, and drainage). The WRNF carried this alternative forward in the analysis due to consideration of visibility and erosion issues of the switchbacks up the eastern leg of Berlaimont Estates' private property. Total disturbance for the alignment under Alternative 3 includes 53.9 acres on NFS land and 11.0 acres of on Berlaimont Estates' private land.

2.4 ALTERNATIVE 4

Alternative 4 also includes issuance of a permanent reciprocal easement to improve, construct, maintain, and use new and existing FSR on NFS land and Berlaimont Estates' private property. The alignment in Alternative 4 was developed to minimize the impacts of new roads on NFS land and to potentially lessen impacts to wildlife from cut and fill slopes and elk winter concentration areas below what is proposed under Alternatives 2 or 3. Total disturbance for the alignment under Alternative 4 includes 50.2 acres on NFS land and 18.1 acres of on Berlaimont Estates' private land.

2.5 PROJECT COMPONENTS COMMON TO THE ACTION ALTERNATIVES

The following components would be similar under Alternatives 2, 3, and 4.

2.5.1 Access Gates

Although sections of FSR 774 and FSR 780 would be placed within a permanent easement and paved/maintained for homeowners' year-round use, the public would continue to have a reciprocal easement for access; motorized public access to these roads would be consistent with current Forest Service management. A gate regulating access to home sites would be located on existing FSR 780 (Alternatives 3). The gate would continue to allow for seasonal motorized public use of FSR 780, while restricting use of the private road to residents. A second "Winter Access Gate" located on FSR 780 near the junction with 774 would regulate motorized and mechanized public access to FSR 780, consistent with existing Forest Service directed winter seasonal closures for M.A. 5.41 (Figure 2-1).

2.5.2 Construction, Operations and Maintenance

The future homeowners' association (HOA) would maintain the entire Berlaimont Estates Access route throughout the year. The road would have a 20-foot-wide paved surface up with 3-foot unpaved shoulders for a total width of 26 feet. Improvement of FSR 774 and FSR 780 on NFS lands, and construction of new road segments, would require numerous retaining walls due to the steepness of terrain. The amount of cut and fill and number of retaining walls varies by Alternative (Table 2-1).

Table 2-1. Retaining Walls and Cut and Fill by Alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Square feet of new cut and fill slope	0	2,236,651	2,014,529	2,098,408
Number of retaining walls 2 to 10 feet	0	6+5=11	+0=6	+0=6
Number of retaining walls 11 to 20 feet	0	8+3=11	+7=15	+4=12
Number or retaining walls 21 to 30 feet	0	3+2=5	+1=4	+1=4
Number of retaining walls 31 to ~40 feet	0	0+1=1	+0=0	+0=0

2.5.3 Utilities

Power and communication utilities associated with the development would be buried within the road corridor for the entire length of the upgraded/new road. A water pipeline would also be buried in the road (on private land) from onsite tanks and reservoirs located within the private property to each home site. Homesites would be on individual sewage disposal systems.

2.5.4 Recreation Use and Parking

The parking area currently located at the southern end of FSR 774 on NFS lands, near the Moonridge neighborhood, would be maintained under all action alternatives. An additional parking area would be constructed on FSR 774 approximately 0.1-mile beyond its junction with FSR 780, to accommodate motorized uses that are not street legal (Figure 2-1). The new parking area would be maintained by the HOA.

A 2.7-mile circular loop trail would be constructed off of FSR 774 to mitigate for the loss of recreation access and concentrate winter recreation use below Beard Creek. This would intersect the Berry Creek Trail (#2008).

2.5.5 Forest Plan Amendments

Fulfilling the Forest Service's obligations under ANILCA would result in an inconsistency with three Forest Wide Standards due to the design and year-round operation of the road on NFS land. In order to approve road reconstruction and year-round access to the private land across NFS lands, amendments to the Forest Plan would be necessary (36 CFR 219.13). The inconsistencies across all action alternatives would be to:

- *Wildlife (General) Standard #1*: Seasonal restrictions will be applied to reduce disturbance in key wildlife habitats.
- *Wildlife (Sage Grouse and Brewer's Sparrow) Standard #4*: Restrict activities that have the potential to impact sage grouse and Brewer's sparrow breeding activities from April 1 to July 31 in areas where breeding is known or suspected in order to minimize any negative impacts to reproductive success or survival.
- *Infrastructure Standard #2*: All new roads passing through this area [MA 5.41] will avoid important forage, cover, and birthing areas.

Additional details on these standards and proposed Forest Plan Amendments may be found later in this report.

2.6 CONNECTED ACTION

Residential development of Berlaimont Estates' private property with 19 homes would not proceed unless the Forest Service grants improved road access. Therefore, residential development would be a connected action per 40 CFR §1508.25(a) ii and iii.

According to the Eagle County plat, Berlaimont Estates' 680-acre private property has been divided into 19 individual lots (each equal to or greater than 35 acres in size) for development of a low-density, year-round residential community. For the purpose of this NEPA analysis the following information was gathered from Berlaimont Estates' Standard Form 299 submitted to the WRNF in 2014 and/or from Berlaimont Estates representatives to inform the analysis of impacts from development on Berlaimont Estates' private property.

A primary single-family residence would be constructed on each of the lots. Some associated caretaker units are anticipated. Power and communication utilities would be buried within the selected access route for the entire length of the upgraded/new road. Water pipelines would also be buried in internal private roads and driveways to supply water to each private parcel from Beard Creek stream and spring diversions, with water stored in onsite tanks and reservoirs. Other residential characteristics will be set forth in covenants developed for the community. Development is expected to be similar under all Action Alternatives.

Construction of the access road would take two years to complete and full residential buildout of the private parcel is expected to require approximately nine years. If approved, starting construction in 2021, all residences would be developed by 2029.

While residential development of the Berlaimont Estates parcel would be a consequence of Alternatives 2, 3 and 4, the details of that development are conceptual at this time. To illustrate the possible extent of the connected action, potential internal roads and building envelopes are shown on some analysis figures. However, the exact locations of these and other potential improvements (e.g., water storage reservoirs, water diversion facilities, the ranch manager's residence, community building, horse corrals, etc.) will remain unknown until the lots are purchased and building plans are approved by the Architectural Control Committee of the HOA. The quantification of conceptual internal road and building envelope impacts to the resources considered herein is only for illustrative purposes.

Per Berlaimont's 2018 comment letter in response to the DEIS, Berlaimont Estates indicated support for on-site or off-site mitigation. BE is open to considering further mitigation efforts as its proposed development such as strict property owner covenants and education to, among other things: eliminate fences and other movement impediments within the property; concentrate development on the flat, hill-top portions of the property rather than on the south-facing slopes; minimize impacts from trash removal; limit non-native landscaping to enhance habitat; inform residents of living practices that enhance wildlife, such as slow driving speeds and pet handling. BE will continue its dialogue with the Forest Service and Colorado Parks and Wildlife to identify specific mitigation requirements that will have a lasting and sustainable positive impact on local wildlife (Table 2-2 and Table 2-3).

2.7 PROJECT DESIGN CRITERIA

The following project design criteria (PDC) applies to all action alternatives.

Table 2-2. Project Design Criteria
The Forest Service will discuss construction plans with Colorado Parks and Wildlife during the design review process to minimize potential impacts to wildlife.
To facilitate wildlife crossings: - Minimize the use of guard rails. - Install speed bumps to reduce speeds in straight sections and before wildlife crossing areas. Speed bump specifications will allow for bike passage. - Maintain a clear roadside, absent of vegetation, that allows drivers to see deer or elk that may enter the road. - Forest Service-approved wildlife warning signs will be installed at the bottom of the road and at Forest Service-recommended intervals.
Limit the installation of new fences, power lines and other structures in sage grouse and Brewer's sparrow sagebrush habitat to reduce possible raptor perches and maintain sagebrush.
The Applicant shall report any large mammal (e.g., elk, deer, etc.) collisions that occur along the authorized roadway to the Forest Service and CPW within 24 hours of occurrence. The Applicant shall remove any roadkill.
Construction of the access route from December 1 to April 15 is prohibited. Deviations from this schedule and the WRNF Travel Management Plan must be approved by the Eagle-Holy Cross District Ranger.
For consistency with Management Area 5.41, Deer and Elk Winter Range, Recreation Guideline 1, <i>Restrict recreation activities that would disturb deer and elk during winter and spring periods</i> , the Forest Supervisor shall implement a human entry closure by special order between November 23 and May 20 annually to maximize big game winter range habitat effectiveness. The closure area shall nearly encapsulate the Berlaimont Estates private property and surrounding NFS lands. At the intersection of FSR 780 and FSR 778: - the closure boundary would follow the alignment of FSR 778 north to the intersection with FSR 783 - the closure boundary would follow the alignment of FSR 783 west to the intersection with FSR 780 - the closure boundary would follow the alignment of FSR 780 east to the intersection with FSR 778
Vehicular road access to the private parcel only will be permitted for Berlaimont Estates residents, as required by law.
Prior to access route construction, the Applicant shall fund and construct educational signage to be located at the top of the Berry Creek Trail and proposed trail to inform users of the winter area closure and deter disturbance to wintering deer and elk in the area. The signage will be reviewed and approved by the Forest Service.
During the development of the snowplowing agreement with the Applicant, include consideration of wildlife movement corridors to minimize adverse impacts on wildlife that could result from snow placement during snowplowing operations.
Any subsequent new proposed recreation trails, within or adjacent to the Berlaimont project area (Thames Creek to Metcalf Creek), would be designed to minimize additional impacts to wintering deer and elk.
The Applicant shall fund and restore all unauthorized trails that exist within the project area at the direction of the Forest Service. This work shall occur concurrent with the access route construction on NFS lands.
The Applicant shall fund and complete the obliteration and restoration of the Thames Creek two-track road, which is an unauthorized route, at the direction of the Forest Service. This work shall occur concurrent with the access route construction on NFS lands.
Survey for raptor nests in areas proposed for road-related tree removal prior to tree cutting each year until the selected access route corridor has been cleared. A no-disturbance buffer around active nest sites would be required from nest-site selection to fledging (generally March through July).
During construction of the facility, contractors are required by Eagle County code to provide a bear proof container on site for all edible and food related trash in order to minimize conflicts with black bears.
The Applicant shall develop a Wildlife Habitat Management Plan in a collaborative manner with the WRNF and wildlife stakeholders as determined by the WRNF to identify habitat enhancement opportunities in the same sub-watersheds as the project area. Such opportunities may include prescribed burning in aspen, road restoration, and invasive plant treatments. The Wildlife Habitat Management Plan shall be submitted to the WRNF prior to access route construction. The Wildlife Habitat Management Plan preparation and the implementation of projects contained within shall be funded by the Applicant.

Table 2-3. Stream Health Criteria and Mitigation Recommended to Minimize Impacts from Alternatives 2–4 on Aquatic Resources Associated with the Berlaimont Access Road Project**Stream Health Design Criteria Common to All Action Alternatives**

Prior to implementation, submit grading plans for all new and improved road segments, and for construction of the mitigation trail, for review and authorization by the WRNF. At a minimum, these documents should meet the basic requirements for stormwater permitting through the State of Colorado Stormwater Management Program.

Avoid soil disturbing activities during periods of heavy rain or excessively wet soils.

Make cuts, fills, and road surfaces strongly resistant to erosion (WCP MM-9 Design Criteria).

For ground-disturbing activities near perennial and intermittent streams and ephemeral draws, CDAs should be minimized by draining roads, road ditches, and other disturbed areas to undisturbed soils rather than directly to streams and ephemeral draws. Drainage from disturbed areas should be modified as necessary using natural topography, rolling dips, waterbars, ditch relief culverts, etc., to disconnect disturbed areas from streams.

All work near stream channels should be conducted in a way that protects vegetation in the WIZ.

Ground disturbances in or adjacent to streams/wetlands would occur during base flow conditions to protect water quality and minimize impacts to wetland soils/vegetation, and with sufficient time to revegetate before the winter season.

Construction practices and operations should not introduce soils, debris, or other pollutants into streams, channels, swales, or wetlands. BMPs adequate for erosion and sediment control should be installed before ground-disturbing activities begin. If natural or biodegradable materials are not used and left on site, all non- natural and non-biodegradable materials should be removed at the end of construction.

Properly compact fills. Install temporary BMPs for sediment and erosion control until planted vegetation provides erosion control (WCP MM-11 Design Criteria).

Where appropriate, revegetate disturbed terrain (including staging areas) immediately after completion of grading using USFS-approved, native seeds.

Areas compacted by construction activities will require mechanical subsoiling or scarification to the compacted depth to reduce bulk density and restore porosity.

Where possible, utilize existing roads and trails to access construction sites.

Prior to disturbance of any waters of the U.S., including wetlands, Berlaimont Estates shall coordinate with the U.S. Army Corps of Engineers to determine if the activities require a permit.

Excavated material should not be stored in the WIZ. Tree removal, excavation and grading should be minimized in the WIZ.

Minimize erosion in road-side ditches by implementing and maintaining standard BMPs for erosion control. For example, line ditch with proper size rock and/or install check dams at adequate intervals.

Design road ditches and cross drains to limit flow to ditch capacity and prevent erosion and failure. Install road- relief culverts or road waterbars at a spacing adequate for the road slope and ditch characteristics (WCP MM-10 Design Criteria).

Design, implement, and maintain standard sediment control BMPs (e.g., sediment traps) at the discharge of road- side ditches and culverts. Where possible, discharge runoff into vegetated areas, away from the WIZ.

Inspect and maintain BMPs a minimum of twice annually: (1) in the spring, as soon as conditions allow; and (2) in the fall season, before snow covers the ground.

Keep construction equipment out of streams, except if specifically authorized by the USFS. This measure sustains stream integrity (WCP MM-3 Design Criteria).

Locate the mitigation trail paralleling Berry Creek as close to the road as possible to maximize the width of the vegetated buffer between the trail and Berry Creek.

Ensure the maximum width of vegetated buffer between FSR 774 and Berry Creek. Revegetate with species that will impede runoff and increase water infiltration.

Table 2-3. Stream Health Criteria and Mitigation Recommended to Minimize Impacts from Alternatives 2–4 on Aquatic Resources Associated with the Berlaimont Access Road Project

In order to reduce sediment delivery to the stream from the improved section of FSR 774 along Berry Creek, surface runoff should be routed to the best extent possible to sediment detention basins and/or vegetated areas rather than directly to streams and ephemeral draws. Sediment basins should be maintained annually.
Ground disturbances in or adjacent to streams/wetlands would occur during base flow conditions to protect water quality and minimize impacts to wetland soils/vegetation, and with sufficient time to revegetate before the winter season.
Construction practices and operations should not introduce soils, debris, or other pollutants into streams, channels, swales, or wetlands. BMPs adequate for erosion and sediment control should be installed before ground-disturbing activities begin. If natural or biodegradable materials are not used and left on site, all non-natural and non-biodegradable materials should be removed at the end of construction.
Properly compact fills. Install temporary BMPs for sediment and erosion control until planted vegetation provides erosion control (WCP MM-11 Design Criteria).
Where appropriate, revegetate disturbed terrain (including staging areas) immediately after completion of grading using USFS-approved, native seeds.
Areas compacted by construction activities will require mechanical subsoiling or scarification to the compacted depth to reduce bulk density and restore porosity.
Where possible, utilize existing roads and trails to access construction sites.
Prior to disturbance of any waters of the U.S., including wetlands, Berlaimont Estates shall coordinate with the U.S. Army Corps of Engineers to determine if the activities require a permit.
Excavated material should not be stored in the WIZ. Tree removal, excavation and grading should be minimized in the WIZ.
Minimize erosion in road-side ditches by implementing and maintaining standard BMPs for erosion control. For example, line ditch with proper size rock and/or install check dams at adequate intervals.
Design road ditches and cross drains to limit flow to ditch capacity and prevent erosion and failure. Install road- relief culverts or road waterbars at a spacing adequate for the road slope and ditch characteristics (WCP MM-10 Design Criteria).
Design, implement, and maintain standard sediment control BMPs (e.g., sediment traps) at the discharge of road- side ditches and culverts. Where possible, discharge runoff into vegetated areas, away from the WIZ.
Inspect and maintain BMPs a minimum of twice annually: (1) in the spring, as soon as conditions allow; and (2) in the fall season, before snow covers the ground.
Keep construction equipment out of streams, except if specifically authorized by the USFS. This measure sustains stream integrity (WCP MM-3 Design Criteria).
Locate the mitigation trail paralleling Berry Creek as close to the road as possible to maximize the width of the vegetated buffer between the trail and Berry Creek.
Ensure the maximum width of vegetated buffer between FSR 774 and Berry Creek. Revegetate with species that will impede runoff and increase water infiltration.
Runoff from the improved section of FSR 774 along Berry Creek should be routed to the best extent possible to sediment detention basins and/or vegetated areas rather than directly to streams and ephemeral draws. Sediment basins should be maintained annually.
Use of Improved Sanding Practices to reduce amount of sediment reaching streams (Similar or comparable to those described in Staples et al., 2004): • Use National Cooperative Highway Research Program (NCHRP, 2004) Snow and Ice Control: Guidelines for Materials and Methods to select appropriate application rates for traction control and deicing operations. • Selection of appropriate particle size: recommend materials larger than #50 sieve (~300 microns in diameter) • Periodic calibration of spreaders for chosen application rate • Use of pre-wetted or liquid deicer

Table 2-3. Stream Health Criteria and Mitigation Recommended to Minimize Impacts from Alternatives 2–4 on Aquatic Resources Associated with the Berlaimont Access Road Project

Application of pre wetted sand with hot water (194-203°F) can provide adequate traction for 1,000-1,500 vehicles for 7 days (Vaa, 2004).

Stream/road crossings must be designed to provide passage of flow and sediment and withstand expected flood flows. New, replacement, and reconstructed crossings (culverts, bridges, and other stream crossings) on perennial or intermittent streams shall provide for aquatic organism passage, unless the accommodation would increase nonnative species encroachment on native fish and amphibian habitat. Exceptions include temporary structures in place for less than one year. Specific aquatic habitat improvement measures will be outlined in Fish and Wildlife Management Plan.

PDC for Design and Construction of the New Beard Creek Crossing

In the vicinity (approximately 200 feet) of the proposed stream crossing, in-slope road surfaces (2 to 4 percent cross-slope) to drain surface runoff into road-side ditch.

Design and construct bridge over Beard Creek to provide for passage of flow and sediment, withstand expected flood flows, and allow free movement of aquatic life (MM-4 Criteria). Obtain all necessary State and Federal permits.

Construct the Beard Creek stream crossing on a straight and resilient stream reach, as perpendicular to flow as possible (MM-4 Design Criteria).

Design and construct the stream crossing to sustain bankfull dimensions of width, depth, and slope and keep streambeds and banks resilient (MM-4 Design Criteria).

Construct stream crossing during periods of low streamflow.

Remove existing 48-inch culvert on Beard Creek and reclaim road segment to be abandoned. Rehabilitate section of Beard Creek channel and stream banks where the culvert is currently installed. Obtain all necessary State and Federal permits (Source: DEIS Watershed section and Western Ecosystems, Inc.)

3.0 BIOLOGICAL EVALUATION

3.1 SENSITIVE SPECIES CONSIDERED IN THE ANALYSIS

The following list includes sensitive species, or their habitats, that are located on the Eagle-Holy Cross Ranger District, or that are located adjacent to or downstream of the project and could potentially be affected. A pre-field review was conducted of available information to assemble occurrence records, describe habitat needs and ecological requirements, and determine whether field reconnaissance is needed to complete the analysis. Sources of information included Forest Service records and files, the State Natural Heritage Program database, state wildlife agency information, and published research (citations).

No further analysis is needed for species that are not known or suspected to occur in the project area, and for which no suitable habitat is present. The following table documents the rationale for excluding a species. If suitable but unoccupied habitat is present, then potential effects are evaluated.

Field surveys for the R2 sensitive animal species and their habitats were conducted in the project area during the spring and/or summer seasons of 2001, 2002, 2006, 2008, 2009, 2016, 2017, and 2019, unless noted otherwise.

Table 3-1. Region 2 Sensitive Species on the WRNF and Analysis Rationale	
Species Common name, <i>Scientific name</i>	Rationale if not carried forward in analysis
FISH	
Roundtail chub, <i>Gila robusta</i>	No suitable habitat (CO River up through Glenwood Canyon)
Mountain sucker, <i>Catostomus platyrhynchus</i>	No suitable habitat (small to medium streams below 7000'; 4 populations documented on the Rifle and Blanco Districts)
Bluehead sucker, <i>Catostomus discobolus</i>	Analyzed in detail. Occupied habitat downstream (CO River upstream to Alkali Creek)
Flannelmouth sucker, <i>Catostomus latipinnis</i>	Analyzed in detail. Occupied habitat downstream (CO River to Eagle River)
Colorado River cutthroat trout, <i>Oncorhynchus clarkii pleuriticus</i>	Analyzed in detail. Population of conservation concern in Berry Creek (isolated, headwater streams and lakes)
AMPHIBIANS	
Boreal western toad, <i>Anaxyrus boreas boreas</i>	No suitable breeding habitat (subalpine marshes and wet meadows; ponds, margins of streams; adjacent uplands, 7,000 - 11,860')
Northern leopard frog, <i>Lithobates pipiens</i>	Outside historic distribution and range (permanent wetlands)
BIRDS	
Northern goshawk, <i>Accipiter gentilis</i>	Analyzed in detail. Potential habitat (closed montane forests >7,500')
Northern harrier, <i>Circus cyaneus</i>	No habitat (grasslands, agricultural lands, marshes, & alpine)
Ferruginous hawk, <i>Buteo regalis</i>	No habitat (plains, grasslands)
American peregrine falcon, <i>Falco peregrinus anatum</i>	Greater than 10 miles from the nearest eyrie. As of April 23, 2019, the American peregrine falcon is no longer a Forest Service Region 2 sensitive species.
Bald eagle, <i>Haliaeetus leucocephalus</i>	Winter foraging habitat present, however, as of April 23, 2019, the bald eagle is no longer a Forest Service Region 2 sensitive species.
White-tailed ptarmigan, <i>Lagopus leucurus</i>	No habitat (alpine habitat and upper elevation willow stands)
Greater sage-grouse, <i>Centrocercus urophasianus</i>	Analyzed in detail. Habitat present (sagebrush)
Columbian sharp-tailed grouse, <i>Tympanuchus phasianellus columbianus</i>	Analyzed in detail. Habitat present (sagebrush and mountain shrub)
Flammulated owl, <i>Psiloscops flammeolus</i>	Analyzed in detail. Habitat present (mature aspen)
Boreal owl, <i>Aegolius funereus</i>	No habitat (mature spruce-fir & mixed conifer)
Black swift, <i>Cypseloides niger</i>	No local nesting habitat (waterfalls, cliffs)
Lewis' woodpecker, <i>Melanerpes lewis</i>	No habitat (ponderosa pine and cottonwoods)
Olive-sided flycatcher, <i>Contopus cooperi</i>	Analyzed in detail. Habitat present (mature aspen)
Loggerhead shrike, <i>Lanius ludovicianus</i>	Sagebrush present, but outside of species elevation range: 4,000 – 6,000 feet
Purple martin, <i>Progne subis</i>	Analyzed in detail. Habitat present (aspen forest near ponds)

Table 3-1. Region 2 Sensitive Species on the WRNF and Analysis Rationale	
Species Common name, <i>Scientific name</i>	Rationale if not carried forward in analysis
Brewer's sparrow, <i>Spizella breweri</i>	Analyzed in detail. Individuals have been documented in the project area, and suitable breeding habitat present (sagebrush)
Sage sparrow, <i>Amphispiza belli</i>	No habitat (low-elevation big sagebrush and sage/greasewood)
MAMMALS	
Pygmy shrew, <i>Sorex hoyi</i>	No habitat (subalpine forests and meadows)
Fringed myotis, <i>Myotis thysanodes</i>	No habitat (forests/woodlands to 7,500 ft.; unknown on WRNF)
Hoary bat, <i>Lasiurus cinereus</i>	No habitat (mixed conifer and lodgepole pine forest)
Spotted bat, <i>Euderma maculatum</i>	No habitat (cliffs, arid terrain)
Townsend's big-eared bat, <i>Corynorhinus townsendii</i>	Analyzed in detail. Habitat, specifically mature pinyon-juniper that provides cavities for roosting, present.
American marten, <i>Martes americana</i>	No habitat (coniferous forests)
River otter, <i>Lontra canadensis</i>	No habitat (i.e., large rivers)
Rocky Mountain bighorn sheep, <i>Ovis canadensis</i>	No habitat (rock/cliff/canyon)
INSECTS	
Western bumblebee, <i>Bombus occidentalis</i>	No habitat (montane and subalpine meadows)
Great Basin silverspot, <i>Speyeria nokomis</i>	No habitat (wetlands supporting violet populations)
Monarch butterfly, <i>Danaus plexippus</i>	Host plant (milkweed) not present

3.2 SENSITIVE SPECIES INFORMATION

3.2.1 Bluehead and Flannemouth Suckers

3.2.1.1 Environmental Baseline for Bluehead Sucker

The bluehead sucker (*Catostomus discobolus*) is native to the Colorado River Basin and is found within the Upper Colorado River and its smaller tributaries. Detailed distribution and trend information is relatively limited, but recent studies suggest that populations are declining throughout their historic range. The bluehead sucker inhabits a wide variety of habitat types throughout its range. It is most commonly found in small to mid-sized streams in the Upper Colorado River basin, but is present in large rivers as well. Bluehead suckers tend to occur in lower-order streams at higher elevations in watersheds when compared to the distribution of flannemouth suckers. Healthy populations have persisted across a wide range of sediment and flow regimes.

This species tends to prefer rocky substrates and is often associated with riffle/run type habitats. Bluehead suckers are believed to be a long-lived species with a life span of approximately 20 years. Data on timing and extent of spawning migrations is limited, but general breeding in the upper Colorado River basin occurs in spring and summer. Larval suckers are known to drift after emergence from the egg dispersing downstream. Habitat degradation and competition and hybridization with non-native species continue to be the main threats to the bluehead sucker in the

Upper Colorado River basin. Anthropogenic activities such as water development projects, dams and diversions, over grazing in riparian areas, improper timber harvest, and road building have resulted in habitat fragmentation and degradation of habitat and the extirpation of bluehead sucker from much of its former range. Additional sediment inputs may alter algae and macroinvertebrate interactions, by further limiting algae-scraping macroinvertebrates and cause algae to increase. Nevertheless, interactions of various factors influencing algae production in streams (e.g., solar radiation, sediment, algae grazing, nutrient inputs) are difficult to predict.

Bluehead suckers are known to thrive in habitats across their native ranges that have higher natural sediment loads than the reach of the Eagle River below the project area. Because sedimentation and depletion effects associated with Alternatives 2–4 could extend to the Eagle River, this species is being analyzed. The bluehead sucker (*Catostomus discobolus*) analysis area for this project extends downward from those tributaries draining the Berlaimont project area to and including the local reach of the Eagle River where potential Alternatives 2–4 effects could extend.

Streams draining the Berlaimont project area are characterized in Section 3.2.3.2 of the 2019 Biological Assessment. Bluehead suckers are present in the Colorado River and in the Eagle River upstream to Alkali Creek (below Wolcott), approximately 8.4 miles below the Edwards I-70 interchange (Woodling and Ketterlin 2002, K. Ross and J. Logan, CDOW). The physical stream habitat in the reach of the Eagle River immediately below the project area is listed as impaired under the CWA, Section 303(d), for sediment. It is possible that reach may support a bluehead sucker population, but they have not been detected there, little specific habitat preference data are available to make this determination, and zinc loading from the Eagle Mine above Minturn may also limit their occurrence. Suitable habitat for this species is not present in any of the streams draining the project area.

3.2.1.2 Environmental Baseline for Flannemouth Sucker

The flannemouth sucker (*Catostomus latipinnis*) analysis area for this project extends downward from those tributaries draining the Berlaimont project area to and including the local reach of the Eagle River where potential Alternatives 2–4 effects could extend.

The flannemouth sucker is endemic to the Colorado River basin with populations occurring in western Colorado. It was historically found in most medium to large, lower elevation streams of the upper Colorado River drainage and currently occupies streams and rivers that are not impacted by impoundments or habitat degradation. This species has also been associated with smaller tributaries and is found occasionally in lakes and reservoirs. The flannemouth sucker has declined in abundance and distribution throughout its historic range.

Life history and general distribution information was summarized from the flannemouth sucker Conservation Assessment (Rees et al. 2005). Flannemouth suckers are typically found in larger, slow moving rivers of the Colorado River drainage. They occupy mainstream habitats of medium to large rivers and are occasionally found in smaller streams. Flannemouth suckers have been collected in the Eagle River near Edwards (Woodling and Ketterlin 2002), and are thought to have occurred within the Upper Eagle River watershed as well. Suitable habitat for flannemouth suckers is not found within the tributaries draining the Berlaimont project area. This species frequents pools and deep runs and can also be found in the mouths of tributaries riffles and backwaters. The adults are generalists that typically use pool and eddy habitats while juveniles and young-of-the-year tend to be

associated with backwaters and shoreline areas of slower habitat types. Flannelmouth suckers generally prefer warmer stream temperatures around 25°C (Rees et al. 2005) and are rarer in cool headwater streams. Flannelmouth suckers are a long-lived species with individuals living up to 30 years. In the upper Colorado River basin, breeding typically occurs from April to June. Spawning habitat consists of glides or slow riffles over medium to coarse gravel substrate. The eggs incubate approximately 6–7 days. Juvenile flannelmouth suckers typically reach sexual maturity by their fifth year.

Habitat degradation, and competition and hybridization with non-native species continue to be the main threats to the flannelmouth sucker in the Upper Colorado River basin. Anthropogenic activities such as water development projects, dams and diversions, over grazing in riparian areas, improper timber harvest, and road building have resulted in habitat fragmentation and degradation of habitat and the extirpation of flannelmouth sucker from much of its former range. Predation and displacement by non-native fish continue to threaten flannelmouth sucker populations. In addition, flannelmouth suckers are sensitive to dissolved heavy metals including zinc. Elevated zinc levels are present in the Eagle River upstream of its confluence with Gore Creek that may preclude its occurrence there. Aquatic habitat in the Eagle River below of the project area has been somewhat degraded state due to historic mine drainage effects, but it is apparently does not preclude flannelmouth suckers since the species was collected there ca. 2002 (Woodling and Ketterlin 2002). The Eagle River (Segment 9a) below the project area is listed as impaired under the CWA, Section 303(d), for sediment (Table 4-9) and monitored for sediment, temperature, and aquatic life. Streams draining the Berlaimont project area are further characterized in Section 3.2.3.2 of the 2019 Biological Assessment.

3.2.1.3 Alternative 1

Direct and Indirect Effects

Alternative 1 is a true No Action Alternative and would not authorize or facilitate any additional direct or indirect effects to the bluehead or flannelmouth sucker or their habitat. Habitat downstream of the project area in the Eagle River would remain in its existing degraded condition due to historic mine drainage, urbanization and sediment effects.

Cumulative Effects

Cumulative effects, reasonably certain future actions, and reasonably foreseeable future actions are defined in Section 8.1. Since there are no negative direct or indirect effects expected to aquatic resources as a result of the No Action alternative, there are no expected cumulative effects, above the baseline condition, associated with the proposed action.

Determination of Effects

No change is expected to the existing habitat as a result of a No Action alternative, therefore, “**no impacts**” are expected to bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*) or their habitats.

3.2.1.4 Alternative 2–4

Direct and Indirect Effects

Under Alternatives 2–4, the concern for these species is the potential for road development, use, and maintenance to increase sediment (as a result of runoff) in Berry, Thames, and Beard Creeks that would flow into the impaired segment of the Eagle River that is inhabited by flannemouth suckers. Habitat immediately below the culvert draining Berry Creek is unoccupied by bluehead suckers and the closest occupied habitat known is approximately 8.4 miles downstream in the vicinity of Alkali Creek. Flannemouth suckers have been collected in the Eagle River near Edwards (Woodling and Ketterlin 2002), and are thought to have occurred within the Upper Eagle River watershed as well. Without BMPs and PDC to limit sediment delivery to project area streams there could be downstream impacts to the Eagle River in the form of additional sediment that may affect flannemouth and bluehead sucker habitat. The Eagle River below the project area is listed as “impaired” for sediment by CDPHE (Table 3-9). Additional sediment contributed from road construction and maintenance could further degrade this section of the Eagle River where flannemouth suckers have been observed. However, the BMPs and PDC that are required for aquatic resources, soils, and hydrology are meant to reduce or eliminate additional sediment delivery into project area streams and the Eagle River. Additionally, bluehead and flannemouth suckers have evolved in, and occupy large river systems with sediment loads that exceed that of the Eagle. It is unlikely that any incremental increase in sediment resulting from the proposed action would have a negative effect on these species.

With the implementation of aquatic BMPs and PDC (Table 2-2), Alternatives 2–4 would maintain stream health in Berry, Beard and Thames Creeks as well as the sediment impacted section of the Eagle River downstream of the project area. Any incremental increases in sediment are not expected to be measurable or negatively affect stream health.

Alternatives 2-4 would involve water depletions of approximately 19.6 acre-feet per year or on average about 0.0537 acre-feet (ac-ft) per day. The U.S. Geologic Survey (USGS) National Hydrologic Dataset (NHD) considers Berry Creek a perennial stream (flows all year around), while both Beard and Tames Creeks are designated as intermittent. By definition an intermittent stream flows only when it receives water from rainfall runoff or springs, or from some surface source such as melting snow.

As discussed above bluehead and flannemouth suckers have been observed in the Eagle River below Edwards, however there is no known observances of them in Berry, Beard or Tames Creeks. For Berry Creek specifically, there is a road culvert on the lower end of Berry Creek, off of Forest Service Lands, that prevents fish passage into Berry Creek from the Eagle River (personal com., Kendall Bakich, Colorado Parks & Wildlife, Area Aquatic Biologist).

Thompson et al. (2019) found larval catostomids (collection of bluehead, flannemouth and white suckers) present approximately sixteen (16) miles upstream in an intermittent stream, and about twenty-four (24) miles upstream in a perennial stream; suggesting long distance spawning migrations for both bluehead and flannemouth sucker. Such observations were made in lower elevation streams with generally lower gradient reaches than what is found in Beard or Tames Creeks. Given that there have been no observances of bluehead or flannemouth sucker in any of the three streams

within or adjacent to the project area, it is unlikely the water depletions from this project will have a direct impact on these two regional sensitive fishes.

Water depletions can have indirect impacts on aquatic habitat by reducing the amount of flow, thereby limiting available habitat (Osmundson et al. 1995, Osmundson 2001). The 19.6 ac-ft of consumptive water use per year would average out to about 0.027 cubic feet per second (cfs). Only at the driest times could this consumptive use exceed the flow of Beard Creek (Table 3-2). Because native suckers are adapted to seasonally capitalize on flow conditions (Thompson et al. 2019), it is unlikely that project depletions will have a significant impact on either bluehead or flannelmouth sucker.

Table 3-2. Low flow condition for Beard Creek	
Flow Condition	Discharge of Beard Ck (cfs)
7 Day 2 Year Low Flow	0.0307
7 Day 10 Year Low Flow	0.00807
7 Day 50 Year Low Flow	0.0183
Source: USGS Stream Stats for Colorado	

Cumulative Effects

Cumulative effects, reasonably certain future actions, and reasonably foreseeable future actions are defined in Section 8.1. With the implementation of BMPs and PDC it is expected that project area streams and the Eagle River downstream of the project area would be maintained in their current state. Since there are no significant negative direct or indirect effects expected to aquatic resources as a result of the proposed action, there are no expected cumulative effects, above the baseline condition, associated with the proposed action.

Determination of Effects

Without BMPs and PDC, additional sedimentation from the upgraded Berry Creek Road (Alts. 2–4) would exacerbate the currently “diminished” stream health condition of Berry Creek and

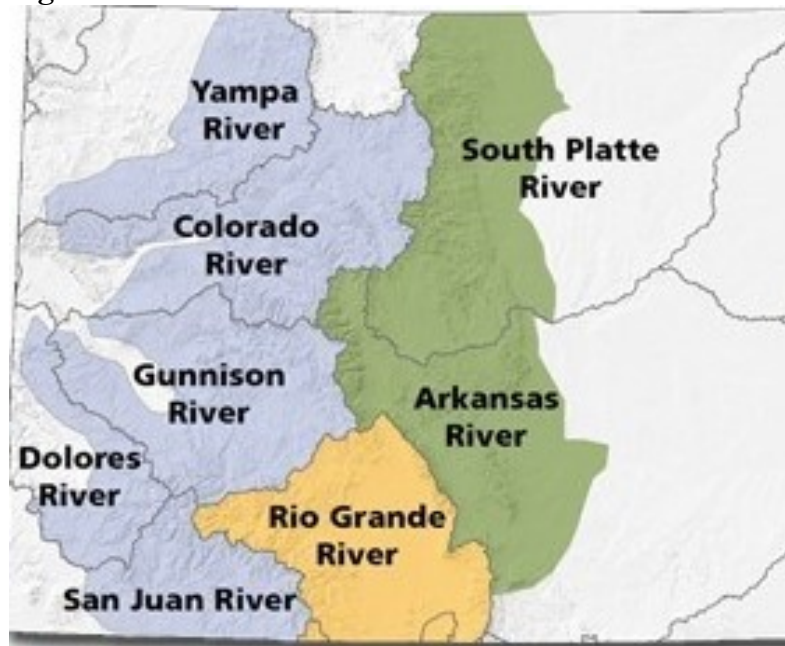
would increase sedimentation to the Eagle River below the project area. However, project BMPs and PDC specifically designed to maintain stream health would reduce or eliminate additive sediment impacts related to project activities. Considering the cumulative water depletions totaling approximately 19.6 acre-feet annually, the indirect impacts of connected project actions for the implementation of Alternatives 2–4 **may impact individuals but is not likely to cause a trend towards federal listing nor a loss of viability in the Planning Area** for bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*), or their habitats.

3.2.2 Colorado River Cutthroat Trout

3.2.2.1 Environmental Baseline

Prior to the development of modern genetic methods, early fisheries biologists felt that there were four subspecies of cutthroat native to Colorado: yellowfin cutthroat trout (*Oncorhynchus clarkii macdonaldi*), greenback cutthroat trout (*O. c. stomias*), Rio Grande cutthroat trout (*O. c. virginialis*) and Colorado River cutthroat trout (*O. c. pleuriticus*). At the time, yellowfin cutthroat trout (YFCT) were determined to be native to the Upper Arkansas River Basin, while greenback cutthroat trout (GBCT) were thought to be native to both the Upper Arkansas River Basin and South Platte River Basin (Figure 3-1). Rio Grande cutthroat trout (RGCT) are the only native cutthroat trout to that basin, whereas Colorado River cutthroat trout (CRCT) were assumed to be the native salmonid for the entire Western Slope of Colorado. For CRCT this included the Green, Yampa and White River Drainages in the northeast, the Upper Colorado River and Gunnison River Basins in west-central Colorado and the Dolores and Upper San Juan River Basins in the southwest.

Figure 3-1. Assumed distribution of native cutthroat trout prior to modern genetic methods.



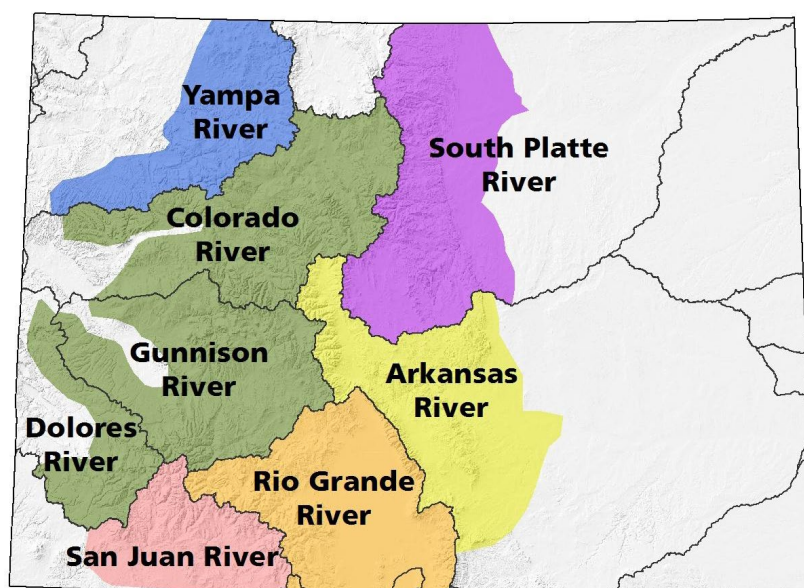
Beginning in the mid-1800s Colorado cutthroat trout suffered severe declines due to overfishing, mining pollution and agricultural practices (Metcalf et al. 2012, Young and Harig 2001). The result led to the extinction of yellowfin cutthroat trout and the eventual listing of greenback cutthroat trout as an Endangered Species in 1967 (downgraded to Threatened in 1977). Similarly, by 2006 it was estimated that CRCT occupied only 14% (309 streams) of their historical range in the Upper Colorado River Basin (Young 2008).

Because of the decline of the only native salmonid to Colorado (cutthroat trout), historically as far back as the 1880s, fishing enthusiasts, private citizens as well as state and federal agencies, began stocking both non-native trout (brook trout, brown trout, rainbow trout, etc.) and various subspecies of cutthroat trout throughout Colorado. As a result of that action, recent genetic results (Metcalf et al., 2012) suggest that cutthroat trout native to the Upper Colorado and Gunnison

basins, were stocked all over Colorado. Having been transplanted east across the continental divide, these cutthroat were subsequently confused as greenback cutthroat trout.

Supported by the power of genetic testing, the true historical range of the various lineages (e.g., subspecies) was clarified in 2012 by Metcalf et al. The accepted historic distribution of both yellowfin cutthroat trout and Rio Grande cutthroat trout remained unchanged (Figure 3-2). Alternately, originally thought to have been native to both the South Platte and Arkansas River basins, it was found that greenback cutthroat trout were native only to the headwaters of the South Platte River. It was also clarified that the western slope is home to three different lineages of cutthroat trout. What is currently termed blue lineage CRCT are native to the Green and Yampa Rivers, including the White River. Green lineage CRCT are native to the Upper Colorado, Gunnison and Dolores River basins. Finally, the San Juan River in southwest Colorado also has a unique cutthroat lineage.

Figure 3-2. Current excepted range of native cutthroat trout based upon recent genetic testing.



Notes: The watersheds in green represent the native range of green lineage CRCT. Purple represents the only native range of greenback cutthroat trout.

The lineage of cutthroat trout that was described as Endangered and then downlisted as Threatened was in fact green lineage Colorado River cutthroat trout and not greenback cutthroat trout. Consequently, until review by the U.S. Fish and Wildlife Service, green lineage CRCT are treated as greenback cutthroat trout, and therefore protected as Threatened under the ESA. The blue lineage CRCT and Rio Grande cutthroat trout are Forest Service R2 Sensitive Species. The conservation status of the San Juan lineage cutthroat trout are yet to be determined.

Colorado River cutthroat trout (green and blue lineages) are found only within limited areas across their historic range, mainly within headwater streams or lakes isolated from lower reaches by impassable barriers to upstream fish movement. This isolation, particularly in small areas of watersheds, decreases the probability that native cutthroat populations will persist over time (Fausch et al. 2006). On occasion, they are found downstream of where isolated populations persist, mixed

with other non-native salmonid species. A CRCT status assessment (Hirsch et al. 2006) suggests that CRCT occupy only 14% of their former range, while only 8% of its former range is currently occupied with “conservation populations” of CRCT. These conservation populations listed in the CRCT Conservation Assessment and Strategy (CRCT Task Force 2001) are those that are a naturally reproducing and recruiting populations with genetic material less than 10% hybridized with other species or sub-species. Core conservation populations are assigned to CRCT populations believed to be greater than 99% pure.

Streams draining the Berlaimont project area are characterized in Section 3.2.3.2 of the 2019 Biological Assessment. Genetic testing of the cutthroat trout in Berry Creek revealed that they are approximately 62 % blue lineage Colorado River cutthroat trout and approximately 38% green lineage Colorado River cutthroat trout. Currently green lineage CRCT are treated as greenback cutthroat trout and therefore protected as Threatened under ESA. However, because they are not of at least 90% purity of either cutthroat trout lineage they are not considered a Conservation Population and do not require formal consultation under Section 7 of ESA. The cutthroat trout in Berry Creek are of Conservation Concern and therefore the effects analysis is discussed below. Although the stream health of Berry Creek is “diminished” for physical habitat variables (DEIS, Watershed section), macroinvertebrates (Section 3.4.1), and fish (Section 3.2; Grove 2012), it supports a CRCT population of conservation concern.

3.2.2.2 Alternative 1

Direct and Indirect Effects

Alternative 1 is a true No Action Alternative and would not authorize or facilitate any additional direct or indirect effects to Colorado River cutthroat trout or its habitat.

Cumulative Effects

Cumulative effects, reasonably certain future actions, and reasonably foreseeable future actions are defined in Section 8.1. Since there are no negative direct or indirect effects expected to aquatic resources as a result of the No Action alternative, there are no expected cumulative effects, above the baseline condition, associated with the proposed action.

Determination of Effects

No change is expected to the existing habitat as a result of a no action alternative, therefore, “**no impacts**” are expected for Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*) or their habitats.

3.2.2.3 Alternatives 2–4

Direct and Indirect Effects

The effects of Alternatives 2–4 on Colorado River cutthroat trout are discussed collectively.

When constructed on hillsides, roads have various impacts on natural hydrologic processes. Unless the surface is impermeable or the soil is completely saturated, water from precipitation or snow-melt soaks into the soil profile (infiltration). In either case, excess water on the land surface that does not evaporate becomes surface runoff. When water is absorbed into the soil profile it can either continue underground to become groundwater or, if it remains in the soil profile above the water

table, it will flow down the hillslope underneath the soil surface. Roads that are constructed on or around the hillside interrupts the flow of this subsurface water on its way to the stream, and can lead to surface runoff. Additionally, excess water on compacted and or impervious road surface becomes surface runoff. Regardless of the source, excessive surface runoff leads to erosion (Dietrich et al. 1993). Instream sedimentation from excessive erosion is one of the most widespread impacts of forested roads.

Although sediment transport by streams is a natural process (Yarnell et al. 2006), excessive sedimentation can not only negatively impact the biological communities, but also alter ecological form and function of streams and rivers (Jones et al. 2000, Lorch 1998). The presence of excessive sediment in streams can reduce the ability of aquatic insects to use the spaces in between cobble and gravel substrate within the stream bed (Milhous 1998, see focal species below). Similarly, sediment can “plug-up” the gravel in fish spawning areas. This can reduce or altogether eliminate spawning for various fish species (Kemp et al. 2009). Additionally, fine sediment (i.e., high clay content) increases the turbidity, or measure of how muddy the water appears. Increased turbidity may cause fishes to avoid specific areas (Bisson et al. 1982), and how they recognize and feed on aquatic insects (Abrahams and Kattenfield 1997).

Research has shown that paved roads produce less sediment than unpaved roads. Clinton & Vose (2003) found that total suspended sediment was significantly lower in streams below paved roads versus streams near poorly maintained unpaved roads. In the Pacific Northwest sediment delivery for heavily used gravel roads has been estimated at approximately 805 tons per mile per year (ton/mi/yr), while paved roads produce only about 3.22 ton/mi/yr (Reid and Dunne 1984). Most encouraging is that Burroughs et al. (1983) found that asphalt paved roads reduced sediment production by almost 97%.

Traction sand applied for snow and ice mitigation to road surfaces can deliver considerable sediment to streams. For the heavily traveled (~25,000 Average Annual Daily Traffic [AADT] estimate, CDOT 2020) I-70 Vail Pass Corridor, Lorch (1998) found that stream channel characteristics and fish habitat were negatively affected by the estimated twelve million tons of traction sand applied annually. As part of the Final EIS for Berlaimont Estates Access Route, the daily AADT for the Berry/Beard Creek Road was estimated to increase by 164 vehicles to a total of 2,764.

In order to reduce the environmental effects for the application of traction sand, the Montana Depart of Transportation (Staples et al. 2004), recommends Improved Sanding Practices such as using materials larger than #50 sieve (approximately 300 microns in diameter), appropriate applications rates and pre-wetting of sand with either hot water (Vaa 2004) or liquid deicer. By pre-wetting sand Staples et al. (2004) estimated that as many as 2,000 vehicles could pass before the sand is removed from the road way. Improved Sanding Practices have been incorporated into the PDC above.

As part of the Project Design Criteria and Best Management Practices one of the Mitigation Measures, BMPs and PDCs from Table 2.6 (page 52) states that:

“Runoff from the improved section of FSR 774 along Berry Creek should be routed to the best extent possible to sediment detention basins and/or vegetated areas rather than directly to streams and ephemeral draws. Sediment basins should be maintained annually.”

The addition of salts for road deicing can negatively impact aquatic ecosystems; however the proposed deicing measures for the road include a sand/salt mix (95% sand, 5% salt). The salt is added primarily to aid in the prevention of the sand stockpiles from freezing solid, but also acts as a deicer. Eagle County does not use magnesium chloride as a deicer on the roads in the winter.

As discussed in the Determination of Effects section below project specific PDC and BMPs would reduce effects to Colorado River cutthroat trout habitat and it is expected that Berry Creek would be maintained in its current “diminished” stream health condition.

Cumulative Effects

Cumulative effects, reasonably certain future actions, and reasonably foreseeable future actions are defined in Section 8.1. With the implementation of BMPs and PDC it is expected that project area streams would be maintained in their current state. Since there are no significant negative direct or indirect effects expected to aquatic resources as a result of the proposed action, there are no expected cumulative effects, above the baseline condition, associated with the proposed action.

Determination of Effects

Without BMPs and PDC, additional sedimentation from the upgraded Berry Creek Road (Alts. 2–4) would exacerbate the currently “diminished” stream health condition of Berry Creek and would not maintain Colorado River cutthroat trout habitat in the lower reach of the stream.

Alternatives 2–4 could affect the lower 0.7 mile of occupied cutthroat trout habitat in Berry Creek.

Regardless of which Alternative is selected the cutthroat population would remain robust above the project area and continue to be a hybridized population of both green and blue lineage Colorado River cutthroat trout. Project BMPs and PDC, including improved sanding practices, specifically designed to maintain stream health would reduce or eliminate additive sediment impacts related to project activities. As a result it is expected that cutthroat trout habitat in the affected portion of Berry Creek would be maintained in its current diminished condition. Therefore the implementation of Alternatives 2–4 **“may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing”** to Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*).

3.2.3 Northern Goshawk

3.2.3.1 Life History and Habitat Associations

The northern goshawk (hereafter “goshawk”) is a forest-interior species generally associated with mature aspen and conifer forests between 7,500 and 11,300 feet on the WRNF (Doerr 2004). At least 22 nests/territories have been documented on the WRNF.

The goshawk analysis area is the same as the project area. Suitable goshawk nesting habitat, which includes the aspen stands on NFS lands between the private parcel’s two legs and aspen on the private parcel, was surveyed in early June 2017 and 2019. No goshawks or nests were detected, and while two raptor nests were found, both were in a dilapidated state.

3.2.3.2 Direct, Indirect, and Cumulative Effects

No Action Alternative (Alternative 1)

Under the No Action Alternative, goshawk habitat would continue to persist in the project area.

Action Alternatives (Alternatives 2-4)

Under Alternatives 3 and 4, permanent loss of mature aspen due to road widening and temporary impacts from construction-related disturbance would occur on NFS land. In addition, future residential development on the private parcel would result in the loss and reduced effectiveness of potential goshawk foraging and nesting habitat. While each action alternative would result in the permanent removal of aspen; Alternative 2, the preferred alternative, would not result in aspen removal on NFS land (Table 3-3). It is unlikely that anticipated residential effects would extend off the private parcel and affect potential goshawk habitat on surrounding NFS land.

Table 3-3. Estimated Acres of Aspen Removed Under Alternatives 2–4									
Ownership	Alternative 2			Alternative 3			Alternative 4		
Vegetation Type	NFS	Pvt.	Total	NFS	Pvt.	Total	NFS	Pvt.	Total
Permanent Impacts									
Aspen, TAA	0.0	40.9	40.9	1.8	41.1	42.9	1.4	41.1	42.5
Temporary Impacts									
Aspen, TAA	0.0	23.1	23.1	4.9	23.4	28.3	2.4	23.3	25.7
Permanent impacts include: clearing for the road and shoulders. Temporary impacts include graded areas that will be reclaimed, and 10-foot buffers around disturbance areas to consider incidental construction disturbance (e.g., driving adjacent to the road, backing up onto vegetation when constructing cut/fill slopes, soil piles, etc.). Buffer zones may be revegetated if sufficiently disturbed (K. Owens, SE Group, pers. comm., Oct. 5, 2017).									

3.2.3.3 Forest-wide Standards and Guidelines, Wildlife-General

- ❖ *Standard 2. Protect known active and inactive raptor nest areas. The extent of the protection will be based on proposed management activities, human activities existing before nest establishment, species, topography, vegetation cover, and other factors. A non-disturbance buffer around active nest sites will be required from nest-site selection to fledging (generally March through July). Exceptions may occur when individuals are adapted to human disturbance.*

Raptor nests surveys in areas proposed for road-related tree removal prior to tree cutting will be conducted each year until the selected access road corridor has been cleared. A no-disturbance buffer around active nest sites would be required from nest-site selection to fledging (generally March through July) (Table 2-2).

Reasonably foreseeable projects considered in this analysis (see Section 8.1.1) would contribute no cumulative effects to this species because impact zones associated with those projects would not extend to potential habitat for this species that could be directly and indirectly affected by Alternatives 2–4 on NFS land (CEQ 1997, USEPA 1999). Regarding northern goshawks, direct, indirect, and reasonably foreseeable project effects associated with Alternatives 2, 3 and 4 on NFS lands “**may adversely impact individuals, but is not likely to result in a loss of viability on the**

planning area, nor cause a trend to federal listing or a loss of species viability rangewide.” Alternative 1 would have “no impact” to northern goshawks on NFS land.

3.2.4 Greater Sage-grouse

3.2.4.1 Life History and Habitat Associations

Greater sage-grouse (GRSG, *Centrocercus urophasianus*) are resident, sagebrush (*Artemisia tridentata*) obligates throughout western North America, with Colorado in the southeastern periphery of the species distribution. Until recently, sage-grouse have been a relatively common game bird in the western United States. Their distribution and abundance have markedly decreased. The species has been extirpated from at least five states and one province, and their long-term existence in at least six states and two provinces is uncertain largely as the result of the loss, fragmentation, and degradation of sagebrush habitat (Colorado Greater Sage-grouse Steering Committee 2008). The current range has been estimated to be a reduction of 44% from the historically occupied range (Stiver et al. 2006).

Greater sage-grouse are permanent residents on their breeding grounds but may move short distances to lower elevations during winter. They forage on the ground, mainly eating sagebrush, but also other plants and insects. They make use of a complex lek system for mating and nests on the ground under sagebrush or other shrubs. Clutch size ranges from six to nine eggs; incubation time is 25 to 29 days. In Moffatt County (extreme NW CO), mean clutch initiation dates were April 21st and, mean hatch dates were May 20-30th (Holmes 2016). Chicks are precocious and leave the nest with the hen shortly after hatching. Chicks are capable of weak flight within about 10 days of hatching. Additional life history information is contained in Northern Eagle/Southern Routt Greater Sage-Grouse Work Group (2004).

3.2.4.2 Environmental Baseline

The GRSG analysis area is the Berlaimont project area. The project area is part of historic greater sage-grouse range. The nearest active leks are west of Highway 131, about eight miles west of the project area. The CDOW (B. Andree, DWM, pers. comm., 1999) indicated that most GRSG breeding in this portion of Eagle County does not occur in traditional, multi-male lek contexts, but is better characterized by individual males displaying in relatively closed sagebrush habitats. This may be a result of a nearly extirpated population.

Past field surveys, dating back to 2001, did not find any greater sage-grouse in the project area. However, in 2009, CPW recorded several GPS locations of a collared GRSG in the vicinity of the Berlaimont project area (monitored 12/29/2009 to 2/11/2010, CPW 2016). Dusky grouse (*Dendragapus obscurus*) were seen daily in the project area during 2017 surveys.

Some project area plant communities are not ideal for GRSG. Greater sage-grouse avoid areas containing raptor perches. The expansion of juniper trees into sagebrush communities, resulting from historic fire suppression, reduces foraging habitat and provides raptor perches (real and imagined). GRSG have been found to avoid areas where conifers have encroached (Doherty et al. 2010). Some local raptors, such as golden eagles (*Aquila chrysaetos*), are GRSG predators. Although eagles don't need perches to successfully hunt GRSG, perches are thought to increase predation rates. This includes most habitats along the lower, existing, access road corridor. Some distance adjacent to the powerline corridor is also likely avoided by GRSG (Knick et al. 2011, Shirk et al.

2015). Elsewhere, collisions with powerlines and their towers were an important source of GRSG mortality (Beck et al. 2006). Powerline towers also provide perches for predatory birds that target grouse eggs (e.g., ravens, *Corvus corax*) or even the birds themselves (golden eagles; USFWS 2015).

Sage-grouse likely avoid road and trail corridors when vehicles and people are present but otherwise use the habitat. Even light road traffic (1–12 vehicles/day) might reduce grouse nesting (Lyon and Anderson 2003). Roads and other anthropogenic features that fragment habitat reduce grouse survival rates, increase predation rates, and are often avoided by GRSG (USFWS 2015, CPW 2016).

Nevertheless, there are relatively large habitat blocks in the vicinity of the project area (the most likely occupied and continuous habitat is the sagebrush and mountain shrub communities west of Beard Creek's eastern ridgeline) that support suitable GRSG habitat. The proposed recreational trail segments bisect habitat that is likely unsuitable for GRSG because of juniper density and proximity. Where junipers are absent, suitable GRSG habitat also extends east from Berry Creek.

3.2.4.3 Direct, Indirect, and Cumulative Effects

No Action Alternative (Alternative 1)

Under the No Action Alternative, Greater sage-grouse habitat would be largely unaltered in the project area, aside from pinyon-juniper encroachment into the sagebrush community over time.

Action Alternatives (Alternatives 2–4)

Each action alternative would result in the permanent removal of sagebrush (*Artemisia* spp.), ranging from 18.4 (Alt 3.) to 19.6 (Alt 2) acres. Temporary habitat impacts would range from 25.8–29.3 acres of sagebrush temporarily removed (Alt 3, Alt 2) (Table 3-4).

Table 3-4. Estimated Acres of Sagebrush Removed for the Project under Alternatives 2–4									
Ownership	Alternative 2			Alternative 3			Alternative 4		
Vegetation Type	NFS	Pvt.	Total	NFS	Pvt.	Total	NFS	Pvt.	Total
Permanent Impacts*									
Sagebrush, SSA	6.6	13.0	19.6	9.3	9.2	18.4	8.3	10.2	18.5
Temporary Impacts*									
Sagebrush, SSA	10.7	18.6	29.3	19.9	5.9	25.8	17.4	9.9	27.3
*Permanent impacts include: clearing for the road surface and shoulders, parking areas, and the mitigation trail. Temporary impacts include graded areas that will reclaimed, and 10-foot buffer around disturbance areas to consider incidental construction disturbance (e.g., driving adjacent to the road, backing up onto vegetation when constructing cut/fill slopes, soil piles, etc.). Buffer zones may be revegetated if sufficiently disturbed (K. Owens, SE Group, pers. comm., Oct. 5, 2017).									

Alternatives 2–4 road and trail development will result in the loss of 19.6 acres (Alternative 2), 18.4 acres (Alternative 3) or 18.5 acres (Alternative 4) of sagebrush and GRSG habitat. Such development would displace the few, if any, birds present from more active road and trail corridors, and fragment habitat potentially occupied by a low density of birds, particularly on private land under Alternative 2, the proposed action. No known leks would be affected. New road use during the lekking and nesting periods may reduce any nearby lek activity and nest initiation. Potential

mortality from collisions with fences would likely be minimal because few, if any, fences would be installed. Additionally, a PDC to minimize raptor perches would be followed (Table 2-2).

The sage-grouse and Brewer's sparrow consistency analysis with applicable Forest-wide standards and guidelines (USFS 2002a), as amended (USFS 2006 and 2008), is provided below.

3.2.4.4 Forest-wide Standards and Guidelines – Sage-Grouse and Brewer's Sparrow

- ❖ *Standard 1. For management activities in sage grouse and Brewer's sparrow habitat, retain or enhance existing habitat by:*
 - a) *Managing for native vegetation,*
 - b) *Retaining a minimum of five percent of sagebrush over 48 inches in height where site characteristics allow, and*
 - c) *Maintaining a minimum of 20 percent canopy cover of sagebrush*

Portions of the Berlaimont project area supports greater sage-grouse and Brewer's sparrow habitat. Alternatives 2–4 would be consistent with these criteria, although Alternatives 2–4 would not be a vegetation management project.

- ❖ *Standard 4. Restrict activities that have the potential to impact sage-grouse and Brewer's sparrow breeding activities from April 1 to July 31 in areas where breeding is known or suspected in order to minimize any negative impacts to reproductive success or survival.*

There are no known leks present in the project area. Individuals, if present, are present at such a low density that it is unknown if breeding is occurring. As a result, breeding is not currently suspected in the project area. Alternatives 2–4 would be consistent with this standard without any activities restriction. However, a road construction activity restriction for Brewer's sparrows (see below) would also benefit any sage-grouse that may be in the vicinity during the similar breeding period.

Breeding Brewer's sparrows are present along portions of access road corridors on NFS lands. Road upgrading during the breeding season would likely have negative effects on the reproductive success of Brewer's sparrows utilizing habitat within approximately 100 meters (Ingelfinger and Anderson 2004) of active construction areas. **All action alternatives (Alts. 2–4) would be inconsistent with this standard** and a Forest Plan Amendment would be required for the Selected Alternative. See the Recommended Conservation Measures section.

- ❖ *Guideline 4. Limit the installation of new fences, power lines, and other structures in sage-grouse and Brewer's sparrow sagebrush habitat to reduce possible raptor perches and maintain sagebrush.*

Power lines are currently present in the project area. Fencing, power lines, and other structures that could be raptor perches would be limited. Power and communication utilities associated with the development would be buried within the road corridor, and fencing would be limited (Table 2-2).

With respect to greater sage-grouse, the direct, indirect, and reasonably foreseeable project effects associated with Alternatives 2–4 on NFS lands “**may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide.**” **Alternative 1 would have no impact.**

At the forest-level, *Artemisia* spp. is estimated to cover 42,473 acres; a reduction in 15-30 sagebrush acres would comprise a negligible percentage of the *Artemisia* spp. in the planning area (i.e., WRNF).

3.2.5 Columbian Sharp-tailed Grouse

3.2.5.1 Life History and Habitat Associations

Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*; CSTG) is one of six existing subspecies of sharp-tailed grouse in North America. It is endemic to big sagebrush, shrub steppe, mountain shrub, and riparian shrub plant communities of western North America (Hoffman and Thomas 2007).

Columbian sharp-tailed grouse in Region 2 occupy seasonally distinct home ranges corresponding to the spring-fall, and winter periods. Spring-fall home range sizes of Columbian sharp-tailed grouse are relatively small (151–212 acres) and the areas used are closer to leks than winter use areas.

Seasonal CSTG activities (peaks) are: (1) movements to breeding areas, mid-March–mid-April (late Mar.–early Apr.), (2) breeding season, late March–mid-June (late April–early May), (3) nesting, early May–mid-July (mid-May–mid-June), (4) incubation, mid-May–early July (late May–late June), (5) hatching early June–early July (mid- to late June); (6) brood-rearing, early June–mid-September (mid-June–late Aug), (7) fall lekking period, mid-September–late October (late Sept.–mid-Oct.), (8) movements to wintering areas mid-October–mid-December (late Oct.–mid-Nov.), and (9) winter season, late October–early April (late Nov.–mid-March; Hoffman and Thomas 2007).

Male sharp-tailed grouse display on spring leks to attract females. Established leks may be used for many years, although their locations may shift over time. After breeding, females build nests under shrubs or grasses, incubating eggs for 21 to 24 days; re-nesting has been documented.

After hatching, chicks eat mostly insects and remain with their mothers in broods for six to eight weeks. Their average life-span is about three years. The most essential component of habitats used by CSTG during winter in Region 2 is the presence of serviceberry (*Amelanchier* spp.). Serviceberry is the primary food source for CSTG from late fall through early spring. Any activity that reduces the distribution and abundance of serviceberry may have negative consequences to CSTG (Hoffman and Thomas 2007).

3.2.5.2 Environmental Baseline

Columbian sharp-tailed grouse were historically found in Eagle County from Red and White Mountain to Gypsum, including portions of the Berlaimont project area. Historical records show CSTG using suitable habitat on Red and White Mountain in the 1970s (CPW 2016). Colorado Parks and Wildlife has started a reintroduction program for CSTG in Eagle County. They have completed two transplants in the area south of State Bridge and additional transplants are planned. To date, transplants have done well and have spread into adjacent areas with sufficient habitat, including the Muddy Pass area on NFS lands (i.e., northwest of the project area; CPW 2016). There are currently no CSTG present in the Berlaimont project area. However, CPW (2016) identified sufficient habitat within June and Berry Creek for CSTG. Other portions of the Berlaimont project area support similar habitats and would also be presumably suitable.

It is unknown if and when CPW might reintroduce CSTG into the project area and whether they would do so knowing potential negative access road and recreational use changes that the Berlaimont project could have on an introduced CSTG population. Roads, power lines, fences, and other facilities and activities associated with residential development can negatively influence CSTG and their habitats.

New and improved roads generally result in increased human activities (Hoffman and Thomas 2007). Construction of new roads has caused abandonment of leks by lesser prairie-chickens (Crawford and Bolen 1976) and GRSG (Braun 1985, Remington and Braun 1991). Hoffman (2001) suggested the cumulative impacts of increased human recreational activities may have a negative effect on CSTG, but noted no experimental research has been conducted on this subject, and evidence to support this possibility is limited to observational accounts. If recreation does impact CSTG, it may occur in four ways: (1) exploitation, (2) disturbance, (3) habitat modification, and (4) pollution (Knight and Cole 1995).

3.2.5.3 Direct, Indirect, and Cumulative Effects

No Action Alternative (Alternative 1)

Under the No Action Alternative, CTSG habitat would be largely unaltered in the project area. Alternative 1 would have no additional effects on the CTSG.

Action Alternatives (2–4)

Each action alternative would result in the permanent removal of 21.1 (Alt. 3) to 23.4 (Alt. 2) acres of sagebrush and mountain mahogany, and temporary losses ranging from 30.6 (Alt. 3) to 37.9 (Alt. 2) acres of habitat (Table 3-5).

Table 3-5. Estimated Acres of Sagebrush and Mountain Mahogany Removed for the Project under Alternatives 2–4									
Ownership	Alternative 2			Alternative 3			Alternative 4		
Vegetation Type	NFS	Pvt.	Total	NFS	Pvt.	Total	NFS	Pvt.	Total
Permanent Impacts									
Sagebrush, SSA	6.6	13.0	19.6	9.3	9.2	18.4	8.3	10.2	18.5
Mountain Mahogany, SMS	2.1	1.7	3.8	2.1	0.6	2.7	2.5	1.1	3.6
Total	8.7	14.7	23.4	11.4	9.8	21.1	10.8	11.3	22.1
Temporary Impacts									
Sagebrush, SSA	10.7	18.6	29.3	19.9	5.9	25.7	17.4	9.9	27.3
Mountain Mahogany, SMS	3.8	4.8	8.6	3.8	1.1	4.9	5.3	2.7	8.0
Total	14.5	23.4	37.9	23.7	7	30.6	22.7	12.6	35.3
*Permanent impacts clearing for the road surface and shoulders, parking areas, and the proposed recreation trail. Temporary disturbance include (1) graded areas that will reclaimed and a 10 foot buffer around disturbance areas to consider incidental construction disturbance (e.g., driving adjacent to the road, backing up onto vegetation when constructing cut/fill slopes, soil piles, etc.). Buffer zones may be revegetated if sufficiently disturbed (K. Owens, SE Group, pers. comm., Oct. 5, 2017).									

No reasonably foreseeable projects considered in this analysis (see Section 8.1.1) would extend to potential habitat for this species, therefore no cumulative impacts have been identified (CEQ 1997, USEPA 1999). This habitat would mostly likely remain unoccupied, and Alternatives 2–4 would have no additional effects on the CSTG. However, because habitats in the Berlaimont project that would be affected by the Action Alternatives represent potential habitat for this species, the direct,

indirect, and reasonably foreseeable project effects associated with Alternatives 2–4 on NFS lands **“may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide.”** Alternative 1 would have **“no impact”** to Columbian sharp-tailed grouse.

3.2.6 Flammulated Owl

3.2.6.1 Life History and Habitat Associations

Apparently secure in Colorado (NatureServe 2016), statewide levels of flammulated owls are estimated at between 1,807 and 5,009 breeding pairs (CNHP 2009). Summer breeding has been confirmed in Eagle County (Andrews and Righter 1992, Wickersham 2016). On the WRNF, flammulated owls have been found in several locations using pure aspen stands and aspen-conifer stands. Most likely, the Forest is only used during the breeding season, with individuals migrating off the forest for the winter (Roberts 2008).

These owls occur regularly from 6,000 to 10,000 feet elevation and prefer old growth (>200 yrs.) or mature (>150 yrs.) ponderosa pine and ponderosa pine/Douglas-fir forests, often mixed with mature aspen (Richmond et al. 1980, Webb 1992, Reynolds and Linkhart 1987). In some areas, birds occur in pure aspen (Webb 1992). Key habitat features seem to be the presence of larger trees and snags, scattered clusters of shrubs or saplings, clearings, and a high abundance of nocturnal arthropod prey (Colorado Partners in Flight 2002). Moths, beetles, grasshoppers, crickets, and caterpillars are also food items. These birds arrive in Colorado from Central America in late April to early May and lay 2–3 eggs in a woodpecker hole at the end of May and June. They can nest in densities of two or more pairs per square mile (Jones 2003). Young hatch in June and early July, and most young fledge by the end of July. The period when this species would be vulnerable to direct mortality of eggs and/or nestlings extends from May 25 to July 23 (Wickersham 2016). Most owls migrate from Colorado by early October.

3.2.6.2 Environmental Baseline

The flammulated owl analysis area is the same as the project area. The project area does not support the ponderosa pine/Douglas-fir habitat association representing primary habitat that this species is associated with; however, the aspen stand on NFS lands is at the ecological lower limit for aspen in this physiographic setting and two nest cavities were detected in this stand in 2017 during the flammulated owl nesting period. One was inactive, the other contained an active house wren nest. Flammulated owls have not been detected during prior field surveys (some of which overlapped crepuscular hours) in and around the project area.

3.2.6.3 Direct, Indirect, and Cumulative Effects

No Action Alternative (Alternative 1)

Alternative 1 would have no additional effects on the flammulated owl.

Action Alternatives (2–4)

Each action alternative would result in the permanent removal of aspen; though Alternative 2 would not generate disturbance within aspen vegetation types on NFS land (Table 3-3). Additionally, approximately 64 acres of disturbance would occur in aspen vegetation types under each of the action alternatives for the development of the private parcel. The Alternatives 3 or 4 habitat loss

(1.8 acres and 1.4 acres respectively) would affect marginal, but potential foraging habitat and potential, but unlikely nesting habitat. Future residential development on the private parcel would result in the loss and reduced effectiveness of flammulated owl foraging and nesting habitat (approximately 40.9 acres under Alternative 2, 42.8 acres under Alternative 3 and 42.5 acres under Alternative 4).

It is unlikely that anticipated residential effects would extend off the private parcel and affect potential flammulated owl habitat on surrounding NFS land. Reasonably foreseeable projects considered in this analysis (see Section 8.1.1) would contribute no cumulative effects to this species because impact zones associated with those projects would not extend to potential habitat for this species that could be directly and indirectly affected by Alternatives 2–4 on NFS land (CEQ 1997, USEPA 1999). Regarding flammulated owls, direct, indirect, and reasonably foreseeable project effects associated with Alternatives 2, 3 and 4 on NFS lands “**may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide.**” Alternative 1 would have “**no impact**” to flammulated owls.

3.2.7 Olive-sided Flycatcher

3.2.7.1 Life History and Habitat Associations

Olive-sided flycatchers are neotropical migrants that breed from sea level to 3,350 meters in the Rockies. Breeding habitat generally is along forest edges and openings, in coniferous and mixed aspen with snags or live trees used as perches (Altman and Sallabanks 2012). Habitat preference seems to be associated with open areas and edges that provide open areas for foraging. Remnant snags and trees in burns and clear cuts may provide the necessary foraging and singing perches. Generally nesting habitat does not have a high canopy closure (<40% canopy closure) (Wickersham 2016). Possible habitat on the WRNF is common and well distributed.

The olive-sided flycatcher analysis area the same as the project area. The project area does not support the ponderosa pine/Douglas-fir habitat association representing primary habitat that this species is associated with, however the aspen habitat present on the private parcel supports this species.

3.2.7.2 Direct, Indirect, and Cumulative Effects

No Action Alternative (Alternative 1)

Alternative 1 would have no additional effects on the olive-sided flycatcher.

Action Alternatives (2–4)

Olive-sided flycatchers were observed in the project area during baseline surveys. Each action alternative would result in the permanent removal of aspen; though Alternative 2 would not generate disturbance within aspen vegetation types on NFS land (Table 3-3). Additionally, approximately 64 acres of disturbance would occur in aspen vegetation types under each of the action alternatives for the development of the private parcels. The Alternatives 3 or 4 habitat loss (1.8 acres and 1.4 acres respectively) would affect potential foraging habitat and potential nesting habitat. Future residential development on the private parcel would result in the loss and reduced effectiveness of potential olive-sided fly catcher foraging and nesting habitat (40.9 acres under Alternative 2, 42.8 acres under

Alternative 3, and 42.5 acres under Alternative 4, refer to Table 4-2). It is unlikely that anticipated residential effects would extend off the private parcel and affect potential habitat on surrounding NFS land.

Regarding the olive-sided flycatcher, direct, indirect, and reasonably foreseeable project effects associated with Alternatives 2, 3 and 4 on NFS lands “may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide.” Alternative 1 would have “no impact” to olive-sided flycatchers.

3.2.8 Purple Martin

3.2.8.1 Life History and Habitat Associations

In Colorado, purple martins (*Progne subis*) are neotropical migrants closely associated with the edges of aspen stands supporting woodpecker nest cavities, usually near meadows and forest openings, and close to streams, springs, or ponds (Levad 1998, Way 2016). The majority of the Colorado population breed in a narrow elevational range between 8,000 and 9,000 feet, although they have been recorded breeding from 6,500 to 10,000 feet (Andrews and Righter 1992, Wickersham 2016). They exhibit high nest site fidelity and return to the same stands and reuse old nest cavities in small colonies in successive years.

The purple martin analysis area is the same as the project area. There are no records of this species closer than 4 miles from the project area, and there are only three prior nesting records (Basalt, Dotsero, Flat Tops) in Eagle County (Chase et al. 1982, Andrews and Righter 1992, Levad 1998, Way 2016). However, a purple martin family (two adults, three fledglings) was found in August, 2017 within four miles of the Berlaimont property, to the north, in mature aspen by the local Forest Service wildlife crew (Austin 2017).

No purple martins were detected in that stand between the two private property legs during those surveys or during any other surveys on NFS and private lands in the project area dating back to 2001. However, due to the presence of a purple martin family in an aspen stand to the north in 2017, the aspen stand on NFS land that would be bisected by the Alternative 3 and 4 access roads is considered to be suitable, but currently unoccupied purple martin breeding and foraging habitat.

3.2.8.2 Direct, Indirect, and Cumulative Effects

No Action Alternative (Alternative 1)

Alternative 1 would have no additional effects on the purple martin.

Action Alternatives (2-4)

Each action alternative would result in the permanent removal of aspen, though Alternative 2, the preferred alternative, would not generate disturbance within aspen vegetation types on NFS land (Table 4-2). Additionally, approximately 64 acres of disturbance would occur in aspen vegetation types under each of the action alternatives for the development of the private parcels. The Alternatives 3 or 4 habitat loss (1.8 acres and 1.4 acres respectively) would affect suitable but currently unoccupied purple martin breeding and foraging habitat. Future residential development on the private parcel would result in the loss and reduced effectiveness of potential purple martin foraging and nesting habitat (approximately 40.9 acres under Alternative 2, 42.8 acres under

Alternative 3 and 42.5 acres under Alternative 4, refer to Table 4-2). Future residential development on the private parcel also would result in the loss and reduced effectiveness of potential purple martin foraging and nesting habitat.

Reasonably foreseeable projects considered in this analysis (see Section 8.1) would contribute no additional cumulative effects to this species because impact zones associated with those projects would not extend to potential habitat for this species that could be directly and indirectly affected by Alternatives 2–4 on NFS land (CEQ 1997, USEPA 1999). Regarding purple martins, direct, indirect, and reasonably foreseeable project effects associated with Alternatives 2, 3, and 4 on NFS lands **“may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide.”** Alternative 1 would have **“no impact”** to purple martins.

3.2.9 Brewer’s Sparrow

3.2.9.1 Life History and Habitat Associations

Brewer’s sparrows (*Spizella breweri*, BRSP) are sagebrush obligates and breeding summer residents in portions of the project area. They occur in all sagebrush habitats in Colorado, but are most abundant in stands of tall, dense, big sagebrush on deep soils with few small shrubs or gaps in the shrub canopy (Wickersham 2016). Nests are built 8–20 inches above ground level in sagebrush that is taller and denser than random shrubs.

During field surveys for the second Colorado Breeding Bird Atlas (Wickersham 2016), nest building (Apr. 11–July 6), nesting (May 18–July 16), and fledging dates (May 31–Aug. 21) generally overlapped the date ranges reported in Atlas I (Lambeth 1998; May 17 [start of nest building]–Aug. 6 [end of fledging]). This species frequently attempts two broods per season.

3.2.9.2 Relevant Threats and Limiting Factors

Brewer’s sparrow populations are in decline because of the loss of sagebrush shrublands across the BRSP breeding range, primarily due to grazing. Otherwise, construction practices have been shown to cause BRSP to abandon nests (Rotenberry, Patten, and Preston 1999).

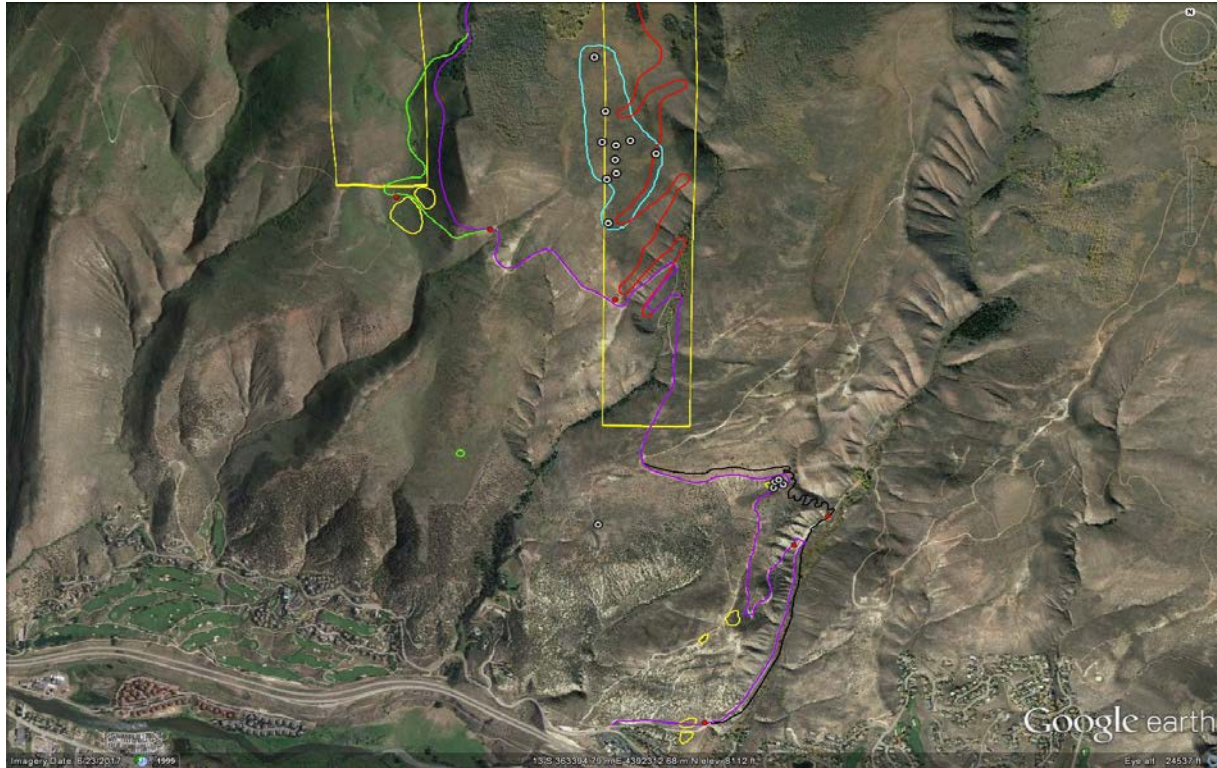
Environmental Baseline

Figure 3-3 shows the initial locations of birds observed in 2017, as well as an area of occupied habitat on and near the private parcel’s eastern leg. During prior year surveys, polygons showing habitat patches containing one or more singing males are shown. BRSP locations differed in 2017 than in prior years, with the last survey having been completed in 2008.

In 2017, Brewer’s sparrows (minimum n=4) were detected two 113 yards from existing roads and trails. In 2018, two additional singing Brewer’s sparrow males were detected within 40 yards of FSR 780. The majority of birds (min. 13/17; 11 males, two females) were detected on a relatively open canopy sagebrush/mountain shrub (serviceberry and snowberry) bench/ridge that would be bisected between the third to fifth switchbacks (Alt. 2) on the private parcel’s eastern “leg.” That habitat was somewhat atypical in that it consisted of a lower sagebrush density, but was higher in other shrub species, and had only moderate overall shrub canopy closure compared to the literature. Some active territories within and beyond 100 meters of the approximate Alternative 2 road centerline extended to the west onto NFS lands.

Under Alternative 2, there could be permanent loss of BRSP nesting habitat.

Figure 3-3. Brewer's Sparrow Observations in the Project Area, 2006–2017



Notes: 2017 waypoints (white) of at least 17 different birds; occupied 2017 habitat on and adjacent to the private parcel's eastern "leg" (turquoise polygon), 2008 occupied habitat (yellow polygons), and 2006 occupied habitat (green polygon). In 2018, one additional BRSP was heard in the sagebrush to the south of Berlaimont's parcel, and one directly adjacent to FSR 780 and the second switchback.

3.2.9.3 Direct, Indirect, and Cumulative Effects

No Action Alternative (Alternative 1)

Alternative 1 would have no additional effects on the Brewers sparrow.

Action Alternatives (2–4)

Road upgrading, new road segments, and road use under Alternatives 2–4 would result in:

- (1) The direct loss of occupied and suitable Brewer's sparrow habitat along some upgraded and new road segments,
- (2) The possible loss or reductions of recruitment due to disturbance from road construction within approximately 100 meters of active territories, and
- (3) The additional and new ongoing harassment (during the residential construction and habitation phases of the Berlaimont Estates project) of birds nesting within the influence of the selected access road and new trail

Each action alternative would result in the permanent removal of sagebrush (*Artemisia* spp.), ranging from 18.4 (Alt 3.) to 19.6 (Alt 2) acres. Temporary habitat impacts would range from 25.8–29.3 acres

of sagebrush temporarily removed (Alt. 3, Alt. 2) (Table 3-4) corridor. These impacts would be additive to existing motorized and non-motorized recreational effects adjacent to existing road and trail corridors.

Alternative 2 in particular would result in a direct loss to nesting Brewer's sparrows by removing sagebrush habitat where breeding and nesting activity is highly probable. Singing males (considered breeding behavior) were found on the southeast segment of the B.E. property during a 2017 Brewer's Sparrow survey. All alternatives would affect BRSP nesting habitat on the lower segment (Figure 3-3). Alternative 4 would affect Brewer's sparrow nesting habitat where breeding was suspected historically.

Additional road use along all action alternative corridors would have effects on an aggregation of nesting Brewer's sparrows along FSR 780 (Figure 3-3). The proposed recreation trail would bisect some potential Brewer's sparrow habitat.

Regarding the WRNF LRMP,

- ❖ *Standard 4. Restrict activities that have the potential to impact sage-grouse and Brewer's sparrow breeding activities from April 1 to July 31 in areas where breeding is known or suspected in order to minimize any negative impacts to reproductive success or survival.*

All action alternatives (Alts. 2–4) would be inconsistent with this standard because there would be no timing restriction to avoid construction within 100 meters of BRSP nesting. As a result, a Forest Plan Amendment would be required for the Selected Alternative.

Alternative 1 would have no additional effects on Brewer's sparrows. Reasonably foreseeable projects considered in this analysis (see Section 8.1.1) would not contribute any cumulative effects to this species because associated impacts would not extend to BRSP habitat in the project area (CEQ 1997, USEPA 1999). Regarding Brewer's sparrows, Alternatives 2–4 “**may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing.**” At the forest-level, *Artemisia* spp. is estimated to cover 42,473 acres; a reduction in 15-30 acres would comprise a negligible percentage of the *Artemisia* spp. in the planning area (i.e., WRNF).

3.2.10 Townsend's Big-eared Bat

3.2.10.1 Life History and Habitat Associations

Townsend's big-eared bat (*Corynorhinus townsendii*) occurs throughout the western two-thirds of Colorado, roosting in caves, mine shafts, crevices, and, occasionally, buildings to elevations of 9,500 feet. This species has been detected in Eagle County but not in the vicinity of the project area (Scott et al. 1984). There are no known Townsend's big-eared bat maternity roosts, hibernacula, or caves and mines that could provide such habitat in the vicinity of the project area. No surveys have been conducted on or in the vicinity of the project area that were adequate to detect this species. There appears to be a nest cavity present on NFS land along FSR 783-1A that could be used by this species as a summer roost; 0.7 acre of pinyon- juniper are known in the vicinity of the road corridors. However, it is possible that tree cavities and other tree opportunities (e.g., partly shed bark on snags) along the Berry Creek riparian corridor and in aspen on NFS land, and the private parcel could

provide summer day roost sites. The analysis area for the Townsend's big-eared bat is the same as the project area.

If *C. townsendii* are present, they could utilize habitats along the road alignments and proposed trail as part of a much larger summer foraging area. Because of water and a theoretically more abundant prey base, this bat would be more likely to occur in the vicinity (i.e., within several miles) of the road segments paralleling Berry Creek and possibly crossing Beard Creek through its riparian corridor. No known roosts or water sources would be affected by any access road alignment.

Road upgrading and new road construction would result in a net loss of potential foraging and roosting habitat on the Forest. Because all potential access road alignment would affect potential habitat on NFS lands, all road alignments would have similar qualitative effects; the longest roads would have the greatest potential effects. Potential foraging and roost habitat on the private parcel would also be lost to road and residential development.

3.2.10.2 Direct, Indirect, and Cumulative Effects

No Action Alternative (Alternative 1)

Alternative 1 would have no additional effects on the Townsend's big-eared bat.

Action Alternatives (2–4)

All action alternatives would result in the permanent removal of 0.7 acre of pinyon-juniper and temporary removal of 2.3 acres of pinyon-juniper (Table 3-6).

Table 3-6. Acres of Pinyon-Juniper Removed for the Project under Alternatives 2–4									
Ownership	Alternative 2			Alternative 3			Alternative 4		
Vegetation Type	NFS	Pvt.	Total	NFS	Pvt.	Total	NFS	Pvt.	Total
Permanent Impacts									
Pinyon-Juniper, TPJ	0.7	0	0.7	0.7	0	0.7	0.7	0	0.7
Temporary Impacts									
Pinyon-Juniper, TPJ	2.3	0	2.3	2.3	0	2.3	2.3	0	2.3
*Permanent impacts include: clearing for the road surface and shoulders, parking areas, and the proposed recreation trail. Temporary impacts include graded areas that will reclaimed, and 10-foot buffers around disturbance areas to consider incidental construction disturbance (e.g., driving adjacent to the road, backing up onto vegetation when constructing cut/fill slopes, soil piles, etc.). Buffer zones may be revegetated if sufficiently disturbed (K. Owens, SE Group, pers. comm., Oct. 5, 2017).									

No cumulative effects were identified for this species because reasonably foreseeable projects considered in this analysis would have no impacts to surrounding habitat (CEQ 1997, USEPA 1999). As a worst case scenario regarding Townsend's big-eared bat, the direct, indirect, and cumulative effects of loss of 0.7 acre of pinyon-juniper habitat under Alternatives 2–4 on NFS lands **“may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing.”** Alternative 1 would have no impact to Townsend's big-eared bat.

3.2.11 Alternatives 2–4 Summary

See Table 3-7 for a summary of effects determinations.

Alternatives 2–4 would not be consistent with all applicable WRNF management direction applicable to Brewer's sparrows. Unless road construction within approximately 100 meters of active territories avoids the Brewer's sparrow breeding season, all Action Alternatives (Alts. 2–4) would be inconsistent with Forest-wide Standard 4 for sage-grouse and Brewer's sparrow, and a Forest Plan Amendment would be required for the Selected Alternative.

Table 3-7. Determination Summary of Effects on R2 Sensitive Species Resulting from the Project under All Alternatives				
Species Common name, <i>Scientific name</i>	Determination by Alternative			
	1	2	3	4
FISH				
Bluehead sucker , <i>Catostomus discobolus</i>	NI	MAII	MAII	MAII
Flannelmouth sucker , <i>Catostomus latipinnis</i>	NI	MAII	MAII	MAII
Colorado River cutthroat trout , <i>Oncorhynchus clarkii pleuriticus</i>	NI	MAII	MAII	MAII
BIRDS				
Northern goshawk , <i>Accipiter gentilis</i>	NI	MAII	MAII	MAII
Bald eagle , <i>Haliaeetus leucocephalus</i>	NI	MAII	MAII	MAII
Greater sage-grouse , <i>Centrocercus urophasianus</i>	NI	MAII	MAII	MAII
Columbian sharp-tailed grouse , <i>Tympanuchus phasianellus columbianus</i>	NI	MAII	MAII	MAII
Flammulated owl , <i>Otus flammeolus</i>	NI	MAII	MAII	MAII
Olive-sided flycatcher , <i>Contopus cooperi</i>	NI	MAII	MAII	MAII
Purple martin , <i>Progne subis</i>	NI	MAII	MAII	MAII
Brewer's sparrow , <i>Spizella breweri</i>	NI	MAII	MAII	MAII
MAMMALS				
Townsend's big-eared bat , <i>Corynorhinus townsendii townsendii</i>	NI	MAII	MAII	MAII
Notes: Species in bold are potentially present and/or are discussed in the text. NI = No impact; BI = Beneficial impact; MAII = may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing. Any species listed in the WRNF table, but not in this table, would not be impacted (NI) by project activities.				

3.3 MIGRATORY BIRDS

In 2008, the Forest Service Chief signed a MOU (#08-MU-1113-2400-264) with the USFWS to promote the conservation of migratory birds. That MOU was pursuant to Executive Order 131866, 66 Fed. Reg. 3853 (2001), Responsibilities of Federal Agencies to Protect Migratory Birds. The Executive Order directs agencies to take certain actions to further comply with the migratory bird

conventions, the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGPEA) and other pertinent statutes. The purpose of the MOU was to strengthen migratory bird conservation by identifying strategies that promote conservation and avoid or minimize negative impacts on migratory birds.

The MOU outlined that the Forest Service shall evaluate the effects of agency actions on migratory birds within the NEPA process, with a focus on species of management concern along with their priority habitats and key risk factors. An evaluation of the effects of Alternatives 2–4 to bird species and habitats of management concern is included in the various sections herein. Active nests of several bird species (e.g., Brewer’s sparrows, green-tailed towhees, house wrens, etc.) were detected incidentally in proposed impact areas during field surveys.

Species in **bold** in the following tables have habitat in the project area, however they are not analyzed in detail, with the exception of the aforementioned FS R2 sensitive birds. For the species in bold, vegetation clearing and road construction may inadvertently remove nests, cause abandonment of nests by adults due to construction-related noise, and thus reduce current year recruitment in the project area for each year vegetation removal and road construction occurs.

Table 3-8. USFWS Birds of Particular Conservation Concern with Potential to Occur in the Berlaimont Analysis Area

Species Common name, <i>Scientific name</i>	Season of Occurrence	General Habitat
American bittern, <i>Botaurus lentiginosus</i>	Breeding	Riparian/wetlands
Bald Eagle , <i>Haliaeetus leucocephalus</i>	Year-round	Riparian/wetlands
Black rosy-finch, <i>Leucosticte atrata</i>	Year-round	Alpine Tundra
Brewer’s sparrow , <i>Spizella breweri</i>	Breeding	Sagebrush
Brown-capped rosy-finch, <i>Leucosticte australis</i>	Wintering	Alpine Tundra
Calliope hummingbird, <i>Stellula calliope</i>	Migrating	Mountain Shrub
Cassin’s finch, <i>Carpodacus cassinii</i>	Year-round	Mixed-conifer
Ferruginous hawk, <i>Buteo regalis</i>	Wintering	Sagebrush
Fox sparrow, <i>Passerella iliaca</i>	Breeding	Sagebrush
Golden eagle , <i>Aquila chrysaetos</i>	Year-round	Rock/cliff
Greater sage-grouse , <i>Centrocercus urophasianus</i>	Year-round	Sagebrush
Juniper titmouse, <i>Baeolophus ridgwayi</i>	Year-round	Pinyon-Juniper
Lewis’s woodpecker, <i>Melanerpes lewis</i>	Breeding	Riparian Cottonwood
Loggerhead shrike, <i>Lanius ludovicianus</i>	Breeding	Sagebrush
Long-billed curlew, <i>Numenius americanus</i>	Breeding	Grasslands
Olive-sided flycatcher , <i>Contopus cooperi</i>	Breeding	Mixed-conifer
Peregrine falcon , <i>Falco peregrinus</i>	Breeding	Rock/cliff
Pinyon jay , <i>Gymnorhinus cyanocephalus</i>	Year-round	Pinyon-Juniper

Table 3-8. USFWS Birds of Particular Conservation Concern with Potential to Occur in the Berlaimont Analysis Area

Species Common name, <i>Scientific name</i>	Season of Occurrence	General Habitat
Prairie falcon, <i>Falco mexicanus</i>	Year-round	Rock/cliff
Rufous hummingbird , <i>Selasphorus rufus</i>	Migrating	Mountain Shrub
Sage thrasher, <i>Oreoscoptes montanus</i>	Breeding	Sagebrush
Short-eared owl, <i>Asio flammeus</i>	Wintering	Riparian/wetlands
Swainson's hawk, <i>Buteo swainsoni</i>	Breeding	Grasslands
Veery, <i>Catharus fuscescens</i>	Breeding	Riparian/wetlands
Western grebe, <i>Aechmophorus occidentalis</i>	Breeding	Riparian/wetlands
Williamson's sapsucker, <i>Sphyrapicus thyroideus</i>	Breeding	Snag & Cavity Dependent
Willow flycatcher, <i>Empidonax traillii</i>	Breeding	Riparian/wetlands
Note: Identified by USFWS on-line IPaC decision support system on July 20, 2017		

3.4 SPECIES OF LOCAL CONCERN

This section addresses other species of concern not considered in the above sections that could also be affected by Alternatives 2–4. Species of Local Concern (SOLC) addressed in this section are those identified from the White River National Forest management direction (i.e., the 2002 White River National Forest Land and Resource Management Plan).

3.4.1 Aquatic Macroinvertebrates

Because of their wide distribution and their sensitivity to disturbance and pollutants, aquatic macroinvertebrates are widely used to monitor the health of streams and rivers. On the WRNF, aquatic macroinvertebrates have been used to address trend and condition of flowing waters.

With respect to Forest Plan Goal 1, Ecosystem Health, Objective 1b (USFS 2002c, pp. 1-3), there is not a viability concern for this group on the WRNF (USFS 2002d), viability is not expected to become a concern through implementation of this project or continued implementation of the Forest Plan, and viability of this group will not be addressed further in this document. The aquatic macroinvertebrate analysis area for this project is Berry Creek, and the Eagle River downstream of the confluence of Berry, Beard, and Thanes creeks.

3.4.1.1 Project-Level Information

Aquatic characteristics of Berry Creek are described in Section 3.2.3.2 of the 2019 Biological Assessment. Stream health data presented in the DEIS Watershed section indicate that the lower reach of Berry Creek is in a “diminished” stream health condition. Table 3-10 provides the most recent macroinvertebrate sampling data for Berry Creek, which also indicates that lower reaches of the stream are currently considered to be in a “diminished” stream health condition for macroinvertebrates. Furthermore, the reach sampled above the influence of the proposed project were in an “at-risk” stream health condition for macroinvertebrates. The streams draining the Berlaimont project area are connected to a segment of the Eagle River (Segment 9a) that is listed as

impaired under the CWA, Section 303(d), for sediment (Table 3-9) and monitored for sediment, temperature, and aquatic life. Currently this section of the Eagle River is on the Monitoring and Evaluation status for aquatic macroinvertebrates (aquatic life).

Table 3-9. Clean Water Act 303-Listed Segments of the Eagle River Connected to the Project Area					
Stream Name	Affected Portion	Monitoring & Evaluation Status	Clean Water Act Section 303(d) Impairment	Year Listed	Affected by Proposed Action
Eagle River	From Berry Creek to Ute Creek	Temperature		2012	No measurable effect
Eagle River	From Berry Creek to Squaw Creek	Aquatic Life	Sediment	2012	Potential sediment effects
Eagle River	From Gore Creek to Berry Creek and from Squaw Creek to Rube Creek	Sediment		2012	Potential sediment effects
Source: Grove, 2012					

3.4.1.2 Direct, Indirect and Cumulative Effects

Alternative 1

The No Action Alternative would have no additional direct, indirect, or cumulative effects to aquatic macroinvertebrates, aquatic faunal communities, or water quality. Berry Creek and the impaired segment of the Eagle River would likely continue to function in a “diminished” or “impaired” stream health condition as a result of a number of anthropogenic disturbances including urban development, historic mine impacts, highway maintenance, the drainage’s erodible geology, sediment from Berry Creek Road, and sediment from the drainage’s network of unpaved trails and roads.

Alternatives 2–4

The proposed action could have effects to stream health and macroinvertebrate communities at the local scale without site specific design criteria. Effects related to Alternatives 2–4 include those associated with increased runoff contributions to Berry Creek resulting from upgrading and paving Berry Creek Road (FSR 774) and the proximal portion of the Edmunds Powerline Road (FSR 780) that is in the Berry Creek drainage and (2) indirect effects to aquatic macroinvertebrates associated with increased sedimentation contributions to Berry Creek and the Eagle River resulting from road use and maintenance (e.g., from traction sand). Reaches of Berry Creek are currently considered to be in a “diminished” condition for physical habitat (DEIS, Watershed section), macroinvertebrates (see Section 3.4.1), and trout (see Section 3.2.2) as a result of the drainage’s erodible geology, existing sediment from Berry Creek Road, and sediment from the drainage’s network of unpaved trails and roads. Macroinvertebrate samples were collected in 2006, 2011, 2015, and 2016 that indicated diminished biological stream health in the lower reach of Berry Creek when compared to reference conditions (Table 3-10). The upper reaches are considered to be in an “at-risk” stream health category, suggesting upstream degradation of habitat from dispersed recreational use and natural sedimentation found in the watershed. Data collected by CDPHE in the Eagle River below the project area indicated that the macroinvertebrate communities were below the attainment threshold for aquatic life.

This is likely due to sediment impairment and urbanization that occurs along the length of the Eagle River.

Excessive sedimentation of streams can smother spawning gravels and/or developing eggs, fill pool habitat, and fill interstitial spaces in the stream bottom available for macroinvertebrate colonization. These impacts would have an overall negative affect on stream health. Guidelines in the WCP Handbook do not allow for activities that would cause long term change to a lower stream health class in any stream reach. Site specific PDC and BMPs have been developed for this project that would significantly reduce sediment related impacts. In addition, Forest Hydrologists would be directly involved in developing and reviewing Drainage Management Plans and Sediment Control Acton Plans. In any case, there is still a possibility that some sediment may enter stream channels. However, with the use of site PDC and BMPs, sedimentation as a result of Alternatives 2–4 is not expected to be measurable.

The 303(d) listed stretch of the Eagle River that is influenced by streams draining the Project Area could also be indirectly affected by sediment draining from project area streams. With the implementation of PDC and BMPs, it is not expected that a measurable amount of sediment would be generated and delivered to the Eagle River as a result of project activities. There would be no measurable effect to the 303(d) listed portion of the Eagle River as a result of project activities.

Table 3-10. Macroinvertebrate Community Metrics Comparing Reference Streams to Berry Creek						
Sample Year	WRNF Sediment Intolerant Taxa	No. EPT Taxa	No. Ephemeroptera (Mayflies)	Benthic Condition Index	% Scrapers	% Clingers
Berry Creek above FSR 744.1 Culvert^a						
2006	6	21	4	4.9	16.2	62.2
2011	7	19	4	<u>5.9</u>	3.9	<u>45.8</u>
2015	4	12	3	6.6	0.46	14.41
2016	4	17	6	5.8	1.84	28.11
Berry Creek at Forest Boundary^b						
2016	3	10	1	6.6	0.29	27.21
Reference Data						
Robust Stream Health	>5.2	>14.8	>5.9	<5.8	>22.2	>51.8
Diminished Stream Health	<4.1	<11.6	<4.6	>6.5	<17.4	<40.6
Notes: Numbers in bold indicate robust values; <u>underlined</u> indicate at risk; and grey cells indicate diminished values. ^a 100 m reach is located above the FSR 744.1 culvert and above the influence of the proposed project, UTM E 364668, UTM N 4391934. ^b 100 m reach starts at the Forest Boundary and is the lowest reach in the watershed, UTM E 364055, UTM N 4390583. Source: USFS (M. Grove, Eagle/Holy Cross District fisheries biologist, pers. comm., Sep. 27, 2017).						

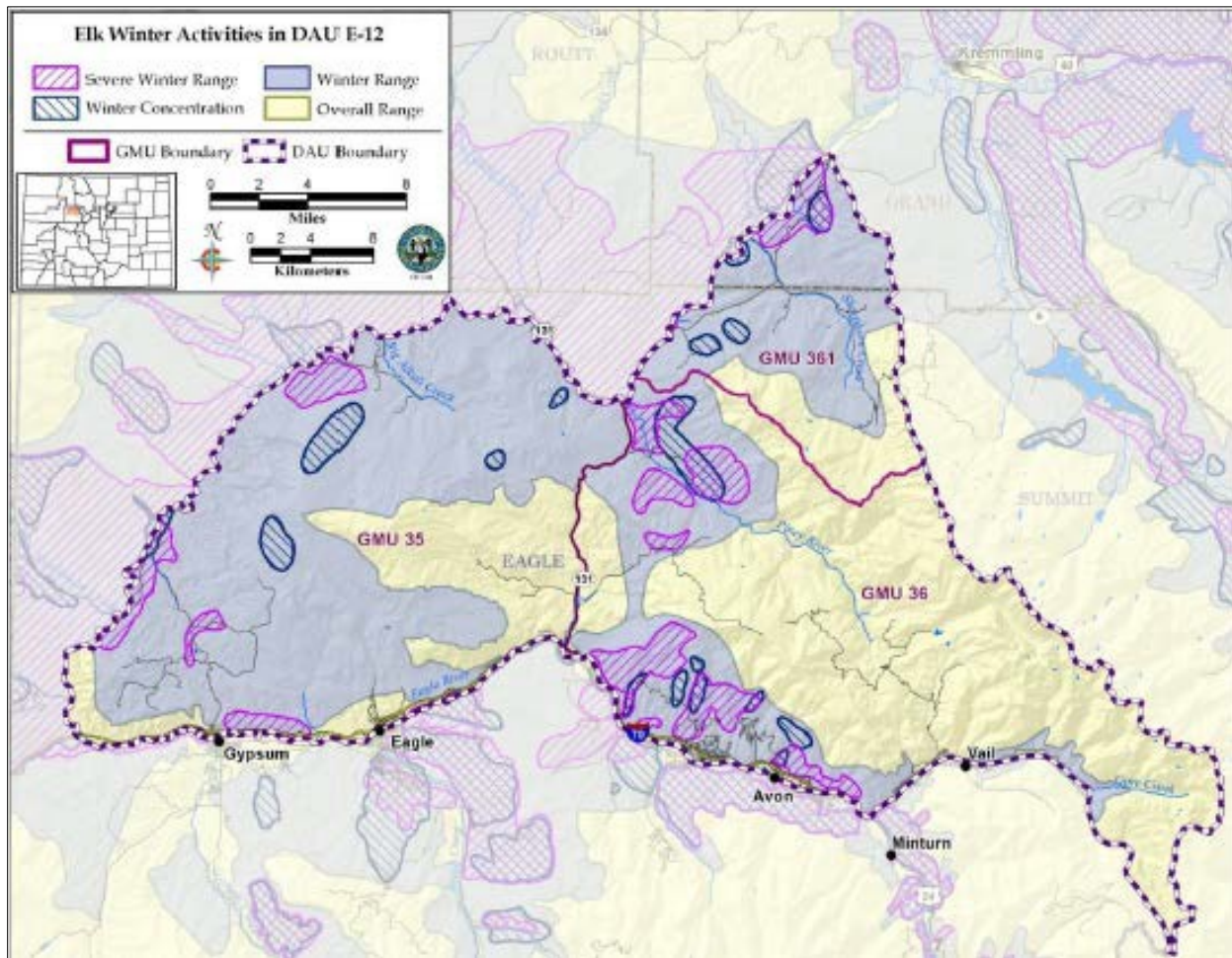
Pertinent WRNF Forest-wide standards and guidelines, as amended, that are applicable to stream health issues are listed in Section 5.1.1 along with the Action Alternatives consistency analysis. Applicable WCPH direction for Alternatives 2–4 are listed and explained in the Chapter 3, Section M – Watershed of the DEIS.

Without BMPs and PDCs, Alternatives 2–4 would further impair aquatic macroinvertebrate habitat in Berry Creek and the effects could extend to the Eagle River. However, with the implementation of stream health BMPs and PDCs, Alternatives 2–4 would maintain stream health in Berry Creek and the Eagle River and would be consistent with all Forest-wide standards and guidelines and WCP handbook Management Measures that are applicable to water quality and aquatic habitat.

Past and present recreational use of unpaved Berry Creek roads and trails have added to the naturally erosive character of the Berry Creek drainage. This has increased sediment contributions to the creek resulting in its currently “diminished” and “at-risk” stream health condition for macroinvertebrates. Reasonably foreseeable projects considered in this analysis (see Section 8.1) would contribute no additional cumulative effects to the Berry Creek macroinvertebrate community because impact zones associated with those projects would not extend to potential habitat for this group that could be directly and indirectly affected by Alternatives 2–4 on NFS land (CEQ 1997, USEPA 1999). Other management activities occurring in the project area include sheep grazing, road maintenance, developed recreation events and land exchanges. None of these activities are having a significant negative or positive affect on stream health at this time. Therefore, there are no expected cumulative effects, above the baseline condition, associated with the proposed action.

3.4.2 American Elk (*Cervus elaphus*)

The project area is in Management Area 5.41 – Deer and Elk Winter Range, and has standards and guidelines corresponding to the need to minimize impacts to wintering ungulates. The Data Analysis Unit (DAU) is the geographic area that represents the year-round range of an elk herd and includes all of the seasonal ranges of this herd. In this case, the applicable herd is DAU E-12, the Piney River herd.

Figure 3-4. Geographic Range of the Piney River Herd

Source: Mao et al., 2013

Notes: Also included is winter range, severe winter range, and winter concentration areas.

3.4.2.1 General Elk Life History Information

Elk inhabit higher elevations during spring and summer and migrate to lower elevations for winter range. The length of seasonal migration varies from just a few miles to nearly 50 miles in some cases. When early winter snows begin to accumulate, cows, calves, and younger bulls begin to move down in elevation to winter ranges, where they usually remain from December through March (Boyd 1978). During winter, elk form large, mixed herds on favored winter range, and more than 1,000 animals may be observed together. Mature bulls typically winter at higher elevations than cows and are found in small bachelor groups. As snowfall lessens in late March, elk start a gradual movement back up to their summer ranges and the cycle begins again (Boyd 1978). Winter range is the most limiting factor for elk in Colorado and in DAU E-12 (Mao et al. 2013).

3.4.2.2 DAU E-12 Habitat Conditions

Three-fourths of the Piney River DAU is on public land, and one-fourth is on private. DAU E-12 contains 915 square miles of elk winter range in the lower elevations of game management units (GMUs) 35, 361, and the western portion of GMU 36 (Mao et al. 2013). There are 112 square miles of severe winter range in the DAU, defined as that part of the overall range where 90% of the

individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten. There are 49 square miles of winter concentration areas in the DAU, defined as areas of winter range that have a density of at least 200% more elk than the surrounding winter range density in the average five winters out of ten.

Elk winter range in E-12 is in poor to fair condition due to maturation and succession of plant communities, as well as habitat loss and fragmentation from land development, among other factors (Mao et al. 2013). The private lands, near I-70, are primary and secondary resort communities. If not already developed, there is heavy pressure to continue to develop private lands on winter range.

Relevant Threats/Limiting Factors to the Piney River Elk Herd

The population objective was reduced from 7,000 elk in 2001, to 3,000 to 4,600 in 2013. This was in light of current threats, i.e., loss of winter habitat primarily from development, habitat fragmentation, and effects from increasing recreation. Hunting pressure has a negative effect on elk population numbers as well, based on a recent paper by Millhouser (2019). Additional habitat loss due to said threats is predicted to further reduce the population size (CPW 2016).

Winter Range on Public Lands

As mentioned, winter range is the most limiting factor to elk herd E-12, and is considered in poor to fair condition. This is largely due to excessive grazing by native and domestic ungulates, which has reduced the grass and forb component in the understory. Additionally, this is partly due to private land development, which has pushed wild ungulates onto public lands. Other factors contributing to current habitat conditions are: pinyon-juniper encroachment, historic fire suppression, and historic droughts (Mao et al. 2013).

Winter Range on Private Lands

As mentioned, roughly one-third of the winter range is on private land. Over the past 30 years, the majority of the private lands in this DAU have been subdivided and developed. The collective effects of the residential developments, associated habitat fragmentation, and recreational activities could result in future reductions in population levels (Mao et al. 2013, CPW 2016).

Summer Range

A large portion of the summer range in the DAU is on public land, much of it in designated wilderness and therefore is relatively protected from intense disturbances. However, it is subject to heavy and increasing recreation uses. The overall mileage of open system roads and trails on the WRNF has not increased significantly over the past 10 years, but the use of the existing system has increased. Additionally, a number of user-created routes have been developed in DAU E-12 by ATVs, 4-wheel drive vehicles, mountain bikers, and other users.

These routes are not a portion of the WRNF system and were evaluated during the development of the 2011 Travel Management Plan. Restoration of user-created routes in DAU E-12 have been ongoing for the past few years.

Recreation

All types of recreation can negatively affect wildlife. Wildlife see humans hiking, with or without their dogs, and those on snowshoes, skies, or bikes, as predators (Bowles 1996) and flee a certain

distance to where the humans are no longer perceived as an immediate threat. Counter to public perception, non-motorized recreational activities had greater negative effects than motorized activities (Larson et al. 2016). It is the animal's displacement from otherwise effective habitat (affecting hundreds of acres or more), the associated energetic expenditures (Ward and Cupal 1979, MacArthur et al. 1982, Gabrielsen and Smith 1995), and the loss of foraging and resting time (Hobbs 1989, Knight and Cole 1995) that represent the greatest negative effects of trails, not the direct loss of a few acres of habitat from a trail several feet wide, albeit miles long (Taylor and Knight 2003).

3.4.2.3 Environmental Baseline in the Berlaimont Project Area

Winter Range in the Berlaimont Project Area

The entire Berlaimont project area is in elk winter range, and CPW has identified this as important, well-utilized winter range in the DAU (CPW 2016). Additionally, three elk winter concentration areas (EWCA) occur within the project area. Elk severe winter range (ESWR) is in and near the project area as well (Fig. 4-2, based on CPW KMZ maps, last updated 2/14/2017).

The importance of elk winter range (and EWCA, EWSR) north of I-70 in the Eagle Valley has increased in recent years as a result of habitat loss and fragmentation from human development activities. South-facing slopes are particularly valuable because of enhanced snow-shedding characteristics. The relatively mesic conditions on side slopes of most project area ridges support more vigorous mountain shrub communities with a greater abundance of serviceberry and mountain mahogany, two important winter browse species. Habitat effectiveness of this winter range is relatively high because of motorized road closures, including the closure of Berry Creek Road (FSR 780) to all motorized use (including snowmobiles) from November 24 to May 21. This closure was implemented specifically to protect this large, isolated block of elk and deer winter range from human disturbance, as it is in WRNF Management Area 5.41.

Due to the winter motorized closure, and generally slow vehicle speeds (< 30 mph) when the roads are open, there have not been any documented animal-vehicle collisions (AVCs) along FSR 774 and FSR 780. In the summer, low to moderately high levels of dispersed recreational activity (i.e., hiking, mountain biking, running, 4wd vehicles, motorcycles, ATVs, and snowmobiling), displace elk from seasonal diurnal bedding and foraging areas with inadequate security. Winter deer and elk use of this habitat block has probably increased in recent years with the loss of adjacent winter range on private lands. Based on 2018-2019 camera traps, hunting activity in the Tames Creek winter concentration area is high, with an average of six hunter groups per day, resulting in significantly lower use of the area by ungulates during hunting season.

Game trails were mapped in Google Earth, in coordination with a March 30, 2017 survey documenting concentrated track locations along FSR 780. Most movements are along drainages and ridges. Currently, there are few barriers on the landscape, though there are local barriers, such as winter recreation activity above the FSR 774 closed gate, which may affect daily movement patterns and habitat use.

Elk Calving in the Project Area

There are no elk production (i.e., calving) areas delineated in the vicinity of the project area by CPW. The CDOW (B. Andree, pers. comm., 2001) indicated that the aspen stands on the private parcel are

used by low numbers of elk during the calving season. Elk were detected in said aspen on June 19, 2001, June 6, 2006, and June 5, 2008, indicating possible calving. Elk, including calves, were detected on the parcel on June 7 and 11, 2017, and the earlier survey occurred just before peak calving. Most of the interior, mature aspen stands with dense shrubby understories are considered to be excellent calving habitat, with the only limitation being the lack of nearby open water. It is likely that elk move to higher elevations in the Gore Range to summer after July 1st.

Recreation Use in the Project Area

Recreation activity in the project area affects elk habitat effectiveness to some extent year-round. While peak recreation activity occurs in the spring through the fall, such activity is of particular concern in the winter, when elk concentrate in the project area. Non-motorized winter recreational use occurs primarily along FSR 780 and the “Endo Alley”/Berry Creek Trail (#2008). Such recreation activity has likely increased in recent years in this area, and as mentioned, across the Eagle Valley (Mao et al. 2013). The recreation use is largely diurnal and crepuscular, and such recreationists temporarily displace elk (and deer) from adjacent foraging and bedding areas with inadequate security habitat to buffer the disturbance. Repeated disturbance likely reduces seasonal habitat effectiveness in proximity to heavy human presence.

Regarding motorized access, FSR 780 is not plowed in the winter. Snowmobile use is authorized on FSR 774, and occasional power line inspections occur in the winter on both FSR 774 and FSR 780. Otherwise, there is a gate near the proximal end of FSR 774 that is closed from November 23rd through May 21st to provide adequate solitude for deer and elk in their winter range, in accordance with Management Area 5.41. This gate, by restricting motorized access, increases the effectiveness of the winter range in the project area. Winter incursions by snowmobiles do occur at low levels, with snowmobilers seen on camera in 2018-2019 on four separate occasions from December to February.

Regarding the levels of recreation use in the winter, the best available data originates from trail counters that were placed on the Berry Creek Trail (#2008), FSR 774, and on a decommissioned route closer to the paved road (Beard Creek) between March 14 and April 18, 2018.

The following numbers likely capture one-third to one-half of the daily use occurring in the area. In other words, the average number of users per day ranges between 75 and 150 people. This means the area below the intersection of FSR 780 with the Beard Creek drainage is likely not effectively providing opportunities for seclusion for deer and elk. Due to the high recreation levels, the winter range habitat within 0.25 mile of the existing FSR 774 is currently in a degraded state (0.25 mile is based on the benefit to ungulates when a road is closed to the general public and use is prevented; USFS 2016).

Table 3-11. Summary of number of users on the aforementioned trails and roads between March 14 and April 18, 2018	
Total Users	2,698
Total Days	36
Avg. Users per day	74.9
Max Users in one day	153
Avg. Weekday Use	66.6
Avg. Weekend Use	96.6

Climate Change

Potential climate change effects on elk winter range would be a continuing part of the environmental baseline. Climate change is reducing the snow pack in western North American mountains (Knowles et al. 2006). Climate change could reduce snowfall, snow accumulation, and snow persistence in the project area, potentially resulting in offsetting effects to elk winter range. Such effects could benefit elk by increasing winter range availability and decreasing the severity of severe winters. Conversely, less snow persistence could increase the levels and distribution of recreational use on winter range, and decrease overall plant productivity, offsetting the benefits to elk by further reducing habitat effectiveness.

3.4.2.4 Effects of Alternative 1

Under Alternative 1, there would be no additional elk habitat disturbance. Seasonal elk habitat effectiveness in the project area would remain largely unchanged, thus largely effective, under current conditions.

3.4.2.5 Direct Effects – All Action Alternatives

Roads

Direct effects from road development and widening are in the form of habitat loss, fragmentation, and population impacts. Roads impact wildlife in three broad ways: (1) injury and death of animals from vehicle collisions, (2) fragmentation and habitat loss from road construction and vehicle use, and (3) pollution, such as from light, noise, and chemical runoff (Visintin et al. 2016).

Mortality from Vehicle Collisions

There are two factors influencing collision risk from the proposed alternatives: (1) vehicle presence and movement, and (2) animal presence (Visintin et al. 2016). Regarding (1), the predicated AADT (the average number of vehicles traveling in both directions in a day) is characteristic of a low-volume traffic road (<400 vehicles per day) (Apronti et al. 2016). The project area roads are expected to average 164 vehicles per day between November 23 and May 21st, and an additional 50 vehicles per day during the summer season from recreationists.

In addition to traffic volume, vehicle speeds affect collision risk. Eighty-five percent of road kill occurs on roads with speeds at or above 45 mph, meaning 15% occur at speeds less than 45 mph (Gunther et al., 1998). Across all alternatives, posted speeds would be 20 mph. If vehicle speeds can be kept in that range, wildlife movement can be facilitated by minimizing guardrail placement (Table 2-2). Additionally, a lower speed limit on turns would improve the response time for both drivers and wildlife by matching the road design (Beckmann et al. 2010, similar to nearby Mountain Star community roads). Additionally, there would be speed bumps to improve driver compliance, and thus reduce the collision risk with ungulates (Table 2-2).

Regarding animal presence, there is a high concentration of elk in the project area in the winter, resulting in increased exposure to vehicle traffic to access diurnal habitat as well as for seasonal movements. Elk need to be able to freely cross roads for daily and migratory movements. Project design criteria intended to facilitate such movements are identified in Table 2-2.

Lastly, even though there will be a high concentration of ungulates in the project area, particularly in the winter, there will likely be some road avoidance by elk (discussed below). Combined, it is predicted that there will be up to two ungulate-vehicle collisions per year.

Direct Habitat Loss from Road Development

Direct habitat loss calculations were derived from the disturbance themes provided by SE Group used for all other analyses. This includes new road segments from the action alternatives, connected action, as well as improving (widening to 26 feet, with cut and fill) of existing forest roads (Table 3-12).

Direct Habitat Loss from Residential Development

Residential development would result in the loss of elk winter range, winter concentration area, severe winter range, transition range, and calving habitat from the development of: roads, driveways, building envelopes, wildfire clearance zones, septic systems, and other facilities on the private parcel. Impacts on the 680.6-acre private parcel would be the same under all access road alternatives, approximately 102 acres (approximately 45 acres for the internal road network and 57 acres for the building envelopes), and not including temporary construction impacts. Habitat losses could be considerably larger if horses are permitted on the property. Overall, direct impacts are comparable across alternatives, with the exception of impacts to elk winter concentration area habitat (Table 3-12, Figure 3-4).

Table 3-12. Total Direct Losses of Elk Habitat Types from Proposed Access Routes and the Internal Road Network Developed on Berlaimont Estates' Private Property

Alternative	Total Road Length in miles (on NFS)	Winter Range Habitat Loss (acres) Temp/Permanent	Winter Concentration Area Habitat Loss (acres) Temporary/Permanent	Severe Winter Range Habitat Loss (acres) Temporary/Permanent
2	5.8 (2.5)	32.5/17.7	0.2/0	16.1/10.4
3	5.4 (4.3)	28.3/16.8	9.7/4.8	14.0/9.5
4	5.7 (4.1)	30.0/17.8	6.3/3.7	14.0/9.5
Proposed Trail	2.7 (2.7)	2.6	0	2.5
Internal Road Network*	3.7 (0)	33.0/12.0	5.1/1.8	12.5/4.5

Notes:

Total road length is across NFS and private (Berlaimont Estates) property.

Alt 2: 0.1 mile of road in winter concentration area habitat, 3.4 miles of road in severe winter range habitat. Alt 3: 1.5 miles in winter concentration area habitat and 2.9 miles in severe winter range. Alt 4: 1.2 miles of road in elk winter concentration area habitat and 2.9 miles in elk severe winter range.

Temporary disturbance indicates construction-related disturbances in areas that will be revegetated. Permanent disturbance entails complete loss of vegetation for conversion to human use.

Proposed trail impacts are from vegetation clearing for an 8-foot-wide trail, on average.

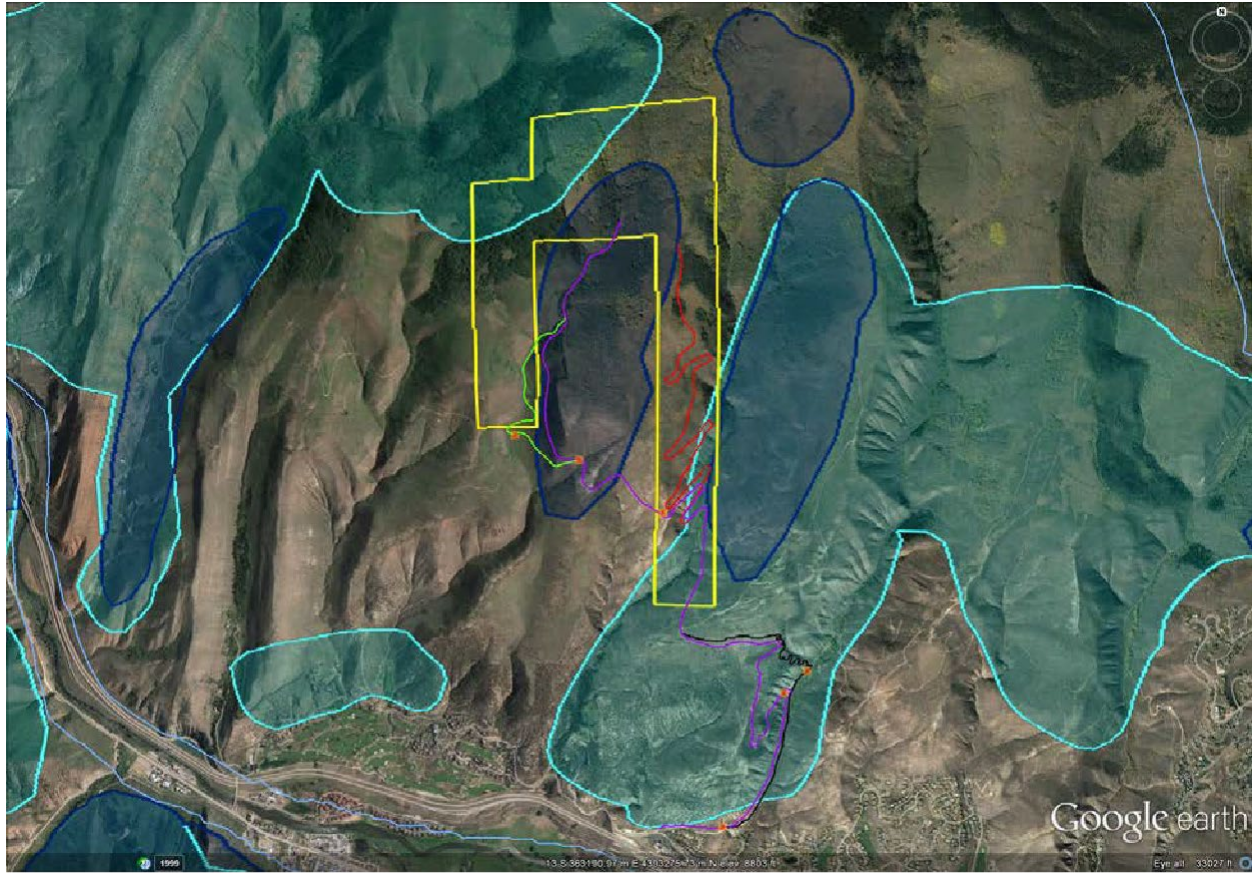
*Direct habitat losses due to building sites were not quantified for each habitat type due to lack of siting specificity at the time of analysis; however, building site impacts would be identical for all alternatives.

The new parking area off of FSR 774 constitutes a 2.6-acre permanent loss of what is mapped as EWR and ESWR.

Direct Habitat Loss from the Proposed Recreation Trail

The proposed recreation trail would result in the direct loss of 2.6 acres of a mix of sagebrush and pinyon-juniper plant communities. This calculation was determined based on an average trail width of 8 feet (Table 3-12).

Figure 3-5. Important Elk Ranges in Vicinity of the Berlaimont Project Area



Notes: Important elk ranges in the vicinity of the Berlaimont project area. The entire area north of the I-70 game fence is winter range. Dark blue polygons are winter concentration areas and turquoise polygons are severe winter range. Red – Alternative 2 access road, Purple – Alternative 3 access road, and Green – Alternative 4 access road.

Further Secondary Development

The most certain additional development would be associated with nine caretaker homes and their activity on the private parcel and along the selected access road.

Habitat Fragmentation from the Access Roads

As a result of the increased vehicle activity along the roads in winter range, elk are predicted to establish home ranges away from even secondary roads. Secondary roads are dirt roads that are seasonally maintained. Primary roads are paved, and maintained and open to the public year-round (Montgomery et al. 2013, Stubblefield et al. 2006). Elk will even select marginal habitat to avoid vehicle activity (Hudston 1979 as cited in McCorquodale 2013). Thus, the proposed roads, which could be considered at best secondary roads due to the winter predicted traffic volume of 164 vehicles per day, would fragment elk winter range in the project area and may lead to decreased elk

winter survival through increased energy expenditures to avoid the roads and use of suboptimal habitat (Polfus et al. 2011). In summary, the improved surface roads may result in a greater elk avoidance effect and contraction of elk home ranges in the project area (Stubblefield et al. 2006).

Habitat Fragmentation from Human Uses due to Road and Private Parcel Development

The effectiveness of habitat surrounding developed portions of the private parcel would also be reduced by human activity. New year-round motorized use of the access road, new human activity on the private parcel, and continuing levels of dispersed on-foot recreation, generally confined to FS roads and trails, would further reduce the effectiveness of habitats beyond areas of direct habitat losses/ modifications. Reduced habitat effectiveness would be the largest impact associated with the overall project.

Winter vehicle use of the upgraded access road, including by residents, guests, and others associated with the proposed Berlaimont Estates Subdivision (but not the public), would affect a considerably larger area of elk winter range, EWCA, and ESWR than that directly impacted by road upgrading.

Lastly, the extent of habitat availability could be reduced by snowplow deposition areas. This would vary with snowfall amounts, temperature and solar gain regimes, slope steepness, exposure, and vegetation cover.

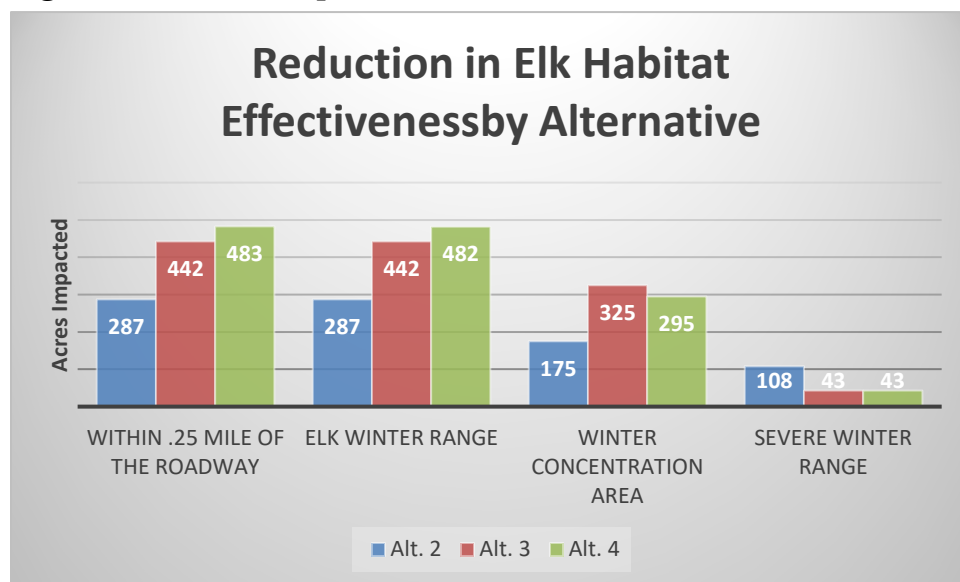
Overall Losses in Habitat Effectiveness due to Habitat Fragmentation

To quantify the effects of roads on the proposed action, the Berlaimont road analysis will follow the rationale supported by USFS 2016:

- *Elk: Based on a 0.25 mile buffer from the edge of the roadway. This represents a midpoint for a group of ungulates for which the literature review identified a distance of between 150 and 490 meters, either side of road, as a disturbance tolerance threshold.*
 - *This does not include the area below the intersection of FSR 780 and Beard Creek due to the existing condition of high year-round recreation use. As a result, the indirect effect of the proposed recreation trail, which would be in close proximity to the Berry Creek Trail (#2008) is not captured in this analysis.*
 - *This does not include the Berlaimont Estates parcel. It is assumed that development on this private parcel (i.e., the connected action) will result in a 680-acre reduction in habitat effectiveness (the size of the inholding), across all alternatives.*
 - *This assumes that 100% of the remaining area provides winter habitat (Table 3-13 and Figure 3-6).*

Table 3-13. Reduction in Elk Habitat Effectiveness by Alternative and Habitat Type

Alternative	Within 0.25 mile of the Roadway	Elk Winter Range	Winter Concentration Area	Severe Winter Range
2	287	287	175	108
3	442	442	325	43
4	483	482	295	43

Figure 3-6. Visual comparison of alternatives.

Considering the aforementioned disclaimers, the Alternative 2 access road would affect the least amount of elk habitat effectiveness on NFS land within .25 mile of all access roads, followed by Alternatives 3 and 4.

Additional Road Barrier Effects from Steep Slopes and Guard Rails

This section is applicable to Mule Deer as well.

Much of the proposed access road would be on slopes $\geq 30\%$, resulting in additional and steeper cut and fill slopes. Upgrading road sections crossing steeper slopes would further affect the ability of animals to (1) move across and up and down local hillsides and (2) access winter forage and bedding areas. Excessive cut and fill slopes can make the slopes too steep for animals to negotiate, especially in winter. Even reducing the slope to a reasonably stable 2:1 slope (30° angle), the slope may be too steep for big game to negotiate in deep snow on both the cut and fill slopes. Replacing or reducing cut and fill slopes with retaining walls along either the cut slope or fill slope would reduce the area of habitat loss, but would create a complete barrier to local animal movements in areas of high cut and fill.

Based on Table 2-1,

- Alternative 2 would have 11% greater cut and fill compared to Alternatives 3 and 4.
- Alternative 2 would have 28 retaining walls (10% more than Alternative 3), Alternative 3 would have 25 (12% more than Alt. 4), and Alternative 4 would have 22 retaining walls (21% less than Alt. 2).

CPW's recommended height for wildlife friendly fencing is 42 inches. A standard 27-inch-tall guard rail that is placed on the slope break at the top of the fill slope creates a barrier to movements. On a 2:1 fill slope, an animal that is 1.5 feet horizontally from the guard rail is 3 feet below the top of the fill slope, and a 27-inch-tall guard rail would require an animal to jump over five vertical feet (62 inches) to get over the guard rail (CPW 2016).

All access roads would be impermeable along most of their lengths without modifying the design of road slopes and guardrails. Impaired movements during migration could result in increased energetic costs, which would be more significant in spring (vs. fall) when elk are in poor condition and moving uphill through consolidated snow. Impaired movements on winter range could also result in increased energetic costs and the reduced availability of winter range if elk are unable to effectively access habitat patches. The area of reduced transitional and winter range effectiveness resulting from access restrictions could equal or exceed the acreage of direct winter range losses.

Adding guard rails to road sections on steep slopes would create additional barriers to elk movements, even in very light snow cover. Ungulates that are on the slope below the guard rail may not be able to jump the guard rail depending on the relative height of the rail in relation to the terrain below. According to CPW (2016), the access road approved by Eagle County shows a total of 22,800 feet of guardrail. The anticipated amount of traffic on a road is one factor influencing the need for guardrails. Less than 400 ADT (average daily traffic count), and guardrails are not commonly used, so they are not common on most NFS roads (M. Barkhurst, Asst. Forest Engineer, WRNF, pers. comm. with K. Owens, SE Group, Oct. 19, 2017). Removing extensive guard rail would facilitate elk daily and migratory movements, and this would especially be the case where historic crossings have occurred. In other words, minimize this barrier effect, only place guardrails where needed, such as on cut slopes and switchbacks, and avoid placement of guardrails on the uphill side of the roads (Table 2-2). Minimization of fencing will further reduce the barrier effect (Table 2-2).

Lastly, minimal fencing is expected to occur, and is in line with the PDC to reduce the added barrier effect to ungulates (Table 2-2).

Feasibility and Effectiveness of Wildlife Crossings (Structures, Guardrail Gaps and Increased Grading) to Increase Permeability

This section is applicable to Mule Deer as well

Colorado Parks and Wildlife (2016) recommended that viable crossings be spaced at least every one-quarter mile along the access road. This provides a general indication of maximum crossing spacing. Even highly functional crossing structures occurring at regular one-quarter mile intervals would likely result in some reduced habitat effectiveness. In this case, deer and elk track data from March, 2017, as well as Google Earth game trails were mapped together as “existing wildlife crossings.” “Potential wildlife crossings” were identified in GIS as portions of the access routes that are expected to be areas that are greater than 10 feet wide, and cut/fill slopes are less than two feet tall on both sides of the access route (and retaining walls are absent).

At existing and potential wildlife crossings, guardrail gaps, increased grading, and ramps should be in place to provide viable wildlife crossings. Also, the snowplow management plan should reflect the need to try to reduce snowplow deposition in area of crossings, if possible (Table 2-2).

3.4.2.6 Indirect Effects – All Alternatives

Private Berlaimont Development

Indirect effects of the Berlaimont Estates residential development on elk and mule deer, on and around the private parcel, include, but are not limited to, the displacing effects (addressed below) of:

(1) human activities, (2) residential fencing, (3) dogs, (4) any on and off-site recreation in new trail corridors (unauthorized, if they extend onto NFS land), and (5) road and highway mortality (addressed below).

Road De-Icing Measures

The road would be treated with a sand/salt mix (95% sand, 5% salt). The salt is added primarily to aid in the prevention of the sand stockpiles from freezing solid, but also acts as a deicer. Eagle County does not use magnesium chloride as a deicer on the roads in the winter. A percentage of the road de-icing materials, the dried salt crystals, attract elk and deer to the roads. This is because salts provide essential nutrients for deer and elk (Trombulak et al. 2000).

Salts thus attract deer and elk, which increases the risk of vehicle collisions. To mitigate such effects, speed bumps and signs would be placed to increase driver reaction time as drivers would drive slower speeds, and roads would not be cleared of vegetation so as to not provide for salts to accumulate and be visually apparent to deer on the side of the roads (Table 2-2).

Noise Disturbance from Construction

If construction were to occur during the winter and spring seasons, such noise and additive human presence could be particularly detrimental, as ungulates are already stressed due to the near-starvation state they are in, and they may get flushed onto poorer quality habitat as a result of the blasting (Brown et al. 2012). To mitigate for this, road construction would be avoided between December 1 and April 15 (Table 2-2).

Recreation Effects

Alternatives 2–4 would likely result in a greater number of users accessing trails and roads farther north, east, and west of the existing FSR 774 gated closure, than they currently do, year-round. As a result, a human-entry closure would be implemented above the intersection of FSR 780 and FSR 778 (Table 2-2).

Increased human intrusion would exacerbate wildlife displacement. This distance varies by species. Elk tend to flush over a ridge, so displacement distance is usually hundreds of yards. Disturbance from recreationists reduces deer and elk foraging effectiveness and increases energy expenditures. This has contributed to the decline in deer and elk herds locally (Mao et al. 2009, 2013).

Based on the current high volume of recreation use in the area, it is uncertain whether or not a new recreation trail would result in a measurable increase in visitations to the area. In addition, the trail would be located below the interception of FSR 780 and Beard Creek, and would include a seasonal sign to limit use above that area. Existing user-created trails would be restored (Table 2-2).

3.4.2.7 Cumulative Effects

The County Planning Department was contacted to identify pending land use applications. No pending land use applications identified met reasonably foreseeable criteria and would potentially affect habitat of this species. However, the Village at Avon has been approved for building, which will have cumulative effects to this herd—resulting in additional losses to elk winter range and reductions in elk winter range habitat effectiveness.

3.4.2.8 WRNF Management Direction Consistency Analysis

Pertinent WRNF Forest Plan standards and guidelines applicable to elk are listed below in Section 6.1.2. In summary, Alternatives 2–4 would be inconsistent with two standards: Wildlife-General, Standard 1 and Management Area 5.41, Deer and Elk Winter Range, Infrastructure, Standard 2, and two guidelines: Deer and Elk Winter Range, Infrastructure, Guidelines 1 and 2.

Wildlife General Standard – 1

❖ *Seasonal restrictions will be applied to reduce disturbance in key wildlife habitat.*

Since FSR 780 and the selected access road would be open to motorized vehicle use by Berlaimont residents year-round, whereas it is currently closed to all winter motorized use, disturbance of adjacent key wildlife habitat would be increased rather than reduced, though a winter area closure will help to minimize disturbance (Table 2-2). No mitigation could be implemented to make Alternatives 2–4 consistent with this standard. Therefore, **Alternatives 2–4 would be inconsistent with this standard** and a Forest Plan Amendment would be required for the Selected Alternative describing why this standard would be set aside for this project. Alternative 1 – the no action alternative, is consistent with this standard.

Management Area 5.41 – Infrastructure

❖ *Standard 2. All new roads passing through this area will avoid important forage, cover, and birthing areas.*

Alternatives 2-4 would be inconsistent with this standard, as they are new roads that would both bisect elk winter concentration area(s), and/or elk severe winter range. All action alternatives would require a Forest Plan amendment.

❖ *Guideline 2. Avoid crossing these areas with new arterial¹³ and collector¹⁴ roads.*

All potential access roads (Alts. 2–4) would be inconsistent with this guideline because a collector road is required to service the connected 19-lot residential development.

3.4.2.9 Summary of Berlaimont Project Effects on Elk

The proposed upgrading and new construction of any selected access road would result in the loss of elk winter range, elk winter concentration area(s), elk severe winter range, and other seasonal habitats that would be additive to declining effective habitat availability in DAU E-12, due primarily to winter range lost to development, habitat fragmentation, and year-round recreational impacts (CPW 2016). Alternative 2 results in the greatest loss in elk severe winter range habitat effectiveness (108 vs. 43 acres), while Alternatives 3 and 4 result in the greatest elk winter concentration area habitat reduction impacts (326 acres (Alt. 3); 295 acres (Alt. 4), vs. 175 acres (Alt. 2). Elk winter range effectiveness losses are greatest for Alt. 4 (483 acres), vs. Alt. 3 (442 acres), and Alt. 2. (287 acres). Alt. 2. has approximately 10% greater cut and fill, and retaining walls, than Alt. 3 and Alt. 4, presenting a barrier to wildlife in terms of crossing the hillside for daily and or migratory movements.

A list of project design criteria are in Table 2-2 to mitigate the effects of Alternatives 2–4 and the connected action to the E-12 herd.

3.4.3 Mule Deer

The mule deer (*Odocoileus hemionus*) is a WRNF species of local concern and has a migration corridor and winter range in the majority of the project area. As a result and as mentioned, the project area is in Management Area 5.41. Seasonal mule deer activity area delineations were obtained from (1) past and current CPW KMZ wildlife maps, last updated November 16, 2016, (2) site-specific surveys, and (3) conversations with the local CPW District Wildlife Manager, B. Andree, since 1986. Additional background issues related to deer (e.g., roads, wildlife crossings, and recreation) are addressed in the elk section.

3.4.3.1 Life History Information

The following summary is from CPW, unless otherwise noted.

Mule deer are widely distributed in western North America. They inhabit every major vegetation type and every climatic zone except the arctic and tropics. Rocky Mountain mule deer is the subspecies found in Colorado, and they occur throughout the state in all ecosystems (Fitzgerald et al. 1994, Armstrong et al. 2011). They reach their greatest densities in shrublands on rough, broken terrain, which provide abundant browse and cover. Mule deer occupy any “edge” habitat, including suburban residential areas. Mule deer range over most of the WRNF and use essentially all habitats. Like elk, mule deer inhabit higher elevations during spring and summer and migrate to lower elevations for winter range. Winter range availability and habitat effectiveness may be the most critical seasonal range for deer survival.

In Colorado, mule deer breed in November and December. Fawns are normally born from June 15 to July 15 (Einarson 1969). Fawning may occur in any habitat type found on the WRNF.

Mule deer eat a wide variety of plants. The seasonal use of foods may change quickly and within a few weeks a highly palatable plant may fall into complete disuse. Deer are mostly browsers, feeding on woody vegetation, including twigs and leaves of shrubs and trees. During the spring months, grasses, with their high protein content, make up a high percentage of the diet in some areas. The diet transitions in the summer to predominantly newly grown forbs and shrubs (Einarson 1969). Autumn frosts bring great changes to mule deer diets. A high portion of the diet is comprised of grasses and forbs, but this period marks the transition to shrubby vegetation. In winter, succulent vegetation is at a minimum and in areas where heavy snow covers herbaceous plants, mule deer will select taller browse, such as trees and shrubs (Kufeld et al. 1973 and L. Carpenter, Gill, et al. 1979, as cited in Armstrong, Fitzgerald, and Meany 2011).

Cover may be a key factor that determines the amount of use deer will make of foraging areas. In optimal deer range 40% of an area will be in cover type habitats. Optimal winter range contains thermal cover consisting of evergreen trees with 75% or greater canopy closure. Loft et al. (1991) documented that deer prefer meadow-riparian habitats in the absence of domestic livestock grazing.

3.4.3.2 Relevant Threats and Limiting Factors

Mule deer are adversely influenced by roads open to vehicular traffic (USFS 2011). Reduced use occurs at some level adjacent to roads, ranging from 150 to 490 meters (USFS 2016). Road type, its location, and its degree of use influences mule deer habitat effectiveness (Rost and Bailey 1979). Deer are frequent traffic casualties and mountain lions, coyotes, and packs of feral dogs prey upon them.

Refer to the elk section for a description of recreation effects. Outdoor recreation activity has increased and will continue to increase, while the amount of land free of human disturbance and available for effective wildlife use has decreased and will continue to do so. Regarding consumptive recreation, licensed hunters take 50,000 to 80,000 deer annually in the state from a population estimated at 700,000 animals statewide.

Winter range conditions are most critical for mule deer survival. Pressures are increasing on most winter range from human developments such as reservoirs, housing developments, access roads, highways and cultivated fields. Overgrazing of mule deer winter range by domestic livestock can have significant impacts on deer populations. The communal life of the deer in mid-winter concentrations brings a critical period in the life of the young deer. Survival is greatest in habitats with adequate forage and during mild weather. However, where growing conditions are poor and use co-occurs with livestock at high concentrations, the winter months of excessive cold and deep snow often become critical for the young deer.

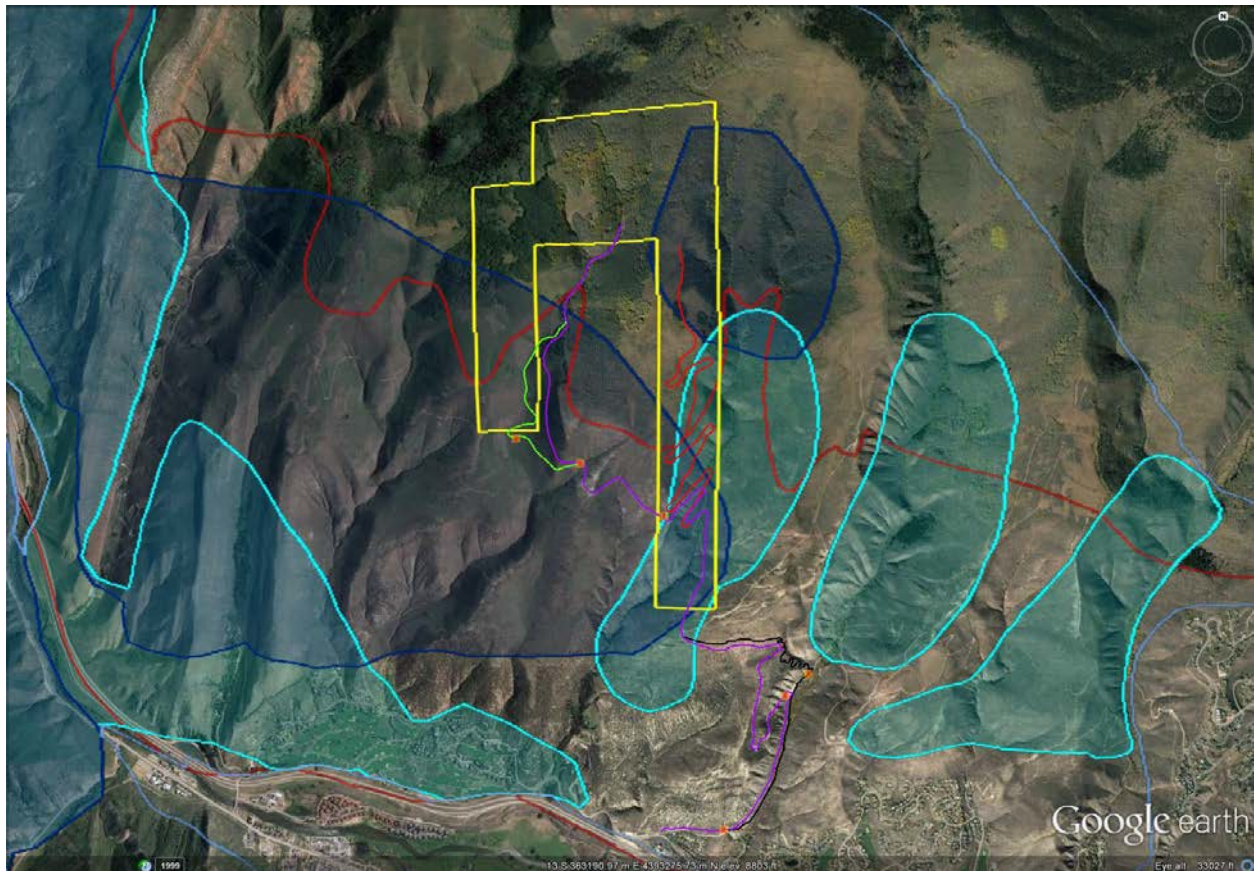
Yearlings and fawns may have been in excellent condition as winter approaches, but larger and more mature animals press forage back, often standing up on hind legs to reach the remaining browse, the smaller deer fail to secure adequate nourishment. Immature deer comprise 60-80% of the mortality during severe winters (Einarson 1969). In a northwestern Colorado study, White and Bartmann (1998) documented significant increases in fawn survival rates after wintering densities of mule deer were lowered.

3.4.3.3 Mule Deer Use of the Berlaimont Access Road Project Area

Mule deer are common and inhabit a wide variety of montane through alpine habitats in Eagle County. They are present year-round in the project area, although different animals are present during summer and winter. As with elk, deer habitats north and south of I-70 in this portion of the Eagle Valley are isolated from each other by I-70 game fencing.

The project area is located within CPW DAU D-8, which contains GMUs 35, 36, 45, and 361. GMU 36 surrounds the project area. The population objective for D-8 has been reduced several times since 1980. In 1988, it was reduced from 26,000 to 21,000, and in 2009 it was reduced from 21,000 to 13,500–16,500. The need to reduce the population objective was due to several factors with the main three factors being the same as that of elk: loss of winter range (largely due to development), habitat fragmentation, and recreation impacts (Mao et al. 2009, CPW 2016). As with elk, mule deer use the large block of largely undeveloped habitat containing the project area at a slightly greater extent than other areas in the GMU, suggesting its relative importance (CPW 2016).

Four important mule deer seasonal ranges are identified by CPW habitat mapping in or near the project area (Figure 3-7). Mule deer winter range (MDWR) is defined as “that part of the range of a species where 90% of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each DAU” (CDOW 1993). Mule deer migration (MDMC) and winter range occupancy dates in this portion of the Eagle Valley are generally from November 15th to April 30th.

Figure 3-7. Important Mule Deer Winter Ranges in the Vicinity of the Project Area

Notes: The entire area outline in light blue north of the I-70 game fence is winter range. Dark blue polygons are winter concentration areas (densities are 200% greater than surrounding winter range in 5 winters out of 10) and turquoise polygons are severe winter range (where in the worst 2/10 winters, 90% of the individuals are located). The entire project area below the approximate 8,800 to 9,000-foot elevation contour (red line) is a mule deer migration corridor (CDOW 1993). Action alternatives: Red Line – Alternative 2; Purple line (where it splits from the green line) – Alternative 3; Green line – Alternative 4. Lower purple line – all action alternatives.

This migration corridor is part of the second largest migratory mule deer herd in Colorado, extending from Vail Pass to as far west as Gypsum and Dotsero (CPW 2016). This migration corridor is, “a specific mappable site through which large numbers of animals migrate and loss of which would change migration routes” (CDOW 1993). In the project area, this corridor covers virtually all portions of all access road corridors on NFS lands and the lower “legs” of the private parcel. Deer migration occurs through this general area twice a year following general descending (fall, west-bound) and ascending (spring, east-bound) traverses. Fall and spring mule deer migration in the vicinity of the project area generally occurs from approximately November 15-December 15 and March 30-April 30 (dates inclusive). Most deer that winter in the project area summer on the south side of the Gore Range and south of I-70 from West Vail to along the ridge line from Shrine Pass to Chicago Ridge. Most deer summering south of I-70 cross the highway through the Mud Springs Gulch underpass east of Dowds Junction (Reed et al. 1975).

3.4.3.4 Effects of the Berlaimont Project on Mule Deer

Deer issues (e.g., road construction effects, habitat impacts, restricted movements, reduced habitat effectiveness, road and highway mortality, road use and private residential development effects, and

displacement from recreational trail corridors associated with Alternatives 2–4) are virtually identical to those described above for elk, with two differences.

Alternative 1

Under the No Action Alternative, there would not be any additional mule deer habitat disturbance as a result of the proposed action. Seasonal deer habitat effectiveness in the project area would remain largely unchanged from current conditions. The seasonal WRNF winter motorized closure would be maintained at the bottom of FSR 774. Wintering deer in the vicinity of existing roads and trails would be displaced every year during hunting season, and occasionally displaced by hiking and mountain biking activities in mild winters, or by snowmobilers when there is ample snowpack. That displacement and reduced habitat effectiveness would likely increase somewhat over time as recreational use levels continue to increase. Potential climate change effects related to deer winter would be the same as those described for elk.

Although, private Berlaimont development under Alternative 1 could have effects on deer habitat, they do not meet the definitions requiring their consideration as direct, indirect, or reasonably foreseeable effects or as a connected action for the reasons stated in Section 2.6.

Alternatives 2–4

Direct Effects

The proposed upgrading and new construction of the selected access road from current conditions would result in the reduction in mule deer winter range, winter concentration areas, severe winter range, migration corridors, and other seasonal habitats that would be additive to declining effective habitat availability in DAU D-8, due primarily to winter range lost to development, habitat fragmentation, and year-round recreational impacts (Mao et al. 2009, CPW 2016).

1. Although the acreage of habitats affected would be different, the types of direct project effects on mule deer would be the same as those addressed for elk, with two differences: In general, mule deer are more susceptible to severe winter range conditions than elk due to their smaller body size. The additional loss of severe winter range would likely have a greater negative effect on mule deer herd numbers following the next severe winter compared to elk.
2. Due to their smaller size, mule deer would be more susceptible to restrictions, barriers, and resulting effects imposed by steep cut and fill slopes, retaining walls, etc.

Habitat Impacts

Table 3-14 shows road length intercepts (in miles) with winter mule deer ranges in the Berlaimont project area, excluding connected action effects on the private parcel, while Table 3-15 reflects the direct habitat losses in acres.

The Alternative 2 access road would have the least road intercepts of any access road alternative on mule deer winter range, winter concentration area(s), and migration corridor habitat on NFS land and an equal road intercepts on mule deer severe winter range on NFS lands (Table 3-14, Table 3-15). As with elk, Alternative 2, the preferred alternative, leaves the most habitat intact west of Beard Creek, so it leaves a large winter concentration area unaltered on NFS lands (Figure 3-4).

Regarding total road length intercepts across all lands, Alternative 3 would have the shortest road intercepts of any access road alternative on mule deer winter range and severe winter range; however, both Alternatives 3 and 4 fragment the most winter concentration habitat.

Table 3-14. Mileages of Road Length that intercepts Seasonal Mule Deer Ranges in the Project Area, Alternatives 2–4

Alternative	Winter Range			Winter Concentration Area			Severe Winter Range			Migration Corridor		
	Total	NFS	Pvt.	Total	NFS	Pvt.	Total	NFS	Pvt.	Total	NFS	Pvt.
2	5.8	2.5	3.3	1.9	0.1	1.8	2.5	0.2	2.3	4.5	2.5	2.0
3	5.4	4.2	1.2	2.4	1.3	1.1	1.2	0.2	1.0	5.0	3.9	1.1
4	5.7	4.1	1.6	2.7	1.1	1.6	1.2	0.2	1.0	5.3	3.8	1.5

Source: SE Group (file: HE_length_calcs_170919.xlsx) and Western Ecosystems, Inc.

Notes:

Data exclude connected action effects on the private parcel, which are considered separately.

Table 3-15. Total Direct Losses of Mule Deer Habitat Types from Proposed Access Routes and the Internal Road Network Developed on Berlaimont Estates' Private Property

Alternative	Total Road Length in miles (on NFS)	Winter Range Habitat Loss (acres) Temp/Permanent	Winter Concentration Area Habitat Loss (acres) Temporary/Permanent	Severe Winter Range Habitat Loss (acres) Temporary/Permanent	Migration Corridor (acres) Temporary/Permanent
2	5.8 (2.5)	32.5/17.7	10.5/5.5	16.1/7.6	25.2/17.7
3	5.4 (4.2)	28.3/16.8	9.8/7.6	5.0/3.8	26.1/15.8
4	5.7 (4.1)	30.1/17.8	16.2/8.6	5.0/3.8	29.0/16.8
Proposed Trail	2.7 (2.7)	2.6	0	0.5	2.6
Internal Road Network*	3.7 (0)	44.5/12.0	9.7/3.6	0/0	0/0

Notes: Total road length across NFS and private (Berlaimont Estates') property.

Temporary disturbance indicates construction-related disturbances in areas that will be revegetated. Permanent disturbance entails complete loss of vegetation for conversion to human use.

Proposed trail impacts are from vegetation clearing for an 8-foot wide trail, on average.

*Direct habitat losses due to building sites were not quantified for each habitat type due to lack of siting specificity at the time of analysis; however, building site impacts would be identical for all alternatives.

The new parking area off of FSR 774 constitutes a 2.6 acre permanent loss of what is mapped as MDWR, MDSWR, and MDMC habitat.

Proposed Recreation Trail

The proposed recreation trail would result in the direct loss of 2.6 acres of a mix of sagebrush and pinyon-juniper plant communities, and would impact designated mule deer winter range, severe winter range, and migration corridor habitat. This calculation was determined based on an average trail width of 8 feet.

Restricted Movements

All of the negative effects described for elk would also apply to mule deer. The quantitative road restriction/ barrier analysis is the same for deer and elk, with differences noted.

Impaired deer movements during migration would result in increased energetic costs, which would be more significant in spring (vs. fall) when animals are in poor condition and moving uphill through consolidated snow. Impaired movements on winter range could also result in increased energetic costs and the reduced availability of winter range if animals are unable to effectively access habitat patches and move farther westward to other down valley winter ranges. Without mitigation, any of the Alternatives 2–4 access roads would have appreciable negative effects on deer winter range availability, habitat effectiveness, road-kill, game damage, and herd survival.

Indirect Effects

Indirect road-related impacts would include:

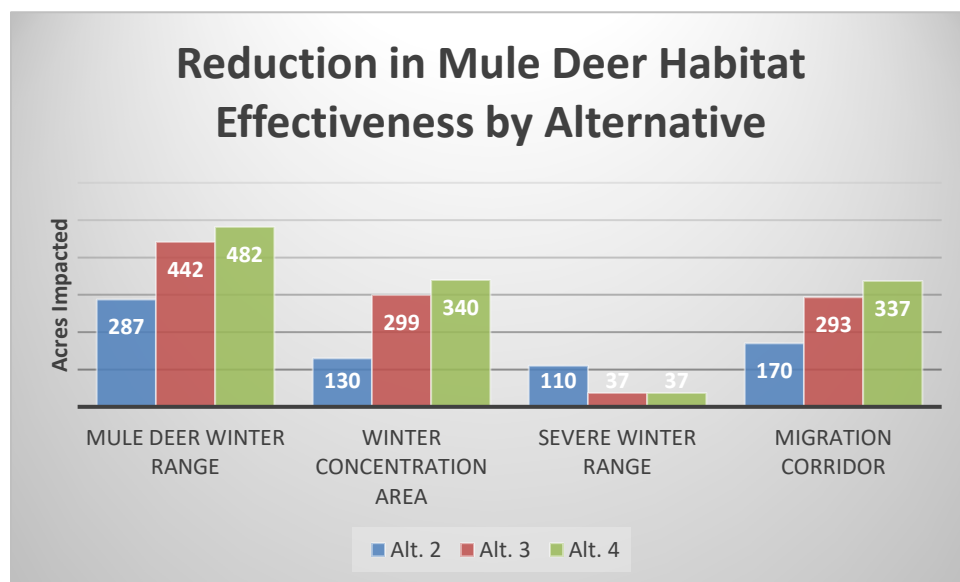
- *Reduced effectiveness of adjacent habitat from increased vehicle and recreation activity,*
- *Restricted migratory and daily movements from road maintenance activities,*
- *Increased injury and road-kill probabilities along access roads,*
- *Indirect residential development impacts would include habitat loss and the reduced effectiveness of surrounding habitats.*

Habitat Impacts from the Connected Action

Reduced Habitat Effectiveness

To quantify the effects of roads on the proposed action, the Berlaimont road analysis will follow the rationale supported by USFS 2016:

- *Mule Deer: Based on a .25 mile buffer from the edge of the roadway. This represents a midpoint for a group of ungulates for which the literature review identified a distance of between 150 and 490 meters, either side of road, as a disturbance tolerance threshold*
 - *This does not include the area below the intersection of FSR 780 and Beard Creek due to the existing condition of high year-round recreation use. As a result, the indirect effect of the proposed recreation trail, which would be in close proximity to the Berry Creek Trail (#2008) is not captured in this analysis.*
 - *This does not include the Berlaimont Estates parcel. It is assumed that development on this private parcel (i.e., the connected action) will result in a 680 acre reduction in habitat effectiveness (the size of the inholding), across all alternatives.*
 - *This assumes that 100% of the remaining area provides winter habitat (Table 3-16 and Figure 3-8).*

Figure 3-8. Visual comparison of alternatives and acres impacted.**Table 3-16. Reduction in Mule Deer Habitat Effectiveness by Alternative and Habitat Type (acres)**

Alternative	Within .25 mile of the roadway	Mule Deer Winter Range	Winter Concentration Area	Severe Winter Range	Migration Corridor
2	287	287	130	110	170
3	442	442	299	37	293
4	483	482	340	37	337

Considering the aforementioned disclaimers, the Alternative 2 access road would affect the least amount of mule deer habitat effectiveness on NFS land within 0.25 mile of all access roads, followed by Alternatives 3 and 4.

Private Berlaimont Development

Habitat effectiveness would also be reduced on and adjacent to the private parcel. The extent of this cannot be quantified precisely at the present time without a development proposal.

Residential clustering would occur, to a certain extent; however, it is likely that most areas of the private parcel and some adjacent NFS lands, including areas of mule deer winter range, winter concentration area habitat, mule deer severe winter range, and migration corridor habitat would be influenced by residential development.

Recreation Effects

The proposed recreation trail, which would be the same under all action alternatives, would occur in mule deer winter range and severe winter range and have the same additional displacing effects on deer as those described for elk.

Road Mortality

Road mortality is presented in detail in the elk section. The selected access road will present the same road-kill patterns and issues to deer as described for elk. There is currently no deer road mortality on project area roads, in part because the current roads are closed to motorized use (other than snowmobiles on FSR 774) during winter. Year-round road use under Alternatives 2–4, where no such use presently occurs and when larger numbers of deer are present in the project area, would increase deer road-kill probabilities. Mortality would most likely occur during migration and winter range occupancy (approx. Nov. 15 to Apr. 30) when most deer use occurs along the access road and roads on the private parcel.

With no measures annual road-kill mortality could reach 30-35 deer along the access road (B. Andree, CDOW, pers. comm., July 13, 2001). That level of mortality would likely have a measurable effect on herd numbers over time, unless CPW adjusted the GMU's harvest strategy to compensate. Project design criteria in Table 2-2 would likely lower this road-kill. If such measures were implemented, deer road-kill mortality associated with the Berlaimont project would likely be relatively low (e.g., on the order of 2 ungulates per year).

That estimate is based on a similar situation at Mountain Star, a largely built-out, 684-acre, 88-homesite subdivision at 8,600-9,200 feet, located 3 miles east (up valley) of the project area. In the last 22 years since development, there has been one documented elk road-kill and approximately 3–4 road-killed deer (J. Clark, Mountain Star Caretaker, pers. comm., Feb. 9, 2009, ca. Aug., 2015). At full buildout, Berlaimont would generate 214 vehicles per day in the summer compared to 889 vehicles per day at Mountain Star. Additionally, Mountain Star has two spanning bridges to facilitate north-south ungulate movements.

3.4.3.5 Summary of Berlaimont Project Effects on Mule Deer

Direct effects of constructing the access road and building residences and internal roads would result in a moderate loss of deer winter range, winter concentration area, severe winter range, transitional range, and migration corridor habitat. The greatest direct effect would be the restrictions and barriers imposed by the road and associated cut and fill and retaining walls on migratory and intra-winter range movements that without compensatory crossing opportunities would have appreciable negative effects on deer winter range availability, habitat effectiveness, road-kill, game damage, and herd numbers. As a barrier, the road could prevent mule deer from accessing winter range, not only in the project area, but also further down valley.

Reduced habitat effectiveness and habitat losses could displace wintering deer to other already occupied winter range (where resident animals in those areas would also be affected) and to unoccupied lower quality habitat that is not currently used as winter range. Game damage to residential landscaping in local, lower elevation subdivisions could increase. Overuse of winter range already at carrying capacity could have adverse, long-term impacts, further impairing the habitat's ability to support the existing number of animals. New human disturbances and increased barriers and restrictions to movements in a large area of deer winter range formerly closed to winter motorized use would force animals to move more frequently and move longer distances, through more difficult terrain (i.e., steeper and longer cut and fill slopes, extensive retaining walls, guard rails packed with plowed snow, etc.) requiring greater energy expenditures, and likely resulting in

additional winter-kill losses in this herd. Without road design mitigation, road-kill along the access road could be substantial.

Considering direct and indirect effects, Alternative 2 would have the lowest impact to mule deer winter and migration habitat types across NFS land, though it would result in increased use of cut and fill, guardrails, and retaining walls because it would cut across the ridgeline. Implementation of project design criteria in Table 2-2 will increase habitat permeability and thus reduce the potential population-level effect to the herd.

3.4.3.6 Cumulative Effects

Cumulative effects on deer would be the same as those presented for elk.

4.0 RECOMMENDED CONSERVATION MEASURES TO AVOID, MINIMIZE, OR MITIGATE ADVERSE EFFECTS

4.1 RECOMMENDED MEASURES

Identified in this section are actions that may be useful or desired but are not part of the proposed action evaluated above. The above determinations of effect could change if these recommended measures are subsequently incorporated into the project with the project decision.

4.1.1 Brewer's Sparrow

A tiered timing approach to construction, such as starting at the bottom of FSR 774, which does not contain any sagebrush habitat, to avoid nesting Brewer's sparrows, would not change the NLAA determination. However, this would reduce the possible abandonment of nests due to construction activities to nesting BRSP on NFS lands in the project area, and thus no Forest Plan Amendment would be needed.

4.1.2 Mule Deer and Elk

The following measures would minimize the collision-risk to deer and elk, in addition to what is indicated in Table 2-2. Further consideration of periodic speed enforcement and education, and an adaptive management approach to consider additional crossings or mitigation measures, should the number of deer and elk collisions per year along the project roads cause population-level concerns. In addition, avoidance of further trail development in this management area would reduce additional recreation impacts. Increased education from the WRNF regarding the effects of recreation on wintering deer and elk would also reduce the effects. These would not change the need for a Forest Plan amendment, but could aid in minimizing population-level impacts.

4.1.3 Beard Creek Spanning Bridge

Mule deer tracks and game trails were seen at the intersection of FSR 780 and Beard Creek in March, 2017 and in Google Earth. As this is the only perennial stream in the project area, it is important to maintain connectivity for deer and elk along this drainage. A spanning bridge that is wide enough to retain natural pathways on either side of the creek could allow for north-south movements along the drainage. However, given the estimated low number of vehicles per day, such a bridge is not warranted; rather other methods would help to lower the risk of vehicle collision and improve habitat for the E-12 and D-6 herds (Table 2-2).

4.2 RECOMMENDED MONITORING

It is recommended that physical habitat, fish, and macroinvertebrate stream health surveys be conducted in Berry Creek on a biennial basis.

5.0 RESOURCE MANAGEMENT DIRECTION CONSISTENCY ANALYSIS

This section considers applicable WRNF Forest-wide standards and guidelines (USFS 2002a) and management direction for Management Area 5.41 – Deer and Elk Winter Range, and MA 8.32 – Utility Corridors, as amended (USFS 2006 and 2008). Standards and guidelines applicable to the bluehead sucker, flannelmouth sucker, CRCT, northern goshawk, peregrine falcon, greater sage-grouse, and Brewer’s sparrow are considered in individual species’ accounts in Section 3.0, but their consistency analysis is summarized in Table 6-2. Applicable Watershed Conservation Practices Handbook direction is considered in Section 6.1.1 and in the DEIS Watershed section.

6.0 APPLICABLE WRNF FOREST-WIDE STANDARDS AND GUIDELINES

6.1 RESOURCES

6.1.1 Water and Riparian Resources

- ❖ *Standard 1. In each stream currently supporting a self-sustaining fish population, ensure that projects maintain sufficient habitat, including flow, for all life history stages of native and desired non-native aquatic species.*

Berry Creek is the lone project area stream supporting a self-sustaining fishery. Project BMPs and PDCs specifically designed to maintain stream health would reduce or eliminate additive sediment impacts related to project activities. The implementation of Alternatives 2–4 with project specific BMPs and PDC, would minimize potential, negative, road upgrading, road maintenance, and recreational effects on Berry Creek and be consistent with this management direction. As a result it is expected that cutthroat trout habitat in the affected portion of Berry Creek would be maintained in its existing condition.

- ❖ *Guideline 2. Keep vehicles and equipment out of streams, lakes, and wetlands except to cross at designated points, build crossings, do restoration work, or where protected by one foot of snowpack or frozen soil.*

Alternatives 2–4 would be consistent with this management direction. This direction is also found in WCP handbook Management Measure 3 and included in PDC.

6.1.2 Wildlife-General

- ❖ *Standard 1. Seasonal restrictions will be applied to reduce disturbance in key wildlife habitat.*

It is unclear what the precise definition and intent of “key” wildlife habitat was in the 2002 Forest Plan. For this analysis, it is assumed that term applies to deer and elk winter concentration areas and severe winter range polygons, as currently mapped by CPW, if not also deer and elk winter range. All potential (Alts. 2–4) access road segments would bisect deer and elk winter range, deer and elk winter concentration area polygons on NFS land (with the exception of elk WCA, under Alt. 2), and deer and elk severe winter range polygons (Figures 3-6 [elk] and 3-7 [deer]). Since the selected access

road would be open to motorized vehicle use by Berlaimont residents, disturbance of adjacent key wildlife habitat would be increased rather than reduced (although there would be a seasonal area closure, Table 2-2). There is no mitigation that could be implemented to make Alternatives 2–4 consistent with this standard. Therefore, Alternatives 2–4 would be inconsistent with this standard and a Forest Plan Amendment would be required for the Selected Alternative describing why this standard would be set aside for this project.

- ❖ *Standard 2. Restrict actions within 500 feet of cave and mine bat roosts to those that will not negatively alter the vegetative and structural characteristics of roosts or impede the movement of bats. When closing mines or caves in the course of establishing resource protection, or in response to safety concerns, minimize disturbance to resident or seasonal bat or other cave-dependent species endemic to the cave or mine and maintain microclimate conditions important to those species. Where bat concentrations are located outside of caves or mines, human disturbance will be managed to protect those populations.*

There are no known bat roosts, bat concentrations, or other structures potentially used by cave-dependent species in the Berlaimont project area that would warrant implementation of this standard.

- ❖ *Standard 3. Restrict the release of the location of bat roosts to administrative purposes only in order to minimize disturbance to roosting bats.*

There are no known bat roosts in the Berlaimont project area would warrant implementation of this standard.

- ❖ *Standard 4. Retain all snags and trees known to be used consistently as bat roosts.*

There are no snags or trees in the Berlaimont project area that are known to be used as bat roosts that would warrant implementation of this standard.

- ❖ *Standard 5. Protect known active and inactive raptor nest areas. The extent of protection will be based on a variety of factors. (The extent of the protection will be based on proposed management activities, human activities existing before nest establishment, species, topography, vegetation cover, and other factors. A non-disturbance buffer around active nest sites will be required from nest-site selection to fledging, generally March through July. Exceptions may occur when individuals are adapted to human disturbance.)*

There are no active or inactive raptor nests in the Berlaimont project area. Project design criteria (Table 2-2) are recommended for Alternatives 2–4 that would ensure consistency with this standard.

- ❖ *Standard 6. In riparian areas, vegetation cover will be managed to provide suitable wildlife habitat along a minimum of 80 percent of the length of riparian zones within the project area. New corridor interruptions will be spaced to minimize interruptions to habitat connectivity.*

All potential (Alts. 2–4) access road segments would result in a new road crossing through Beard Creek's and/or Thames Creek's riparian corridor. The affected riparian habitat varies by Alternative. Table 6-1 describes the length and percentage of riparian disturbance as it pertains to each alternative. Alternative 4 would affect the most riparian habitat of any alternative. However, the maximum disturbance would be less than 10% and would still provide 80% of the project area riparian habitat unaffected. The remainder of Beard, Thames, and Berry Creek's riparian corridors

on NFS lands would be unaffected by Alts. 2–4 and those alternatives would be consistent with this standard.

Table 6-1. Length and percentage of riparian disturbance for Alternatives 1–4

Alternative	Affected Riparian Length (miles)	Total Riparian Length in Project Area (miles)	Percent Affected	Consistent with Standard 6
1	0.007	13.4	<1%	Yes
2	0.1	13.4	<1%	Yes
3	0.5	13.4	4%	Yes
4	1.2	13.4	8.9%	Yes

- ❖ *Standard 7. Vegetation treatments and new roads and trails will not reduce the elk habitat effectiveness index below 0.40 [Mar., 2005 errata] by Data Analysis Unit (DAU), or further reduce effective habitat in DAUs that are already at or below 0.40 on National Forest lands.¹⁵*

Since the DAU is 626 miles, 250 miles (40%) are on the WRNF, the relatively small impacts considered by the proposed action would not measurably affect the index covering the entire DAU.

- ❖ *Standard 8. Discourage land use practices and development that adversely alter the character of peregrine falcon hunting habitat or prey base within ten miles of the nest site and the immediate habitats within one mile of the nesting cliff.*

Alternatives 2–4 would be consistent with this standard, as explained in the peregrine analysis.

- ❖ *Guideline 1. Structure such as fences, major highways, bridge upgrades or replacements, and canals should be designed and built taking wildlife movement into consideration.*

Limited fencing applicable to specific situations to reduce potential impacts to wildlife has been recommended by CPW as in Table 2-2. Any fencing, new bridges, and wildlife crossing structures associated with Alternatives 2–4 would be consistent with this guideline.

6.1.3 Sensitive Species

- ❖ *Standard 3. Activities will be managed to avoid disturbance to sensitive species that would result in a trend toward federal listing or loss of viability. The protection will vary depending on the species, potential for disturbance, topography, location of important habitat components, and other pertinent factors. Special attention will be given during breeding, young rearing, and other times that are critical to the survival of both flora and fauna.*

The effects to sensitive species from Alternatives 2–4 would not be severe or widespread enough that would result in a trend toward federal listing or loss of viability.

6.1.4 Species of Viability Concern, Aquatic

6.1.4.1 Colorado River Cutthroat Trout

Applicable Colorado River cutthroat trout standards and guidelines are addressed in Section 3.2.2.3. Alternatives 2–4 would be consistent with all applicable Colorado River cutthroat trout standards

and guidelines. The only project area stream/watershed that provides cutthroat trout habitat is Berry Creek.

- ❖ *Standard 1. For management activities that have the potential to impact occupied cutthroat trout habitat, tributaries of occupied cutthroat trout habitat, or identified reintroduction areas, maintain or enhance existing cutthroat trout habitat. At a minimum and where necessary: Reduce sediment from existing roads and trails; Maintain pool depths; Maintain riparian vegetation; Retain large woody debris in streams.*

The implementation of the proposed project for Alternatives 2–4 would require specific PDC and BMPs to reduce or eliminate additional sediment potentially contributed from construction activities and road maintenance. In addition, paving the existing dirt road along Berry Creek would reduce existing sediment impacts from a minimally maintained dirt road. As a result pool depths and sediment from existing roads and trails is expected to be maintained or reduced. Riparian vegetation or large woody debris would not be affected in Berry Creek. Alternatives 2–4 would be consistent with this Standard.

- ❖ *Standard 2. When implementing management activities in 6th field Hydrologic Unit Codes (sub-watersheds) containing cutthroat trout identified as recovery populations in the Colorado River Cutthroat Recovery Plan, maintain or reduce existing net density of roads (open or closed) to restore or prevent alteration of the hydrologic function of the sub- watershed. Temporary roads must be decommissioned upon project completion.*

No new roads are being proposed in the Berry Creek watershed. The proposed action uses existing roads in the Berry Creek watershed, therefore maintaining the net density.

Alternatives 2–4 would be consistent with this Standard.

- ❖ *Guideline 1. Restrict construction of new roads within 350 feet of occupied cutthroat streams or within 150 feet from the edge of the current or historic floodplain, whichever is greater, to maintain hydrologic function and limit road-related stream sediment.*

There are no new roads proposed in the Berry Creek watershed. Alternatives 2–4 would be consistent with this Guideline.

- ❖ *Guideline 2. Reroute roads adjacent to cutthroat trout streams and their tributaries, when possible, to reduce direct impacts to cutthroat habitat, or to improve hydrologic function.*

Due to the limited space between Berry Creek, the existing road, and steep hillsides, it is not possible to relocate the section of FSR 774 that is located in the Berry Creek watershed. Alternatives 2–4 would be consistent with this Guideline.

6.1.5 Species of Viability Concern, Terrestrial

6.1.5.1 Sage-grouse and Brewer's Sparrow

Applicable sage-grouse and Brewer's sparrow standards and guidelines are addressed in their respective sections. Alternatives 2–4 would not be consistent with all applicable WRNF management direction applicable to Brewer's sparrows.

6.2 FOREST-WIDE STANDARDS AND GUIDELINES CONSISTENCY ANALYSIS SUMMARY

Table 6-2 summarizes the WRNF Forest-wide standards and guidelines (USFS 2002b) consistency analysis for Alternatives 1–4 that are applicable to the resources considered herein. Alternative 1 would be consistent with all applicable Forest-wide standards and guidelines.

Alternatives 2–4 would be consistent with all applicable Forest-wide standards and guidelines except Wildlife-General Standard 1 and Sage Grouse and Brewer’s Sparrow Standard 4 (because of Brewer’s sparrows). There is no mitigation that could be implemented to make Alternatives 2–4 consistent with Standard 1. Road construction mitigation could be implemented to make Alternatives 2–4 consistent with Standard 4. A Forest Plan Amendment would be required for the Selected Alternative describing why a standard or standards would be set aside for this project.

Table 6-2. Alternatives 1–4 Consistency with WRNF Forest-Wide Standards and Guidelines				
Applicable Forest-Wide Standards and Guidelines	Alternative			
	1	2	3	4
Water and Riparian Resources				
Standard 1	C	C	C	C
Standard 4	C	N/A	N/A	N/A
Guideline 1	C	N/A	N/A	N/A
Guideline 2	C	C	C	C
Management Area 5.41				
Standard 2	C	C	NC	NC
Guideline 2	C	C	NC	NC
Wildlife-General				
Standard 1	C	NC	NC	NC
Standard 2	C	N/A	N/A	N/A
Standard 3	C	N/A	N/A	N/A
Standard 4	C	N/A	N/A	N/A
Standard 5	C	C	C	C
Standard 6	C	C	C	C
Standard 7	C	C	C	C
Standard 8	C	C	C	C
Standard 9	C	C	C	C
Guideline 1	C	C	C	C

Table 6-2. Alternatives 1–4 Consistency with WRNF Forest-Wide Standards and Guidelines				
Applicable Forest-Wide Standards and Guidelines	Alternative			
	1	2	3	4
Proposed, Threatened, Endangered Species and Sensitive Species				
Standard 2	C	C	C	C
Standard 3	C	C	C	C
Species of Viability Concern, Aquatic: Colorado River Cutthroat Trout				
Standard 1	C	C	C	C
Guideline 1	C	C	C	C
Guideline 2	C	C	C	C
Species of Viability Concern, Terrestrial: Sage-grouse and Brewer's Sparrow				
Standard 1	C	C	C	C
Standard 3	C	C	C	C
Standard 4	C	NC	NC	NC
Guideline 4	C	C	C	C
Notes: NC = Not Consistent; C = Consistent; N/A = Not Applicable. Source: USFS (2002a) and Western Ecosystems, Inc.				

6.3 MANAGEMENT AREA 5.41, DEER AND ELK WINTER RANGE

All potential access road segments on NFS land in the Berlaimont project area would occur in a 5.41 Management Area, Deer and Elk Winter Range. These areas are managed to provide adequate amounts of quality forage, cover, and solitude for deer, elk, and other species while on winter range. Standards and guidelines for this management area that are applicable to the resources considered herein include the following:

6.3.1 Biodiversity

- ❖ *Standard 1. Vegetation composition and structure are managed to meet the needs of deer, elk, and other species on their winter ranges within the constraints of the conservation of biological diversity and the maintenance and enhancement of sensitive habitats.*

Alternatives 2–4 would be consistent with this standard. While Alternatives 2–4 would result in negative effects to deer, elk, and other species on their winter ranges, ongoing habitat projects and mitigation associated with the proposed action, in the form of habitat restoration, would help manage the vegetation composition and structure to meet the needs of deer and elk.

6.3.2 Infrastructure

- ❖ *Standard 2. All new roads passing through this area will avoid important forage, cover, and birthing areas.*

Alternative 2 is consistent with this standard as there would be no new roads on NFS lands. On private land, Alternative 2 was designed to largely avoid elk severe winter range and to avoid elk winter concentration areas. Alternatives 3 and 4 would be inconsistent with this standard, as they are new roads that would both bisect an elk winter concentration area. Both Alternatives 3 and 4 would require a Forest Plan amendment.

- ❖ *Guideline 2. Avoid crossing these areas with new arterial¹⁶ and collector¹⁷ roads.*

Alternative 2 would be consistent with this guideline, as no collector road would be developed on NFS lands. Alternatives 3 and 4 would be inconsistent with this guideline because a collector road is required to service the connected 19-lot residential development.

6.3.3 Recreation

- ❖ *Guideline 1. Restrict recreation activities that would disturb deer and elk during winter and spring periods.*

For consistency with this guideline, the Forest Supervisor shall implement a human entry closure by special order between November 23 and May 20 annually to maximize big game winter range habitat effectiveness starting between the intersection of FSR 780 and FSR 778. This closure will continue from FSR 780 west to the National Forest boundary, FSR 778 north of the intersection of FSR 783, and FSR 783 southwest to the National Forest boundary. Access to the private parcel will be permitted for Berlaimont Estates residents (Table 2-2). Therefore, Alternatives 2, 3, and 4 would be consistent with this guideline.

6.3.4 Special Uses

- ❖ *Guideline 1. Discourage special uses that require access during winter and spring periods.*

The human entry seasonal closure described in Table 2-2 would discourage special uses that require access between November 23 and May 20 annually. Therefore, Alternatives 2, 3, and 4 would be consistent with this guideline.

6.3.5 Vegetation Management

- ❖ *Standard 2. Vegetation management will be designed to maintain or improve deer and elk habitat objectives.*

The proposed action is not a vegetation management project.

6.3.6 Wildlife

- ❖ *Guideline 1. Where trees and shrubs are sparse, and terrain is the primary factor providing cover, minimize human activity during periods when elk and deer are concentrated in the area.*

The human entry seasonal closure described in Table 2-2 would discourage special uses that require access between November 23 and May 20 annually. Therefore, Alternatives 2, 3, and 4 would be consistent with this guideline.

- ❖ *Guideline 2. Habitat management goals are developed in coordination with the Colorado Division of Wildlife and the owners of intermingled and adjacent private land to minimize resource conflicts on and off National Forest System lands.*

A wildlife management plan will be developed in coordination with the Forest Service, CPW, and wildlife stakeholders identified by the FS (Table 2-2). In addition, the WRNF encourages Berlaimont Estates to develop a comprehensive wildlife mitigation and enhancement plan in coordination with CPW and the WRNF to educate residents, guests, and contractors about important wildlife issues related to occupancy and habitation of the development (e.g., dog and pet controls, seasonal use restrictions [on- and off-site], big game winter range and migration issues, bears and trash disposal, fencing, landscaping, wildlife mortality on local roads, mountain lions, feeding wildlife, weed management, education, enforcement, water quality, etc.).

6.4 MANAGEMENT AREA 8.32, DESIGNATED UTILITY CORRIDORS – EXISTING AND POTENTIAL

6.4.1 Infrastructure

- ❖ *Guideline 1. Public access restrictions may be imposed within the corridor for health, safety, resource, or compatibility considerations.*

Restricting public recreation from areas west of Berry Creek valley's western ridgeline during big game winter range occupancy would be consistent with this guideline (Table 2-2). Otherwise, Alternatives 2–4 would be inconsistent with this guideline.

There are no other MA 8.32 standards or guidelines applicable to the aquatic and wildlife resources for Proposed Action components associated with Alternatives 2–4 in an existing designated utility corridor.

6.5 WRNF MANAGEMENT AREA DIRECTION CONSISTENCY ANALYSIS SUMMARY

Table 6-3 summarizes the WRNF management direction (USFS 2002b) consistency analysis for Alternatives 1–4.

Table 6-3. Summary of Alternatives 1–4 Consistency with Applicable WRNF Management Direction for Management Areas 5.41 and MA 8.32				
Management Area Applicable Forest Plan Direction	Alternative			
	1	2	3	4
MA 5.41, Deer and Elk Winter Range				
<i>Biodiversity</i>				
Standard 1	C	C	C	C
<i>Infrastructure</i>				
Standard 2	C	C	NC	NC
Guideline 1	C	C	C	C
Guideline 2	C	C	NC	NC
<i>Recreation</i>				
Guideline 1	NC	NC	NC	NC

Table 6-3. Summary of Alternatives 1–4 Consistency with Applicable WRNF Management Direction for Management Areas 5.41 and MA 8.32

Management Area Applicable Forest Plan Direction	Alternative			
	1	2	3	4
<i>Special Uses</i>				
Guideline 1	C	C	C	C
<i>Vegetation Management</i>				
Standard 2	N/A	N/A	N/A	N/A
<i>Wildlife</i>				
Guideline 1	NC	NC	NC	NC
Guideline 2	C	C	C	C
MA 8.32, Designated Utility Corridors – Existing and Potential: Infrastructure				
Guideline 1	C	NC	NC	NC
Notes: NC = Not Consistent; C = Consistent; N/A = Not Applicable. Source: USFS, 2002a USFS, 2002b and Western Ecosystems, Inc.				

7.0 LITERATURE CITED

- Altman, Bob and Rex Sallabanks. 2012. Olive-sided Flycatcher (*Contopus cooperi*), version 2.0. In *The Birds of North America* (P.G. Rodewald, editor). Cornell Lab of Ornithology, Ithaca, New York, USA. <https://doi.org/10.2173/bna.502>.
- Abrahams, M. V., & Kattenfeld, M. G. (1997). The role of turbidity as a constraint on predator-prey interactions in aquatic environments. *Behavioral Ecology and Sociobiology*, 40(3), 169-174.
- Andrews, R. and R. Righter. 1992. *Colorado birds: a reference to their distribution and habitat*. Denver Museum of Natural History. Denver, CO. 442 pp.
- Apronti, D., K. Ksaibati, K. Gerow, and J.J. Hepner. 2016. Estimating traffic volume on Wyoming low volume roads using linear and logistic regression methods. *Journal of Traffic and Transportation Engineering* 3: 493-506.
- Armstrong, D.M., J.P. Fitzgerald and C.A. Meaney. 2011. *Mammals of Colorado*, second edition. Denver Mus. Nature and Science and Univ. Press of Colorado. Boulder, CO. 620 pp.
- Beck, J.L., K.P. Reese, J.W. Connelly and M.B. Lucia. 2006. Movements and survival of juvenile greater sage-grouse in southeastern Idaho. *Wildl. Soc. Bull.* 34: 1070-1078.
- Beckmann, J.P., A.P. Clevenger, M. Huijser, and J.A. Hilty. 2010. *Safe Passages: Highways, Wildlife, and Habitat Connectivity*. Washington, DC: Island Press, 2010.

- Bisson, P. A., & Bilby, R. E. (1982). Avoidance of suspended sediment by juvenile coho salmon. *North American Journal of Fisheries Management*, 2(4), 371-374.
- Bowles, A.E. 1995. Responses of wildlife to noise. Pp. 109-156 in R.L Knight and K.J. Gutzwiller, eds. *Wildlife and recreationists: coexistence through management and research*. Island Press, Wash. D.C.
- Boyd, R.J. 1978. American elk. Pp. 11-29 in J.W. Schmidt and D.L. Gilbert. *Big game of North America*. Stackpole Books. Harrisburg, PA. 494 pp.
- Braun, C.E. 1985. Changes in sage grouse lek counts with advent of surface coal mining. *Proceedings Issues and Technology in the Management of Impacted Western Wildlife* 2:227– 231.
- Brown, C. L., Hardy, A. R., Barber, J. R., Frstrup, K. M., Crooks, K. R., & Angeloni, L. M. (2012). The effect of human activities and their associated noise on ungulate behavior. *PloS one*, 7(7), e40505.
- Burroughs Jr, E. R., Haber, D. F., Watts, F. J., & Kadoch, T. L. (1983). Measuring surface erosion on forest roads and estimating costs of erosion control--preliminary results (No. N908).
- Center for Environmental Quality (CEQ). 1997. Council on Environmental Quality. 1997. Considering cumulative effects under the National Environmental Policy Act. Council on Environmental Quality, Executive Office of the President. Wash., D.C. 64 pp.
- Chase, C.A., S.J. Bissell, H.E. Kingery, W.D. Graul, and M.B. Dillon. 1982. Colorado bird distribution latilong study. *Colorado Field Ornithol.* CDOW Denver, CO. 81 pp.
- Clinton, B. D., & Vose, J. M. (2003). Differences in surface water quality draining four road surface types in the southern Appalachians. *Southern Journal of Applied Forestry*, 27(2), 100-106.
- Colorado Division of Wildlife 1993. Appendix A, WRIS, mule deer seasonal activity areas, Feb. Colorado Div. Wildl. 2 pp.
- Colorado Greater Sage-grouse Steering Committee 2008. Colorado greater sage-grouse conservation plan. Colorado Division of Wildlife, Denver, Colorado, USA.
- CNHP 2009. Colorado Natural Heritage Program's Biodiversity Assessment of Arapaho and Roosevelt National Forest.
- CPW 2016. Berlaimont Estates Access Route EIS Scoping Comments. Referral letter from Perry Will (CPW) to Scott Fitzwilliams (WRNF Forest Supervisor). Glenwood Springs, CO. Nov. 7. 15 pp.
- Colorado Partners in Flight 2002. Land bird conservation plan, Physiographic Region 62: Southern Rocky Mountains. Rky. Mtn. Bird. Observ., Brighton, CO.
- Council on Environmental Quality 1997. Considering cumulative effects under the National Environmental Policy Act. Council on Environmental Quality, Executive Office of the President. Wash., D.C. 64 pp.

- Crawford, J.A. and E.C. Bolen 1976. Effects of lek disturbance on lesser prairie chickens. *Southwestern Naturalist* 21:238–240.
- CRCT Task Force 2001. Conservation agreement and strategy for Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) in the States of Colorado, Utah, and Wyoming. Colorado Division of Wildlife, Fort Collins. 87p.
- Dietrich, W. E., Wilson, C. J., Montgomery, D. R., & McKean, J. (1993). Analysis of erosion thresholds, channel networks, and landscape morphology using a digital terrain model. *The Journal of Geology*, 101(2), 259-278.
- Doherty, K.E., D.E. Naugle and B.L. Walker. 2010. Greater sage-grouse nesting habitat: the importance of managing at multiple scales. *J. Wildl. Manage.* 74: 1544–1553.
- Fausch, K.D., B.E. Reiman, M.K. Young, and J.B. Dunham. 2006. Strategies for conserving native salmonid populations at risk from nonnative fish invasions: tradeoffs in using barriers to upstream movement. Gen. Tech. Rep. RMRS-GTR-174. Fort Collins, CO: USDA Forest Service Rocky Mountain Research Station. 44 pp.
- Gabrielsen, G.W. and E.N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in R. L. Knight, and K. J. Gutzwiller, eds. *Wildlife and recreationists, coexistence through management and research*. Island Press, Washington, D.C.
- Grove, M. 2012. Aquatic species Biological Evaluation for the Sagebrush Enhancement Project, Eagle/Holy Cross Ranger District, White River National Forest, Eagle County, Colorado. USFS, Minturn, CO.
- Gunther, K.A., M.J. Biel and H.L. Robison 1998. Factors influencing the frequency of road- killed wildlife in Yellowstone National Park. pp. 395 to 405 in *Proceedings of the International Conference on Wildlife Ecology and Transportation*. Fort Myers, FL, Feb. 9 to 12, 1998.
- Hobbs, N.T. 1989. Linking energy balance to survival in mule deer; development and test of a simulation model. *Wildl. Mono.* 101.39pp.
- Hoffman, R.W., tech. ed. 2001. Northwest Colorado Columbian sharp-tailed grouse conservation plan. Northwest Colorado Columbian Sharp-tailed Grouse Work Group and Colorado Division of Wildlife, Fort Collins, CO.
- Hoffman, R.W. and A.E. Thomas. 2007. Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/columbiansharptailedgrouse.pdf> [date of access].
- Holmes, B. 2016. Greater sage-grouse (*Centrocercus urophasianus*). Pp. 118-119 in *Colorado breeding bird atlas*. Colorado Bird Atlas Partnership and Colorado Division of Wildlife. Denver, CO. 636 pp.

- Ingelfinger, F. and S. Anderson. 2004. Passerine response to roads associated with natural gas extraction in a sagebrush steppe habitat. *Western North American Naturalist*: Vol. 64: No. 3, Article 13.
- Jones, S.R. 2003. *Owls of Boulder County*. Boulder County Nature Assn., Boulder, CO. 51pp.
- Jones, J. A., Swanson, F. J., Wemple, B. C., & Snyder, K. U. (2000). Effects of roads on hydrology, geomorphology, and disturbance patches in stream networks. *Conservation Biology*, 14(1), 76-85.
- Kemp, P., Sear, D., Collins, A., Naden, P., & Jones, I. (2011). The impacts of fine sediment on riverine fish. *Hydrological processes*, 25(11), 1800-1821.
- Kimley-Horn and Associates, Inc., 2013. Traffic Analysis Letter, Berlaimont Estates, Eagle County, Colorado. Kimley-Horn and Associates, Inc., Denver, CO. Apr. 18.
- Knick, S.T., S.E. Hanser, R.F. Miller, D.A. Pyke, M.J. Wisdom, S.P. Finn, E.T. Rinkes and C.J. Henny. 2011. Ecological influence and pathways of land use in sagebrush. Chapt. 12 in Knick, S.T. and J.W. Connelly, eds. *Greater sage-grouse – ecology and conservation of a landscape species and its habitats*. *Studies in Avian Biology*: 38. Berkeley, CA. Univ. Calif. Press. Pp. 203– 251.
- Knight, R.L., and D.N. Cole. 1995. Wildlife responses to recreationists. Pages 51-69 in R. L. Knight, and K. J. Gutzwiller, eds. *Wildlife and recreationists, coexistence through management and research*. Island Press, Washington, D.C.
- Lambeth, R. 1998. Brewer's sparrow (*Spizella breweri*). Pp. 456-457 in Colorado breeding bird atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife. Denver, CO. 636 pp.
- Larson, C.L., S.E. Reed, A.M. Merenlender and Crooks, K.R. 2016. Effects of recreation on animals revealed as widespread through a global systematic review. *PLoS One* 11(12):e0167259. Doi:10.1371/journal.pone.0167259.
- Levad, R. 1998. Purple martin (*Progne subis*). Pp.3342-335 in Kingery, H., ed. 1998. Colorado breeding bird atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife. Denver, CO. 636 pp.
- Loft, E.R., J.W. Menke and J.G. Kie. 1991. Habitat shifts by mule deer: the influence of cattle grazing. *J. Wildl. Manage.* 55:16-26.
- Lorch, B. (1998). *Transport and aquatic impacts of highway traction sand and salt near Vail Pass, Colorado* (Master's thesis, Colorado State University).
- Lyon, A.G. and S.H. Anderson. 2003. Potential gas development impacts on sage grouse nest initiation and movement. *Wildl. Soc. Bull.* 31:486-491.
- Mao, J., J. Martens, J. Yost, P. Will, L. Sidener, J. Haskins, B. Andree, B. Wodrich, B. Manly, L. Miller, G. Abram, and Domson, D. 2009. D-8 State Bridge Deer Data Analysis Unit Plan, Game Management Units 15, 35, 36, and 45. Colorado Division of Wildlife, Glenwood Springs, CO. Sep. 10.

Mao, J., B. Andree, C. Wescoatt, K. Wright, M. Yamashita, and P. Will. 2013. Frying Pan River Elk Herd E-16 Data Analysis Unit Plan, Game Management Units 44, 45, 47, and 444. Colorado Parks and Wildlife, Glenwood Springs, CO. July 12.

McCorquodale, S.M. 2013. A brief review of the scientific literature on elk, roads, & traffic. Washington Department of Fish and Wildlife, Olympia, USA.

Metcalf, J. L., Love Stowell, S., Kennedy, C. M., Rogers, K. B., McDonald, D., Epp, J., ... & Martin, A. P. (2012). Historical stocking data and 19th century DNA reveal human-induced changes to native diversity and distribution of cutthroat trout. *Molecular Ecology*, 21(21), 5194-5207.

Milhous, R. T. (1998). Modelling of instream flow needs: the link between sediment and aquatic habitat. *Regulated Rivers: Research & Management: An International Journal Devoted to River Research and Management*, 14(1), 79-94.

Millhouser, P. 2019. Evaluating Landscape Connectivity and Habitat Fragmentation Effects on Elk in the Roaring Fork and Eagle Valleys. Draft. Rocky Mountain Wild, Denver.

Montgomery, R. A., G.J. Roloff, and J.J. Millspaugh. 2013. Variation in elk response to roads by season, sex, and road type. *The Journal of Wildlife Management*, 77(2), 313-325.

NatureServe 2016. An online encyclopedia of life [web application]. Arlington, Virginia, USA: Association for Biodiversity Information. Available: <http://www.natureserve.org/>.

Northern Eagle/Southern Routt Greater Sage-Grouse Work Group. 2004. Northern Eagle/Southern Routt Greater Sage-Grouse Conservation Plan. Colorado Division of Wildlife, Denver, CO.

Osmundson, D. B. (2001). Flow regimes for restoration and maintenance of sufficient habitat to recover endangered Razorback Sucker and Colorado Pikeminnow in the upper Colorado River: Interim recommendations for the Palisade-to-Rifle reach (No. 74). Colorado River Fishery Project, US Fish and Wildlife Service.

Osmundson, D. B., Nelson, P., Fenton, K., & Ryden, D. W. (1995). Relationships between flow and rare fish habitat in the 15-mile reach of the Upper Colorado River. Final Report. US Fish and Wildlife Service, Grand Junction, Colorado.

Polfus, J., D. Fischer, and J. Vore. 2011. Literature Review And Synthesis Of The Effects Of Residential Development On Ungulate Winter Range In The Rocky Mountain West.

Intermountain Journal of Sciences, 17(1-4), 60.

Reed, D.F., T.N. Woodard, and T.M. Pojar. 1975. Behavioral response of mule deer to a highway underpass. *J. Wildl. Manage.* 39:361-367.

Rees, D.E., J.A. Ptacek, and W.J. Miller. 2005. Roundtail chub (*Gila robusta robusta*): a technical conservation assessment. Report prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project, Lakewood, CO. 27 pp.

- Reid, L. M., & Dunne, T. (1984). Sediment production from forest road surfaces. *Water Resources Research*, 20(11), 1753-1761.
- Remington, T.E. and C.E. Braun. 1991. How surface coal mining affects sage grouse, North Park, Colorado. *Proceedings Issues and Technology in the Management of Impacted Western Wildlife* 5:128–132.
- Richmond, M.L., L.R. DeWeese, and R.E. Pillmore. 1980. Brief observations on the breeding biology of the flammulated owl in Colorado. *Western Birds*. 11:35-46.
- Rottenberry, J.T., M.A. Patten, and K.L. Preston. 1999. Brewer's Sparrow (*Spizella breweri*), version 2.0 in *The Birds of North America* (P.G. Rodewald, editor). Cornell Lab of Ornithology, Ithaca, New York, USA. <https://doi.org/10.2173/bna.390>.
- Scott, J., D.M. Armstrong, S.J. Bissell, J. Freeman, and B. Lengas. 1984. The bats of Colorado. Colorado Division of Wildlife, Denver. 23 pp.
- SE Group 2017. Study plan for the Berlaimont Estates Access Route Environmental Impact Statement. SE Group, Frisco, CO. Sep.
- Shirk, A.J., M.A. Schroeder, L.A. Robb, and Cushman S.A. 2015. Empirical validation of landscape resistance models: insights from the greater sage-grouse (*Centrocercus urophasianus*). *Land. Ecol.* 30:1837-1850.
- Staples, J. M., Gamradt, L., Stein, O., & Shi, X. (2004). Recommendations for winter traction materials management on roadways adjacent to bodies of water. Montana Department of Transportation.
- Stubblefield, C. H., K.T. Vierling, and M.A. Rumble. 2006. Landscape-scale attributes of elk centers of activity in the central Black Hills of South Dakota. *Journal of Wildlife Management*, 70(4), 1060-1069.
- Stiver, S.J., A.D. Apa, J.R. Bohne, S.D. Bunnell, P.A. Deibert, S.C. Gardner, M.A. Hilliard, C.W. McCarthy, and Schroeder, M.A.. 2006. Greater Sage-grouse Comprehensive Conservation Strategy. Western Association of Fish and Wildlife Agencies. Unpubl. Rep. Cheyenne, WY.
- Taylor, A.R. and Knight, R.L. 2003. Wildlife responses to recreation and associated visitor perceptions. *Ecol. Appl.* 13:951–963.
- Thompson, K. G., and Z. E. Hooley-Underwood. 2019. Present Distribution of Three Colorado River Basin Native Non-game Fishes, and Their Use of Tributary Streams. Colorado Parks and Wildlife Technical Publication 52.
- Trombulak, S. C., & Frissell, C. A. (2000). Review of ecological effects of roads on terrestrial and aquatic communities. *Conservation biology*, 14(1), 18-30.

USFS 2016. Terrestrial Wildlife Habitat Accomplishment Reporting Procedures. United States Forest Service. Prepared by National and Regional Wildlife Staff. Revised December 8, 2016.

USEPA 1999. Consideration of cumulative effects in EPA review of NEPA documents. U.S. Environmental Protection Agency Off. Fed. Activities. Wash., D.C. 18 pp.

USFS 2002a. Land and Resource Management Plan-2002 revision for the White River National Forest. Glenwood Springs. CO.

USFS 2002b. Final environmental impact statement, Volume 1, for the White River National Forest Land and Resource Management Plan 2002 revision. White River National Forest, Glenwood Springs. CO.

USFS 2002c. Final environmental impact statement, Volume 3, for the White River National Forest Land and Resource Management Plan 2002 revision (Appendices B-M and P-Q). White River National Forest, Glenwood Springs. CO.

USFS 2002d. Final environmental impact statement, Volume 4, for the White River National Forest Land and Resource Management Plan 2002 revision (Biological Evaluation). White River National Forest, Glenwood Springs. CO.

USFS 2006. Decision notice & finding of no significant impact, Forest Plan Amendment 02, alpine and roadless standards and guidelines. USDA Forest Service, White River National Forest, Glenwood Springs, CO. Jan.

USFS 2011. White River National Forest Travel Management Plan Final Environmental Impact Statement, Eagle, Garfield, Gunnison, Mesa, Moffat, Pitkin, Rio Blanco, Routt, Summit Counties, Colorado USDA Forest Service, Glenwood Springs, CO. March.

Vaa, T., 2004. Implementation of New Sanding Method in Norway. SNOW04-025. Sixth International Symposium on Snow Removal and Ice Control Technology. Transportation Research Circular E-C063: Snow and Ice Control Technology. June 2004. pp. 473-486.

Visintin, C., R. Van der Ree, and McCarthy M.A. 2016. A Simple Framework for a complex problem? Predicting wildlife-vehicle collisions. *Ecology and Evolution* 6(17): 6409-6421.

Ward, A.L. and Cupal, J.J. 1979. Telemetered heart rate of three elk as affected by activity and human disturbance. Pp. 47-56 in K. Downing, ed. Symp. On dispersed recreation and natural resource management. Utah State Univ. Logan, UT.

Way, A.E. 2016. Purple martin (*Progne subis*). Pp.382-383 in The second Colorado breeding bird atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife. Denver, CO. 727 pp.

Wickersham, L. E. (2016). The Second Colorado Breeding Bird Atlas. Colorado Bird Atlas Partnership.

Woodling, J. and J. Ketterlin. 2002. Annual biological monitoring of the Eagle Mine Superfund site, Eagle County, Colorado in 2001. Report prepared for the State of Colorado.

Yarnell, S. M., Mount, J. F., & Larsen, E. W. (2006). The influence of relative sediment supply on riverine habitat heterogeneity. *Geomorphology*, 80(3-4), 310-324.

Young, M. K., & Harig, A. L. (2001). A critique of the recovery of greenback cutthroat trout. *Conservation Biology*, 15(6), 1575-1584.

Young, Michael K., R. Nick Schmal, Thomas W. Kohley, and Victoria G. Leonard. 1996. Conservation Status of Colorado River cutthroat trout. General Technical Report RM-GTR-282. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 32 p.

8.0 APPENDICES

8.1 CUMULATIVE EFFECTS

8.1.1 Past, Present, Reasonably Foreseeable, and Reasonably Certain Projects

The following specific past, present, reasonably foreseeable, and reasonably certain projects have been identified by the Forest Service as projects relevant for analysis in Alternatives 1-4 from a cumulative effects context (Table 8-1). Most of these projects have been approved and are part of the environmental baseline considered, if not mentioned, above under individual species accounts. Approved, but unimplemented components of those projects are considered to have been implemented and part of the environmental baseline that may be further affected by Alternatives 2-4. Not all resources and species considered herein will be affected by all of these projects. Detailed descriptions of those approved projects are provided in the technical and NEPA documents that are incorporated herein by reference and summarized below. Additional effects of reasonably foreseeable projects are considered above under individual species accounts based on the best available information for each project. Projects are on NFS lands, unless otherwise noted.

Table 8-1. Cumulative Effects Matrix for Those Past, Present, Reasonably Foreseeable, and Reasonably Certain Projects Considered, If Not Described, Above Under Individual Species Accounts

Project	Project Location (Straight Line Distance to Berlaimont Property)	Project Description	Project Approval/ Implementation	Project Area (acres)
Edwards Area Community Plan	0–8 miles	The community plan is intended to work as an extension of the Eagle County Comprehensive Master Plan, providing planners, officials, land-owners and developers with policies and strategies to help formulate land use plans and guide decision making over the course of the next five to ten years.	Implemented February 2017	N/A
2010 HT 1 Hazard Tree Clearing	4–8.5 miles	A hazard tree removal project for beetle-killed pines; goals were to reduce wildfire fuels and to minimize dangers associated with falling trees.	Implemented 2010	309 acres
2010 Red Sandstone Hazard Tree Clearing	10–13.5 miles	A hazard tree removal project for beetle-killed pines; goals were to reduce wildfire fuels and minimize dangers associated with falling trees.	Implemented 2010	206 acres
2011 HT 9 Lost Lake Road and Trail Clearing	11–12.5 miles		Implemented 2011	202 acres
2012 HT 16 FSRs 734–744 Hazard Tree Clearing	4–6.5 miles	A hazard tree removal project for beetle-killed pines; goals were to reduce wildfire fuels and to minimize dangers associated with falling trees.	Implemented 2012	191 acres
2013 HT 26 RMEF Sagebrush Mowing			Implemented 2013	118 acres
2013 Indian Creek Salvage Timber Sale, Clearcut with Reserves	9–10 miles	A project to commercially harvest beetle-killed pines to reduce wildfire fuels.	Implemented 2013	484 acres
2015 Moniger Park Salvage Timber Sale, Clearcut with Reserves	6.5–7 miles	A project to commercially harvest beetle-killed pines to reduce wildfire fuels.	Implemented 2015	333 acres
2016 Piney Salvage Timber Sale, Clearcut with Reserves		A project to commercially harvest beetle-killed pines to reduce wildfire fuels.	Implemented 2016	471 acres

Table 8-1. Cumulative Effects Matrix for Those Past, Present, Reasonably Foreseeable, and Reasonably Certain Projects Considered, If Not Described, Above Under Individual Species Accounts

Project	Project Location (Straight Line Distance to Berlaimont Property)	Project Description	Project Approval/ Implementation	Project Area (acres)
2013 Berry Creek Sagebrush Enhancement Project	1–3.5 miles	A study of the effects of sagebrush treatments on the bird community.	Implemented 2013	168 acres
Realignment of trails near FSR 774 and FSR 780	0–3 miles	Trails realigned to improve their sustainability.	Foreseeable	
2011 White River National Forest Travel Management Plan Final Environmental Impact Statement and Record of Decision (WRNF Travel Management Plan)	0–3 miles	Designated the winter and summer travel patterns for FSR 774, FSR 780, and surrounding terrain.	Implemented 2011 (Amendment or exemption may be required in the ROD for this project depending on selected alternative)	Forest-wide
Proponent request to swap winter motorized access on FSR 774 for FSR 779	0–4.5 miles	Town of Avon and the Powderhounds Snowmobile club may plow and groom a new alignment of FSR 779 to connect it to the groomed snowmobile system on FSR 734.	Foreseeable	2.5 miles
Sagebrush Enhancement Project	1–2 miles	A sagebrush habitat augmentation project. Four treatment units adjacent to FSR 790 and FSR 717.1A were mowed; Vegetation component changed from a sagebrush over-story with little understory to a predominantly grass and forb component, and caused a reduction in sagebrush cover and the height of sagebrush considered suitable for habitat of BRSP (Brewer's Sparrow) and GRSG (Greater Sage-Grouse).	Implemented 2012	120 acres
Competitive or Direct Sale of Four Forest Service Administrative Parcels in Eagle County		Competitive sale to the public or direct sale to Eagle County of four Forest Service administrative use parcels.	Foreseeable	8.48 acres
EagleVail Trail Extension Project CE	7–8.5 miles	Construction of a non-motorized trail that would connect the Stone Creek Trail to the Meadow Mountain Trail and make other minor trail adjustments in the vicinity.	Under Analysis	3.7 miles

Table 8-1. Cumulative Effects Matrix for Those Past, Present, Reasonably Foreseeable, and Reasonably Certain Projects Considered, If Not Described, Above Under Individual Species Accounts				
Project	Project Location (Straight Line Distance to Berlaimont Property)	Project Description	Project Approval/ Implementation	Project Area (acres)
Hardscrabble Project EA	11–18 miles	Implementation of vegetation management activities in the Hardscrabble area. Potential treatments include clearcuts, pre- commercial thinning, patch clearcut, salvage and overstory removal.	Expected January 2018	1,682 acres
FY18 Eagle-Holy Cross Ranger District Outfitter Guide Permit Reissuance CE	N/A	The Forest Service is considering reissuing eight expiring outfitter/guide priority permits, extending one probationary two-year priority use permit, and renewing one priority use permit.	Expected November, 2017	N/A
Edwards Medical Center PUD Amendment	1–3 miles	Two operating rooms will be added to the Edwards Surgery Center.	Ongoing	2,855 square feet
Stillwater Zone Change	2–4 miles	Three existing, aging homes would be replaced with a new affordable housing neighborhood that would consist of a 21- unit residential enclave. These residences are intended to provide quality housing opportunities for the local workforce.	Ongoing	3 acres