

Table of Contents

- [1. Introduction](#)
- [2. Climate Impact Analysis](#)
- [3. Extreme Weather Resilience](#)
- [4. Roads and Road Building](#)
- [5. Logging on Steep Slopes](#)
- [6. Riparian Mapping](#)
- [7. Findings of No Impact](#)
- [8. Long-term Actions and Timeline](#)
- [9 Economic Analysis and Cost Estimates](#)
- [10 Monitoring and Reporting](#)
- [11. Monitoring, Reporting, and Accountability](#)
- [12. Success Criteria, Adaptive Management, and Lessons Learned](#)
- [13. Prioritization of Actions](#)
- [14. Limited Range of Alternatives](#)
- [15. Wildlife Habitat Considerations Focus on Bear and Deer](#)
- [16. Basal Area Retention and Logging Intensity](#)
- [17. Conclusion](#)

1. Introduction

This document provides detailed comments on the Lickstone Project Draft Environmental Assessment (EA). While the EA demonstrates significant effort in planning and analysis, several areas require further consideration and clarification. These comments aim to highlight these areas and provide constructive feedback to improve the overall project plan and its environmental assessment.

The Lickstone Project proposes a variety of vegetation management activities on 2,711 acres of National Forest System Lands in the Pisgah National Forest. Proposed activities include commercial and non-commercial timber harvest, prescribed fire, and habitat improvement (EA, p. 1). The project area is located in Haywood County on the Pisgah Ranger District of the National Forests in North Carolina, approximately 25 miles southwest of Canton, NC, near Lake Logan (EA, p. 1).

The EA states that the purpose of this project is to "move conditions in the project area toward those set out in goals, objectives, and desired conditions of the 2023 Nantahala and Pisgah

National Forests Final Land Management Plan (Forest Plan)" (EA, p. 3). The focus is on ecosystem restoration, forest management, and terrestrial and aquatic habitat improvement.

While these goals are commendable, our review has identified many areas where the EA's analysis falls short or requires further clarification. The following sections detail these concerns and provide recommendations for improvement.

2. Climate Impact Analysis

The current analysis of climate impacts in the EA is insufficient, particularly regarding a full life-cycle accounting of carbon costs. A comprehensive assessment should include:

- Carbon sequestration lost from harvested trees
- Emissions from logging equipment and transportation
- Carbon release from soil disturbance
- Long-term carbon sequestration potential of different management strategies

The EA provides the following analysis and conclusions regarding climate impacts:

a. Analysis Scope:

- The effects analysis area for carbon includes forested lands within the Pisgah and Nantahala National Forests.
- The timeframe for the analysis is 20 years. (EA, p. 37)

b. Current Conditions:

- Forest carbon stocks have increased by about 18% between 1990 and 2020.
- Over 80% of the stands are middle-aged and older (greater than 80 years).
- Timber harvest has affected less than 0.25% of the forested area annually from 1990 to 2011. (EA, p. 37)

c. Proposed Action:

- The project includes timber harvesting and prescribed burning on approximately 2,838 acres.
- This affects about 0.05% of the Pisgah National Forest's 512,578 acres. (EA, p. 38)

d. Carbon Impacts:

- The EA states that the proposed action would have a minor impact on carbon stocks.

- It focuses on aboveground carbon in live woody vegetation (49% of total ecosystem carbon stocks).
- The EA suggests that soil carbon (31% of stocks) would see negligible loss from the proposed activities. (EA, p. 38)

e. Emissions:

- The EA calculates potential emissions from prescribed burning to be between 33-49 tons total.
- It states this would be a 3.2-4.7% increase in county-level emissions, and less than 0.1% increase in state-wide emissions. (EA, p. 21)

f. Long-term Effects:

- The EA suggests that any initial carbon emissions would be temporary and offset by forest regrowth.
- It argues that the proposed actions may reduce the risk of more severe disturbances (like insect outbreaks or wildfires) that could result in greater carbon losses. (EA, p. 39)

g. Conclusions:

- The EA concludes that the project would make an "extremely small direct contribution to overall emissions."
- It states that no short-term or long-term direct, indirect, or cumulative significant adverse effects to air quality are expected. (EA, p. 22)

Issues:

1. Inappropriate Scale of Analysis:

The EA's use of all forested lands in the Pisgah and Nantahala National Forests as the effects area for carbon analysis is problematic for several reasons:

a. Dilution of Impact: By using such a large area (512,578 acres) as the baseline, the EA artificially minimizes the apparent impact of the project. The project's 2,838 acres represent only 0.05% of this large area, making the effects seem negligible.

b. Lack of Site-Specific Analysis: The broad scale fails to account for site-specific factors in the Lickstone Project area that could influence carbon dynamics, such as:

- Local soil types and their carbon storage capacity
- Specific forest compositions and age structures in the project area
- Unique topographical features that might affect carbon cycling

c. Misalignment with Project Scope: The analysis scale is inconsistent with the localized nature of the proposed actions. A more appropriate scale would focus on the project area and its immediate surroundings.

d. Potential Violation of NEPA Requirements: The National Environmental Policy Act (NEPA) requires a "hard look" at environmental impacts. Using an overly broad scale of analysis may fail to meet this standard by obscuring local impacts.

Recommendation: The Forest Service should revise the climate impact analysis to focus specifically on the 2,838 acres of the Lickstone Project area and its immediate vicinity. This would provide a more accurate assessment of the project's true carbon and climate impacts.

2. Misinterpretation of Current Conditions:

The EA's presentation of current conditions regarding forest carbon stocks is problematic and potentially misleading:

a. Undervaluing Ongoing Sequestration: While the EA notes an 18% increase in forest carbon stocks between 1990 and 2020, it fails to emphasize the critical ongoing role of these forests in carbon sequestration.

b. Mischaracterization of Forest Age: The EA describes 80% of stands as "middle-aged and older (greater than 80 years)," implying these forests are nearing the end of their carbon sequestration potential. This is inaccurate:

- Many tree species in the Southern Appalachians can live for centuries and continue sequestering carbon well beyond 80 years.
- Older forests often sequester carbon at higher rates than younger forests due to their larger biomass [Citation needed].

c. Inappropriate Focus on Past Harvest Levels: The EA's mention of low historical harvest rates (less than 0.25% annually) seems to imply a need for increased harvesting. This logic is flawed:

- Low harvest rates should be seen as a positive factor for carbon sequestration, not a justification for increased harvesting.
- The focus should be on maximizing the forests' natural carbon sequestration potential, not on timber production metrics.

d. Neglect of Forest Potential: The EA fails to consider the long-term carbon sequestration potential of these forests if left undisturbed:

- Studies show that old-growth forests continue to be net carbon sinks [Citation needed].

- The transition from middle-aged to old-growth forests represents a significant opportunity for increased carbon storage.

Recommendation: The Forest Service should revise this section to:

- Emphasize the ongoing and future carbon sequestration potential of these forests.
- Provide a more accurate characterization of forest age in relation to carbon sequestration potential.
- Present low historical harvest rates as a positive factor for climate mitigation.
- Include analysis of the long-term carbon sequestration potential if the forests are allowed to mature further.

3. Inadequate Long-term Accounting and Future Harvest Projections:

The EA's analysis of proposed actions and their climate impacts is insufficient due to its limited scope and lack of long-term projections:

a. Incomplete Accounting of Proposed Actions:

- While Table 1 in the EA lists Treatment Acres and Acres of Primary Treatment, it fails to account for areas being prepared for future harvests.
- This omission significantly underestimates the total area that will be impacted by logging activities over time.

b. Insufficient Timeframe:

- The 20-year analysis timeframe is inadequate given the long-term nature of forest carbon dynamics and climate change impacts.
- This short-term view fails to capture the full extent of planned harvesting activities and their cumulative effects on carbon stocks.

c. Lack of Future Harvest Projections:

- The EA does not provide projections for future harvest levels in areas currently being prepared for logging.
- Without this information, it's impossible to accurately assess the long-term carbon impacts of the project.

d. Misalignment with Climate Change Timelines:

- As atmospheric carbon continues to rise and climate change worsens, a longer-term perspective (30-50 years) is crucial for understanding the project's true impact on climate mitigation efforts.

e. Failure to Consider Changing Climate Conditions:

- The analysis does not account for how changing climate conditions over the next several decades might affect forest growth rates and carbon sequestration potential.

Recommendation: The Forest Service should revise the climate impact analysis to:

- Provide a comprehensive accounting of all areas being prepared for future harvest, including projected timelines for these harvests.
- Extend the analysis timeframe to at least 50 years to align with climate change projections and capture long-term forest carbon dynamics.
- Include detailed projections of future harvest levels based on current management plans and silvicultural treatments.
- Incorporate climate change scenarios to assess how changing conditions might affect forest growth and carbon sequestration rates over the extended timeframe.
- Provide a cumulative carbon impact assessment that includes both current and projected future harvests over the 50-year timeframe.

6. Incomplete Carbon Impact Assessment:

The EA's analysis of carbon impacts is severely limited and potentially misleading due to its narrow focus and omission of key factors:

a. Overemphasis on Aboveground Carbon:

- The analysis primarily focuses on aboveground carbon in live woody vegetation, which represents only 49% of total ecosystem carbon stocks.
- This approach ignores or minimizes other crucial carbon pools and fluxes.

b. Underestimation of Soil Carbon Impacts:

- The EA suggests that soil carbon (31% of stocks) would see negligible loss from the proposed activities.
- This assertion is questionable given the extent of ground disturbance associated with harvesting and other treatments.
- Research indicates that logging operations can significantly impact soil carbon through disturbance, erosion, and changes in soil microclimate [Citation needed].

c. Omission of Full Lifecycle Carbon Accounting:

The EA fails to account for numerous sources of carbon emissions associated with logging and wood processing, including:

- Emissions from logging machinery during operations
- Fuel consumption by trucks transporting logs to mills

- Energy use and emissions from lumber milling processes
- Transportation emissions from mills to subsequent processing locations, often overseas
- Emissions associated with further processing and manufacturing of wood products

d. Potential Underestimation of Total Carbon Cost:

- By ignoring these additional sources of emissions, the EA likely captures less than half of the actual full lifecycle carbon cost of the proposed activities.
- This significant underestimation could lead to flawed decision-making regarding the project's climate impacts.

e. Lack of Consideration for Carbon Leakage:

- The analysis does not address the potential for carbon leakage, where reduced timber production in one area may lead to increased harvesting elsewhere, potentially in areas with less stringent environmental regulations.

Recommendation: The Forest Service should conduct a comprehensive, full lifecycle carbon impact assessment that:

- Includes a thorough analysis of impacts on all forest carbon pools, including soil carbon.
- Accounts for all emissions associated with logging operations, transportation, and wood processing.
- Considers the potential for carbon leakage and its implications for global carbon emissions.
- Provides a comparison of the total lifecycle carbon impacts of the proposed actions versus leaving the forest undisturbed.
- Utilizes standardized lifecycle assessment methodologies to ensure accuracy and comparability [e.g., ISO 14040 and 14044].

7. Unsupported Conclusion of No Significant Impact:

Given the numerous shortcomings in the EA's climate impact analysis, its conclusion of no significant impact is unsupported and potentially misleading:

a. Inadequate Analytical Basis:

- The EA's conclusion relies on an incomplete and flawed analysis that fails to consider crucial aspects of the project's carbon impacts.
- The omission of full lifecycle carbon accounting, long-term harvest projections, and comprehensive soil carbon impacts undermines the validity of this conclusion.

b. Failure to Meet NEPA Requirements:

- The National Environmental Policy Act (NEPA) requires federal agencies to take a "hard look" at the environmental consequences of their proposed actions.
- The superficial and incomplete nature of the EA's climate analysis falls short of this standard, potentially violating NEPA requirements.

c. Disregard for Scientific Consensus:

- The EA's conclusion appears to disregard the scientific consensus on the critical role of forests in climate mitigation and the importance of maintaining and enhancing forest carbon stocks.
- This approach is inconsistent with current climate science and forest management best practices.

d. Lack of Precautionary Principle Application:

- Given the gravity of the climate crisis, the EA should err on the side of caution when assessing potential impacts.
- The conclusion of no significant impact fails to apply this precautionary principle, potentially underestimating the project's climate risks.

e. Insufficient Consideration of Cumulative Impacts:

- The EA does not adequately consider how this project, in combination with other forest management activities and broader climate trends, might cumulatively impact regional and global climate mitigation efforts.

Recommendation: The Forest Service should:

1. Withdraw the conclusion of no significant impact regarding climate effects.
2. Conduct a comprehensive, scientifically rigorous climate impact analysis that addresses all the concerns raised in this comment paper.
3. Reassess the project's potential climate impacts based on this more thorough analysis, including consideration of cumulative effects.
4. If significant impacts are identified, as seems likely given a more comprehensive analysis, develop and evaluate alternatives that minimize these impacts.
5. Consider preparing a full Environmental Impact Statement (EIS) rather than an EA, given the potential for significant climate impacts.

Conclusion: The current EA falls well short of the necessary due diligence and scientific analysis required by NEPA, particularly concerning climate impacts. Given the critical importance of forests in climate mitigation and the increasing urgency of the climate crisis, a much more thorough and scientifically grounded analysis is essential before any conclusion about the project's climate impacts can be drawn.

3. Extreme Weather Resilience

The EA fails to adequately address the region's specific vulnerabilities to extreme weather events, particularly in the context of the proposed logging and road-building activities:

3.1 Vulnerability to Extreme Weather Events

a. Regional Characteristics:

- Pisgah National Forest is characterized as a temperate rainforest, with some areas receiving 80" to over 100" of rainfall annually.
- The region is prone to extreme rain events, with rainfall rates sometimes reaching 4-6" per hour for extended periods.
- The steep terrain and soil composition make the area highly susceptible to landslides and flash flooding.

b. Historical Impacts:

- The region has a documented history of landslides resulting in significant loss of life and property.
- In recent years, the Forest Service has spent several million dollars repairing damage from extreme weather events.

The EA does not provide a comprehensive analysis of these regional characteristics or historical impacts in relation to the proposed project activities.

3.2 Inadequate Consideration of Project Impacts on Resilience

The EA does not sufficiently analyze how the proposed activities may exacerbate the area's vulnerability to extreme weather events:

a. Road-related Risks:

- Roads in steep terrain are particularly problematic, being both prone to slides and often contributing to slides by altering water flow patterns.
- The EA does not adequately assess how proposed road construction and improvements may increase landslide risks.

b. Logging Impacts on Slope Stability:

- Logging activities remove canopy cover and root mass, both critical factors in mitigating the impact of extreme rainfall.
- The EA fails to provide a comprehensive analysis of how the proposed logging may affect slope stability and increase landslide risks.

c. Cumulative Effects:

- The EA does not sufficiently consider the cumulative effects of logging, road construction, and increased extreme weather events on overall landscape resilience. 3.3 Insufficient Mitigation Strategies

The EA lacks robust strategies to address the increased risks associated with extreme weather events:

a. Absence of Climate-adaptive Planning:

- There is no evidence of climate-adaptive planning that considers future increases in extreme weather frequency and intensity.

b. Inadequate Risk Assessment:

- The EA does not include a comprehensive risk assessment that considers the likelihood and potential impacts of extreme weather events on proposed project areas.

Recommendation: The Forest Service should:

1. Conduct a detailed vulnerability assessment of the project area, considering current and projected extreme weather patterns.
2. Provide a comprehensive analysis of how proposed logging and road-building activities may affect landscape resilience to extreme weather events.
3. Develop and incorporate robust mitigation strategies that specifically address landslide and flash flooding risks.
4. Consider alternative approaches that prioritize maintaining and enhancing natural landscape resilience, such as:
 - Limiting road construction and prioritizing the decommissioning of high-risk roads.
 - Focusing on selective harvesting methods that maintain continuous forest cover and root systems.
 - Implementing enhanced riparian buffer zones to improve flood mitigation.
5. Include a long-term cost-benefit analysis that factors in the potential costs of damage repair and restoration following extreme weather events.

Conclusion: Given the region's vulnerability to extreme weather events and the potential for proposed activities to exacerbate these risks, it is imprudent to proceed with extensive logging and road-building without a more thorough analysis and robust mitigation strategies. The EA's failure to adequately address these concerns represents a significant oversight that could lead to increased environmental damage and financial costs in the future.

4. Roads and Road Building

The proposed road construction and reconstruction raise concerns about habitat fragmentation, erosion, and long-term maintenance costs.

4.1 Underestimation of Road Construction Impacts

The EA significantly understates the impacts of proposed road construction and improvements:

a. Mischaracterization of Existing Conditions:

- The EA states that new roads will be built on existing "road corridors."
- These corridors are often decades-old, unmaintained paths not designed for heavy equipment or significant use.
- Many were not created with the intent of continued use and do not meet current standards for grade or environmental protection.

b. Inadequate Assessment of Construction Requirements:

- The EA fails to acknowledge that these 6.2 miles of "new" roads will require full construction, not mere improvement. Nor does the EA account for any impact from the tons of gravel introduced into the soil and likely flowing into streams when it rains.
- The analysis does not adequately address the extensive work needed to bring these old corridors up to current road standards.

c. Insufficient Stream Crossing Analysis:

- The old road templates cross numerous streams. What type of protection is planned and who decides that? When is that decision made? When are fords acceptable and when must culverts be used? How is culvert sizing done without proper mapping of the hydrology?
- Without current and accurate stream maps, it's impossible to accurately assess the impact or potential cost of building these roads. Relying on field work during implementation does not at all meet the standard required by NEPA to analyze and assess impacts before a project begins.

The EA's presentation of net road mileage is misleading and fails to accurately represent the project's true impact:

a. Inappropriate Offsetting of New Roads:

- The EA reduces the new road mileage to 2 miles by subtracting roads to be decommissioned.

- This accounting is flawed as most "decommissioning" involves only administrative removal from maps, not actual on-the-ground work.

b. Failure to Address Maintenance Capacity:

- The EA does not address the Forest Service's capacity to maintain these new roads to standard.
- There's no acknowledgment of the historical failure to maintain existing roads to standard.

4.3 Inadequate Analysis of Skid Road Impacts

The EA's analysis of soil impacts from road building is incomplete and potentially misleading:

a. Omission of Skid Road Impacts:

- The analysis ignores the immediate impacts of skid roads during operations.
- These skid roads will often use old road templates but there is significant impact when opening these templates up to operations.
- Opening up these healed roads exposed not only the road bed but the bank as well and there is no accounting for soil disturbance of the back - which is often at least 1/3 to 1/2 the road width.

b. Lack of Risk Assessment:

- There's no consideration of the risk of extreme weather events occurring while skid roads are in use.
 - This oversight could lead to significant environmental damage and safety hazards.
 - Past projects such as Courthouse Vegetation Management are proof of this risk.
- 4.4 Insufficient Consideration of Long-term Consequences

The EA fails to adequately address the long-term implications of road construction and use:

a. Cumulative Environmental Impacts:

- No comprehensive analysis of how these roads may affect long-term forest health, wildlife habitat, and water quality.

b. Financial Sustainability:

- Lack of consideration for the long-term costs of road maintenance and potential environmental remediation.

Recommendations:

- Conduct a comprehensive reassessment of road construction needs, including:

- Detailed surveys of all proposed road corridors
- Current and accurate stream mapping
- Analysis of construction requirements to meet modern standards
- Provide a realistic accounting of new road mileage without offsetting against poorly defined "decommissioning" activities.
- Include a thorough analysis of skid road impacts, including:
 - Immediate environmental effects during use
 - Potential risks associated with extreme weather events
 - Long-term impacts on soil and water resources
- Develop a comprehensive road management plan that addresses:
 - The NFPF required such an analysis be completed for the entire forest within 3 years, and now nearly two years later this project doesn't plan to use or produce such an analysis.
 - The Forest Service's capacity to maintain new and existing roads
 - Long-term environmental and financial implications of road construction and maintenance
 - Strategies for minimizing the overall road footprint in the forest
- Consider alternatives that significantly minimize new road construction and prioritize the improvement and maintenance of existing, necessary roads.

Conclusion: The EA's treatment of road-related impacts is inadequate and potentially misleading. A more thorough, realistic assessment of road construction needs, impacts, and long-term consequences is essential for informed decision-making and compliance with environmental protection standards.

4.4 Road Effects

There are many units which will require temporary roads and other ground disturbing impacts such as log landings during operations. This is obvious from the description of the treatment and Table 40. Estimated short-term and long-term effects to soil productivity. That table notes a total of 49 log landings are needed in total. As well, 30.29 miles of Skid roads are needed and 22.07 miles of Skid Trails. It is likely that skid roads will be put onto old road templates, and certainly those old templates are not suitable in their current condition to sustained equipment traffic. Further, many old road templates cross riparian areas and there is not acknowledgement of that, not description of necessary preventative measures. At 15 feet wide a skid road requires significant new disturbance. Table 40 is deceiving. In total, log landings are 12.5 acres of long-term effect and 12.5 acres of short term effects, because the effect is both short-term (creating the log landing) and long-term (having a cleared and compacted area). Why would log landing effects be different than effects from bladed skid roads, which shows the full effect as both short-term and long-term. Further, the table is deceiving because it starts with a constraint (the

% of unit area), then estimates impact based on a % which is within the guidelines. This is backwards - there must be a real analysis of needed skid roads and trails and an assessment of the % of area covered. Of course the effects impact fits within the guideline - because it has been constrained to fit within the guideline. It is an estimate based on a constraint not an assessment based on actual planning and analysis. Statements such as "Skid roads are assumed to occupy 3.5% of the ground system harvested area." highlights this problem with the table. The Forest Service does not know how many miles of skid roads are needed because they did not actually analyze the need, you just made assumptions.

Regarding Temporary Roads, many descriptions of treatments note that an initial commercial entry is planned and then follow-up entries are also intended to occur within 2-10 years. But there is no discussion of what happens to those roads during that interim period. Will they be "closed and obliterated after use and planted with native seed mix beneficial to wildlife" and then re-opened again later? If they are not to be closed and obliterated then the classification as 'Temporary' is wrong and misleading. How would such roads be maintained in the interim between treatments? Is there sufficient funding to ensure they are maintained to a standard that ensures they do not cause problems?

5. Logging on Steep Slopes

Harvesting on steep slopes poses significant risks of erosion and landslides. The EA's treatment of this issue is inadequate and raises several concerns.

5.1 Analysis of Slope and Erosion Hazard Data

A review of Table 43 in the EA reveals significant concerns regarding the extent of logging proposed on steep slopes and areas with high erosion hazard:

Table 1: Summary of Slope and Erosion Hazard Data

Treatment Type	Severe Erosion Hazard	Very Severe Erosion Hazard	Total % Severe or Very Severe
Commercial Thinning	35.90%	39.73%	75.63%
Uneven-aged	40.96%	34.15%	75.11%
Oak Shelterwood	47.84%	44.46%	92.30%
Shelterwood with Reserves	17.74%	71.02%	88.76%
Clearcutting with Reserves	20.54%	6.65%	27.19%
Wildlife Fields	25.12%	56.84%	81.96%

Treatment Type	Severe Erosion Hazard	Very Severe Erosion Hazard	Total % Severe or Very Severe
Woodland Units	33.17%	4.10%	37.27%
Other Treatment	4.61%	2.12%	6.73%

a. Erosion Hazard Distribution:

- Severe Erosion Hazard: Approximately 25% of proposed harvest units
- Very Severe Erosion Hazard: Approximately 27% of proposed harvest units
- Combined, over 50% of proposed harvest areas are in zones of severe or very severe erosion hazard

b. Slope Gradient Analysis:

- The EA classifies areas as "poorly suited for ground-based harvest" if they have steep slopes
- Approximately 81% of the activity area is considered "poorly suited for ground-based methods"

c. Harvest Methods on Steep Slopes:

Despite the high percentage of areas poorly suited for ground-based methods, the EA proposes:

- 31% of the activity area for ground-based harvesting methods
- 63% for mixed ground and skyline methods

d. Specific Concerns by Treatment Type:

- Uneven-aged Management: 78.4% on poorly suited terrain
 - Oak Shelterwood: 94.4% on poorly suited terrain
 - Shelterwood with Reserves: 98.3% on poorly suited terrain
- 5.2 Inadequate Mitigation Measures

The EA fails to provide sufficient mitigation strategies for the high-risk logging activities proposed:

a. Lack of Slope-Specific Best Management Practices:

- No detailed BMPs tailored to the specific challenges of logging on severe and very severe erosion hazard areas

b. Insufficient Alternative Considerations:

- Limited exploration of alternative harvesting methods or exclusion of the steepest areas from harvest plans

5.3 Potential Environmental Impacts

The EA underestimates the potential consequences of logging on these steep, erosion-prone slopes:

a. Increased Erosion and Sedimentation:

- High risk of soil loss and water quality degradation in nearby streams
- Potential for significant and long-lasting impacts on forest ecosystem health

b. Long-term Soil Productivity Loss:

- Erosion on steep slopes can lead to permanent loss of topsoil and reduced site productivity

c. Landslide Risk:

- Elevated risk of landslides, especially when combined with extreme weather events

Recommendations:

- Conduct a more detailed analysis of slope gradients and erosion hazards for each proposed harvest unit.
- Develop and present specific, robust Best Management Practices for logging on steep slopes with high erosion hazards.
- Consider excluding areas with "very severe" erosion hazard from harvest plans, particularly those with ground-based or mixed harvesting methods.
- Provide a comprehensive risk assessment that considers the cumulative impacts of logging on steep slopes, road construction, and potential extreme weather events.
- Explore and present alternative harvesting plans that minimize activities on the steepest and most erosion-prone areas.
- Include a long-term monitoring plan to assess and mitigate erosion impacts over time.

Conclusion: The extensive logging proposed on steep slopes with high erosion hazards presents significant environmental risks. The EA's failure to adequately address these risks and provide robust mitigation strategies is a critical oversight. A thorough reevaluation of harvest plans on these sensitive areas is necessary to ensure forest health and environmental protection.

6. Riparian Mapping

The riparian mapping in the EA is inadequate. It is neither current nor accurate.

6.1 Inadequate Pre-implementation Riparian Mapping

The EA fails to provide comprehensive riparian mapping prior to project implementation. This is due to the use of outdated NHD data when more recent and more accurate data is available. This issue was raised during the objection period for the Nantahala and Pisgah Forest Plan in 2022. The forest service ignored the objection then and is still ignoring the need to have current, accurate riparian mapping data.

a. Lack of Detailed Riparian Zone Delineation:

- Because the maps are not accurate the riparian zones cannot be estimated.
- The EA does not include specific, pre-determined riparian zone boundaries for the project area. Field work should supplement the planning, it does not substitute for the required planning.
- This omission prevents a thorough assessment of potential impacts on water resources and aquatic ecosystems.

b. Deferral of Riparian Zone Determination:

- The EA indicates that riparian zone determination will occur during project implementation.
- This approach precludes accurate impact assessment during the planning phase and limits public input.

The EA lacks clear, specific guidelines for the identification and marking of riparian zones:

a. Absence of Standardized Criteria:

- No detailed criteria are provided for determining the extent of riparian zones.
- The EA does not specify professional qualifications required for those marking riparian zones.

b. Lack of Consistency Measures:

- No mechanisms are described to ensure consistency in riparian zone determination across the project area.

The EA does not provide clear methodologies for classifying streams:

a. Undefined Criteria for Stream Types:

- No specific criteria are given for determining whether a stream is perennial, intermittent, or ephemeral.

- This ambiguity could lead to inconsistent protection measures for different stream types.

b. Potential for Misclassification:

- Without clear guidelines, there's a risk of misclassifying streams, potentially leading to inadequate protection of important water resources. 6.4 Implications for Environmental Impact Assessment

The lack of pre-implementation riparian mapping and clear guidelines has significant implications:

a. Inability to Accurately Assess Impacts:

- Without detailed riparian maps, it's impossible to accurately evaluate the project's potential impacts on water resources and aquatic ecosystems.

b. Limited Public Oversight:

- The deferral of riparian zone determination to the implementation phase effectively excludes public input on this critical aspect of the project. Considering the remote location of the project and the difficulty of public access to the project area it is not likely that riparian zone marking will ever be reviewed or assessed.

c. Risk of Inadequate Protection:

- Inconsistent or inadequate riparian zone marking could lead to insufficient protection of sensitive aquatic habitats.

Recommendations:

- Conduct comprehensive riparian mapping of the entire project area prior to finalizing the EA, including:
 - Identification and classification of all streams (perennial, intermittent, and ephemeral)
 - Delineation of riparian zones based on scientifically sound criteria
- Develop and include in the EA specific, detailed guidelines for riparian zone determination and marking, including:
 - Clear criteria for identifying riparian zone boundaries
 - Standardized methods for measuring and marking these zones
 - Professional qualifications required for personnel conducting riparian zone assessments
- Establish and describe a clear methodology for stream classification, including:
 - Specific criteria for distinguishing between perennial, intermittent, and ephemeral streams

- Protocols for seasonal assessments to accurately classify streams
- Implement a quality control process to ensure consistency in riparian zone determination and stream classification across the project area.
- Provide updated riparian maps and stream classifications for public review and comment before project implementation.
- Include a monitoring plan to assess the effectiveness of riparian protection measures throughout the project's duration.

Conclusion: The EA's approach to riparian mapping and protection is inadequate for ensuring the conservation of critical water resources and aquatic ecosystems. By deferring important decisions to the implementation phase and failing to provide clear guidelines, the EA prevents accurate impact assessment and meaningful public input. A more comprehensive, transparent approach to riparian mapping and protection is essential for responsible forest management and compliance with environmental regulations.

6.1 Comprehensive Stream Mapping

Outdated riparian mapping was raised as an objection during the Nantahala Pisgah Forest Plan process. It seems evident from the EA that the concern has not been resolved. Leaving the important work of mapping riparian areas until implementation is not adequate.

6.2 Buffer Zone Analysis

There is no determination of how much area is taken up by riparian buffers. Without knowing where streams are on the land the assessment if riparian impacts cannot be accurate. It is unknown how many stream crossings there in the many miles of temporary roads and skid trails, not is it well understood what type of crossing may be required - ford, culvert, rock armor, etc...

6.3 Water Quality and Aquatic Habitat Impacts

No mapping, no accurate assessment.

7. Findings of No Impact

7.1 Mischaracterization of Impacts

The Environmental Assessment (EA) frequently states "no impact" for various project activities when, in reality, some level of impact is likely to occur. This approach is problematic and potentially misleading for several reasons:

a. Inaccurate Representation:

Stating "no impact" when there are clear potential impacts, however minor, does not accurately represent the environmental consequences of the proposed actions.

b. Failure to Meet NEPA Requirements:

The National Environmental Policy Act (NEPA) requires a "hard look" at potential environmental impacts. Dismissing impacts as non-existent rather than analyzing their extent and significance may fall short of this requirement.

c. Hindrance to Informed Decision-Making:

By not acknowledging and assessing all potential impacts, the EA fails to provide decision-makers and the public with a complete understanding of the project's environmental consequences.

7.2 Example: Ground Logging and Migratory Birds

A specific example of this issue is the treatment of potential impacts on migratory birds:

a. Potential Impact:

Ground logging operations during nesting season could disturb or destroy nests, eggs, and young birds.

b. EA's Approach:

The EA appears to state "no impact" without providing provisions against logging during nesting season or thoroughly assessing the potential consequences.

c. More Appropriate Analysis:

The EA should acknowledge the potential impact, assess its extent and significance, and if necessary, propose mitigation measures (such as seasonal restrictions on logging activities).

7.3 Importance of Accurate Impact Assessment

The purpose of a Finding of No Significant Impact (FONSI) is not to claim zero impact, but rather to:

- a. Identify and describe all potential impacts, regardless of their perceived significance.
- b. Assess the extent and intensity of these impacts.
- c. Determine whether the cumulative effects of these impacts rise to the level of "significant" as defined by NEPA regulations.

7.4 Recommendations

To address this issue, we recommend that the Forest Service:

- Review all "no impact" statements in the EA and revise them to accurately reflect any potential impacts, however minor.
- Provide a clear, quantitative assessment of the extent and intensity of all identified impacts.

- Include a more nuanced discussion of impact significance, rather than relying on a binary "impact/no impact" approach.
- Where impacts are deemed insignificant, provide clear reasoning and evidence to support this conclusion.
- Consider developing a tiered system for categorizing impacts (e.g., none, minimal, moderate, significant) to more accurately represent the range of potential environmental consequences.

By addressing these concerns, the EA would provide a more accurate, transparent, and useful assessment of the Lickstone Project's potential environmental impacts, in line with NEPA requirements and best practices in environmental assessment.

7.5 Review of Impact Assessments in the EA

a. Air Quality:

The EA states: "Based on existing air quality information, no short-term or long-term direct, indirect, or cumulative significant adverse effects to air quality are expected from the proposed actions."

Analysis: While the EA concludes no significant effects, it does acknowledge some impacts:

- Emissions from prescribed burning, including carbon dioxide, carbon monoxide, and particulate matter.
- Potential short-term increases in fine particulate matter concentrations.

Example of mischaracterization: The EA states "no short-term or long-term direct, indirect, or cumulative significant adverse effects" despite acknowledging emissions and potential short-term increases in particulate matter.

b. Soil Productivity:

The EA states: "There would be no significant adverse effects from non-native invasive plants."

Analysis: However, the EA acknowledges:

- Temporary increases in ruderal (weedy) species within activity areas.
- Potential spread of non-native invasive plant species (NNIP) across the project area.

Example of mischaracterization: The conclusion of "no significant adverse effects" seems to contradict the acknowledged spread of NNIP and increases in weedy species.

c. Wildlife Habitat:

The EA states: "The no action alternative would have no effect on the spruce-fir moss spider."

Analysis: While this may be true for the no-action alternative, it doesn't address potential impacts from the proposed action. The EA later acknowledges potential impacts to other species' habitats but often concludes "no significant impact" without clear justification.

d. Aquatic Resources:

The EA states: "Expected cumulative effects should not be any greater than the direct and indirect effects disclosed above for each alternative and there should be no adverse cumulative effects to aquatic resources in the aquatic analysis area, based on the project's design criteria."

Analysis: This statement appears to dismiss cumulative effects without a thorough analysis. The EA acknowledges potential impacts such as:

- Temporary fluctuations in turbidity during culvert installations.
- Potential sediment entering streams at existing crossings during haul activities.

Example of mischaracterization: The conclusion of "no adverse cumulative effects" seems to contradict the acknowledged individual impacts, which could potentially accumulate over time and space.

e. Cultural Resources:

The EA states: "These design criteria and protection measures result in the proposed action having no short-term or long-term direct, indirect, or cumulative effects on cultural resources."

Analysis: While protective measures are in place, the absolute statement of "no effects" seems unlikely given the scope of ground-disturbing activities proposed.

7.6 Recommendations Based on Review

- Revise impact statements to accurately reflect the presence of impacts, even when deemed insignificant.
- Provide clearer justification for determinations of "no significant impact," including quantitative thresholds where applicable.
- Include a more nuanced discussion of cumulative effects, acknowledging that multiple small impacts can accumulate to create more significant effects.
- Develop a standardized approach for categorizing and describing impacts across all resource areas to ensure consistency and accuracy.
- Consider preparing a full Environmental Impact Statement (EIS) if the cumulative impacts, when accurately assessed, may be significant.

By addressing these issues, the EA would provide a more accurate and transparent assessment of the Lickstone Project's potential environmental impacts, aligning better with NEPA requirements and best practices in environmental assessment.

8. Long-term Actions and Timeline

The Environmental Assessment (EA) for the Lickstone Project lacks crucial information regarding the implementation timeline, follow-up treatments, and long-term management plans. This omission raises significant concerns about the feasibility and effectiveness of the proposed actions.

8.1 Lack of Detailed Implementation Timeline

a. Absence of Phasing Information:

- The EA does not provide a clear timeline or phasing plan for implementing the various treatments across the more than 1,000 acres of forest.

b. Feasibility Concerns:

- Without a detailed timeline, it's impossible to assess whether it's feasible to complete all proposed treatments within a reasonable timeframe.

Recommendation: Include a comprehensive implementation timeline that outlines the sequence and estimated duration of each proposed treatment.

8.2 Inadequate Information on Follow-up Treatments

a. Lack of Specificity:

- The EA mentions the need for follow-up treatments but fails to provide detailed information about their nature, timing, or extent.

b. Resource Allocation Uncertainty:

- There's no clear indication of whether resources will be available for necessary follow-up treatments.

Recommendation: Provide a detailed plan for follow-up treatments, including their timing, extent, and estimated resource requirements.

8.3 Absence of Long-term Management Plans

a. Post-Implementation Ambiguity:

- The EA doesn't adequately address what happens after the initial treatments are completed.

b. Ecological Succession Considerations:

- There's no clear plan for managing the treated areas as they progress through various stages of ecological succession.

Recommendation: Include a long-term management plan that outlines strategies for maintaining desired forest conditions over time.

8.4 Feasibility and Prioritization Concerns

a. Resource Allocation:

- The EA doesn't provide information on how resources will be allocated across the various proposed treatments.

b. Lack of Prioritization:

- There's no clear prioritization of treatments, making it difficult to understand which actions are most critical or will be implemented first.

c. Contingency Planning:

- The EA lacks contingency plans in case certain treatments prove unfeasible or ineffective.

Recommendations:

1. Conduct and include a feasibility assessment for all proposed treatments.
2. Prioritize treatments based on ecological need, resource availability, and logistical considerations.
3. Develop and include contingency plans for scenarios where certain treatments may not be feasible.

8.5 Project Management Best Practices

The EA's approach to project planning falls short of standard project management best practices. It lacks:

- a. Clear milestones and deadlines
- b. Resource allocation plans
- c. Cost estimates for individual treatments and follow-up actions
- d. Performance metrics or success criteria

Recommendation: Incorporate standard project management elements into the EA to provide a clearer, more actionable plan.

8.6 Adaptive Management Considerations

a. Monitoring and Evaluation:

- The EA doesn't adequately address how the effectiveness of treatments will be monitored over time.

b. Adaptive Strategies:

- There's no clear framework for adjusting management strategies based on monitoring results.

Recommendation: Include an adaptive management plan that outlines monitoring procedures, success criteria, and strategies for adjusting management approaches based on outcomes.

Conclusion:

The lack of a detailed long-term action plan and timeline in the Lickstone Project EA raises serious concerns about the feasibility and effectiveness of the proposed forest management activities. Without this crucial information, it's challenging to assess the project's potential for success or its long-term environmental impacts. We strongly recommend that the Forest Service revise the EA to include a comprehensive, time-bound action plan that addresses these concerns and aligns with best practices in project management and adaptive forest management.

9 Economic Analysis and Cost Estimates

The Economic section of the Environmental Assessment (EA) provides some cost estimates for the Lickstone Project, but these estimates are incomplete and lack crucial details. A review of Tables 33-36 reveals several shortcomings that need to be addressed for a more accurate and comprehensive economic assessment.

9.1 Limitations of Current Economic Analysis

a. Treatment-Based Focus:

- The cost estimates are primarily focused on direct treatment costs, neglecting to break out associated expenses.

b. Omission of Ancillary Costs:

- The EA fails to account for significant ancillary costs such as:
 - Road building and maintenance
 - Implementation of riparian zone Best Management Practices (BMPs)
 - Long-term monitoring and adaptive management

- Potential mitigation measures for unforeseen impacts

c. Lack of Temporal Consideration:

- The analysis doesn't clearly differentiate between short-term and long-term costs.

d. Incomplete Revenue Projections:

- While timber revenue is estimated, potential losses in ecosystem services or recreational value are not considered. 9.2 Review of Tables 33-36

Table 33: 2025 harvest volume and value

Table 34: 2035 harvest volume and value

Table 35: 2045 harvest volume and value

Table 36: Costs of reforestation and stand improvement by treatment types

Issues:

- These tables provide a simplistic view of revenues and costs, focusing only on timber values and direct treatment costs.
- The tables do not account for the time value of money beyond a simple discount rate.
- There's no sensitivity analysis to account for potential variations in timber prices or treatment costs.
- The tables do not include costs for road construction, maintenance, or other infrastructure needs. Those costs seem to be 'built in' to the timber costs.
- Environmental costs and benefits are not monetized or included in the analysis. 9.3 Recommendations for Improvement

1. Comprehensive Cost Accounting:

- Include all direct and indirect costs associated with the project, including road building, maintenance, BMP implementation, monitoring, and potential mitigation measures.
- Provide detailed breakdowns of cost components for each treatment type.

2. Life Cycle Cost Analysis:

- Conduct a full life cycle cost analysis that considers all costs and benefits over the project's entire lifespan, including long-term maintenance and monitoring.

3. Ecosystem Services Valuation:

- Incorporate an assessment of changes in ecosystem services values (e.g., carbon sequestration, water quality, recreation) resulting from the project.

4. Sensitivity Analysis:

- Perform and present a sensitivity analysis to account for potential variations in timber prices, treatment costs, and other economic factors.
5. Opportunity Cost Consideration:
 - Include an analysis of opportunity costs, comparing the proposed actions with alternative uses of the forest resources.
 6. Temporal Distribution of Costs and Benefits:
 - Clearly delineate the timing of costs and benefits, using appropriate discounting methods to calculate net present values.
 7. Risk Assessment:
 - Include an economic risk assessment that considers potential setbacks, natural disasters, or changes in market conditions.
 8. Socioeconomic Impact Analysis:
 - Assess and quantify the project's potential impacts on local employment, tourism, and other economic sectors.
 9. Comparative Analysis:
 - Provide a comparative economic analysis of different treatment scenarios or alternatives.
 10. Transparency in Assumptions:
 - Clearly state all assumptions used in the economic calculations and provide justifications for these assumptions.

Conclusion:

The current economic analysis in the EA lacks the depth and breadth necessary for a thorough understanding of the Lickstone Project's financial implications. By implementing these recommendations, the Forest Service would provide a more comprehensive, transparent, and reliable economic assessment. This enhanced analysis would better inform decision-making processes and allow for a more accurate evaluation of the project's overall costs and benefits.

10 Monitoring and Reporting

The Environmental Assessment (EA) for the Lickstone Project fails to provide a comprehensive monitoring and reporting plan, which is essential for assessing the success of planned actions, enabling adaptive management, and ensuring transparency. This omission is particularly concerning given the emphasis on monitoring and reporting in the 2023 Nantahala and Pisgah National Forests Land Management Plan.

10.1 Lack of Specific Monitoring Objectives

a. Absence of Measurable Targets:

The EA outlines various objectives and desired conditions but fails to provide specific, measurable targets for assessing progress towards these goals. For example, while the project aims to "move structure class towards the natural range of variation" (NEPA05_summary.md), there are no quantifiable metrics to measure this progress.

b. Inadequate Baseline Data:

There's no clear indication of how baseline conditions will be established to enable meaningful comparisons post-implementation. While the EA provides some current condition data, such as the age class distribution in Figure 3, it doesn't specify how this will be used as a baseline for future monitoring.

Recommendation: Develop and include specific, measurable objectives for each major aspect of the project, along with plans for establishing baseline data. These should align with the Forest Plan's monitoring questions and indicators, such as those related to ecological conditions and species habitat (Forest Plan, Chapter 5: Monitoring and Adaptive Management).

10.2 Insufficient Reporting Mechanisms

a. Lack of Reporting Schedule:

The EA does not outline a schedule or process for regular reporting on project outcomes.

b. Absence of Public Disclosure Plans:

There's no clear commitment to making monitoring results publicly available, despite the Forest Service's emphasis on transparency and public involvement.

Recommendation: Establish a clear reporting schedule and mechanism for disseminating results to the public and stakeholders, similar to the Forest Plan's requirement for a biennial monitoring evaluation report (Forest Plan, Chapter 5).

10.3 Inadequate Adaptive Management Framework

a. Missing Feedback Loop:

The EA lacks a clear process for incorporating monitoring results into future management decisions.

b. Absence of Trigger Points:

There are no defined thresholds that would trigger management changes based on monitoring outcomes.

Recommendation: Develop and include an adaptive management framework that outlines how monitoring results will inform future management decisions, similar to the adaptive management approach described in the Forest Plan (Chapter 5).

10.4 Limited Scope of Proposed Monitoring

a. Focus on Implementation Rather Than Outcomes:

The EA appears to emphasize monitoring of project implementation rather than ecological and socioeconomic outcomes. While it mentions some monitoring activities, such as for non-native invasive plants (NEPA05_summary.md, Botanical Resources section), these are not comprehensive.

b. Neglect of Long-term Monitoring:

There's insufficient attention to long-term monitoring needs, which are crucial for assessing the true impacts of forest management actions.

Recommendation: Expand the scope of monitoring to include both short-term and long-term ecological and socioeconomic outcomes, aligned with the Forest Plan's monitoring program (Forest Plan, Chapter 5).

10.5 Lack of Cost Accounting and Fiscal Reporting

a. Absence of Budget Tracking:

The EA does not outline how project costs will be tracked and reported, despite providing estimated costs for reforestation and stand improvement (Table 36).

b. No Plan for Cost-Benefit Analysis:

There's no provision for ongoing assessment of the project's cost-effectiveness.

Recommendation: Include a plan for tracking and reporting project costs, and for conducting regular cost-benefit analyses.

10.6 Insufficient Stakeholder Engagement in Monitoring

a. Limited Community Involvement:

While the EA mentions collaborative meetings and field trips, it doesn't outline opportunities for stakeholder involvement in monitoring activities.

b. Lack of Traditional Ecological Knowledge Integration:

There's no mention of incorporating traditional ecological knowledge or local expertise into monitoring efforts.

Recommendation: Develop a plan for engaging stakeholders and incorporating diverse knowledge sources in monitoring activities, in line with the Forest Plan's emphasis on partnerships and collaboration (Forest Plan, Chapter 1: Introduction).

10.7 Absence of Quality Assurance Measures

a. Lack of Data Quality Standards:

The EA doesn't specify standards for ensuring the quality and reliability of monitoring data.

b. No Third-Party Verification:

There's no provision for independent verification of monitoring results.

Recommendation: Establish clear data quality standards and consider incorporating third-party verification of monitoring results.

10.8 Proposed Monitoring and Reporting Framework

To address these shortcomings, we recommend the Forest Service develop and include a comprehensive monitoring and reporting plan that includes:

- Specific, measurable objectives for each major project component, aligned with Forest Plan goals
- Methods for establishing baseline data
- Clear indicators and metrics for assessing progress
- A detailed monitoring schedule, including both short-term and long-term monitoring
- Protocols for data collection, analysis, and quality assurance
- A framework for adaptive management, including trigger points for management changes
- A regular reporting schedule and mechanism for public disclosure of results
- Plans for stakeholder engagement in monitoring activities
- A system for tracking and reporting project costs
- Provisions for independent verification of monitoring results

Conclusion:

The lack of a robust monitoring and reporting plan in the Lickstone Project EA is a significant oversight that undermines the project's potential for success and its alignment with the principles of adaptive management emphasized in the new Forest Plan. Without comprehensive monitoring and transparent reporting, it's impossible to assess whether the project is meeting its stated goals and objectives or to make informed adjustments to management strategies. We strongly urge the Forest Service to develop and incorporate a detailed monitoring and reporting plan that addresses these concerns and ensures accountability, transparency, and continuous improvement in forest management practices, as required by the 2023 Nantahala and Pisgah National Forests Land Management Plan.

11. Monitoring, Reporting, and Accountability

The Lickstone Project proposal would benefit from a more robust and transparent monitoring, reporting, and accountability framework. We recommend the following additions to the project

plan:

11.1 Measurable Objectives and Outcomes

The project should clearly define measurable objectives and outcomes for each major component. For example:

1. Forest Structure and Composition:

- Objective: Increase young forest conditions by 1,037 acres over the project lifetime.
- Measurable Outcome: Percentage of forest in young forest condition (0-10 years) increases from 0% to 11% within 10 years of project initiation.

2. Oak Regeneration:

- Objective: Improve oak recruitment in 177 acres of oak shelterwood treatments.
- Measurable Outcome: Achieve at least 50% oak composition in the regeneration layer (seedlings and saplings) within 5 years of treatment.

3. Wildlife Habitat Improvement:

- Objective: Create 12 acres of permanent wildlife openings.
- Measurable Outcome: Increase in target wildlife species populations (e.g., ruffed grouse, white-tailed deer) by 20% within 5 years of opening creation.

4. Red Spruce Restoration:

- Objective: Restore red spruce in 253 acres of treatment areas.
- Measurable Outcome: Increase red spruce component from current levels to at least 20% of stand composition within 10 years of treatment.

5. Prescribed Burning:

- Objective: Conduct prescribed burns on 1,349 acres.
- Measurable Outcome: Reduce fuel loads by 40% and increase fire-adapted plant species diversity by 30% within 3 years of burning.

6. Non-native Invasive Species Control:

- Objective: Reduce the spread and abundance of non-native invasive plants in treated areas.
- Measurable Outcome: Decrease cover of non-native invasive species by 50% within 3 years of treatment in targeted areas.

7. Soil Productivity:

- Objective: Maintain soil productivity in harvested areas.
- Measurable Outcome: No more than 15% decrease in soil organic matter content within 5 years of harvest activities.

8. Water Quality:

- Objective: Maintain or improve water quality in project area streams.

- Measurable Outcome: No significant increase in turbidity or sedimentation in monitored streams compared to pre-project baselines.

11.2 Proposed Monitoring Strategies

To effectively track progress towards these objectives, we recommend implementing the following monitoring strategies:

- Forest Inventory and Analysis:
 - Establish permanent plots across treatment areas to monitor changes in forest structure, composition, and growth rates.
 - Frequency: Initial baseline, then every 5 years.
- Wildlife Surveys:
 - Conduct breeding bird surveys, pellet counts for deer and grouse, and camera trap studies for larger mammals.
 - Frequency: Annually during breeding season for birds, bi-annually for other wildlife.
- Vegetation Monitoring:
 - Establish transects and quadrants to monitor changes in plant species composition, diversity, and cover.
 - Frequency: Annually for first 3 years post-treatment, then every 3 years.
- Soil Sampling:
 - Collect soil samples to monitor changes in soil organic matter, nutrient content, and compaction.
 - Frequency: Baseline before treatment, then 1, 3, and 5 years post-treatment.
- Water Quality Monitoring:
 - Install continuous monitoring stations for turbidity and conduct regular water quality sampling.
 - Frequency: Continuous monitoring for turbidity, quarterly sampling for other parameters.
- Non-native Invasive Species Surveys:
 - Conduct targeted surveys in treated areas and along access routes.
 - Frequency: Annually for first 3 years post-treatment, then every 2 years.
- Photo Point Monitoring:
 - Establish photo points to visually document landscape changes over time.
 - Frequency: Annually, with consistent season and conditions.
- Economic Impact Assessment:
 - Track project costs, timber revenues, and local economic indicators.
 - Frequency: Annually, with a comprehensive review every 5 years.

- Recreation Use Surveys:
 - Conduct visitor use surveys to monitor changes in recreation patterns and satisfaction.
 - Frequency: Annually during peak use seasons.

11.3 Public Accessibility and Engagement

To ensure transparency and accountability, I propose the following measures:

- Online Data Portal:
 - Develop a user-friendly website where all monitoring data, reports, and analyses are publicly accessible.
 - Include interactive maps and visualizations to help the public understand project impacts.
- Annual Public Meetings:
 - Host annual meetings to present monitoring results, discuss project progress, and gather public feedback.
 - Live-stream meetings and provide online participation options for remote stakeholders.
- Citizen Science Program:
 - Develop opportunities for public participation in monitoring activities, such as wildlife surveys or invasive species mapping.
 - Provide training and resources to ensure data quality and consistency.
- Quarterly Newsletter:
 - Publish a quarterly newsletter summarizing recent monitoring results, upcoming activities, and opportunities for public involvement.
 - Distribute through email, social media, and local community centers.
- Adaptive Management Forum:
 - Establish a regular forum where monitoring results are reviewed, and potential management adaptations are discussed with stakeholders.
 - Clearly document how public input influences management decisions.
- Educational Outreach:
 - Develop educational materials and programs to help the public understand forest ecology, management practices, and the importance of monitoring.
 - Offer guided field trips to showcase monitoring activities and project outcomes.
- Comment and Feedback System:
 - Implement an ongoing system for public comments and feedback on project activities and monitoring results.

- Provide regular responses to public inquiries and concerns.
- Annual Accountability Report:
 - Publish an annual report that clearly communicates project progress, challenges, and adaptations based on monitoring results.
 - Include a section specifically addressing how public input has been incorporated into project management.

These recommendations are supported by best practices in forest management and public engagement. For example, the Forest Plan emphasizes the importance of monitoring and adaptive management (Forest Plan, Chapter 5: Monitoring and Adaptive Management). Additionally, the project's collaborative approach aligns with these suggestions for ongoing public involvement (Appendix A: Background, Public Involvement and Comments section).

By implementing these monitoring, reporting, and public engagement strategies, the Lickstone Project can ensure that its objectives are measurable, its impacts are well-documented, and its management remains responsive to both ecological outcomes and public concerns. This approach would significantly enhance the project's transparency, accountability, and overall effectiveness in achieving its goals for forest restoration and management.

12. Success Criteria, Adaptive Management, and Lessons Learned

The Lickstone Project would benefit from clearly defined success criteria, a robust adaptive management approach, and a systematic method for capturing and applying lessons learned. These elements are crucial for effective project management and long-term forest health improvement.

12.1 Success Criteria

Establishing clear, measurable success criteria is essential for objectively assessing project outcomes and guiding future management decisions. We recommend developing a comprehensive set of criteria that address ecological, economic, and social aspects of the project. These criteria should align with the Forest Plan's desired conditions and objectives for the North Slope Geographic Area (USFS, 2023).

Proposed success criteria framework:

- Ecological Criteria:
 - Specific targets for species composition and forest structure, aligned with the Natural Range of Variation (NRV) for each ecozone as described in the Forest Plan (USFS,

2023, Table 2).

- Thresholds for acceptable levels of non-native invasive species, referencing the species listed in Table 5 of the Environmental Assessment.
- Habitat quality metrics for focal species such as ruffed grouse, white-tailed deer, and elk, as mentioned in the Wildlife Habitat Active Management Areas (WHAMA) section of the EA.
- Economic Criteria:
 - Timber harvest volumes and revenue targets, based on the estimates provided in Tables 33-35 of the EA.
 - Cost-effectiveness measures for various treatments, considering the cost estimates in Table 36.
- Social Criteria:
 - Recreational use levels and visitor satisfaction ratings, particularly for activities mentioned in the Recreation section of the EA, such as hunting, fishing, and hiking.
 - Community support and engagement metrics, building on the collaborative approach described in the Public Involvement and Comments section.
- Operational Criteria:
 - Timelines for treatment implementation, aligned with the project timeline implied in the EA.
 - Safety records and environmental compliance measures, ensuring adherence to the design criteria outlined in the EA.

12.2 Adaptive Management Approach

An adaptive management approach is crucial for the Lickstone Project, given the complexity of forest ecosystems and the long-term nature of forest management. We recommend implementing a structured adaptive management framework that allows for regular assessment and adjustment of management strategies.

Proposed adaptive management framework:

- Annual Review Cycle:
 - Conduct yearly assessments of monitoring data against the established success criteria.
 - Hold stakeholder meetings to discuss findings and potential adaptations, building on the collaborative process described in Appendix A of the EA.
- Tiered Response System:
 - Develop a tiered system of management responses based on the degree of deviation from success criteria.

- For example, minor adjustments could be made for small deviations, while significant shortfalls might trigger major strategy changes.
- Experimental Approach:
 - Implement some treatments as controlled experiments to directly compare outcomes. This could be particularly valuable for comparing different uneven-aged management techniques described in the EA, such as group selection and irregular shelterwood.
 - Use results to refine future management strategies.
- Continuous Improvement Process:
 - Regularly update best practices based on project learnings.
 - Provide ongoing training to staff on new techniques and findings, particularly in areas such as non-native invasive species control and prescribed burning techniques.

12.3 Carrying Forward Lessons Learned

To ensure that significant lessons from the Lickstone Project inform future forest management efforts:

a. Comprehensive Documentation:

- Maintain detailed records of all management actions, monitoring results, and adaptations.
- Document both successes and challenges, particularly in areas of focus such as oak regeneration and spruce-fir restoration.

b. Case Study Development:

- Develop in-depth case studies on specific aspects of the project, such as the implementation of uneven-aged management techniques or the effectiveness of prescribed burning in different ecozones.
- Use these case studies in training materials for forest managers across the National Forest system.

c. Peer-Reviewed Publications:

- Encourage project scientists and managers to publish findings in academic journals, contributing to the broader scientific understanding of forest management practices in the Southern Appalachians.

d. Inter-Forest Knowledge Exchange:

- Establish regular forums for sharing lessons learned with other National Forests, particularly those with similar ecozones and management challenges.

- Participate in regional and national conferences to disseminate project insights.

e. Public Education Materials:

- Develop educational resources that translate project learnings into accessible formats for the public, building on the existing collaborative relationships described in the EA.
- Use these materials to build public understanding and support for science-based forest management.

f. Long-term Monitoring Commitment:

- Establish some project areas as long-term research sites, particularly in ecozones of special concern such as spruce-fir and high elevation red oak.
- Continue monitoring beyond the project timeline to capture long-term ecological changes and the effectiveness of management strategies.

By implementing these recommendations, the Lickstone Project can serve as a model for adaptive, science-based forest management and contribute significantly to our understanding of effective restoration techniques in Southern Appalachian forests.

I've reviewed Section 13 and made updates based on the information provided in the Environmental Assessment (EA) for the Lickstone Project. Here's the revised section with added references and citations:

13. Prioritization of Actions

13.1 Review of Current Prioritization in the EA

After reviewing the Environmental Assessment (EA), it's evident that there is limited explicit prioritization of actions presented. While the document outlines various treatments and activities, it does not provide a clear hierarchy or timeline indicating which actions are considered most critical or should be implemented first. However, some implicit prioritization can be inferred from the project's focus areas:

a. Partial Prioritization:

- The EA emphasizes certain actions, such as creating young forest conditions and restoring fire-adapted ecosystems, which align with Forest Plan objectives (USFS, 2023, ECO-O-02).
- There's a focus on specific ecological zones, particularly oak and spruce-fir restoration, indicating some level of prioritization (EA, Appendix B).

b. Temporal Sequencing:

- Some temporal sequencing is implied, particularly for treatments like oak shelterwood, which require multiple entries over time (EA, Table 1).
- Prescribed burning is proposed on a 3-5 year rotation, suggesting some level of temporal planning (EA, Proposed Action section).

c. Resource Allocation:

- While not explicit, the allocation of treatment acres across different management types suggests some prioritization (EA, Table 1).

13.2 Implications of Limited Prioritization

The limited explicit prioritization in the plan creates several challenges:

a. Difficulty in Assessing Cost-Benefit Relationships:

- While cost estimates are provided (EA, Tables 33-36), it's challenging to understand how these costs relate to priority outcomes without a clear prioritization framework.

b. Challenges in Tracking Progress:

- Without clear priorities, it may be difficult to gauge overall project progress, especially for long-term goals like restoring ecosystem composition and structure (EA, Purpose and Need section).

c. Potential for Inefficient Resource Allocation:

- The lack of explicit prioritization could lead to suboptimal allocation of resources across the various proposed actions.

d. Difficulty in Adaptive Management:

- While the EA mentions adaptive management (EA, Appendix A), the lack of clear priorities may hinder effective decision-making when adjustments are needed.

e. Stakeholder Communication Challenges:

- The collaborative approach described in the EA (Appendix A) could be enhanced with clearer communication of project priorities.

13.3 Recommendations for Prioritization

To address these issues, we recommend that the Forest Service:

- Develop a Clear Prioritization Framework:
 - Categorize proposed actions into priority levels, building on the implicit priorities already present in the EA.
 - Provide rationale for the prioritization, linking to Forest Plan objectives and desired conditions for the North Slope Geographic Area (USFS, 2023).
- Create a Phased Implementation Plan:
 - Develop a timeline that shows the sequence of actions over the project lifespan, expanding on the temporal aspects already mentioned for treatments like oak shelterwood and prescribed burning.
 - Indicate dependencies between different actions, particularly for multi-step treatments like uneven-aged management (EA, Appendix B).
- Link Priorities to Project Objectives:
 - Clearly connect prioritized actions to specific project objectives and desired outcomes, as outlined in the Purpose and Need section of the EA.
 - Explain how high-priority actions contribute most significantly to addressing the departures from Natural Range of Variation identified in the North Slope Geographic Area (EA, Table 8).
- Establish Critical Path Actions:
 - Identify and highlight actions that are essential for the success of other project components, such as initial treatments that enable future prescribed burning or habitat improvements.
- Align Prioritization with Resource Allocation:
 - Provide a budget and resource allocation plan that reflects the established priorities, building on the economic analysis presented in the EA (Tables 33-36).
- Incorporate Flexibility:
 - While establishing priorities, include a mechanism for adjusting them based on monitoring results and changing conditions, aligning with the adaptive management approach mentioned in Appendix A of the EA.
- Stakeholder Input on Priorities:
 - Engage stakeholders in the prioritization process, building on the collaborative approach described in Appendix A of the EA.
- Develop Progress Metrics Tied to Priorities:
 - Create specific, measurable indicators for tracking progress on high-priority actions, linking them to the Forest Plan monitoring questions and indicators for focal species (USFS, 2023).

Conclusion:

While the Lickstone Project EA provides valuable information on proposed actions and their rationale, the lack of explicit prioritization could impact the project's effectiveness and ability to achieve its stated goals. By developing and incorporating a comprehensive prioritization framework that builds on the implicit priorities already present, the Forest Service would greatly enhance the project's clarity, manageability, and potential for success. This would not only improve resource allocation and progress tracking but also facilitate better communication with stakeholders and enable more effective adaptive management throughout the project's lifecycle.

14. Limited Range of Alternatives

The Lickstone Project EA presents only two alternatives:

1. No Action Alternative (Alternative A)
2. Proposed Action (Alternative B)

This binary approach of "Do Nothing" or "Do Everything" is problematic for several reasons and may not comply with the National Environmental Policy Act (NEPA) requirements for considering a reasonable range of alternatives.

14.1 Issues with Limited Alternatives

a. Lack of Nuanced Choices:

- The current alternatives don't allow for a balanced approach that might prioritize certain objectives while deferring others.
- It forces an all-or-nothing decision, which may not be optimal for forest management.

b. Potential Non-Compliance with NEPA:

- NEPA requires consideration of a reasonable range of alternatives.
- Presenting only two extreme options may not meet this requirement.

c. Missed Opportunities for Optimization:

- Without middle-ground alternatives, there's no opportunity to explore optimized approaches that balance different priorities and resource constraints.

d. Lack of Flexibility:

- The current approach doesn't account for potential resource limitations or changing conditions that might necessitate a scaled-back approach.

e. Difficulty in Public Engagement:

- Stakeholders are left with limited options for input, potentially reducing meaningful public participation in the decision-making process.

14.2 Need for Middle-Ground Alternatives

Considering the complexity of the Lickstone Project, with its multiple goals, objectives, and proposed actions, several middle-ground alternatives could be developed. These might include:

1. Prioritized Action Alternative:

- Focus on high-priority actions identified through a rigorous prioritization process.
- Defer lower-priority actions for future consideration.

2. Phased Implementation Alternative:

- Propose a staged approach, implementing actions over a longer timeframe based on logical sequencing and resource availability.

3. Resource-Constrained Alternative:

- Develop an alternative that assumes limited resources, focusing on the most cost-effective actions that provide the greatest benefit per unit of investment.

4. Ecological Focus Alternative:

- Prioritize actions that have the most significant positive impact on ecosystem health and biodiversity, potentially deferring some economic objectives.

5. Minimal Disturbance Alternative:

- Propose an approach that achieves key objectives while minimizing ground disturbance and potential negative impacts on existing forest structure.

14.3 Benefits of Including Middle-Ground Alternatives

a. Better Compliance with NEPA:

- A range of alternatives would better fulfill NEPA requirements for considering various approaches.

b. Improved Decision-Making:

- Decision-makers would have more options to consider, potentially leading to a more nuanced and effective management approach.

c. Enhanced Public Engagement:

- Stakeholders would have more meaningful choices to consider and comment on, potentially leading to better public input and support.

d. Flexibility in Implementation:

- Multiple alternatives would provide options if full implementation of the proposed action proves unfeasible due to resource constraints or changing conditions.

e. Opportunity for Compromise:

- Middle-ground alternatives could help bridge differences between stakeholders with varying priorities.

f. Better Risk Management:

- A range of alternatives would allow for consideration of different risk profiles, potentially leading to a more balanced approach to forest management.

14.4 Examples from the Lickstone Project EA

The Lickstone Project EA includes a wide range of proposed actions that could be prioritized or phased differently to create meaningful alternatives. For example:

1. Vegetation Management: The EA proposes various treatments across 2,711 acres (Table 1, p. 7). An alternative could focus on a subset of these treatments or prioritize specific ecological zones.
2. Prescribed Burning: The project proposes burning 1,349 acres (Table 1, p. 7). An alternative could reduce this area or phase implementation over a longer period.
3. Wildlife Habitat Improvement: The creation of 12 acres of permanent wildlife fields (Table 1, p. 7) could be prioritized or scaled back in different alternatives.
4. Road Management: The project proposes adding 6.27 miles of roads to the system (p. 12-13). Alternatives could explore different balances of road addition.

14.5 Recommendations

- Develop Additional Alternatives:
 - Create at least 2-3 middle-ground alternatives that address different priorities, resource constraints, and implementation approaches.
- Conduct Comparative Analysis:

- Provide a thorough comparison of all alternatives, including their potential environmental impacts, costs, benefits, and alignment with project objectives.
- Stakeholder Input on Alternatives:
 - Engage stakeholders in the development and refinement of these additional alternatives to ensure diverse perspectives are considered.
- Scalability Considerations:
 - Design alternatives that can be scaled up or down based on available resources and changing conditions.
- Prioritization Within Alternatives:
 - For each alternative, provide a clear prioritization of actions to guide implementation.

Conclusion

The current binary approach of "No Action" versus "Full Implementation" in the Lickstone Project EA falls short of providing a meaningful range of alternatives for decision-makers and stakeholders to consider. By developing and analyzing middle-ground alternatives, the Forest Service would not only better comply with NEPA requirements but also potentially arrive at a more optimized, flexible, and widely supported approach to achieving the project's objectives. We strongly recommend that the EA be revised to include a more diverse and nuanced range of alternatives that reflect the complexity of forest management decisions and the varied interests of stakeholders.

15. Wildlife Habitat Considerations: Focus on Bear and Deer

The Lickstone Project Environmental Assessment (EA) frequently mentions wildlife habitat improvement as a key objective. However, the EA's approach to wildlife habitat improvement, particularly for bear and deer, lacks critical context and data.

15.1 Bear Habitat and Management

The EA mentions bears and bear habitat in several contexts, including the Sherwood Bear Sanctuary and the creation of suitable habitat through various management practices. However, there are some inconsistencies and missing information:

- The EA states that "The Sherwood Tract is currently closed to hunting" (p. 115). This information appears to be outdated, as the North Carolina Wildlife Resources Commission recently opened this area to bear hunting due to overpopulation concerns. It seems

contradictory to propose habitat improvements for bears when the NCWRC has opened up more areas for hunting due to overpopulation.

- The EA does not provide current data on bear populations in the project area or discuss how the proposed habitat improvements align with recent bear management decisions.
- There is no analysis of potential impacts of improved bear habitat on human-bear conflicts or overall bear management goals.

Recommendation:

The EA should include:

- Current data on bear populations in the project area
- An explanation of how the proposed habitat improvements align with recent bear management decisions
- A discussion of potential impacts of improved bear habitat on human-bear conflicts and overall bear management goals. Why there is a need to improve bear habitat considering the NCWRC considers the bear population is so large that they have opened up more areas for hunting.

15.2 Deer Habitat and Oak Regeneration

The EA emphasizes both oak regeneration and deer habitat improvement as project goals. However, it fails to address the well-documented issue of deer browse pressure on oak regeneration:

- The EA states, "White-tailed deer require open or grassy areas for browsing and mature forest for mast production critical to foraging success" (p. 116), but does not address how increased deer populations might impact oak regeneration efforts.
- The EA mentions, "Oak restoration opportunities are rapidly waning in the face of mesophication" (p. 4), but doesn't discuss how deer browse pressure contributes to this issue.
- The EA lacks current data on deer populations in the project area and strategies for managing deer browse pressure to ensure successful oak regeneration.
- Data from USFS FSveg suggests that many stands currently have enough advanced regeneration to support efforts to regenerate oak. But perhaps the reason there is some oak regeneration is that the deer population is not so high that it is preventing oak regeneration. If the deer population is increased would that not be a factor that prevents oak regeneration?

Recommendation:

The EA should include:

- Current data on deer populations in the project area
- An analysis of the potential impact of deer browse on proposed oak regeneration efforts
- Specific strategies for managing deer populations or protecting oak regeneration from browse pressure
- A discussion of how deer habitat improvement goals will be balanced with oak regeneration objectives

15.3 Overall Wildlife Habitat Considerations

The EA's approach to wildlife habitat improvement appears to lack critical context and data:

- **Absence of Population Data:** The EA does not provide current population data for key species like bear and deer, making it difficult to justify the need for habitat improvements.
- **Lack of Carrying Capacity Analysis:** There's no discussion of the current habitat's carrying capacity for different species, which is crucial for determining if habitat is indeed a limiting factor.
- **Missing Conflict Analysis:** The EA fails to address potential conflicts between different wildlife management goals (e.g., improving habitat for both predators and prey species).
- **Inadequate Integration with Regional Wildlife Management:** The EA doesn't fully consider how the proposed habitat improvements align with broader regional wildlife management strategies.

Recommendations:

- Conduct and include a comprehensive wildlife population assessment for key species in the project area.
- Provide a carrying capacity analysis for the current habitat and projected changes under the proposed actions.
- Include a thorough analysis of potential conflicts between different wildlife management goals and strategies for addressing these conflicts.
- Consult with the North Carolina Wildlife Resources Commission to ensure alignment with current regional wildlife management strategies and incorporate this information into the EA.
- Develop and include specific, measurable objectives for wildlife habitat improvement that are based on current population data and aligned with regional management goals.
- Address the potential negative impacts of improved habitat for certain species (e.g., increased human-bear conflicts, overbrowsing by deer) and propose mitigation strategies.

By addressing these issues and providing more detailed, data-driven analysis, the Forest Service can develop a more effective and justifiable wildlife habitat management plan that

aligns with both local and regional wildlife management objectives.

16. Basal Area Retention and Logging Intensity

a) Lack of specificity in basal area (BA) retention:

- Many proposed treatments lack detailed specifications for retained BA.
- Where BA retention is mentioned (e.g., 30 sq ft/acre for some shelterwood cuts), it's often vague or indirect.
- This lack of clarity makes it difficult to assess the true impact of treatments on forest structure.

b) Absence of initial basal area information:

- The EA fails to provide data on the initial BA of treatment units.
- Without this baseline, it's impossible to contextualize the retained BA or understand the extent of change.

c) No calculation of logging percentages:

- The EA does not provide calculations of what percentage of each unit's BA is being removed.
- This omission obscures the true intensity of the proposed logging activities.

d) Lack of forest-wide impact assessment:

- There's no analysis of what percentage of the overall forest area is being logged versus left untouched.
- This gap prevents a comprehensive understanding of the project's landscape-level impacts.

e) Implications for impact assessment:

- The EA frequently states there will be "no impact" from various treatments.
- Without clear data on logging percentages, these claims lack substantiation.
- The scale of logging is significant, which contradicts many "no impact" assertions.

f) Ecological considerations:

- Different species and ecosystems have varying sensitivities to BA removal.
- Without specific logging percentages, it's challenging to assess potential ecological effects.

g) Cumulative impacts:

- The lack of detailed BA and logging percentage data makes it difficult to assess cumulative impacts across multiple units or over time.

h) Transparency and public understanding:

- The absence of clear logging intensity data hinders public stakeholders from fully grasping the project's scope and potential effects.

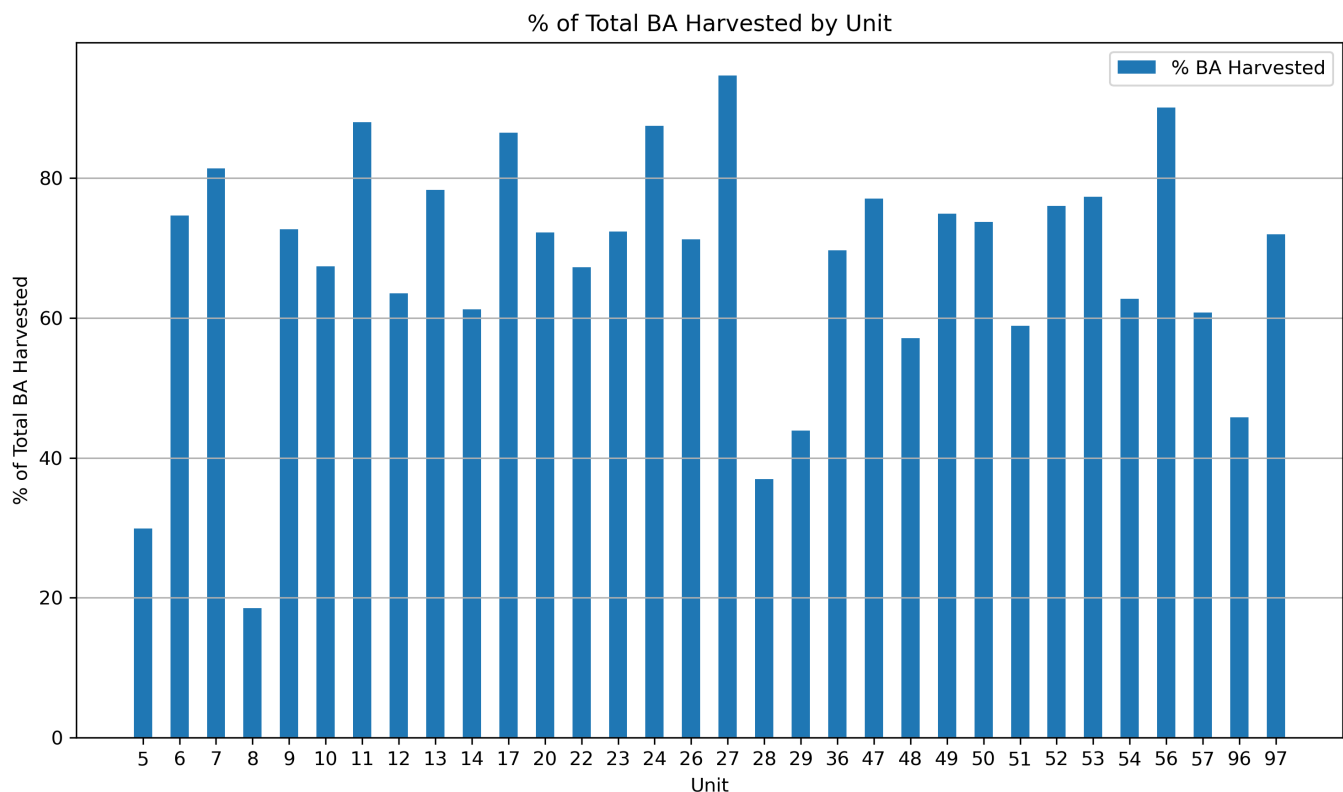
i) Consistency with best practices:

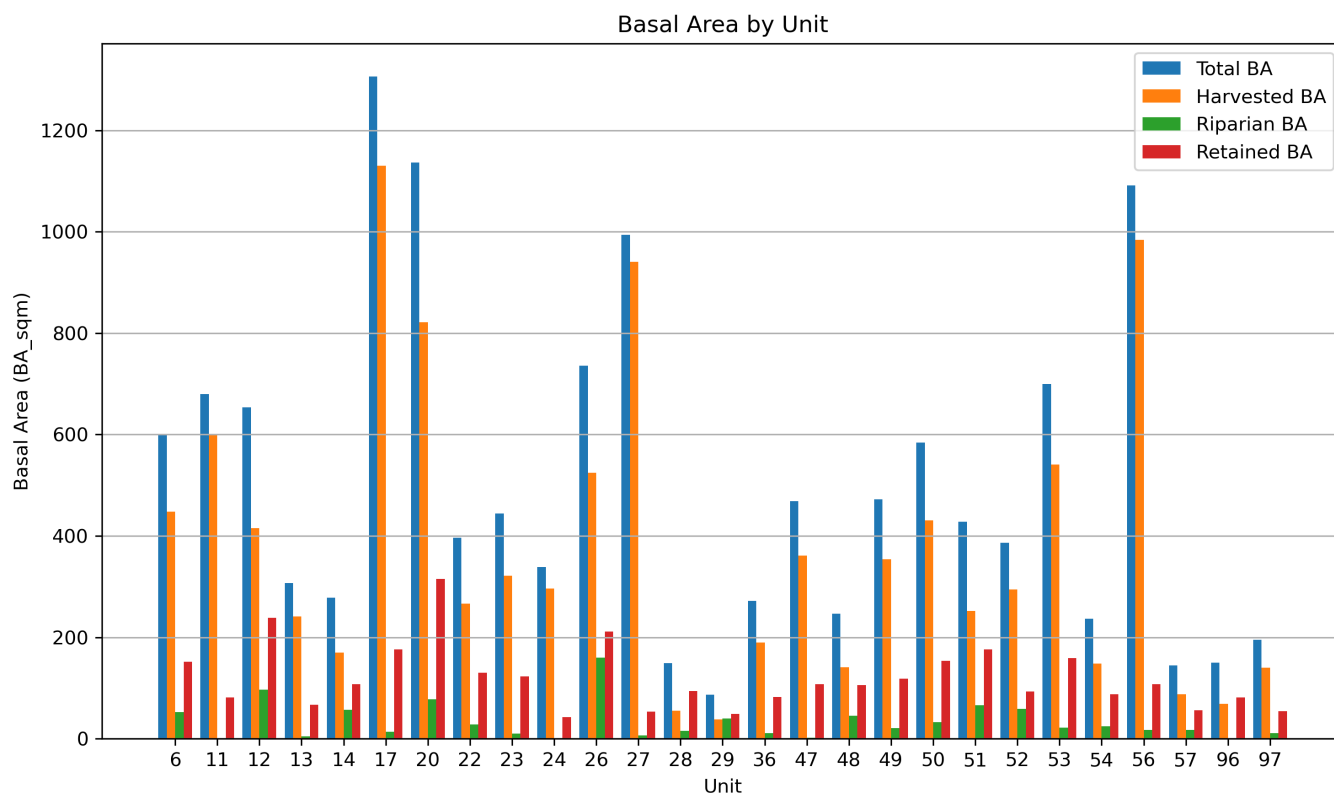
- Standard forestry practices typically involve clear documentation of initial stand conditions, proposed removals, and expected post-treatment conditions.
- The EA's lack of this information falls short of these best practices.

j) Implications for monitoring and adaptive management:

- Without clear baselines and treatment intensities, it becomes challenging to effectively monitor outcomes and adapt management strategies.

A LiDAR analysis to simulate treatments showed many units will have more than 80% of their total basal area (i.e. trees) removed and most units will have more than 60% removed. While technically not a clear-cut it is timber harvesting at an intense scale.





Proposed Commercial Treatments

NEPA Unit Number	Treatment	Commercial Harvest	Acres	Logging System	Management Area	Needs*
1	Commercial Thinning	Yes	9	Tractor --winching required	Matrix	7
2	Commercial Thinning	Yes	6	Mixed -- skyline and tractor with winching	Matrix	7
5	Uneven-aged	Yes	98	Mixed -- skyline and tractor with winching	Matrix	2a, 4a, 4c, 4d
6	Uneven-aged	Yes	26	Tractor --winching required	Matrix	2a, 4a, 4c, 4d, 4f
7	Uneven-aged	Yes	57	Tractor --winching required	Matrix	2a, 4a, 4c, 4d

NEPA Unit Number	Treatment	Commercial Harvest	Acres	Logging System	Management Area	Needs*
8	Uneven-aged	Yes	53	Mixed -- skyline and tractor with winching	Matrix	2a, 4a, 4c, 4d
9	Uneven-aged	Yes	115	Mixed -- skyline and tractor with winching	Matrix	2a, 4a, 4c, 4d, 4f
10	Uneven-aged	Yes	292	Tractor -- winching required	Matrix	2a, 4a, 4c, 4d, 4f
11	Uneven-aged	Yes	21	Tractor -- winching required	Matrix	2a, 4a, 4c, 4d, 4f
12	Oak Shelterwood	Yes	32	Mixed -- skyline and tractor	Matrix	1a, 2a, 4a, 4b,4c, 4d
13	Midstory Treatment	No	14	None	Matrix	2a, 6
14	Oak Shelterwood	Yes	17	Skyline	Matrix	1a, 2a, 4a, 4b,4c, 4d
15	Midstory Treatment	No	13	None	Matrix	2a, 6
17	Oak Shelterwood	No	33	Mixed -- skyline and tractor with winching	Matrix	1a, 2a, 4a, 4b,4c, 4d
18	Midstory Treatment	No	10	None	Matrix	2a, 6
19	Oak Shelterwood	Unk	4	Skyline	Matrix	1a, 2a, 4a, 4b,4c, 4d

NEPA Unit Number	Treatment	Commercial Harvest	Acres	Logging System	Management Area	Needs*
20	Midstory Treatment	No	50	None	Matrix	2a, 6
22	Oak Shelterwood	Unk	21	Mixed -- skyline and tractor with winching	Matrix	1a, 2a, 4a, 4b,4c, 4d
23	Oak Shelterwood	Unk	25	Tractor -- winching required	Matrix	1a, 2a, 4a, 4b,4c, 4d
24	Midstory Treatment	No	13	None	Matrix	2a, 6
25	Midstory Treatment	No	2	None	Matrix	2a, 6
26	Midstory Treatment	No	17	None	Matrix	2a, 6
27	Oak Shelterwood	Unk	15	Tractor -- winching required	Matrix	1a, 2a, 4a, 4b,4c, 4d
28	Midstory Treatment	No	16	None	Matrix	2a, 6
29	Oak Shelterwood	Unk	4	Tractor -- winching required	Matrix	1a, 2a, 4a, 4b,4c, 4d
36	Commercial Thinning	Yes	15	Tractor -- winching required	Interface	7
47	Shelterwood With Reserves	Yes	21	Mixed -- skyline and tractor with winching	Matrix	1, 2a, 2c, 4d
48	Shelterwood With Reserves	Yes	14	Skyline	Matrix	1, 2a, 2c, 4d

NEPA Unit Number	Treatment	Commercial Harvest	Acres	Logging System	Management Area	Needs*
49	Shelterwood With Reserves	Yes	20	Mixed -- skyline and tractor with winching	Matrix	1, 2a, 2c, 4d
50	Shelterwood With Reserves	Yes	25	Mixed -- skyline and tractor with winching	Matrix	1, 2a, 2c, 4d
51	Oak Shelterwood	Yes	24	Mixed -- skyline and tractor with winching	Matrix	1a, 2a, 4a, 4b,4c, 4d
52	Shelterwood With Reserves	Yes	9	Skyline	Matrix	1, 2a, 2c, 4d
53	Shelterwood With Reserves	Yes	28	Skyline	Matrix	1, 2a, 2c, 4d
54	Shelterwood With Reserves	Yes	13	Mixed -- skyline and tractor with winching	Matrix	1, 2a, 2c, 4d
56	Shelterwood With Reserves	Yes	25	Mixed -- skyline and tractor with winching	Matrix	1, 2a, 2c, 4d
57	Shelterwood With Reserves	Unk	9	Skyline	Matrix	1, 2a, 2c, 4d
96	Midstory Treatment	No	16	None	Matrix	2a, 6
97	Midstory Treatment	No	10	None	Matrix	2a, 6

Alltogether this totals over 1,000 acres of commercial timber harvest.

1. Uneven-aged Management: No specific basal area retention requirement is mentioned for this treatment type.
2. Oak Shelterwood: No specific basal area retention requirement is mentioned for the initial entry. The second entry (overstory removal) would occur after adequate oak regeneration is established, typically 5-10 years after the first entry.
3. Shelterwood with Reserves: For units with a Moderate or High Scenic Integrity Objective, there is a requirement to "Retain an average of 30 sq ft/acre or higher (shelterwood establishment cut)". This applies to units 47, 48, 49, 50, 52, 53, 54, 56, and 57.
4. Midstory Treatment: No specific basal area retention requirement is mentioned for this non-commercial treatment.
5. Commercial Thinning: For unit 1, which has a Moderate to High Scenic Integrity Objective, there is no specific basal area retention mentioned. For units 2 and 36, no specific basal area retention requirement is mentioned.

Additionally, the visual design criteria in Appendix G provide some guidance on retention for units with higher Scenic Integrity Objectives, but these are not always expressed in terms of specific basal area requirements.

Summary of Table 5. Site specific scenic integrity objectives and required visual design features.

- Uneven-aged Management:
 - Units 5, 6, 7, 8, 9, 10, 11: No specific basal area retention mentioned.
- Oak Shelterwood:
 - Units 12, 14, 17, 19, 22, 23, 27, 29, 51: All require "Retain an average of 30 sq ft/acre or higher (shelterwood establishment cut)"
- Shelterwood with Reserves:
 - Units 47, 48, 49, 50, 52, 53, 54, 56, 57: All require "Retain an average of 30 sq ft/acre or higher (shelterwood establishment cut)"
- Midstory Treatment:
 - Units 13, 15, 18, 20, 24, 25, 26, 28, 96, 97: Not listed in Table 5, no specific retention requirements.
- Commercial Thinning:
 - Unit 1: No specific basal area retention mentioned.
 - Unit 2: No specific basal area retention mentioned.
 - Unit 36: No specific basal area retention mentioned.

A review of Table 5. EA Appendices shows Oak Shelterwood and Shelterwood with Reserves units have a specific basal area retention requirement of 30 sq ft/acre or higher. The Uneven-aged Management and Commercial Thinning units don't have specific basal area retention requirements listed in this table. Midstory Treatment units are not included in the table, which is consistent with their non-commercial nature.

Commercial Treatments Summary:

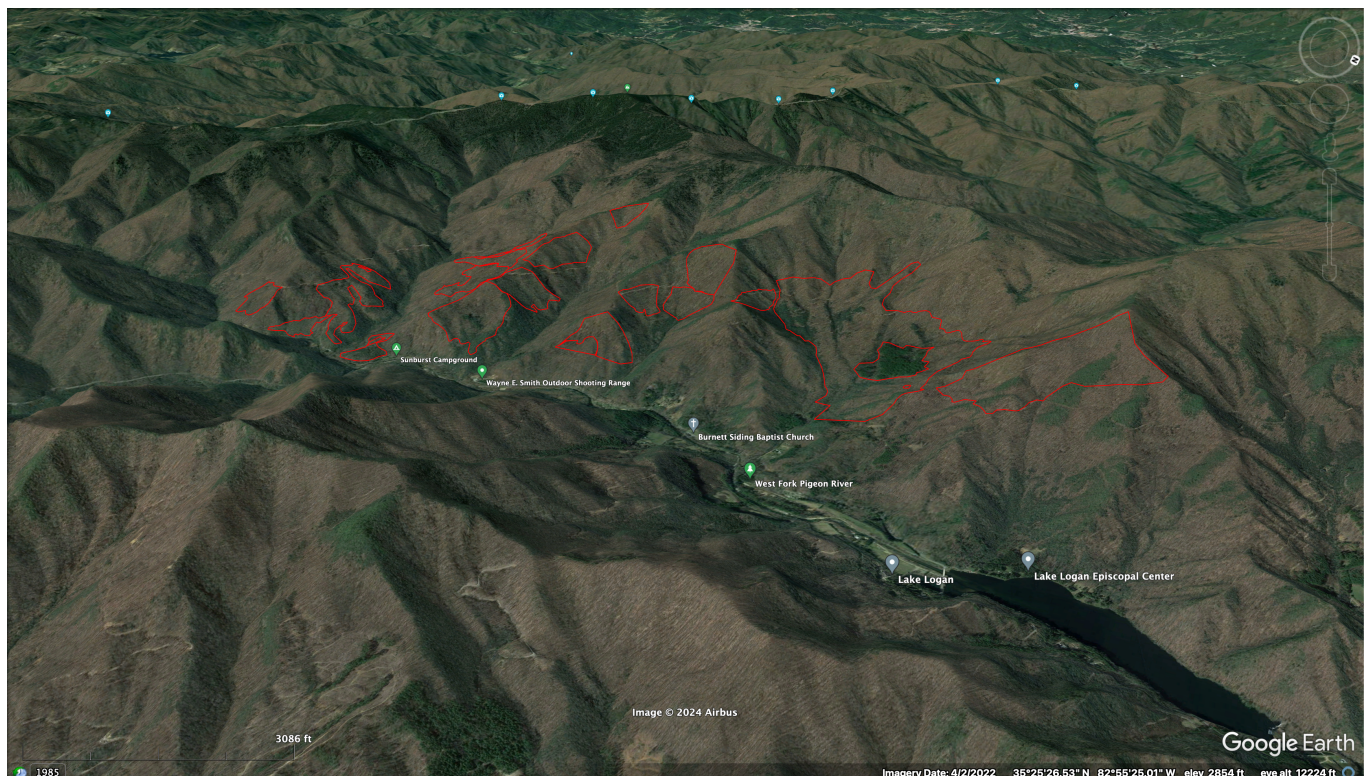
- Uneven-aged: 662 acres
- Oak Shelterwood: 172 acres
- Shelterwood with Reserves: 164 acres
- Commercial Thinning: 30 acres

Total commercial treatment acres: 1,028 acres

This total includes all units marked as "Yes" for commercial harvest, plus those marked as "Unk" (unknown) for Oak Shelterwood, as these could potentially be commercial harvests.

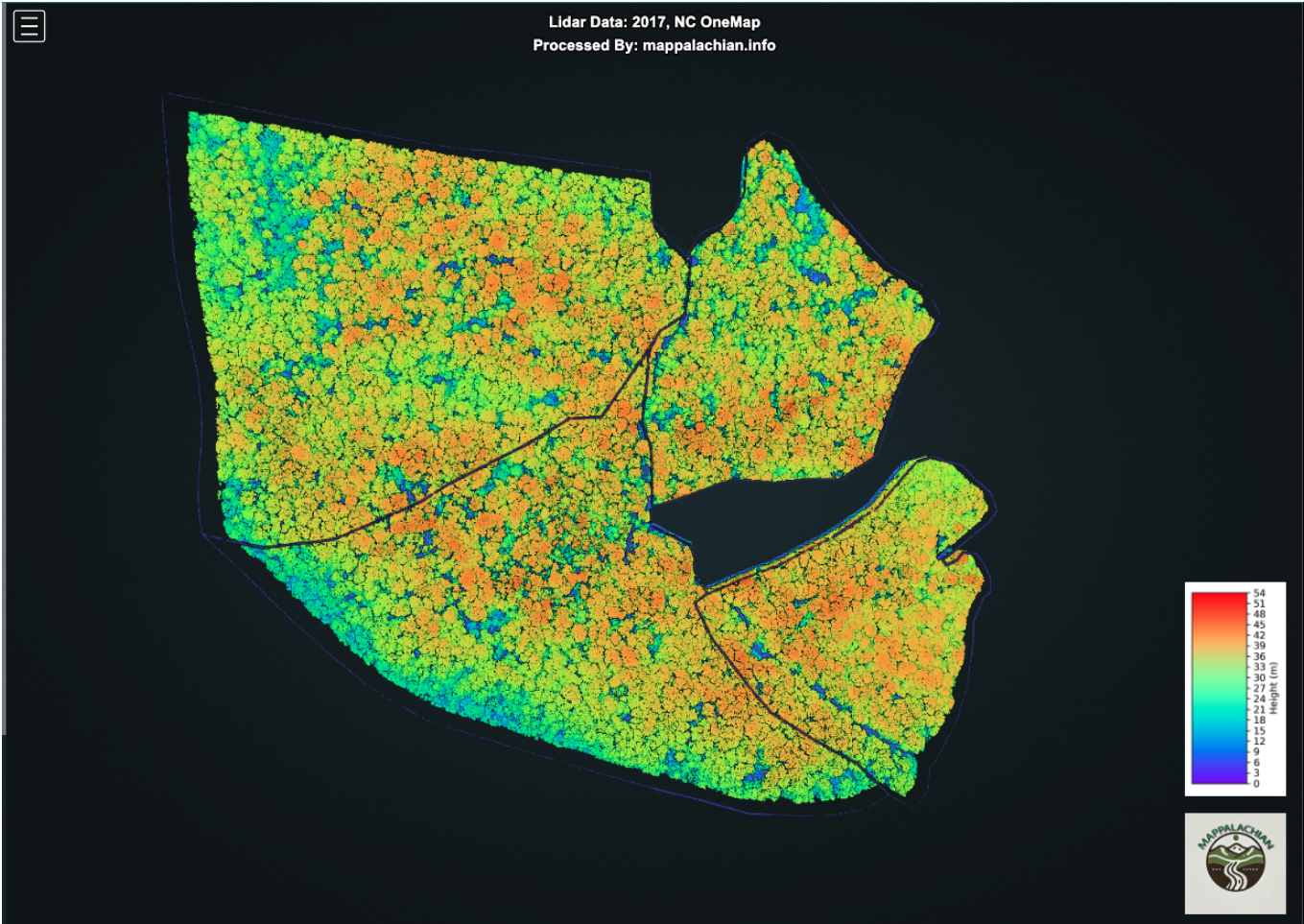
It is inconceivable that 1,028 acres of commercial treatment would not have any impact. I cannot support this project considering the scope of the planned commercial treatments.

For perspective, the image below shows all commercial treatments placed on the Lickstone Area in Google Earth. More treatments are marked 'unknown' and these are not included.



LiDAR analysis of treatments was used to generate simulated units after treatment and these show dramatic changes in the landscape. One notable area is the combined 77 acres which makes up units 14, 22, 48, and 51. These units are all adjacent to each other and the LiDAR analysis shows that they approximately 60% of the trees will be harvest, and more than 80% outside riparian buffers.

Figure 1. LiDAR analysis of units 14, 22, 48, and 51. Before Treatment



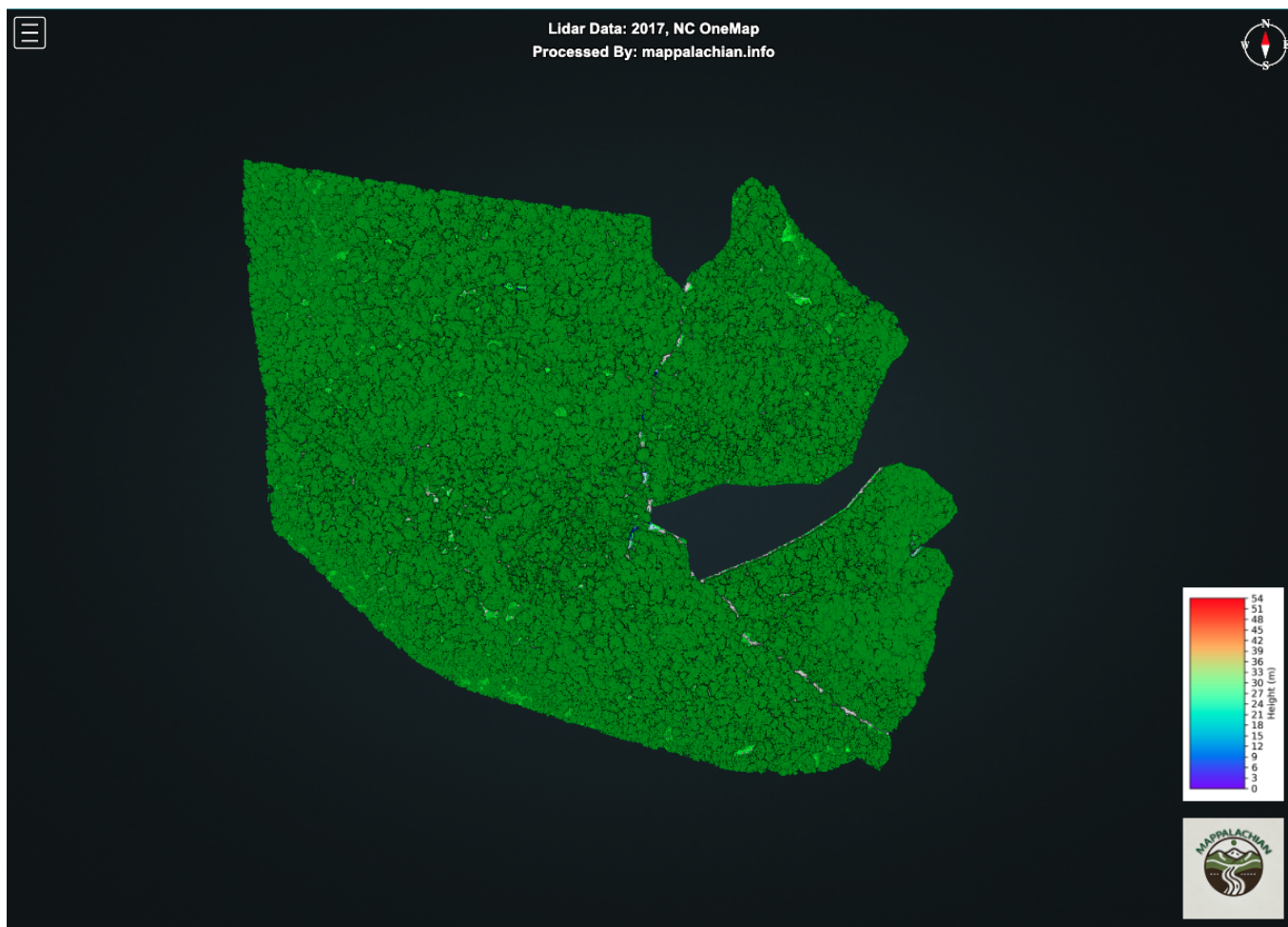
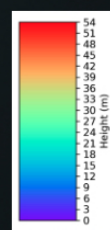
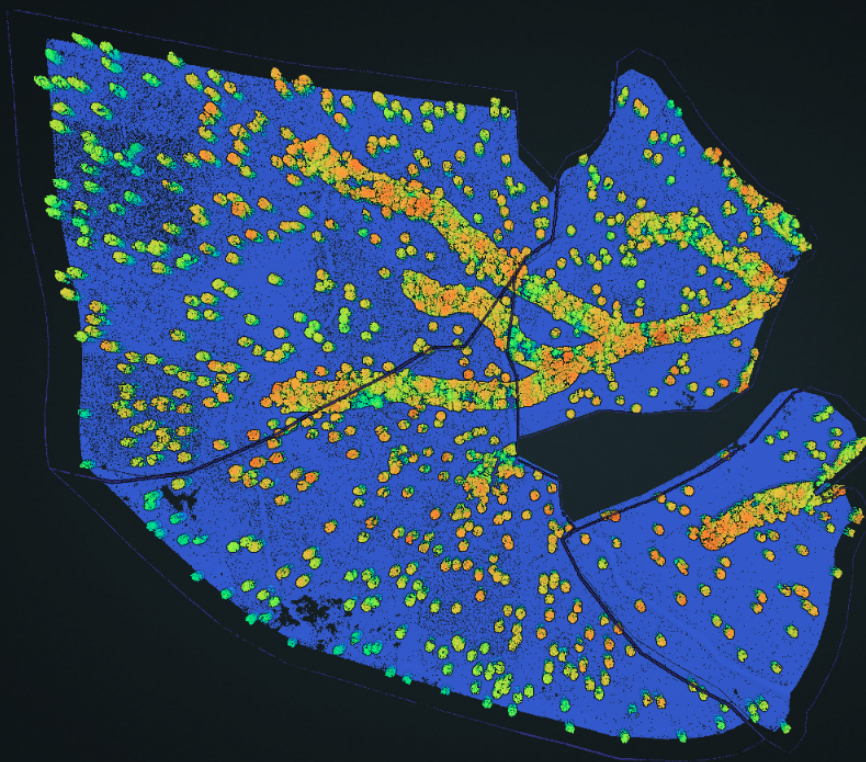


Figure 2. LiDAR analysis of units 14, 22, 48, and 51. After Treatment



Lidar Data: 2017, NC OneMap
Processed By: mappalachian.info





17. Conclusion

Summary:

The comments offer a detailed and critical analysis of the Lickstone Project EA, highlighting numerous areas where the assessment falls short of providing a thorough and transparent evaluation of the project's potential impacts and effectiveness. Key concerns include:

- **Climate Impact Analysis:** The EA's analysis of climate impacts is insufficient, lacking a full life-cycle accounting of carbon costs and using an inappropriately large scale that dilutes the apparent impact of the project.
- **Extreme Weather Resilience:** There's inadequate consideration of the region's vulnerability to extreme weather events, particularly in relation to proposed logging and road-building activities.
- **Roads and Road Building:** The EA understates the impacts of proposed road construction and improvements, and provides misleading representations of net road mileage.
- **Logging on Steep Slopes:** The extent of logging proposed on steep slopes with high erosion hazards presents significant environmental risks that are not adequately addressed.

- **Riparian Mapping:** The EA's riparian mapping is inadequate, outdated, and inaccurate, preventing a thorough assessment of potential impacts on water resources.
- **Findings of No Impact:** The EA frequently states "no impact" for various project activities when some level of impact is likely to occur, potentially violating NEPA requirements.
- **Long-term Actions and Timeline:** The EA lacks crucial information regarding the implementation timeline, follow-up treatments, and long-term management plans.
- **Economic Analysis:** The cost estimates provided are incomplete and lack crucial details for a comprehensive economic assessment.
- **Monitoring and Reporting:** The EA fails to provide a comprehensive monitoring and reporting plan, essential for assessing success and enabling adaptive management.
- **Limited Range of Alternatives:** The EA presents only two extreme alternatives, lacking middle-ground options that could provide more nuanced and potentially more effective approaches.
- **Wildlife Habitat Considerations:** The EA's approach to wildlife habitat improvement, particularly for bear and deer, lacks critical context and data to justify the proposed actions.

Conclusion:

The Lickstone Project Environmental Assessment, while demonstrating significant effort in planning and analysis, falls short in several critical areas that are essential for a comprehensive and transparent evaluation of the proposed forest management activities. The EA's shortcomings in climate impact analysis, consideration of extreme weather risks, road construction impacts, steep slope logging, riparian mapping, and wildlife habitat management raise serious concerns about the project's potential environmental consequences and long-term sustainability.

Furthermore, the lack of a robust monitoring and reporting framework, coupled with insufficient economic analysis and a limited range of alternatives, hinders the ability to make informed decisions and adapt management strategies effectively over time.

To address these issues and strengthen the project's potential for success, we strongly recommend that the Forest Service:

- Conduct a more comprehensive and scientifically rigorous analysis of climate impacts, extreme weather resilience, and environmental risks associated with proposed activities.
- Develop and include a detailed, time-bound action plan with clear prioritization of activities and a robust monitoring and reporting framework.
- Provide a more thorough economic analysis that includes all direct and indirect costs associated with the project.

- Expand the range of alternatives to include middle-ground options that allow for more nuanced decision-making.
- Update and improve riparian mapping and wildlife habitat assessments to ensure accurate evaluation of potential impacts and effectiveness of proposed actions.

By addressing these concerns and incorporating more comprehensive analyses, the Forest Service can significantly enhance the Lickstone Project's potential to achieve its forest management goals while minimizing environmental risks and ensuring long-term sustainability. This revised approach would not only better align with NEPA requirements but also foster improved stakeholder engagement and support for the project's objectives.

Given the numerous concerns I have expressed I cannot support the project as it is currently proposed. There is too much commercial timber harvest on slopes which are too steep. There is too little concern for the risks entailed by logging on such steep slopes. There is insufficient reason and little need to push miles of new roads into remote backcountry areas. There is far too much proposed and far too little detail about who, how, and when the proposed actions will be completed and whether or not the required follow-up will ever be undertaken.