Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Granite Moccasin Project
Environmental Assessment

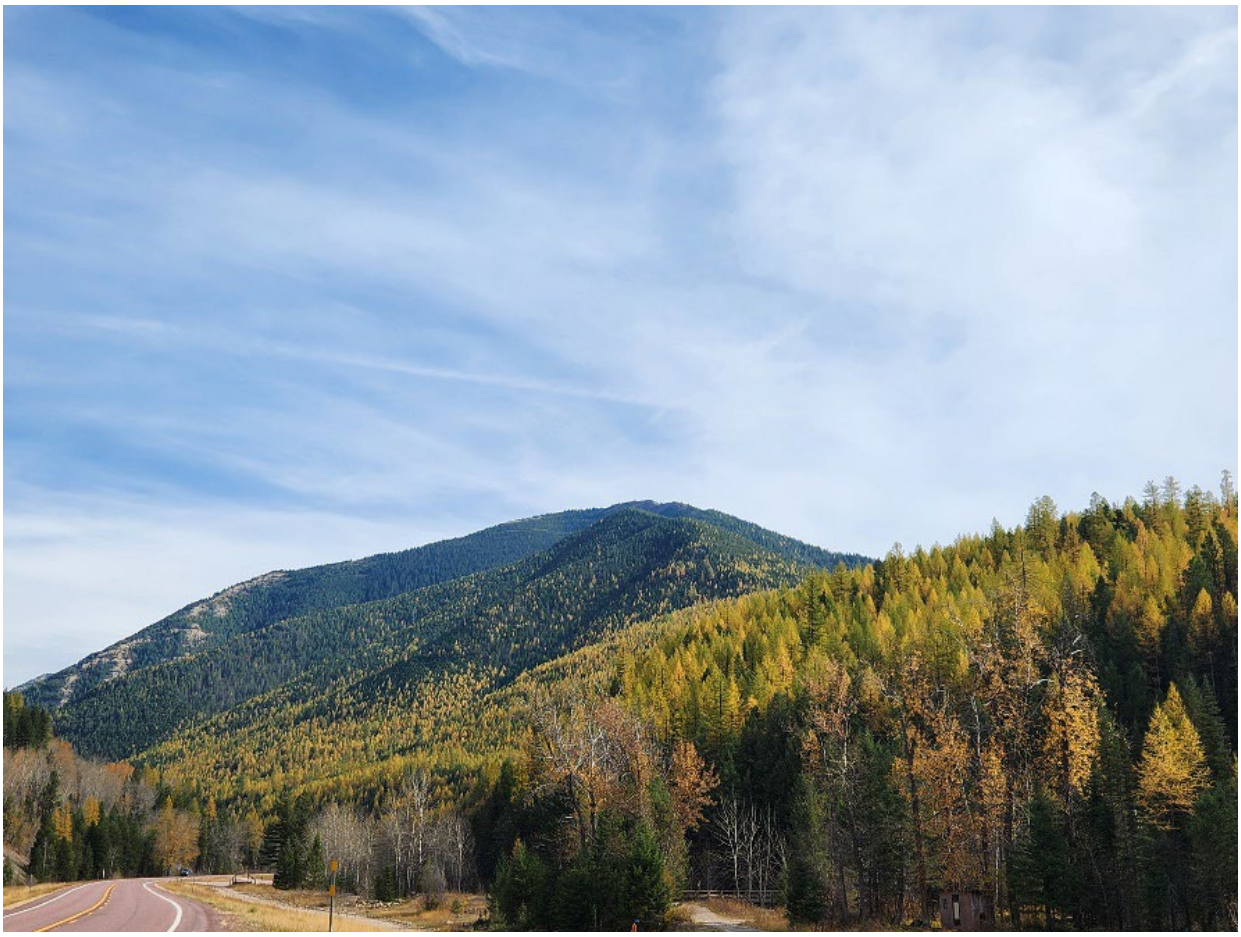

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Table of Contents

List of Tables

List of Figures

Project Area

The Granite Moccasin Project is located within the Hungry Horse Ranger District of the Flathead National Forest. Accordingly, the responsible official will be the District Ranger. The 67,536-acre project area, situated south of Glacier National Park in Flathead County, extends roughly 40 miles along U.S. Highway 2 (Figure 1). Within this project area, vegetation treatments are proposed on 4,737 acres (see Proposed Action section of this document).

Within the project area, land ownership consists of approximately 94 percent National Forest System (hereafter, NFS) lands, about 6 percent privately owned lands, and a small portion (under 1 percent) owned and managed by the State of Montana Department of Natural Resources and Conservation (DNRC). All proposed activities would occur on NFS lands.

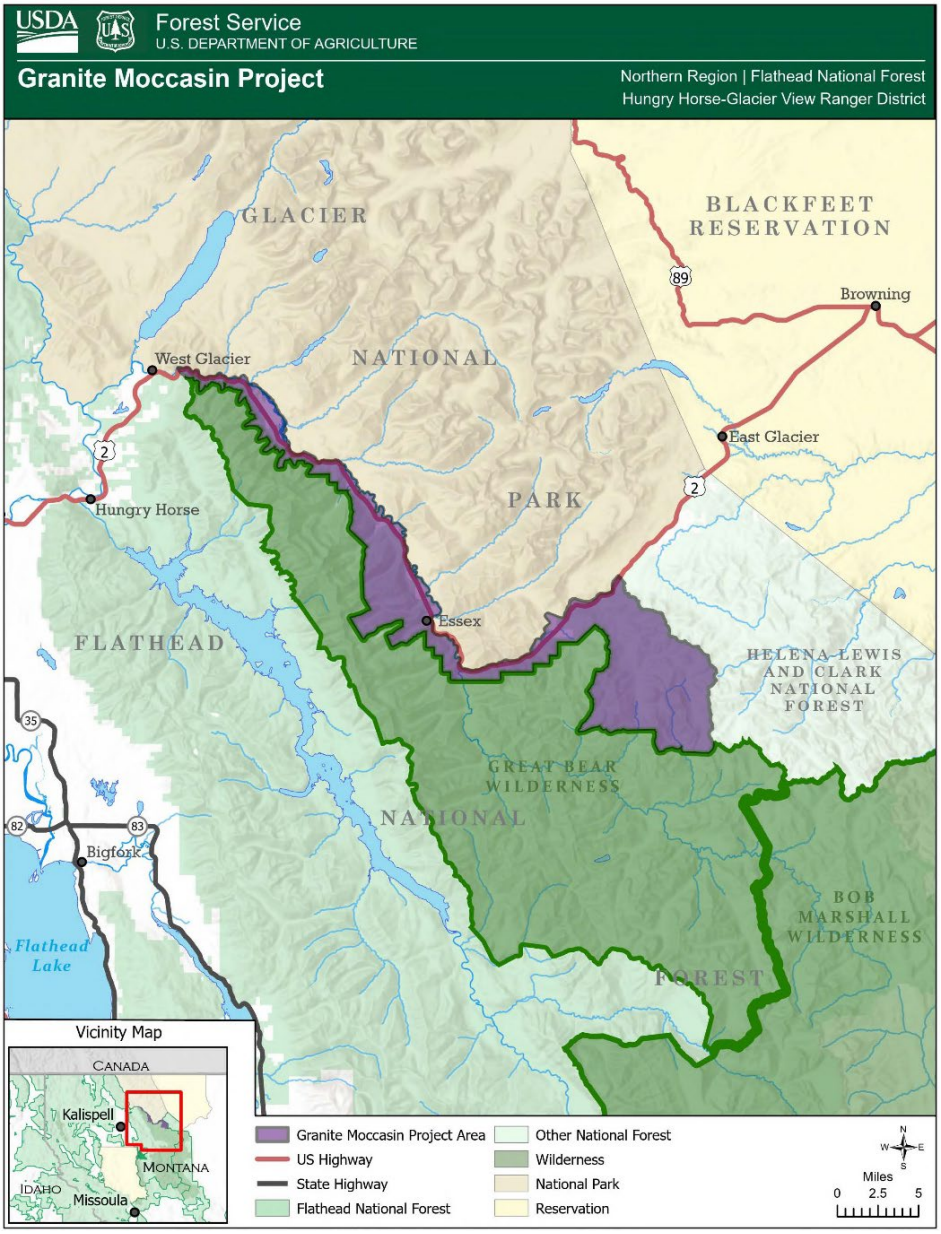

Figure 1. Granite Moccasin project area

Wildland–Urban Interface

The purpose and need, proposed action, and analysis in this environmental assessment use the Healthy Forest Restoration Act (HFRA) section 16(B) criteria for mapping the wildland–urban interface (hereafter, WUI) (project file R001). This mapping is necessary to identify areas where specific lynx exceptions and exemptions, as authorized by the forest plan, may be applied. This process ensures that the proposed action aligns with both the forest plan and the HFRA.

Purpose and Need

The purpose and need of the Granite Moccasin Project are derived from the differences between the existing landscape conditions and the desired conditions described in the Flathead National Forest Land Management Plan (hereafter, forest plan) (USFS 2018b). Following field review of the project area and interdisciplinary discussions, which included consideration of the Community Wildfire Protection Plan for Flathead County, Montana (2021) and the Montana Forest Action Plan (2020), the following purpose and need were identified:

- Reduce tree densities and fuel loadings in the WUI to result in less intense fire behavior near communities and facilitate safe wildland fire operations.
- Improve the diversity and resilience of terrestrial ecosystems and vegetation.
- Provide a mix of forest products to contribute to economic sustainability, generating jobs and income for local economies.

Reduce Tree Densities and Fuel Loadings in the WUI

The Granite Moccasin project area extends through John F. Stevens Canyon along U.S. Highway 2, a critical transportation corridor and the only vehicle route between the Flathead Valley and the northern plains of eastern Montana. This narrow canyon, which includes portions of the designated recreational segment of the Middle Fork Flathead River, contains a high concentration of essential infrastructure such as the BNSF railroad, utility corridors, and DOT facilities; it also encompasses the communities of Essex, Pinnacle, Snowslip, and Fielding, as well as several private inholdings. Historic sites such as the Izaak Walton Inn and the Walton Ranger Station also lie within the project area. These community assets, infrastructure, private properties, and historic sites contribute to the area's designation as WUI.

Steep terrain and a dominant stand-replacing fire regime increase the vulnerability of these communities and assets. Historical fire records show a pattern of intense activity followed by a long lull and recent resurgence: over 21,000 acres burned between 1893 and 1929, followed by minimal activity until 1998, when more than 6,000 acres burned. Subsequent large fires, including the Sheep (2015) and Paola Ridge (2018) fires, consumed over 5,000 acres and posed significant threats to local communities and infrastructure.

The dominant fire regime presents major challenges for wildfire suppression, as direct attack is often impractical. Consequently, reducing fuels near infrastructure and private property is essential for protection. Currently, about 80 percent of recent burns have occurred near the Continental Divide, farther from the WUI. In contrast, most forested areas within the WUI have remained unburned since before 1929, resulting in increased tree size, density, and understory growth (Figure 8 in Appendix D). The understory growth has created ladder fuels that elevate the risk of stand-replacing crown fires, which could endanger lives and property.

In alignment with the forest plan (FW-DC-FIRE-02), fuel reduction is prioritized in areas where wildfires on NFS lands threaten communities and assets. The Granite Moccasin project area, situated near at-risk communities and aligned with prevailing wind patterns, is particularly susceptible to severe fire behavior. Risk mitigation strategies include disrupting fuel continuity across the landscape, reducing surface fuels within the WUI, and managing for lower tree densities. Strategic fuel breaks and improved ingress/egress routes are also recommended to enhance firefighter safety (FW-DC-FIRE-01, 02, 07; FW-DC-TE&V-13).

The primary purpose of the Granite Moccasin Project is to reduce hazardous fuels in these high-risk areas to protect communities, infrastructure, and historic properties. Current untreated stands commonly exhibit dense understory growth that contributes to elevated wildfire hazard (see example images in Appendix D).

Improve Diversity and Resilience of Terrestrial Ecosystems and Vegetation

Vegetation management has influenced current stand conditions in the Granite Moccasin project area. Since the 1950s, about 6 percent of the area was harvested for regeneration, with many clearcuts in the 1970s, and roughly 1,000 acres received liberation cuts that encouraged additional regeneration. These stands, now more than 50 years old, remain dense where no thinning has occurred. Unharvested and unburned stands have also continued to increase in density, leading to competition for light, nutrients, and water; reduced tree vigor and resistance to insects and disease; higher mortality; and accumulating surface fuels.

To improve stand diversity and resilience, the project proposes treatments that reduce density and competition, improve species composition, and increase structural complexity. Many treatments focus on recruiting and retaining larger, desirable species such as western larch and western white pine. Additional treatments aim to establish those same species through regeneration harvest and planting. Other treatments intend to restore whitebark pine through various combinations of planting, noncommercial release treatments, and prescribed fire. These actions are needed to maintain large, long-lived trees and reduce susceptibility to insects, disease, and stand-replacing wildfire across the WUI, riparian areas, timber production lands, and recreation areas (FW-DC-TE&V-03, 07, 08, 11, 12, 13, 14, and 21; FW-DC-RMZ-01).

Appendix D shows an example of Douglas-fir mortality throughout the Essex Creek vicinity of the project area. Left untreated, such mortality is expected to continue into the foreseeable future.

Provide Forest Products

Timber production supports ecological and economic sustainability by helping achieve forest plan desired vegetation conditions and contributing to local economies. Sustainable, regularly scheduled harvests are expected on suitable lands, and timber use on other land types can still support desired conditions and provide social and economic benefits. Active vegetation management across all land types improves forest resilience and reduces the risk of timber loss to wildfire, insects, and disease.

Even-aged, commercial-size western larch stands currently require thinning due to competition and crown closure, and commercial thinning can serve as one of multiple entries to maintain sustainable harvest levels. The Granite Moccasin Project includes treatments designed to improve forest structure and fire behavior while supplying wood products to local economies (FW-DC-TIMB-01, 02, 03, 04, 06, and 07).

Proposed Action

The proposed action is a set of management actions intended to meet the project's purpose and need and includes the project design features in Appendix A. Table 1 and Table 2 provide summaries of the vegetation management and road management components of the proposed action. Maps of proposed units are provided in Appendix B, and a list of proposed unit-specific treatments is provided in Appendix C.

Table 1. Summary of proposed vegetation management activities

Proposed vegetation treatments	Acres
Commercial thin	770
Improvement cut	250
Seed tree	987
Clearcut	150
Shelterwood	194
Group selection	40
Hardwood release	23
Salvage	3
Total proposed commercial treatment	**2,417**
Precommercial thin	283
Understory removal	214
Hazardous fuel thin	47
Prescribed burn	240
Whitebark pine restoration – daylight/release	427
Whitebark pine restoration – daylight/release and plant	182
Whitebark pine restoration – planting	Up to 426*
Whitebark pine restoration – prescribed burn and plant	583
Total proposed noncommercial treatment	**2,189**
Utility corridor expansion (includes mechanical and hand thinning)	131
Total proposed vegetation treatment acres (commercial and noncommercial)	**4,737**

*Note that planting is only expected to occur in portions of proposed whitebark pine restoration – planting units. See treatment descriptions for additional information.

Table 2. Summary of proposed road management activities

Proposed road management	Miles
New NFS roads – impassable status	7.60
Temporary road construction	0.75
NFS haul routes (includes new system road construction)	79.85

Proposed Vegetation Treatment

To meet the purpose and need of the project, several different silvicultural treatments are proposed. See Table 31 in Appendix C for a list of treatments by unit.

Commercial thin is a commercial timber harvest that retains a generally well-stocked forest composed of the healthiest trees with large, well-formed crowns and reduced fuel loading. The objective of this treatment is to improve forest growth, resilience, and species composition by reducing overall tree density. Leave tree selection would favor fire-tolerant species, including western larch, western white pine, Douglas-fir, and where present, ponderosa pine. These trees would then have more growing space with increased access to light, nutrients, and water. Increased growing space improves tree vigor and increases resilience to insects, disease, and wildfire. Commercial thinning would also achieve fuels reduction and timber production objectives by reducing tree densities and ladder fuels allowing for vigorous growth of preferred species. These activities would be completed using commercial harvest methods and post-harvest fuels methods (see descriptions in the Treatment Methods section below).

Improvement cut is a timber harvest that removes the less desirable trees of any species primarily to increase resilience and improve the composition, structure, and quality of the stand treated. This treatment type is often similar to a commercial thin but differs in that treatment occurs to achieve a specific objective and is not always commercial in nature.

Even-aged regeneration treatments—such as **shelterwood, seed tree, and clearcut methods**—are used to shift a mature stand into a seedling stage. These techniques aim to regenerate preferred tree species like western larch, western white pine, and ponderosa pine, reduce forest fuels, and lessen future losses from forest pathogens. They create forest openings that mimic those created by natural disturbances.

Seed tree harvest is planned where existing trees of preferred species are available to provide seeds for the site. Clearcut harvest is planned where the existing stand lacks preferred species and is therefore the optimum method. Shelterwood harvest is planned where retention of existing overstory trees is sufficient to provide shade for newly established seedlings or is necessary due to harsh aspects and slopes. Seed tree and shelterwood harvests would generally be reforested using a combination of natural regeneration and planting. Clearcut stands would generally be reforested by planting. All treatments would retain large overstory trees of preferred species where available for long-term stand structure, snag replacements, and downed wood recruitment. Treatments would also retain existing large, downed wood, where available. These activities would be completed using commercial harvest methods, post-harvest fuels methods, and site preparation and reforestation methods (described in Treatment Methods section below).

Regeneration treatments in twenty-one units (alone or in combination) would result in new even-aged openings over 40 acres (units 8, 21, 23, 25, 32, 33, 47, 49, 50, 63, 64, 65, 67, 69, 71, 71a, 80, 110, 403, 410, and 411), but none of these proposed treatments, alone or in combination, would exceed maximum opening sizes identified in table 21 of the forest plan (150 acres for cool-moist). These openings were determined necessary to meet or contribute to the purpose and need for this project and applicable desired conditions. The units are a composite of individual stands with regeneration needs. The resulting openings would mimic natural ecological processes consistent with the mixed-severity and high severity fire regimes of the project area. Consistent with FW-DC-TE&V-3, they would represent a range of sizes and shapes and follow natural breaks and topographic features and landscape patterns.

Group selection is an uneven-aged regeneration treatment involving multiple entries that would alter a portion of the unit from a mature tree class to a seedling stage, while retaining a generally well-stocked stand in the remaining area. The objective of these entries is to establish an uneven-

aged structure with three or more age classes while successfully regenerating preferred shade intolerant tree species such as western larch and western white pine. This treatment involves several components:

- Small patch openings (2 to 10 acres) across 20 to 50 percent of the stand area.
- Untreated retention patches within riparian management zones and 10 to 20 percent of the overall treatment area.
- Thinning of the remaining "matrix" across up to 50 percent of the remaining area.

Proportions of those various treatments will be determined at the time of implementation and based on the severity of root disease and beetle activity at the time of treatment. Trees would be removed using *commercial harvest methods*, thereby reducing fuels, minimizing losses caused by forest health pathogens, and creating patch sizes consistent with natural disturbance regimes. These treatments could be followed by treatments using *post-harvest fuels methods*.

Hardwood release is an intermediate treatment to provide more growing space to existing hardwoods and is typically designed to increase the proportion of aspen in stands where it is found growing in mixed-conifer conditions. This is achieved by removing less desirable conifer species from within a perimeter of existing aspen or other hardwood trees. Considered a form of improvement cut, this treatment improves the composition, structure, and quality of the stand treated by reducing tree densities and subsequent fuel loading. These activities would be completed using commercial harvest methods and post-harvest fuels methods (see descriptions in Treatment Methods section below).

Utility corridor expansion treatments are intended to reduce fuels and lower the likelihood of fire spread within about 1½ tree lengths (about 150 feet) of either side of existing powerlines. These treatments are being proposed in coordination with local utility companies including Flathead Electric, Glacier Electric, and Northwestern Energy. Under the proposed action, units 1, 2, 3, 5, 14, 51, and 55a would likely be completed using commercial harvest methods and post-harvest fuels methods while units 200, 201, and 800 would be accomplished using noncommercial treatment methods (described in Treatment Methods section below).

Precommercial thin is a noncommercial intermediate treatment planned in young, generally even-aged stands (less than 35 years old) when trees are still small. The primary objective is to maintain or improve health, growth, and species composition while reducing fuels. A portion of the existing trees which are seven inches or smaller in diameter are felled and removed, scattered, or piled and burned to leave a relatively well-stocked forested condition. Treatment is generally accomplished using noncommercial treatment methods (described in Treatment Methods section below).

Understory removal is proposed to maintain a reduced fuel load condition. With this treatment, trees less than six inches in diameter at breast height would be lopped and scattered. The goal is to maintain reduced ladder fuels and wide spacing between trees. Treatment is generally accomplished using noncommercial treatment methods (described in Treatment Methods section below).

Prescribed burn is a treatment that applies fire to reduce accumulated fuels, alter stand structures, and maintain or promote development of a diverse mosaic of vegetation conditions. To prepare a site for prescribed burning, treatment may include the slashing of trees and shrubs,

piling, and pile burning, followed by hand or aerial ignition of prescribed fire. It is proposed to reduce fuels in strategic locations for community protection in unit 700. In units 622, 623, 624, and 625 prescribed burning is proposed for whitebark pine restoration and will be used to create suitable ground for planting rust-resistant seedlings. Prescribed burning would consume fuels at a moderate- to high-intensity to create a mosaic of openings, reduce understory brush and small trees, and reduce fire hazard or allow for the artificial regeneration of whitebark pine. Treatment is generally accomplished using noncommercial treatment methods (described in Treatment Methods section below).

Table 3 describes the tree retention for each type of vegetation treatment and the associated percent of canopy cover.

Table 3. Description of retention for vegetation treatments

Vegetation treatment type	Trees per acre	Canopy cover
Commercial thin	60–120 medium trees per acre	30-60%
Improvement Cut	40–100 medium to large trees per acre	25-60%
Clearcut, Seed tree	0–20 medium to large trees per acre	0-15%
Shelterwood	5–40 medium to large trees per acre	5-40%
Precommercial thin	150–350 small trees per acre	20-50%
Understory removal	80–350 medium to large trees per acre	40-70%
Hardwood Release	40-100	20-50%
Utility Corridor Expansion	20-100	10-60%
Group Selection	Highly variable	30-70%
Prescribed burn	Highly variable	30-70%

Whitebark pine restoration is proposed under this project using a variety of treatment methods. The objective of whitebark pine restoration is to promote populations of cone-bearing trees, increase genetic diversity, increase white pine blister rust resistance, and increase the proportion of whitebark pine across the landscape. Whitebark pine restoration will be accomplished using one of the following methods:

- **Planting:** Rust resistant seedlings would be planted in units located within recently burned areas where aerial imagery shows low regeneration of competing conifers. In these areas, planting or direct seeding can occur without any site prep activities. Planting is only expected to occur in 10 to 50 percent of the area within units 610, 611, 612, 613, 626, and 627 because terrain and vegetative competition is variable. Planting sites will be identified at the time of implementation and occur where the likelihood of planting success is greatest. These activities will be accomplished using noncommercial treatment methods (described in Treatment Methods section below).

- **Daylight/Release Treatments:** Daylight/release treatment is the action of cutting live conifers within a specified distance of selected whitebark pine trees. Cut trees are lopped and scattered or piled for burning. This benefits whitebark pine by reducing competition thus increasing individual vigor, cone production potential, and aiding survival of potential wildfire effects. In units 600 through 606, daylight/release treatments will occur in areas planted within the last twenty years with rust-resistant whitebark pine seedlings. In units 614 through 620, the treatment will be used to release natural regeneration found within recent regeneration harvest openings, while in 607 and 621, it will be used to reduce fuels and competition around cone-bearing trees. Treatments would only occur around scattered individuals in those stands and much of the vegetative conditions would remain unchanged. These activities will be accomplished using noncommercial treatment methods (described in Treatment Methods section below).
- **Daylight/Release and Plant:** This treatment type first releases all healthy whitebark pine using the methods described above with additional slashing of undesirable conifers followed by piling and burning. This is done to create suitable ground for planting rust resistant seedlings within proposed units. This treatment method is proposed in units 608 and 628, where whitebark pine is only found as scattered individuals in smaller tree sizes. These activities will be accomplished using noncommercial treatment methods (described in Treatment Methods section below).
- **Prescribed Burn and Plant:** In these units, prescribed fire will be used to reduce competition and fuel loading, creating suitable ground for planting. Very few whitebark pine are currently found in the proposed treatment units; therefore, daylight/release treatments will first occur to protect any that may be present to the extent possible. These activities will be accomplished using noncommercial treatment methods (described in Treatment Methods section below).

Note that treatment focus areas and treatment units identified by Jenkins et al. (2022) were used to inform the location of many whitebark pine restoration units. Treatment focus areas are areas where restoration actions were determined to have a high likelihood for success based on a variety of remotely sensed biophysical characteristics at a landscape scale. Identified treatment units are areas where specific restoration activities were identified within well-defined treatment boundaries.

Treatment in Riparian Management Zones

Riparian management zones (hereafter, RMZs) are areas adjacent to and surrounding streams, wetlands, and other water features. This project proposes limited treatments within these zones. In the inner RMZs, about 130 acres would receive noncommercial treatments, with 115 acres focused on whitebark pine restoration through hand treatments only. Mechanical work may occur on up to 10 acres for hazardous fuels thinning, utility-corridor expansion, and salvage (unit 110). In the outer RMZs, roughly 476 acres are proposed for treatment: 137 acres of noncommercial hand treatments (with up to 8 acres allowing mechanical hazardous fuels thinning), 327 acres of mechanical commercial treatments, and about 16 acres for utility corridor expansion. Activities proposed in RMZ would follow forest plan standards FW-STD-RMZ-01 through 06 and include project design features PDF-AQ-02 through 04 and 06.

Treatment in Grizzly Bear Secure Core

The project proposes several different types of activities in lands identified as grizzly bear secure core as defined by the forest plan. These activities include both commercial and noncommercial vegetation treatments and road management to access these vegetation treatments. Project activities that require the use of roads will follow forest plan standards FW-STD-IFS-02 and 03.

Treatment in Old Growth

About 4,620 acres qualify as old growth within the project area, according to the criteria established by Green et al. (2011). There are treatments proposed for about 43 acres of old growth in two units located within the same forest stand. The first, unit 50, is a 40-acre group selection harvest that would create small openings by removing dead or dying trees as well as smaller trees of shade tolerant species that are likely to be lost to root disease or other pathogens, which are currently widespread within the stand. The second, unit 110, is a 3-acre salvage harvest that would remove windthrown trees from a portion of the same stand. These trees fell in a wind event after the proposed action was published. White pine and western larch will be planted within openings created by each treatment to establish root disease resilient species within the high use recreation area where these treatments are proposed. Site-specific prescriptions will be designed to retain old-growth characteristics while reducing fuels, as these units are also located within the WUI and adjacent to private lands.

Treatment in Inventoried Roadless Area

Vegetation management is proposed on up to 2,250 acres in roadless areas, including prescribed fire, commercial thinning, noncommercial thinning, and white bark pine restoration treatments. No road construction would occur in roadless areas to accomplish these activities. Proposed activities are consistent with the Roadless Rule.

Treatment in Wild and Scenic River Corridors

In 1976, Congress designated the North, Middle, and South Forks of the Flathead River as part of the National Wild and Scenic Rivers System. The project area includes the segment of the Middle Fork of the Flathead River classified as recreational and assigned Management Area 2a under the forest plan. This section has outstandingly remarkable values for fisheries, geology, water quality, wildlife, recreation, scenery, history, and ethnography.

While recreational river segments are not suitable for timber production, timber harvesting for other multiple-use purposes and to achieve desired vegetation conditions is allowed (MA 2a-SUIT-02). Actions are proposed on about 401 acres in wild and scenic river corridors, all of which occur in the WUI, and which includes about 102 acres of utility corridor expansion. MA 2a-SUIT-05 allows for the presence of utility corridors. These actions are needed to reduce tree densities and fuel loadings in the WUI as described in the Purpose and Need (FW-DC-FIRE-02; FW-DC-FIRE-01, 02, 07; FW-DC-TE&V-13.

Treatment Methods

Commercial Harvest Methods

Commercial harvest methods consist of tree removal through ground-based mechanized systems, cable systems, or a combination of those systems. Ground-based mechanized systems include cutting and staging trees with tracked mechanized felling equipment and moving cut trees to landings for processing with rubber-tired skidders; and using cut-to-length equipment where a harvester falls and processes trees and a forwarder carries processed logs to a landing. Cable systems include skyline harvest systems where trees are mechanically or manually felled and then dragged to the landing via a suspended cable for processing; and use of cable-tethered ground-based equipment to fall, yard, and complete other post-harvest project activities. Landings are areas adjacent to roads where logs are sorted, processed, and loaded for hauling.

Post-Harvest Fuels Methods

Once harvest activities are completed, post-harvest fuels treatments would occur. Understory trees, damaged trees, and brush may be slashed. Downed wood (in excess of retention requirements) may be excavator-piled, chipped, masticated, broadcast burned, or underburned. Piles within units and at landings would be burned following treatment. Where prescribed burning is used post-harvest, fireline and fuel breaks would be constructed by hand or using machines.

Noncommercial Treatment Methods

Noncommercial units may be treated using hand methods, including chainsaws and crews, and mechanized equipment to fell, lop-and-scatter, chip, masticate, or pile and burn fuels. Planting will be accomplished using hand crews, though helicopters may be used to carry planting crews or seedlings to units 626 and 628. Prescribed burning would be implemented via hand or aerial ignition. Prescribed fire units will have additional site preparation activities along the open roads. Holding features for these areas can include slashing the understory, removing standing dead hazardous trees, and removing or dispersing large dead and down woody materials that could impact the safety fire personnel. These activities will help to mitigate risk to fire fighters for holding, ignitions, and assist in the success of overall implementation of the prescribed fire. These activities will have an additional safety benefit to the open road system used for a holding feature post prescribed fire operations. Where burning is used, fireline and fuel breaks would be constructed by hand or using mechanized equipment.

Site Preparation and Reforestation Methods

A combination of natural regeneration (allowing trees to naturally reseed) and planting would occur following regeneration treatments. To create a favorable seed bed for reforestation, methods like understory slashing, broadcast burning, or machine scarification may be used to create areas of bare soil with reduced competing vegetation. Planting would occur where insufficient natural regeneration of desired species is anticipated, or where restoring rust-resistant western white pine or whitebark pine is an objective.

Proposed Road Management

National Forest System Haul Routes

National Forest System roads used as haul routes would be maintained in accordance with best management practices both before and after use for project activities (FW-STD-WTR-02 and FW-DC-IFS-07). The objectives of road maintenance are to reduce concentrated runoff, minimize road surface erosion, filter ditch water before it enters streams, and decrease risk of culvert failures during peak runoff events. Maintenance work could include installing culverts, replacing existing culverts with larger culverts, installing drainage dips and surface water deflectors, placing riprap to armor drainage structures, replenishing road surface aggregate, placing aggregate to reinforce wet areas, constructing and cleaning ditches, and blading road surfaces. These actions would bring the roads up to current best management practices standards, better accommodate public and project-related traffic, and reduce deferred maintenance.

During analysis for potential impacts on sediment delivery to streams, we specifically identified three culverts on Pinnacle Creek to replace and a new culvert to install on an unnamed tributary to Granite Creek as road improvements that will be required before hauling.

Temporary Roads

Temporary roads would be constructed to the minimum standards necessary for log hauling on NFS roads. About 0.75 miles of temporary roads are proposed, with about half of that using existing road templates and the other half being new construction. All temporary roads would be rehabilitated following timber harvest activities and would cease to function as roads.

System Road Construction

System roads would be constructed and maintained to the minimum standards necessary to support project activities. About 7.6 miles would be placed on the NFS road system after construction and would be closed year-round (that is, made impassable). These additions would allow for future access to support forest management while also meeting forest plan standard FW-STD-IFS-02, which requires no net decrease to the baseline secure core and no net increase to baseline open motorized route density or total motorized density on NFS lands during the non-denning season within the primary conservation area.

No-Action Alternative

The no-action alternative for the Granite Moccasin Project means no new activities would occur in the project area. Forest Service policy to suppress wildland fires would continue. This alternative would not achieve the project's purpose and need to improve vegetation resilience, reduce fuels, or support local economic sustainability. Existing activities like recreation and road maintenance would continue, as would natural disturbances such as wind, insects, and fire. This alternative serves as a baseline for comparison with the proposed action.

Alternatives Considered but Not Analyzed in Detail

Some alternatives were considered during project development based on public feedback and the interdisciplinary team’s review, but they were not analyzed in detail.

Increasing treatment acres. Including more acres for treatment in the project area was infeasible due to limitations set by management area direction or the presence of steep terrain. However, two small units were added because they align with project needs: Unit 110—a 3-acre salvage harvest near the Essex cross-country ski trails within Management Area 7—was added after a large wind event blocked access to portions of the trail system. Unit 502—a 12-acre hazardous-fuel thinning unit near private property in Management Area 6a—was added based on public comment.

Inventoried roadless areas. Treatments were not included in some inventoried roadless areas in initial project design because they would not comply with the Roadless Rule or be consistent with management area direction. However, certain activities in other inventoried roadless areas can be implemented consistent with the Roadless Rule, and omitting those specific treatment acres would not meet the purpose and need to reduce fuel loading in the WUI or to improve diversity and resilience of terrestrial ecosystems.

Wildlife. Some lynx habitat was excluded from treatment to meet forest plan standards VEGS5 and VEGS6. Limited treatments that do occur within lynx habitat are consistent with exceptions and exemptions to those standards. Project design features were added to the proposed action to reduce and minimize effects to all species, including timing restrictions, treatment within mapped category 4A wetlands, leave-patches within connectivity areas, and compliance with access management standards and guidelines.

Soil instability - Skyland units. We added PDF-SOIL-08 to address stability concerns in the Skyland area.

Wild and Scenic Rivers. Completely avoiding treatments in the Wild and Scenic River corridor (Management Area 2a) was considered but dismissed because it would not meet the purpose and need to reduce fuel loading in the WUI that overlaps the corridor. The project is consistent with forest plan direction, which allows treatment in recreational river corridors for multiple-use purposes and to achieve desired vegetation conditions (MA 2a-SUIT-02).

Analysis Authorities

The Healthy Forest Restoration Act (HFRA) of 2003 and the 2001 Federal Register provide criteria for determining WUI boundaries and communities at risk. These criteria recommend distances from a boundary of an at-risk community or an area adjacent to an evacuation route to delineate WUI (16 USC 6511(16)(B)). An HFRA WUI analysis was completed for the project area following the criteria for determining communities at risk and WUI delineation (project file R001). About 54 percent of treatment units meet the WUI definitions set forth in HFRA (16)(B).

On April 3, 2025, the Secretary of the United States Department of Agriculture issued a memorandum[1] making an Emergency Action Determination (EAD) under section 40807 of the Infrastructure Investment and Jobs Act (IIJA). This EAD encompasses millions of acres of NFS lands rated as very high or high wildfire risk, as well as those acres designated under section 602 of HFRA that are experiencing declining forest health. Actions taken in response to the EAD will support improving durability, resilience, and resistance of NFS lands to fire, insects, and disease.

[1] 1078-006, Increasing Timber Production and Designating an Emergency Situation on NFS Lands (https://www.usda.gov/sites/default/files/documents/sm-1078-006.pdf).

About 58 percent of NFS lands proposed for treatment in the Granite Moccasin project area are covered by this EAD, and therefore, this project is being proposed and analyzed under this emergency action authority. The public was notified of this authorized emergency action with publication of the proposed action document on the project webpage in late December 2025.

Environmental Impacts

The responsible official identified issues[2] for detailed analysis based on internal review and feedback received from the public on the proposal; these are discussed in this section and are organized by resource. Analyses and discussions assume implementation of design features in Appendix A and considered past, ongoing, and reasonably foreseeable activities (Appendix E). Supporting documentation is in the proposal record; this environmental assessment incorporates the proposal record by reference.

Terrestrial Ecosystems and Vegetation

Summary

Implementation of the proposed action would reduce forest density and modify vegetation composition and structure to meet the project purpose and need. Thinning activities would favor long-lived, early seral, and fire-tolerant species, increasing growing space and improving tree vigor. These changes increase resilience to insects, disease and stand-replacing wildfire, which is especially important given the critical infrastructure in the Granite Moccasin project area.

Regeneration harvests would promote the establishment of forest plan desired species through planting and natural regeneration, improving and diversifying species composition in treated stands. Understory removal in previously thinned stands would further reduce ladder fuels, while utility-corridor expansion units would help lower fuel loading near critical infrastructure within the WUI. Whitebark pine conditions would also improve through the planting of rust-resistant seedlings and reducing competing conifers in existing stands.

Issues

How will the proposed action move current forested conditions toward forest plan desired conditions thereby meeting the purpose and need of the project to improve the diversity and resilience of terrestrial ecosystems and vegetation and to reduce tree densities and fuel loadings, including in inventoried roadless areas and the HFRA (16)(B)-defined WUI?

Assumptions and Methodology

Because design features in Appendix A have been incorporated into the proposed action, some effects are not discussed in detail as those design criteria negate the need for a detailed analysis per 7 CFR 1b.11(a)(11). For example, PDF-TEV-01 and 02 require that all live trees over 17 inches in diameter are retained within 300 feet of old growth stands and that treatments within old growth will not affect stands to the extent that tree sizes and ages will be reduced below the criteria in Green et al. (2011), respectively. Therefore, the old growth analysis below assumes

[2] "Issue means a logical cause-effect relationship between the actions proposed (cause) and the reasonably foreseeable impacts (effect) on resources found in the affected environment" (7 CFR 1b.11(a)(23)).

that the standards and guidelines in FW-GDL-TE&V-06 and FW-STD-TE&V-01 will be met, and a detailed analysis is not warranted. Snag retention requirements are similarly incorporated into design features and therefore not analyzed. Other forest attributes such as size class are not analyzed because they do not provide meaningful metrics to understand the issue being addressed.

Data Sources. This analysis used extensive field reconnaissance, field data, monitoring, site visits with Forest Health and Protection staff, experience, and the best professional judgment of the interdisciplinary team members. All proposed treatment units were visited by a certified Forest Service Silviculturist and reviewed by project specialists prior to inclusion. The primary data sources used for analysis include the FSVeg database, the Forest Service Activities Tracking System (FACTS) database, and the R1 Vegetation Map (R1 VMAP). VMAP data was used to analyze remote areas where field reconnaissance did not occur, and to assess state and private lands within the analysis area. It was also the dataset used in the final environmental impact statement (FEIS) for the forest plan (USFS 2018a). See project file O001 for additional information on analysis methods and data sources.

Indicators. The indicators in (Table 4) used to evaluate the proposed action's ability to address the purpose and need related to forest vegetation and terrestrial ecosystems are based on the issue identified and current conditions.

Table 4. Terrestrial ecosystems and vegetation indicators

Resource/ Element	Indicator	Measure	Source
Improve the diversity and resilience of vegetation communities	Desirable forest cover types (western larch, western white pine, whitebark pine, and early seral conifer).	Acres	FW-DC-TE&V-03, FW-DC-TE&V-07, FW-DC-TE&V-08, FW-DC-TE&V-09 FW-DC-TIMB-01, FW-DC-TIMB-07
Reduce tree densities and fuel loadings.	Conifer stands with less than 40% canopy cover.	Acres	FW-DC-FIRE-02, FW-DC-FIRE-03, FW-DC-FIRE-07, FW-DC-TE&V-13, FW-DC-TE&V-21, FW-DC-TIMB-01, FW-DC-TIMB-07

Forest cover type is used to evaluate how well the project meets forest plan objectives to increase the proportion of the landscape composed of stands dominated by preferred species. Preferred species in the Granite Moccasin project area include western larch, western white pine, and whitebark pine. Early-seral conifer types are also desirable because they represent low-density forests where grasses, forbs, and shrubs dominate and tree canopy closure has not yet occurred.

Canopy cover is an easily observable indicator of forest stand density and reflects the total area occupied by tree crowns within a given area. It is defined as the percentage of ground covered by a vertical projection of tree crowns, considering trees of all heights, and it is also used to indicate changes in fuel loading. Density influences individual tree growth and vigor: lower densities allow for more growing space and greater access to light, water, and nutrients. As a result, trees grow larger more quickly and develop stronger natural defenses against insects and disease,

increasing overall stand resilience. Lower forest density is also a desired condition within the WUI to reduce fuel loads and modify fire behavior near values at risk.

Forests with canopy cover of less than 10 percent are considered non-forested or transitional, early seral conifer types. Forests with canopy covers of between 10 and 40 percent are considered low density (FW-DC-TE&V-13), while canopy cover greater than 40 percent indicates moderate or high density.

Scope of the Analysis

The project area, at approximately 67,538 acres, provides a well-defined region for meaningful evaluation of trends, patterns and ecological processes of forest vegetation. The spatial boundaries were selected to encompass all lands outside congressionally designated Wilderness, capturing the full extent of where vegetation management may occur, including areas where management is conducted for timber production as well as to meet other objectives. Recommended Wilderness areas are also included because of proposed hand-planting activities permitted under the forest plan.

In total, the analysis area contains approximately 41,470 acres of inventoried roadless area and 27,220 acres of WUI (approximately 60 and 40 percent of the analysis area, respectively) with more than 12,500 acres where these designations overlap. Understanding existing conditions within the inventoried roadless areas and WUI, as well as the implications of these overlapping but contrasting management directions, is critical for evaluating how the proposed action addresses the project's purpose and need. Therefore, indicator tables in this analysis show the entire analysis area, WUI, inventoried roadless areas, the overlapping WUI and inventoried roadless areas, and finally inventoried roadless areas outside the WUI.

The timeframe for this analysis includes consideration and discussion of both short-term and long-term effects. In this analysis, short-term refers to effects occurring immediately or within 10 to 15 years following implementation, when planted seedlings establish and initial shifts in species composition occur. Long-term refers to effects expected 30 years or more after implementation, representing the timeframe in which stands progress from stand-initiation (when seedlings are establishing) into stem-exclusion (when canopy closure occurs and competition for light, water, and nutrients begins to cause mortality amongst trees and shifts in species composition may occur). Effects beyond this period are not assessed due to uncertainties of future disturbance regimes and the dynamic nature of forested ecosystems.

Potentially Affected Environment

The Granite Moccasin analysis area has been grouped into areas of similar biophysical characteristics called potential vegetation types (hereafter, PVTs) (Table 5). These are coarse groupings of the Northern Region habitat type groups, which in turn are groupings of individual habitat types (Pfister et al. 1977). Habitat types are an aggregation of ecological sites of similar biophysical environments (such as climate, aspect, and soil characteristics) that produce plant communities of similar composition, structure, and function. They are based on the potential climax plant community that would occur in the absence of stand-replacing disturbance such as fire. By assembling habitat types into groups based on similarities of climatic and physical factors, PVTs provide a broad understanding of vegetation communities that would develop similarly over time given no major natural or human disturbances.

In contrast, the existing vegetation condition describes what currently exists on a site. The characteristics of existing plant communities can be highly variable over time and space within a potential vegetation type. The existing condition reflects each site's unique history, forest character, pattern of disturbances, and point in time along the successional pathway.

Understanding potential vegetation type's location and abundance is important because the forest plan describes vegetation management direction according to potential vegetation type. Project file O002 provides a map showing the distribution of PVTs throughout the analysis area. Additional information can be found in the forest plan FEIS (volume 1, pages 169-171) (USFS 2018a).

Table 5. PVTs in analysis area

PVT	Acres	Percent of Analysis Area
Cool-Moist	56,017	83%
Cold PVT	7,519	11%
Warm-Dry PVT	1,690	3%
Warm-Moist PVT	263	<1%
Water/Non-Forest	2,047	3%

Coniferous Forest Composition and Cover Types

Forest cover type refers to the dominant tree species that currently occupy a forested stand. Nearly all the forest stands in the analysis area are composed of a mix of species in different proportions. The determination of forest cover type for the Granite Moccasin analysis is based on the dominance types described in the forest plan, which are based on USDA Forest Service Northern Region classifications for existing vegetation (Milburn et al. 2015). These have been refined to address the specific issues and analysis needs of the project. Table 6 displays the cover types present within the analysis area. Project file O003 provides a map showing their relative spatial distribution across the landscape.

Table 6. Existing cover types in the analysis area

Cover type	Analysis Area Acres (%)	WUI Acres (%)	Inventoried roadless areas (IRA) Acres (%)	IRA/WUI Overlap Acres (%)	IRA Outside WUI Acres (%)
Subalpine fir/Engelmann spruce	24,764 (37%)	5,114 (19%)	17,889 (43%)	2,743 (22%)	15,146 (53%)
Lodgepole Pine	14,680 (22%)	6,566 (24%)	8,416 (20%)	3,944 (31%)	4,472 (16%)
Douglas-fir	9,181 (14%)	5,020 (18%)	5,849 (14%)	2,699 (21%)	3,150 (11%)
Non-Forest/Water	8,222 (12%)	4,411 (16%)	3,391 (8%)	319 (3%)	3,072 (11%)
Early Seral Conifer	5,414 (8%)	1,973 (7%)	3,828 (9%)	1,700 (14%)	2,128 (7%)
Western Larch	4,967 (7%)	3,870 (14%)	1,944 (5%)	1,175 (9%)	769 (3%)
Aspen	134 (<1%)	133 (<1%)	15 (<1%)	15 (<1%)	N/A
Ponderosa Pine	62 (<1%)	61 (<1%)	2 (<1%)	1 (<1%)	1 (<1%)

Cover type	Analysis Area Acres (%)	WUI Acres (%)	Inventoried roadless areas (IRA) Acres (%)	IRA/WUI Overlap Acres (%)	IRA Outside WUI Acres (%)
Western White Pine	54 (<1%)	54 (<1%)	N/A	N/A	N/A
Birch	31 (<1%)	22 (<1%)	N/A	N/A	N/A

*Note that Non-forest cover type includes grass and shrub types, water, POPUL, HMIX, SPVEG and Urban. IMIX cover types were included with western larch and TMIX with spruce/fir to simplify analysis. See project file O001 for additional information.

Within the Cool-Moist PVT, subalpine fir and Engelmann spruce are the predominant conifer species, a pattern largely driven by the long fire-free intervals across much of the area. Lodgepole pine and Douglas-fir also form major components in lower to-mid elevations. Western larch makes up a relatively small proportion as a dominance type but is present in mixed-conifer stands throughout all but the highest elevations. The early seral conifer type is also common within the Skyland fire perimeter in the northeastern portion of the analysis area.

The cold PVT occupies the higher elevations and is largely dominated by cold, moist subalpine fir and Engelmann spruce cover types. The remainder are colder, drier sites often dominated by alpine grasses and shrubs. Whitebark pine is often found as scattered individuals but is no longer present in sufficient densities to be considered the dominant cover type. Western larch and other early-seral conifers are rare within these high-elevation environments.

Because it occupies much of the lower elevations, the WUI portion of the analysis area contains a higher proportion of early seral conifer species such as western larch and lodgepole pine than the portions outside the WUI. For example, nearly 80 percent of the western larch dominated stands occur within the WUI. In areas where WUI and inventoried roadless areas overlap, lodgepole pine and Douglas-fir are more prevalent than in the remainder of the analysis area.

Detailed information on forest cover types are found in project file O014.

Forest Density and Canopy Cover

Table 7 displays the forest density in the analysis area. Areas with canopy cover under 10 percent, including non-forested areas and water, are not included in the summary. See project file O005 for a map of tree canopy cover classes.

Table 7. Coniferous forest density

Tree canopy cover	Forest density	Analysis Area Acres (%)	WUI Acres (%)	Inventoried roadless areas (IRA) Acres (%)	IRA/WUI Overlap Acres (%)	IRA Outside WUI Acres (%)
10-40% canopy cover	Very Low/Low	22,439 (33%)	6,365 (23%)	14,603 (35%)	2,686 (21%)	11,917 (40%)
>40% canopy cover	Moderate/High	31,299 (47%)	14,342 (53%)	19,497 (47%)	7,877 (63%)	11,621 (40%)

The analysis area currently contains a larger proportion of high-canopy-cover stands than low-canopy-cover stands. This pattern is even more pronounced within the WUI, where high-density stands make up the largest share, especially in areas where the WUI overlaps with the

inventoried roadless areas. In contrast, the portion of the inventoried roadless area outside the WUI contain the lowest proportion of high-density stand conditions.

Old Growth

The forest plan defines old growth as a community of forest vegetation that is distinguished by sufficient numbers of large, old trees and by stand densities and related structural attributes occurring at levels that meet the definitions established for the Northern Region of the Forest Service in Green et al. (2011). Old-growth forest conditions are not limited to the stands that are classified as the very large tree size class; old growth also occurs in the medium and large size classes and is determined at the stand level. Old-growth stands were identified using a variety of data sources, including aerial imagery, VMAP, FSVeg spatial stand data, site specific common stand exams, and field surveys. Project file O001 provides a detailed explanation of the old growth analysis for this project.

Within the Granite Moccasin analysis area, 4,620 acres (approximately 7 percent) of forested land appear to qualify as old growth. These old-growth stands are well distributed across the analysis area and include stands comprised of a variety of forest cover types found on a wide array of aspects, slope positions, and size classes.

In addition to the measurable criteria established for old growth forests (Green et al. 2011), there are associated forest structural conditions that provide key ecosystem characteristics for wildlife species (such as very large live trees, decayed trees, very large snags, and large fallen trees). Mature forests may contain remnant trees that are very large and have survived repeated wildfires but occur in low numbers. Very large trees and snags (more than 20-inch diameter at breast height) are common throughout many portions of the analysis area due to its rugged nature that has limited access for large-scale harvest activity or firewood gathering. Due to the importance of the Middle Fork Geographic Area for many wildlife species, the forest plan provides specific snag retention and recruitment standards (GA-MF-STD-02) that are applicable throughout the project area.

Effects of the No-Action Alternative

There would be no immediate, short-term effects on vegetation, and natural processes such as tree growth and mortality would continue over the long term. This effects analysis assumes that all wildland fires would be successfully suppressed during the period covered by this analysis, though potential implications for firefighter safety in the event of a fire are considered. This analysis focuses on long-term effects because short-term effects are already reflected in the current conditions described above.

Coniferous Forest Composition

Under the no-action alternative, the presence and dominance of shade-intolerant species would be expected to decrease over time. As natural succession progressed, forest cover types would continue shifting towards the shade-tolerant species dominance types. Subalpine fir and Engelmann spruce would continue establishing in understories, first increasing ladder fuels and eventually shifting stand dominance through natural succession in the absence of fire or other disturbance.

Mature lodgepole pine stands would remain at elevated or increasing risk of mountain pine beetle infestation. Douglas-fir would become increasingly susceptible to Douglas-fir beetle and various root diseases, resulting in long-term decline. As competition and shade-tolerant ingrowth increased, western larch would decline in vigor, and western white pine would continue declining due to the ongoing white pine blister rust infestation. Over time, these early-successional cover types would decrease in dominance as stands would not experience the conditions necessary to regenerate and new cohorts would fail to establish. Forest vegetation communities would experience a decrease in resilience to insects and disease and an increase in the likelihood of loss to stand-replacing wildfire over time (project file O011).

These declines in resilience would be especially notable within the WUI, which contains the highest concentration of shade-intolerant conifer types in the analysis area. There, increasing ladder fuels and accumulating down woody material from insect- and disease-related mortality would heighten the potential for large, high-severity wildfires. The probability of large-scale, stand-replacing fire would therefore continue to rise, increasing risks to critical infrastructure, adjacent communities, and public health and safety under the no-action alternative.

Forest Density and Canopy Cover

Without treatment, forest density would continue to increase throughout the analysis area in the absence of disturbance. Acreage in the greater than 40 percent canopy cover classes (Table 7) would steadily increase over time as shade-tolerant species continuously regenerated within the understory of stands. Individual tree growth would slow as stand density and competition increased. Tree mortality in stem exclusion stands would be common due to density-related stress. As these trees died, surface and ladder fuels would increase, and canopy conditions would become increasingly more susceptible to stand-replacing crown fires. Especially within the WUI, this would cause a decreased ability for fire crews to safely fight wildfires should they occur. Within many stand understories, grass, forb, and shrub species would decrease as tree densities would prevent sunlight from reaching the forest floor.

Old-Growth

Under the no-action alternative, no trees within old growth or late successional forest would be harvested, nor would there be harvest in stands adjacent to old growth or in mature forests approaching old growth. Access roads through old growth or mature forests approaching old growth would not be improved. Existing conditions for these components would not be changed. There would be no modification or edge-related blowdown within old-growth stands.

In many of these stands, the health and vigor of larger overstory trees would continue to decline with increased competition as natural succession continued. Death of larger trees due to disease or insects would continue at increasing rates, especially in stands dominated by species susceptible to root disease. This would add to the snag and large down wood components in those stands which could improve the late successional or old growth values for associated wildlife species. However, in most of the stands currently classified as old growth, as the existing larger diameter trees died, there would be fewer large trees available to replace them. Over time, this mortality would reduce both the amount and quality of old-growth and late-successional forests in the analysis area. Under these conditions, should a wildfire occur, it would be increasingly likely to burn at a stand-replacing severity due to the persistent ladder fuels and heavy surface fuels.

Mid-seral forests would continue to progress towards large tree size, but at a decreased rate with no intermediate harvest. Due to species composition, density, and competition these stands may never achieve a large or very large size class. Stands currently at high densities, particularly lodgepole dominated sapling stands, would have a small chance of ever developing the necessary tree sizes and complex stand structures of an old-growth stand.

Effects of the Proposed Action

Coniferous Forest Composition

Beneficial effects of the proposed action would include an improvement in species composition within all treated stands. In thinned stands this would be accomplished by favoring preferred species for retention at the time of treatment. Within the Granite Moccasin analysis area, preferred species include western larch, western white pine, and whitebark pine due to their long-lived nature and relatively low susceptibility to insects and disease. However, in many stands where lodgepole pine exceeds 70 percent of the stand composition, the residual stand would remain dominated by that species.

Within stands identified for regeneration harvest (shelterwood, seed tree, clearcut, and group selection) species composition would be beneficially altered and improved. Where planting is planned, species would be converted to the species planned for planting. Where natural regeneration is expected, cover type would be converted to the early-seral conifer type. In both instances, these effects would be most prevalent in the short term. Over the long term, future treatments may be needed to select for desired species through precommercial thinning or other treatments to ensure their continued dominance; these would be analyzed under future action. The openings created through these treatments, including those exceeding 40 acres, would mimic natural ecological processes consistent with mixed-severity fire regimes and insect and disease damages from native pests and pathogens. These openings would also follow natural topographic features and landscape patterns. The resulting patterns would contribute to maintenance or attainment of desired condition FW-DC-TE&V-03 while the increased resilience to future disturbances would help to prevent potential loss of timber within lands suitable for timber production (desired condition FW-DC-TIMB-07).

Prescribed burning would provide a variety of beneficial effects to vegetative composition. In some stands, where fire-tolerant species such as western larch and Douglas-fir are present, those species would increase in dominance, with changes limited to a reduction in understory density. In stands dominated by lodgepole pine or subalpine fir/Engelmann spruce cover types, species composition would be converted to the early-seral conifer type. However, where burning is planned for the purposes of whitebark pine restoration, stands would largely convert to that species, with poor quality planting ground remaining as early seral conifer. These benefits would be experienced immediately and change over the long term as natural succession progressed.

Additional whitebark pine restoration activities would have the beneficial effect of further establishing that species throughout the analysis area. These activities include a variety of planting and daylight thinning and release treatments, occurring both alone and in conjunction. Planting rust-resistant seedlings is proposed in multiple areas where recent fires have provided suitable ground for tree planting activities. In Recommended Wilderness, action will be limited to hand planting of whitebark pine. In other areas (not in Recommended Wilderness), release treatments are proposed where rust-resistant seedlings have been planted within the last 20 years.

Those treatments would remove competing conifers within a specified radius of sapling-sized seedlings to allow whitebark pine to more readily become the dominant species in those stands. In yet other areas, treatments would be aimed at providing enhanced fire protection to mature, cone-bearing trees or to release natural sapling-sized trees.

Project file O004 provides a map showing expected post-treatment cover types, and Table 8 summarizes the changes in species composition expected from proposed treatments.

Table 8. Cover type changes based on the proposed action

Cover type	Analysis Area Acres (%)	WUI Acres (%)	Inventoried roadless areas (IRA) Acres (%)	IRA/WUI Overlap Acres (%)	IRA Outside WUI Acres (%)
Subalpine fir/ Engelmann spruce	-1014 (-1.5%)	-496 (-1.8%)	-455 (-1.1%)	-231(-1.8%)	-224 (-0.8%)
Lodgepole Pine	-1370 (-2%)	-487 (-1.8%)	-500 (-1.2%)	-93 (-0.7%)	-407 (-1.4%)
Douglas-fir	-287 (-0.4%)	-232 (-0.9%)	-47(-0.1%)	-2 (-<0.1%)	-45 (-0.2%)
Early Seral Conifer	823 (+1.2%)	297 (+1.1%)	261 (+0.6%)	154 (+1.2%)	107 (+0.4%)
Western Larch	505 (+0.7%)	421 (+1.5%)	77 (+0.2%)	77 (+0.6%)	No Change
Aspen	21 (+<0.1%)	21 (+0.1%)	19 (+0.1%)	19 (+0.2%)	No Change
Western White Pine	449 (+0.7%)	416 (+1.5%)	2 (+<0.1%)	2 (+<0.1%)	No Change
Whitebark Pine	920 (+1.4%)	75 (+0.3%)	673 (+1.6%)	75 (+0.6%)	598 (+2.1%)

Within the inventoried roadless area, many of the changes to species composition that would occur are in the portion where the inventoried roadless area also overlaps with the WUI. In the portions of the inventoried roadless area outside of the WUI, all changes in species composition are based on prescribed burns that are proposed for the purposes of whitebark pine restoration. The conversion of some burned areas to the early-seral conifer cover type is based on the likelihood that parts of these burns contain poor-quality planting sites, such as areas with high beargrass competition or wet areas. The increase in the whitebark pine cover type in the inventoried roadless area would be a beneficial increase in the diversity of terrestrial vegetation.

Forest Density and Canopy Cover

The proposed action would have the beneficial effect of reducing forest density in treated stands as trees are removed, slashed, or burned. This reduction in density would provide trees more growing space, increasing their access to the limited light, water, and nutrients within treated stands. This increase in vigor would produce larger trees faster than in the no-action alternative. The reduction in density would be most effective in the short term. Over the long term, lower-density conditions would not persist because young trees and brush would regenerate. In younger stands especially, maintaining lower tree densities would likely require future treatments, which would be analyzed as a separate, future action.

Notably, project activities would reduce the proportion of the analysis area with greater than 40 percent canopy cover (Table 9). This reduction in canopy would be well distributed throughout the analysis area and emphasized within the WUI to meet fuels reduction objectives (FW-DC-FIRE-07, FW-OBJ-FIRE-01). Outside of the WUI reductions in density would largely occur either within management areas where harvest for the purpose of timber production is allowed or

to restore whitebark pine. Within the inventoried roadless area, reductions in density are largely concentrated within the WUI, with reductions in density outside the WUI limited to whitebark pine restoration. Where whitebark pine-restoration burning is proposed, low-density conditions are expected to return within the short-term as planted seedlings establish.

Project file O006 provides a map showing the expected distribution of post-treatment canopy cover conditions.

Table 9. Canopy cover changes based on the effects of the proposed action

Tree canopy cover	Forest density	Analysis Area Acres (%)	WUI Acres (%)	Inventoried roadless areas (IRA) Acres (%)	IRA/WUI Overlap Acres (%)	IRA Outside WUI Acres (%)
10-40% canopy cover	Very Low/Low	1,817 (+3.4%)	1,239 (+6%)	331 (+1%)	300 (+2.8%)	31 (+0.1%)
>40% canopy cover	Moderate/High	-2,591(-4.8%)	-1,520 (-7.3%)	-563 (-1.7%)	-454 (-4.3%)	-109 (-0.5%)

Within stands where regeneration harvest is proposed, openings sometimes exceeding 40-acres in size would be created in the short-term that would have a canopy cover of under 10 percent. However, these new openings would create adequate light and space to regenerate desired species through planting or natural regeneration and would contribute to new forest patterns. The existing forest patterns result from multiple factors, including physical site conditions (such as soil productivity, moisture, and topography), forest characteristics (such as density, species composition, different rates of growth, and change over time), and disturbances (including type, severity, and size). As would occur under the natural fire regimes, it is desired that early-successional patches vary widely in size, shape, and conditions (such as tree density and multiple canopy layers). These factors and the resulting patterns fall within the natural range of variation analyzed in the forest plan's final environmental impact statement (volume 1, beginning on page 272) (USFS 2018a) and detailed in desired condition FW-DC-TE&V-18.

Old Growth

Effects of the proposed action would be limited to 43 acres in two adjacent treatment units that are part of the same stand. That stand is currently being adversely affected by both root disease and infestations from multiple bark beetle species, most notably Douglas-fir beetle. Together, these insects and diseases are causing ongoing mortality, with high amounts having already occurred within the last 5 to 10 years. In unit 50 (40 acres), the proposed group selection harvest would focus on removing dead trees and species susceptible to the insects and disease infecting the stand, largely subalpine fir, Engelmann spruce, and Douglas-fir. The removal of dead trees is expected to create gaps where western larch and western white pine will be planted. Planting these species will have the beneficial effect of establishing resilient, root disease-tolerant species that will persist over the long-term. Within the matrix surrounding the gaps, generally smaller diameter spruce and fir will be removed due to their susceptibility to root disease. This will have the short-term beneficial effect of increasing the resilience of retention trees. All live trees of old growth size will be retained. The salvage harvest in unit 110 (3 acres) was proposed following the release of the proposed action due to a large windthrow event that occurred after its release.

That treatment will only remove downed trees that are accessible from the road due to most of the unit falling within an inner RMZ.

All new roads were planned to avoid impacts to old growth and mature stands wherever possible to comply with FW-GDL-TE&V-07. Existing road templates were used whenever possible and motorized public use of new roads in these stands is not planned. Within the Granite Moccasin Project just under 0.3 miles (about 775 feet) of two different haul routes pass through old-growth stands. Both sections will be constructed using historic templates and made impassable following the completion of project activities. Because existing templates are used, no old growth trees will be affected. Using the existing template will limit soil disturbance compared to other alternatives, because not only are the templates existing, they represent the shortest routes.

Road Construction

New and temporary road construction would occur with the proposed action. New and temporary roads on existing templates result in essentially no new change to the existing forest vegetation. The change occurred in the past when the road was originally built. The primary effect would be the removal of shrubs, small trees and other vegetation that may grow within the road template, with little to no additional disturbance of soils and adjacent vegetation. New and temporary roads that are newly constructed as part of the proposed action would result in removal of existing trees and other forest vegetation, and disturbance of soil surface layers and plant roots within the road template. In the case of new system roads this clearing would be permanent, and the road profile no longer managed for vegetation. In the case of Temporary roads, impacts would be temporary, and the roads would be restored after use, allowing native vegetation to re-establish.

Other Effects

Thinning would lower tree densities and, in some stands, change species compositions. These treatments would have relatively little immediate impact on forest size class, but over the long-term (beyond the timeframe of this analysis) would contribute to recruitment of larger size classes of trees (see project file O001).

The proposed activities would have some impact on the number of snags and dead and downed woody material on this landscape. Prescribed fire would increase snags of all size classes where it occurs. Harvest and fuel reduction activities would decrease small snags and smaller diameter down wood. However, these actions would lead to an increase in quantity and quality of snags in the long term as a greater quantity of long-lived trees reach larger sizes. In all regeneration harvest units, live and dead leave trees are not planned for removal in any future entry and thus would remain on the site. They would increase the structural diversity in the stand and across the landscape over the long-term. Live trees would provide a continuous seed source for stand regeneration. Live leave trees would continue to grow, persisting in the stand, with many potentially becoming large, old legacy trees. Eventually they would die and become large snags and ultimately large, downed wood. At all these stages, leave trees provide benefits to the ecosystem and resources, such as habitat for wildlife, contributions to soil productivity, and attractive visual appearance.

Forest products gathering is expected to continue in the project area at current levels. This includes firewood cutting, as well as collection of Christmas trees, boughs, post and pole, and other miscellaneous material. Firewood cutting would continue to limit snags and downed woody material, generally within 200 feet of open roads. Christmas tree and bough harvesting would continue to thin young forests adjacent to open roads.

Fire and Fuels

Summary

Vegetation management within the WUI in the Granite Moccasin project area would reduce potential fire intensity by decreasing both tree density and surface and canopy fuel loading. Treatments that remove ladder fuels, increase canopy base height, and break up continuous canopy cover shift fire behavior from crown fire toward torching or surface fire. Under modeled conditions, these changes reduce flame lengths, often from the high values associated with those fuel models that have high loading of conifer litter (fuel models timber litter 5 and timber understory 5), toward more manageable levels (generally below 8 feet and ideally below 4 feet). These reductions improve opportunities for safe and effective wildfire suppression and reduce the risk of high severity fire spread into or from WUI communities.

Issues

This fuels analysis considers how the proposed action would affect tree density and fuel loading in the WUI, which is an issue we identified for detailed analysis based on the purpose and need of the project and public input related to concern about effectiveness of fuels treatments. Changes in tree density and fuel loading directly influence flame length and fire type probability. Reducing fuels and opening canopy structure improves firefighter safety, reduces the likelihood of crown fire, and increases suppression effectiveness.

Assumptions and Methodology

This analysis relies on field reconnaissance and site visits; practitioner experience and fuels specialist judgment; Standard Fire Behavior Fuel Models (Scott and Burgan 2005) (Table 10); LANDFIRE datasets for areas lacking recent inventory; BEHAVE Plus 7.0 modeling to estimate flame length and fire type; and Interagency Fuel Treatment Decision Support System (IFTDSS) for modeling flame length, rate of spread, and crown fire potential.

Table 10. Fuel models applicable to the analysis area because of existing or desired conditions

Fuel models occurring in treatment units	Description
Timber litter 1 (TL1)	Light to moderate load, fuels 1 to 2 inches deep. Spread rate very low; flame length very low.
Timber litter 3 (TL3)	Moderate load conifer litter. Spread rate very low; flame length low.
Timber litter 5 (TL5)	High load conifer litter; light slash or mortality fuel. Spread rate low; flame length moderate.
Grass shrub 1 (GS1)	Shrubs are about 1-foot high, low grass load. Spread rate moderate; flame length low.
Timber understory 1 (TU1)	Fuelbed is low load of grass and/or shrub with litter. Spread rate low; flame length low.
Timber understory 5 (TU5)	Fuelbed is high load conifer litter with shrub understory. Spread rate moderate; flame length moderate.
Slash-blowdown 1 (SB1)	SB1 Fine fuel load is 10 to 20 tons/acre, weighted toward fuels 1 to 3 inches diameter class, depth is less than 1 foot. Spread rate moderate; flame length low.

Fuel models occurring in treatment units	Description
Shrub 1 (SH1)	Low shrub fuel load, fuel bed depth about 1 foot; some grass may be present. Spread rate very low; flame length very low.
Shrub 5 (SH5)	Heavy shrub load, depth 4 to 6 feet. Spread rate very high; flame length very high.

The LANDFIRE, BEHAVE Plus 7.0, and IFTDSS tools estimate current and potential fire behavior using inputs such as fuel model, slope, aspect, canopy cover, stand height, and canopy base height. Weather parameters used reflect typical fire season conditions and represent the conditions under which suppression actions are most critical.

Historic Natural Fire Regimes. Historic natural fire regimes describe the expected frequency and severity of fire across landscapes (Agee et al. 1990, Brown 1994, Schmidt et al. 2002) (Table 11). Fire frequency is the average number of years between fires. Severity is the effect of the fire on the dominant overstory vegetation.

Most of the project area falls within fire regime III, with fire regimes I and II on drier slopes and fire regimes IV and V on cooler, higher elevation slopes and ridges. Fire regime information provides ecological context but is not used directly as an indicator; flame length and fire type probability are the relevant measures.

Table 11. Historical natural fire regimes

Classification	Description
I	0–35-year frequency, low severity
II	0–35-year frequency, stand-replacement severity
III	35–100+ year frequency, mixed severity
IV	35–100+ year frequency, stand-replacement severity
V	200+ year frequency, stand-replacement severity

Indicators. Forest Plan direction emphasizes reducing fuels and improving operational conditions for wildfire response, especially within the WUI. For this project, the indicators of flame length and fire-type probability were selected to assess changes in tree density and fuel loading (Table 12). Flame length is a direct measure of fire intensity and suppression feasibility, and fire-type probability is the likelihood of surface fire, torching, or crown fire. These measures are drawn from Forest Plan components including FW-DC-FIRE-01, FW-DC-FIRE-02, FW-DC-FIRE-07, FW-DC-TE&V-13, FW-GDL-FIRE-05, and FW-GDL-FIRE-06.

Table 12. Resource condition indicators and measures for assessing effects

Resource/ Element	Indicator	Measure
Fuel loading	Amount of surface fuels	Change in flame lengths (target is < 4 ft)
Fuel loading	Canopy base height and crown density	Change in flame length and its connected effect on crown fire type probability (target is to decrease probability of crown fire)

Flame length. Shorter flame lengths allow for direct attack and safer firefighter engagement. Treatments that remove surface and ladder fuels typically produce measurable decreases in modeled flame length.

Fire type. Fire is classified as one of three types (Table 13). Active crown fire requires dense canopy fuels and low canopy base height (Agee and Skinner 2005). Treatments aim to reduce crown continuity and raise canopy base height, making transition to crown fire less likely (Stratton 2004).

Table 13. Fire types and associated fire behavior

Fire type	Fire behavior
Surface	Understory fire
Torching	Surface fire with occasionally torching trees
Active Crown	Fire spreading through the overstory crowns

Scope of the Analysis

For NEPA purposes, the analysis area is the entire project area, including approximately 27,220 acres classified as WUI using Healthy Forest Restoration Act (HFRA) (16)(B) definitions. However, effects on flame length and fire-type probability occur almost entirely within treated units, where vegetation structure is altered. Therefore, the analysis evaluates project-level context, and treatment unit-level effects, where fuel loading and tree density would change measurably. This distinction explains why Table 14 compares only treated acres; untreated acres show negligible measurable change when aggregated across the project area.

Potentially Affected Environment

Past wildfire and timber harvest have shaped the existing vegetative conditions described in the Purpose and Need and Terrestrial Ecosystems and Vegetation sections. Nyack, Pinnacle, Snowslip, and Essex are at-risk communities due to their locations within a narrow corridor with single primary egress (that is, Highway 2), high fuel loading, and frequent human-caused ignition potential (see project file R001). Human use, including dispersed recreation such as hiking, horseback riding, and camping, contributes to the potential for human-caused ignitions. Wildfire, under existing conditions, could also affect primary egress routes (that is, Highway 2) for the large number of visitors the area receives during the summer season.

Current fuel conditions vary but are dominated by timber litter 5 (TL5) and timber understory 5 (TU5) fuel models, reflecting high conifer litter loading and dense understory vegetation (Table 14). Insect and disease mortality contributes pockets of heavy downed fuels. These conditions produce high modeled flame lengths and elevated probability of torching or crown fire. Current stand structures include dense multistory canopies with continuous ladder fuels and low canopy base heights, conditions that favor crown fire initiation and spread. Fuel treatments that reduce tree density and surface fuel continuity can shift fire behavior from crown fire to torching or surface fire.

Effects of the No-Action Alternative

Under the no-action alternative, existing fuel conditions within the project area would remain unchanged, and no hazardous fuel reduction would occur in the WUI. Dense stands of unmanaged timber, continuous ladder fuels, and extensive surface fuel accumulations would persist throughout the corridor, particularly near the communities of Nyack, Pinnacle, Essex, and Snowslip. These conditions would continue to support high flame lengths and maintain a high probability of torching or crown fire, as indicated by current TL5 and TU5 fuel models. Without treatment, canopy base heights would remain low and crown continuity high, enabling surface fires to transition readily into the overstory and sustain active crown fire behavior. As natural fuel accumulation continues, shade tolerant understory trees will grow denser, basal area will increase, and ladder fuel development will further heighten crown fire potential.

In the absence of vegetation management, large diameter Douglas fir and western larch would experience increased competition from dense lodgepole pine and understory conifers, reducing overall stand vigor and increasing the likelihood that even fire-resistant species would be killed during high intensity wildfire events. Firefighter access and operational effectiveness would also continue to deteriorate as vegetation encroaches on existing roads and travel corridors, resulting in reduced visibility, longer response times, and fewer practical suppression opportunities. These conditions would elevate risks to public and firefighter safety and maintain a high likelihood of wildfire spreading rapidly across jurisdictions or impacting private lands adjacent to NFS lands.

Human-caused ignitions would remain a particular concern due to the high levels of travel, recreation, and commerce along Highway 2. Without proactive fuels treatments to lower intensity and alter fire behavior, wildfires would be more likely to produce prohibitively long flame lengths and crown fire activity that limit suppression options. Additionally, smoke from uncontrolled wildfires would continue to affect local communities and sensitive airsheds during peak fire season, contributing to public health impacts and reducing visibility along the transportation corridor. Overall, taking no action would not move the fire and fuels condition toward Forest Plan objectives and desired conditions and would maintain elevated wildfire risk to communities, infrastructure, natural resources, and firefighter safety.

Effects of the Proposed Action

While only modest amounts of acres in the project area are proposed for treatment, those treatments are expected to have a broader effect on fire behavior and suppression because they are strategically located to break up large, continuous fuel beds, reduce fire intensity, and create defensible areas that increase the probability of successful initial attack and safer suppression efforts across a much larger landscape. While treatments would result in small shifts in fuel loading when lumped with all project area acres; treatment areas are strategically concentrated where values are at risk, that is, in the WUI.

Following implementation of the proposed treatments, changes in vegetation structure and fuel loading would influence fire behavior in both the short- and long-term. These changes produce a mix of beneficial and adverse effects, though the overall outcome strongly favors reduced fire intensity and improved firefighter and public safety.

In the short-term, mechanical treatments, particularly precommercial thinning, can temporarily increase surface fuel loading due to the presence of slash. This may elevate localized flame lengths until material decomposes naturally over 5 to 7 years or is treated through piling or prescribed burning. Reduced canopy cover immediately following thinning may also allow greater wind penetration and sunlight exposure, which can increase the rate of surface fire spread. These short-term effects are expected in treated units but remain limited in duration and extent, and they do not increase the likelihood of crown fire because ladder fuels have been removed and canopy base height has increased.

Reduced stand density, higher canopy base height, and broken canopy continuity lead to substantial reductions in expected flame lengths and a shift in probable fire type from crowning toward torching or surface fire (Table 14). These outcomes are consistent across all modeled treatment types and represent considerable improvements in wildfire response conditions. Fire-adapted tree species such as western larch and Douglas-fir are more likely to survive surface fires, especially in thinned stands, than the slow moving, high-intensity fires that occur in dense, untreated stands.

These improvements also enhance firefighter safety, as shorter flame lengths and surface fire behavior allow for more predictable fire spread and increased opportunities for direct attack. Treatments create defensible terrain, improve visibility, and increase maneuvering space for hand crews and engine operations. Reduced crown fire potential lowers the likelihood of entrapment conditions and extreme heat exposure.

Where prescribed burning is used, smoke would be produced during implementation (a short-term adverse effect); however, burns are conducted under conditions that meet smoke management and dispersion requirements. These short duration smoke effects are outweighed by the long-term benefit of reducing the likelihood of large, high intensity wildfires that produce far more smoke for extended periods.

Overall, the adverse short-term effects associated with increased surface fuels in specific treatment areas are temporary and localized, whereas the beneficial short- and long-term effects—including lower flame lengths, reduced crown fire potential, increased stand resilience, and enhanced firefighter and public safety—extend across the life of the stand and substantially reduce wildfire risk within the WUI.

Table 14. Granite Moccasin fuel model comparison of vegetation treatments within no-action and the proposed action alternatives

Vegetation treatment type	Acres	Fuel model[a] (from no action to proposed action)	Flame length (ft), no-action alternative	Flame length (ft), proposed action	Fire type, no-action alternative	Fire type, proposed action
Commercial thin	770	TL5 to TU2	160	17	Crowning	Torching
Seed tree	945	TU5 to GS1	70	5	Crowning	Surface
Improvement cut	250	TU5 to TU1	70	4	Crowning	Surface
Shelterwood	197	TL5 to TL3	160	2	Crowning Torching	Surface
Precommercial thin	283	TU5 to TU3	70	35	Crowning	Torching
Understory removal	214	TU5 to SB1	44	9	Crowning Torching	Surface

Vegetation treatment type	Acres	Fuel model[a] (from no action to proposed action)	Flame length (ft), no-action alternative	Flame length (ft), proposed action	Fire type, no-action alternative	Fire type, proposed action
Prescribed burn[b]	240	TU5 to TU3	H – 70, F – 3, B – 2	H – 24, F – 6, B – 3	Crowning	Torching, Surface
Whitebark pine restoration – prescribed burn[b]	583	TU5 to SB1	H – 70, F – 3, B – 2	H – 5, F – 3, B – 2	Crowning	Torching, Surface

a. Standard Fire Behavior Fuel Models (Scott and Burgan 2005).

b. H= Head fire, F= Flanking fire, B= Backing fire in general related to slope and wind influence. Head Fire: The fastest spreading part of a fire's perimeter, usually the side toward which the wind is blowing. It is the most dangerous type of fire behavior. Flank Fire: The side of the fire that is perpendicular to the head and moves at a moderate rate. It is used to move around a burn unit and into the direction of the wind. Backing Fire: The side of the fire opposite the head, moving into the wind. It is used to consume fuel in the path of a wildfire and/or change the direction of force of the fire's convection column. These definitions are essential for understanding fire behavior and managing prescribed burns effectively.

Scientific Basis for Vegetation Treatments

Hazardous fuel reduction activities, such as mechanical or hand thinning and prescribed fire, that remove surface and canopy fuels, are well-established management practices for reducing fire risk and restoring forest structure altered by past management and fire suppression (Agee and Skinner 2005, Barnett et al. 2016); for moderating subsequent fire behavior (Finney 2001, Stephens and Moghaddas 2005), reducing fire severity (Safford et al. 2009, Prichard and Kennedy 2014, Brodie et al. 2024), and improving forest resilience to future disturbances (Stevens et al. 2014, Hood et al. 2016).

Work by the Rocky Mountain Research Station (Jain et al. 2021). The study found that in general, fire behavior characteristics within fuel treatments were effective at creating more desirable conditions by slowing the rate of spread, shifting fire behavior from crown fire to surface fire, and decreasing fire severity. Treatments not only affected fire behavior within treatment units themselves but also created valuable fire suppression opportunities by creating anchor points for fireline construction, structure protection, and spot fire suppression (Jain et al. 2023).

Aquatic Resources

Summary

Adverse effects to aquatic resources would only occur during project implementation and would be very limited. Short-term, less than 3 years, adverse effects may include small amounts of sediment input above current levels in bull trout and westslope cutthroat trout streams along with potential displacement of individual cutthroat when culverts are upgraded within the Pinnacle Creek drainage. Proposed road best management practices (BMPs) and maintenance would produce long-term, greater than 3 years, benefits to water quality, aquatic habitats, bull trout (distinct populations and overall core area), westslope cutthroat trout, and other aquatic organisms through reduced sediment delivery potential. Maintenance of RMZs would provide long-term protection of water quality and habitat for all aquatic species. Upgrade of the Pinnacle Creek culverts could impact individual westslope cutthroat trout and other aquatic organisms during implementation, but in the long-term would improve passage, thereby increasing distribution and genetic diversity in this stream. All actions support maintenance of existing water quality beneficial use classifications and watershed condition framework ratings.

Issues

Table 15 shows indicators and measures derived from the forest plan for specific aquatic resource elements where internal and external scoping suggest relevant issues exist. Project file H-001 documents relevant issues carried forward for analysis as well as rationale explaining why some issues were anticipated to have limited to no adverse effects and therefore were not included in the effects analysis. The supporting paragraphs detail methods and assumptions used to generate measures for analysis.

Table 15. Resource condition indicators and measures for assessing effects

Resource/ Element	Indicator	Measure
Watersheds (water quality)	Indicator 1-Water quality beneficial use determinations Indicator 2- Watershed Condition Framework ratings	Measure 1- Sediment delivery to streams (tons/year) Measure 2- Percent change in sediment delivery relative to undisturbed background estimates.
Riparian areas and wetlands (aquatic habitat/stream morphology)	Indicator 2- Watershed Condition Framework ratings	Measure 1- Sediment delivery to streams (tons/year) Measure 2- Percent change in sediment delivery relative to undisturbed background estimates.
Aquatic species	Indicator 1- Water quality beneficial use determinations Indicator 2- Watershed Condition Framework ratings Indicator 3- Bull trout local or core population status	Measure 1- Sediment delivery to streams (tons/year) Measure 2- Percent change in sediment delivery relative to background estimates. Measure 3- Percent change in sediment delivery relative to background estimates within affected portions of bull trout subwatersheds. Measure 4- Miles of potentially affected bull trout critical habitat. Measures 1 through 4 collectively used to qualitatively define effects to aquatic species.

Source: USFS 2018b

Assumptions and Methodology

Sediment delivery is the principal measure affecting water quality, aquatic habitat for fish and other aquatic species, and stream morphology. Increased sediment delivery is used as a surrogate for total suspended sediment and nutrient (specifically phosphorus) concentrations in this analysis. Similarly, sediment delivery rates are used as surrogates for analyzing potential effects on riparian areas and wetlands, and ultimately aquatic species and their habitat. Furthermore, roads are the primary source of anthropogenic sediment delivery to streams (Sugden and Woods 2007). Specifically, road-generated sediment delivery on the Flathead National Forest is estimated to represent about 2 percent of total yield at the subwatershed (HUC12) scale which is unlikely to be measurable (USFS 2020). However, recent sediment studies have determined that most road sediments come from a very small percentage of drain points (Black et al. 2014, Black et al. 2012, Cissel et al. 2013, 2014, Nelson et al. 2014). More specifically, road-stream crossings are estimated to account for 74 percent of all road sediment delivery to streams (Cissel et al. 2014). The analysis quantifies modeled stream sediment delivery estimates relative to undisturbed background conditions during and after project implementation. Impacts to bull trout are assumed when sediment delivery overlaps critical habitat. The significance of effect would depend on the volume of sediment delivered and the length of critical habitat affected.

Sediment delivery estimates associated with roads are based on a 50-year climate simulation using the water erosion prediction project (WEPP) road batch interface. Therefore, estimated sediment delivery represents the average of what could potentially occur over a 50-year period. Sediment delivery generated through road grading, temporary bridge placement or removal, and BMP application, are incorporated in the WEPP model outputs under the general assumption these increases, or potential reductions, fall within predicted error for model outputs (plus or minus 50 percent). Roads previously reclaimed are assumed to be zero because they are disconnected from stream channels. Sediment delivery from the existing road system follows guidance detailed in project file H-002, while proposed new roads follow methodology outlined in project file H-003. Sediment delivery estimates associated with culvert replacement or removal follow guidance detailed in project file H-004. The analysis assumes all proposed activities would be completed in one year to overlap potential effects in time and space, although effects are more likely to be distributed over a 3 to 5-year period. Detailed information about the WEPP model is available at: http://forest.moscowfsl.wsu.edu/fswepp/.

This analysis assumes all sediment generating activities occur simultaneously in a single year. However, proposed activities would be implemented over several years and so peak values for sediment delivery shown in Table 21 would be less. Field data and model outputs will be used to inform road maintenance decisions in the proposed action, helping further reduce road erosion and sediment delivery potential (relative to values shown in Table 21). The analysis also assumes proper application of all design features and effectiveness values similar to those observed through State and Federal BMP field reviews which average over 98 percent effective (Buxton 2025).

Data Sources. Information for this analysis was gathered from a variety of sources including those incorporated in the forest plan (USFS 2018b). Additional data include NetMap WEPP road spatial attributes, digital elevation maps, NRCS soil survey of Flathead National Forest Area, Montana (Martinson and Basko 1998), and site-specific PRISM climate data generated through the WEPP user interface. Other information includes field observations in or near the project area. These data include Forest Service spatial data for field evaluation of RMZs, road stream crossings, and field WEPP surveys (project file H-005), Montana Fish Wildlife and Parks Fish and Montana Natural Heritage Program data (project file H-006), and Montana Department of Environmental Quality reports (Gildea et al. 2004, MDEQ 2021).

Scope of the Analysis

The spatial bounds of analysis areas are variable, depending on which component of aquatic resource is analyzed and temporal nature of possible effects (Table 16). Temporal bounds for aquatic resources range between short-term (project initiation to approximately 3 years post completion) and long-term (more than 3 years post completion), depending on the type and spatial scale of effects.

Long-term effects are generally characterized spatially at the subwatershed, core population or local population scale. This geographic extent provides an ideal mechanism for interpreting effects of a multitude of management actions on soil, hydrologic function (USFS 2011), aquatic species, and water quality (Makarowski 2020).

Some project activities (for example, improvements) have narrowly focused objectives, and target specific stream reaches, sites, and/or individuals. Resource elements affected through these actions require more refined spatial analysis to illustrate meaningful short-term effects within the context of the proposed activity (Table 16).

Table 16. Spatial and temporal scale of analysis by resource element

Resource/ Element	Short-term: project initiation to approximately 3 years post completion	Long-term: Greater than 3-years post completion
Watersheds (water quality)	Site/reach	Subwatershed (HUC12)
Riparian areas (aquatic habitats/ stream morphology)	Site/reach	Subwatershed (HUC12)
Aquatic Species	Site/reach/individual	Local population to Core population area

Potentially Affected Environment

Timber management and continued operation of utility and transportation corridors influence aquatic resources throughout the project area by increasing potential sediment delivery to streams and physical alteration of stream morphology and habitat. Table 17 presents principal waterbodies within analysis area subwatersheds, water quality use classifications, and watershed condition framework ratings. Water quality impaired streams are absent from the project area.

Table 17. Principle streams within subwatersheds and water quality use classification (MDEQ 2021) and watershed condition framework ratings (USFS 2011) for each subwatershed

Subwatershed (HUC12)	Principle Streams	Water Quality Use Classification*	Watershed Condition Framework rating
Bear Creek- Middle Fork Flathead River	Bear Creek, Devil Creek, Giefer Creek, Skyland Creek	B-1	Functioning Properly
Granite Creek	Challenge Creek, Dodge Creek, Granite Creek	A-1, B-1	Functioning Properly
Deerlick Creek-Middle Fork Flathead	Deerlick Creek, Moccasin Creek, Pyramid Creek, Skiumah Creek, Rescue Creek, Crystal Creek, Middle Fork Flathead River	A-1, B-1	Functioning Properly
Dickey Creek-Middle Fork Flathead	Dickey Creek, Middle Fork Flathead River	A-1, B-1	Functioning Properly
Essex Creek-Middle Fork Flathead	Essex Creek, Sheep Creek, Java Creek, Middle Fork Flathead River	A-1, A-closed, B-1	Functioning Properly
Stanton Creek-Middle Fork Flathead	Pinnacle Creek, Tunnel Creek, Stanton Creek, Disbrow Creek, Middle Fork Flathead River	A-1, B-1	Functioning Properly

***A-1**: Waters classified as suitable for drinking, culinary, and food processing purposes after conventional treatment for removal of naturally present impurities. **A-closed**: Waters classified as suitable for drinking, culinary, and food processing purposes after simple disinfection. **B-1**: Waters classified as suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

Portions of Essex Creek within the project boundary are water quality use classified as A-closed. These stream segments are within the Essex Municipal Watershed although proposed activities are downstream from the municipal outtake. All potential affected streams segments in Essex Creek are water quality classified as B-1.

Bull trout, listed as threatened under the Endangered Species Act, occurs in portions of the project area along with their designated critical habitat. Bear Creek and Granite Creek are designated critical habitat for bull trout spawning and rearing. The distinct bull trout populations in these streams are part of the Flathead Lake Core Area (FWS 2015a). The Bear Creek and Granite Creek watersheds are part of the Conservation Watershed Network (USFS 2018b). The Middle Fork of the Flathead River is also critical habitat for bull trout as it provides a migration corridor between Flathead Lake and spawning tributaries.

Project file H-007 displays mapped critical habitat for bull trout in the project area. Bull trout baseline conditions for these subwatersheds are functioning appropriately (project file H-008). In the Flathead Basin, non-native species interactions and demographic effects, such as angling bycatch, legal angling, and poaching, are the primary drivers of bull trout population numbers. Habitat degradation is not considered a primary threat in the Flathead Basin (FWS 2015b).

Westslope cutthroat trout, a Montana State Species of Concern, are well distributed across the project within the mainstem Middle Fork Flathead River and associated tributaries.

The meltwater lednian stonefly and their designated critical habitat are absent from the analysis area.

Effects of the No-Action Alternative

With no action, potential water quality changes are not anticipated, and water quality beneficial use classifications and watershed condition framework ratings would remain unchanged; current sediment inputs from existing roads are miniscule compared to background amounts. Relatedly, no impacts to bull trout (distinct populations or core populations) or current distribution or abundance of westslope cutthroat trout would occur. However, removal and replacement of three Pinnacle Creek culverts, which are potential fish barriers, would not occur, so they would continue to limit aquatic organism passage, adversely impacting distribution and genetic diversity. Additional details on taking no action is below.

Watersheds (Water Quality)

Active forest management including application of forestry and road best management practices (BMPs) are ongoing within the project area on public and private lands. The most recent BMP field audit conducted by the Montana DNRC found that over 98 percent of practices met or exceeded BMP standards for protection of water and soil (Buxton 2025). Field evaluation of BMP and storage practices on the Flathead National Forest closely resemble findings from the DNRC's BMP field review process, suggesting similar efforts within analysis area subwatersheds are highly effective at preserving road prisms, disconnecting the road system from streams, minimizing erosion, and reducing sediment delivery. Furthermore, a synopsis of road sediment delivery from the Flathead National Forest (USFS 2020) illustrates that road-derived sediment may account for an average of 2 percent of the total sediment load at the subwatershed scale. Road erosion modeling results for the current condition support these assessments and suggest sediment loads in all affected subwatersheds represent less than 1 percent of the total load (Table 18).

Table 18. Background erosion across subwatersheds and added sediment delivery from roads within the watershed

Subwatershed (HUC12)	Background erosion[a] (tons/year)	Road sediment delivery[b] (Tons/year) Road sediment delivery (tons/year)	Percent of Background Sediment Delivery
Bear Creek-Middle Fork Flathead	839	1.95	0.23
Granite Creek	655	1.69	0.26
Deerlick Creek-Middle Fork Flathead	1,275	1.24	0.10
Dickey Creek-Middle Fork Flathead	683	.30	0.04
Essex Creek-Middle Fork Flathead	726	1.58	0.22
Stanton Creek-Middle Fork Flathead	1,083	0.68	0.06

a. Background estimates for sediment delivery follow guidance presented in (Elliot 2013).

b. WEPP road data and model results available in project file H-005.

Riparian Areas and Wetlands (Aquatic Habitat/Stream Morphology), and Aquatic Species

Table 19 details current watershed condition framework indicator ratings, specific to aquatic habitat, riparian/wetland habitat, water quality, water quantity, and aquatic species (aquatic biota) within the analysis area subwatersheds. These ratings suggest current levels of road sediment delivery do not compromise the sustainability of existing aquatic habitat conditions at the subwatershed (Table 19) or stream scale (Table 20). While future BMP work or maintenance on NFS roads wouldn't be precluded under the no-action alternative, postponement of BMP work or maintenance at existing stream crossings and road surfaces may elevate potential sediment delivery between maintenance periods. In particular, Pinnacle Creek has three culverts which are undersized and/or potential westslope cutthroat trout barriers that would likely continue to be an issue for the foreseeable future and is an adverse effect of taking no action.

Table 19. Habitat and biotic conditions within subwatersheds

Subwatershed (HUC12)	Aquatic Habitat Condition [a]	Water quality/quantity Condition [a]	Riparian/Wetland Habitat Condition [a]	Aquatic Biota Condition [a]
Bear Creek-Middle Fork Flathead	Fair	Good	Good	Fair
Granite Creek	Good	Good	Good	Fair
Deerlick Creek-Middle Fork Flathead	Good	Good	Good	Fair
Dickey Creek-Middle Fork Flathead	Good	Good	Good	Fair
Essex Creek-Middle Fork Flathead	Good	Good	Good	Fair
Stanton Creek-Middle Fork Flathead	Good	Good	Good	Fair

a. Condition rating 1-Good suggests that this condition is properly functioning, condition rating 2-Fair suggests that this condition is functioning at risk (Potyondy and Geier 2011).

The Fair rating for aquatic habitat in Bear Creek-Middle Fork Flathead is due to Highway 2 constricting the Bear Creek floodplain and channel. The Fair ratings for all Aquatic Biota are due to depressed bull trout populations and varying degrees of hybridized westslope cutthroat trout.

This amount of current road sediment input is so low (Table 20) that it is not expected to affect spawning success, fry emergence, or survival of bull trout. Inputs to the Middle Fork of the Flathead, which is bull trout migration critical habitat, are not at measurable amounts above background sediment levels currently.

Table 20. Bull trout spawning and rearing streams and effects of road sediment input

Bull trout S&R stream	Existing Road sediment delivery Overlap with bull trout critical habitat a (tons/year)	Road sediment delivery percent of background b	Affected Stream Miles
Bear Creek	0.17	0.04	1.08
Granite Creek	0.04	0.01	0.39

a. Volumes reflect road sediment delivery greater than 100 lbs. per year within approximately 810 meters of mapped bull trout critical habitat.

b. Percent background is relative to undisturbed background estimates presented by Elliot (2013) for watershed areas above point sources within approximately 810 meters of mapped bull trout critical habitat and delivering more than 100 lbs. of sediment per year.

Effects of the Action Alternative

Environmental effects on aquatic resources would vary in duration, depending on the type of disturbance, timing, and intensity of post-disturbance precipitation. The spatial extent of effects would generally be limited to the reach scale, approximately 810 meters downstream of delivery sites (Foltz et al. 2008).

Watersheds (Water Quality)

Management activities identified under the proposed action would increase road sediment delivery to streams by less than 0.3 percent of background levels in either the short-term (1 to 3 years) or long-term (more than 3 years) relative to current conditions in most subwatersheds (Table 21).

Short-term adverse effects: Project activities would have short-term adverse effects on water quality. These effects include increased sediment delivery potential in most subwatersheds, particularly from road construction, BMP application, and increased traffic levels on haul routes (project file H-007) during and immediately following disturbance, persisting for the duration of haul activities and are limited in extent because of the scale and wide spatial distribution where the effects would occur. These effects would then decline exponentially with each passing precipitation event as fine sediment availability is reduced over time (Luce and Black 2001) once project activities are complete, a process that may take several months to a year.

Table 21. Estimated sediment delivery during and after project implementation

Subwatershed (HUC12)	Short-Term Road Sediment Delivery [a] (tons/year) Years 1-3	Short-Term Road Sediment Delivery percent of background [a] (tons/year) Years 1-3	Short-Term Change [c] (tons/year)	Long-Term Road Sediment Delivery [b] (tons/year) Years 3+	Long-Term Road Sediment Delivery percent of background [b] (tons/year) Years 3+	Long-Term Change [c] (tons/year)
Bear Creek-Middle Fork Flathead	1.90	0.23	0.15	0.48	0.06	-1.27
Granite Creek	1.84	0.28	0.77	0.17	0.03	-0.90
Deerlick Creek-Middle Fork Flathead	0.63	0.05	0.1	0.17	0.01	-0.36
Dickey Creek-Middle Fork Flathead	0.18	0.03	-0.05	0.06	0.01	-0.17
Essex Creek-Middle Fork Flathead	0.40	0.06	-1.18	0.05	0.01	-1.53
Stanton Creek-Middle Fork Flathead	1.28	0.12	1.18	0.04	0.01	-0.06

a. Road sediment delivery includes culvert replacement estimates for sediment delivery and BMP application.
b. Long-term delivery represents the return of low traffic volumes to all roads in a post BMP status.
c. Change is relative to model outputs for existing conditions.

Additionally, culvert replacement actions in Pinnacle Creek and one new stream crossing in an unnamed tributary to Granite Creek would cause temporary increases in turbidity and total suspended sediment during construction. Water quality effects from culvert replacement are expected to be reduced to near pre-project levels within 24 hours based on previous observations (Jakober 2002). The magnitude and severity of these potential adverse water quality effects under the proposed action would be less than those described under a culvert failure scenario (project file H-004), which shows potential fine sediment delivery values can be four to five times greater when crossings fail.

Long-term beneficial effects: In contrast to the short-term adverse impacts, project activities would yield long-term water quality benefits. These benefits would result from the reduction in chronic sources of sediment delivery and stream turbidity (USFS 2018b). Applying road BMPs and upgrading culverts would reduce erosion, sediment delivery (Table 21), and failure risk in the long-term. New culverts would meet Forest Plan standards and further disconnect roads from streams, ultimately benefiting water quality long term as the transportation infrastructure becomes more resilient to high flow events. The effectiveness of erosion control BMPs in reducing sediment by more than 90 percent (Foltz et al. 2008) and protecting soil and water resources over 98 percent of the time (Buxton 2025) supports the anticipated long-term benefits.

Riparian Areas and Wetlands (Aquatic Habitat/Stream Morphology)

Short-term adverse effects: Upgrading stream culverts would have short-term adverse effects on aquatic habitat and channel morphology due to physical modification at specific sites: three Pinnacle Creek culvert replacements and one new stream crossing on specified road S-7 at an unnamed headwater tributary to Granite Creek (project file H-007). Additionally, sediment from culvert replacements and other sources (such as, high traffic haul routes, and BMP application) may produce short-term adverse effects at individual sites or reaches by altering channel habitat conditions, such as increasing pool tail fines, reducing median substrate size, and decreasing residual pool depths. Adverse effects to riparian areas and wetlands, including physical habitat loss at construction sites (that is, stream crossings) and fine sediment accumulation in downstream reaches (which changes habitat conditions), are also anticipated. These effects are not expected to persist long-term, as disturbed areas recover quickly, seasonal flooding mobilizes sediments, and effective erosion control BMPs reduce sediment by over 90 percent (Foltz et al. 2008).

Long-term beneficial effects: Over the long-term, stream culvert improvements and road BMP application would provide beneficial effects by reducing potential disturbance and road surface erosion (Table 21). This reduction in long-term sediment delivery potential would improve stream habitat conditions.

Aquatic Species

Effects on aquatic species are evaluated based on sediment delivery estimates in bull trout and westslope cutthroat trout habitat at subwatershed and reach scales. The Middle Fork Flathead River has bull trout migration critical habitat; the subwatersheds in table 7 provide inputs into the Middle Fork. During and after project implementation, sediment delivery at either the subwatershed or reach scale would be much less than 1 percent of background levels (Table 21 and Table 22).

Table 22. Sediment delivery from proposed action within bull trout designated critical habitat

Bull trout spawning and rearing streams	Proposed Action Road sediment delivery [a] (tons/year)	Short-Term (Implementation) Road Sediment Delivery percent of background [b] (Tons/year). Years 1-3	Post Haul Road sediment delivery (tons/year)	Long-Term (Implementation) Road Sediment Delivery percent of background [a] (Tons/year). Years 3+	Affected Stream Miles
Bear Creek	0.26	0.06	0.07	0.02	1.08
Granite Creek	0.09	0.03	0.01	Less than 0.01	0.39

a. Volumes reflect model predicted road sediment delivery greater than 100 lbs. per year within approximately 810 meters of mapped bull trout critical habitat.

b. Percent background is relative to undisturbed background estimates presented in Elliot (2013) for watershed areas above point sources within approximately 810 meters of mapped bull trout critical habitat and delivering more than 100 lbs. of sediment per year.

Short-term adverse effects: Limited short-term adverse effects to aquatic species are expected only during project implementation. These may include small amounts of sediment input above current levels in bull trout and westslope cutthroat streams, and potential temporary displacement of individual westslope cutthroat trout when culverts are upgraded in the Pinnacle Creek drainage.

Long-term beneficial effects: Over the long-term (greater than 3 years), proposed road BMPs and road maintenance would provide beneficial effects to bull trout, westslope cutthroat trout, and other aquatic species by reducing sediment delivery potential. Maintenance of RMZs would ensure long-term habitat protection. Additionally, upgrading Pinnacle Creek culverts would create better passage for aquatic organisms, improving distribution and genetic diversity in that stream, especially for westslope cutthroat trout.

Overall Conclusion

Given the sediment estimates (Table 22) and despite identified short-term adverse effects, the proposed action is not expected to cause short- or long-term impacts to water quality, aquatic habitat (including riparian/wetland habitat), or aquatic species populations (including bull trout and westslope cutthroat trout) across the project area. Project design features, BMPs, and the maintenance of RMZ functionality (USFS 2018b) ensure that no changes to water quality beneficial use classifications or watershed condition framework ratings are expected for any aquatic resources.

Wildlife

The coarse-filter/fine-filter approach of the 2012 planning rule and the forest plan maintains the natural diversity of species, ecosystems, and ecosystem processes and thus provides for most of the conditions needed for wildlife species on the Flathead National Forest. Most of the potential effects of the proposed action on wildlife species are addressed in the analysis for terrestrial and aquatic ecosystems and their key characteristics and their needs are met through this project's consistency with all forest plan components for those habitats (project file U-001). Also see FEIS Appendix 6, including table 6-3 which lists habitat associates and status for wildlife species on the Flathead National Forest (volume 4, pp. 6-1 to 6-30) (USFS 2018a).

Wildlife is not driving the project's purpose and need for action (see Purpose and Need section). Although proposed project activities may have negative impacts to some wildlife species over the short-term due to disturbance and habitat changes, many wildlife species would benefit from proposed treatments over the long term due to increased diversity of vegetation communities and decreased risk of high intensity and severity wildfire. This wildlife analysis focuses on threatened and endangered wildlife species, connectivity and forest ungulates.

The NEPA regulations at 7 CFR 1b.2(f)(3)(ii) require the consideration of both short- and long-term effects, and both beneficial and adverse effects. The term "adverse" has different definitions under NEPA and the Endangered Species Act. While not explicitly defined in the NEPA regulations, "adverse" can generally be understood to mean "negative", and that is how the term is used in this analysis. While adverse (negative) effects are disclosed throughout the Wildlife section, adverse effects under NEPA should not be construed to imply an "adverse" impact or finding under Endangered Species Act (that is, harm or take to listed species or designated critical habitat).

Grizzly Bear (Threatened Species)

Summary

The Granite Moccasin action area is in the primary conservation area of the Northern Continental Divide Ecosystem. The project is in Dickey Java, Moccasin Crystal, Skyland Challenge, Staton

Paola and Tranquil Geifer grizzly bear subunits. Temporary changes to open motorized route density (OMRD), total motorized route density (TMRD), and secure core (CORE) would occur but would be compliant with FW-STD-IFS-03 and all other plan components. Spring and denning habitat occur throughout the affected subunits. Design features and restrictions on implementation feasibility will reduce effects to those habitats. Forage and cover occur across the affected subunits and proposed vegetative treatments would enhance grizzly bear forage.

Issues

How does the proposed action affect grizzly bear seasonal habitats, forage/cover/connectivity, habitat security (ORMD, TRMD, Secure Core) and disturbance?

Assumptions and Methodology

Data used for analysis included VMap data and the project vegetation layer, National Agricultural Imagery Program (NAIP) imagery, grizzly bear denning habitat model, predicted habitat use models, and a review of relevant and applicable science. In addition, site-specific information on habitat characteristics was collected during on-site visits to proposed treatment areas. Discrepancies may exist in reported acres or miles due to geographic information system (GIS) processes or rounding.

To evaluate compliance with forest plan standards and guidelines for grizzly bears, the following indicators were used:

- Effects on forage, cover and connectivity by vegetation management.
- Acres of vegetation management in seasonal grizzly bear habitats.
- Motorized access (OMRD, TMRD, CORE) in the affected bear management subunits.
- Level of disturbance.

Scope of the Analysis

The Granite Moccasin action area is in the primary conservation area of the Northern Continental Divide Ecosystem. The project is in Dickey Java, Moccasin Crystal, Skyland Challenge, Staton Paola, Long Dirtyface and Tranquil Geifer subunits. Subunits are the approximate size of a female grizzly bear’s home range and have been determined as the appropriate scale to analyze effects to grizzly bears by the Interagency Grizzly Bear Committee.

The temporal bounding for this analysis focuses on impacts to habitat effectiveness, which reflects an area's ability to support grizzly bears based on the quality of the habitat and the type/amount of human disturbance imposed on it. The project would lead to both short-term and long-term effects to grizzly bears. Short-term effects include disturbance from proposed timber harvest, fuel reduction, road management, and associated activities. The period for completion of motorized access with contract activities is 5 years. Ten years is the timeframe assumed for implementation of prescribed burning, and post-harvest treatments could take longer to implement. These boundings capture the disturbance generated during implementation from equipment operation, increased vehicle traffic, road management, and any other disturbance that may result from increased human presence in the affected areas. Cover would be impacted as each unit is treated, and foraging opportunities could improve as early as the following year. The analysis of long-term effects considers the time it would take for treated stands to recover and provide cover for grizzly bears. Foraging conditions would continue to improve in treated areas over the long term and stands

would recover to again provide cover in approximately 20 years. The project does not include activities that would permanently impact grizzly bears or their habitat.

Potentially Affected Environment

Habitat needs for grizzly bears and the character and distribution of these habitats across the Forest is discussed in detail in the terrestrial wildlife section of the Forest Plan FEIS, volume 2 (USFS 2018a) and in its Biological Assessment (USFS 2017). Grizzly bear population ecology, biology, and habitat descriptions and relationships identified by research are described in the Grizzly Bear Recovery Plan (FWS 1993), the five-year status review (FWS 2021), and the species status assessment (SSA) (FWS 2022b). Documented consistency with coarse filter plan components for terrestrial ecosystems and vegetation and RMZs will ensure that habitat needs for grizzly bear are maintained.

Grizzly bears and their habitat are known to occur in the action area. Recent research on grizzly bear space use identified much of the action area as high for predicted habitat use by both males and females (Sells et al. 2023). The Moccasin Crystal, Stanton Paola and Dicky Java subunits are in the Lower Middle Fork bear management unit (BMU), where monitoring has verified occupancy by female grizzly bears with offspring each year from 2018 to 2023. The Long Dirtyface, Trandquil Geifer and Skyland Challenge subunits are in the Upper Middle fork bear management unit, which had verified occupancy by females with offspring in 2018, 2022, and 2023 (Costello et al. 2023).

Across the Northern Continental Divide Ecosystem, human-caused mortality continues to be primary factor in grizzly bear survival rates. Causes of grizzly bear mortality have generally been due to factors beyond Forest Service control (such as train collision, mistaken identity, defense of life, poaching), although most of these are related to conflicts at sites associated with frequent or permanent human presence. Dicky Java (4 percent), Moccasin Crystal (5 percent), Stanton Paola (3 percent), and Tranquil Geifer (2 percent) contain areas of small private lands primarily along the U.S. Highway 2 corridor. Long Dirtyface and Skyland Challenge subunits are entirely under NFS ownership.

Seasonal Habitat

Grizzly bears use a mosaic of habitats that vary throughout the year. The affected subunits provide habitat for grizzly bears year-round. Affected subunits include modeled potential denning habitat. Potential denning habitat ranges from 28 to 48 percent across the affected subunits. The denning period west of the continental divide in the Northern Continental Divide Ecosystem is December 1 to March 31. Denning habitat is also used for foraging outside the denning period. This is especially true during the den emergence period (April 1 to May 1) when females with cubs remain near the den for several weeks. There is also important food sources found in high elevation shrub fields and talus slopes that bears seek out during late summer. As bears move away from their dens in spring, they seek out green vegetation which leads them to low-elevation snow-free habitat. Spring habitat for this analysis considered elevations and aspects that would be expected to be snow free during the springtime as well as riparian areas that are known to be highly productive and used for movement by many wildlife species. Bears generally avoid areas within 500 meters of an open route and those areas were not considered spring habitat. Grizzly bears use a variety of habitats during summer and fall, seeking out ripe berries and other seasonal food sources.

Predicted spring habitat across the affected subunits ranges from 24 to 32 percent. Table 38 in Appendix F summarizes the estimated seasonal habitats available within the affected subunits.

Forage, Cover, Connectivity

Grizzly bears are opportunistic omnivores and take advantage of diverse food resources throughout the non-denning season. The action area is currently providing a variety of foraging opportunities for grizzly bears. Openings and open forest conditions provide grasses, forbs, and shrubs for foraging grizzly bears. The affected subunits currently have high levels of forested cover, ranging from 54 to 77 percent. Forage and cover were estimated using the project vegetation layer (see Terrestrial Ecosystems and Vegetation section) to demonstrate potential project effects to grizzly bear habitat (see Table 39 in Appendix F). It is likely that some areas classified as cover also provide foraging opportunities in the understory but as canopy cover increases, understory vegetation decreases due to the lack of sunlight reaching the forest floor. It is also likely that some areas classified as forage also provide cover such as dense shrub fields or riparian vegetation. Forested cover provides connectivity across the affected subunits. Topography also contributes to cover for bear movement, especially in open areas and near human activity.

Secure Core and Motorized Access

Across the analysis areas, a network of roads and trails facilitates human access, contributing to the risk of mortality or displacement of grizzly bears. Motorized route densities on NFS land have decreased substantially in the past decades due to road management to facilitate grizzly bear recovery. Table 23 displays the existing open motorized route density (OMRD), total motorized route density (TMRD), and secure core (CORE) percentages for the affected subunits.

Table 23. Existing motorized access conditions in the affected subunits, in percentage of the subunit

Subunit	OMRD (> 1 mi/mi^2)	TMRD (> 2 mi/mi^2)	CORE
Dickey Java	8	0	86
Long Dirtyface	0	0	100
Moccasin Crystal	8	1	81
Skyland Challenge	20	17	65
Stanton Paola	7	3	84
Tranquil Geifer	0	2	89

Roads that are closed to public motorized use affect grizzly bears to a lesser extent than open roads (Proctor et al. 2019). Illegal use of closed roads and illegal user-created routes may disturb individual bears, reduce bear use of habitat near these routes, or increase the risk of mortality. Recent closure device monitoring in the affected subunits has revealed evidence of motorized breaches. Between 2021-2024, 99 devices were inspected in the analysis area.

Of these devices, four surveys were found to be ineffective, with evidence of unauthorized motorized use either breaching the closure device or bypassing it. No ineffective devices were found in the Moccasin Crystal, Dicky Java, and Long Dirtyface subunits. The ineffective berm on Forest Service Road 569X has been reported as ineffective for three years. This route would be used for implementation, and an effective closure would be installed post implementation.

The ineffective berm at 1151 is within 500 meters of U.S. Highway 2 (annual average daily traffic was 2,087 vehicles in 2025 at Essex), and bears are likely avoiding this area. This berm is on the schedule for maintenance.

Disturbance

The affected subunits consist primarily of NFS lands, with private and limited state parcels along the northern boundary of subunits near U.S. Highway 2. The Great Bear Wilderness and several inventoried roadless areas are located throughout the analysis area and provide abundant areas free from disturbance. The Skyland Challenge subunit experiences the highest levels of year-round public motorized use. Federally authorized activities that may disturb grizzly bears include vegetation management; road and trail construction and maintenance; motorized and non-motorized summer and winter recreation; special use permits including outfitting and guiding into the wilderness and on the Middle Fork of the Flathead River; utility maintenance, and firewood and other miscellaneous forest product gathering. The Food/Wildlife Attractant Storage Order in the Northern Continental Divide Ecosystem contributes to improved conditions for grizzly bears by requiring all users of NFS lands to store food, garbage, and other bear attractants in a bear-resistant manner. Human activities on private and state land also disturb grizzly bears. Attractants on private land increase the risk of human-bear conflict and grizzly bear mortality.

Effects of the No-Action Alternative

Forest vegetation in the Granite Moccasin action area would continue trending away from desired conditions. Forest fuel loads would continue increasing in the overstory and understory due to high stand densities as well as insect and disease impacts. This would continue increasing the risk of high severity wildfire in the action area.

Closed canopied forest has been found to have low potential forage for grizzly bears (Nielsen et al. 2010). Forests in the Middle Fork have high canopy closure and have missed normal fire disturbance over the past century due to fire suppression resulting in denser and more widespread closed canopy forest than would have occurred under natural fire cycles. Much of the habitat providing potential forage is at high elevations or on private and state land. The use of foraging habitat on private land could lead to human-bear conflicts and increase the risk of mortality. Natural processes including insects, disease, and wildfire would continue to be the primary drivers of habitat conditions in the action area. Continued fuel loading could lead to severe impacts to the analysis area in the event of wildfire, reducing cover for grizzly bears. Wildfire would produce higher severity and intensity burning with existing conditions increasing the time for forage like grasses and berry producing shrubs to grow. Forage habitat could be improved over the long term as vegetation recovers but without cover nearby, this may not benefit grizzly bears in the area as bears have been found to select foraging sites closer to forest edges (Stewart et al. 2013). This is especially true for females with cubs since they prefer to forage near cover for security reasons (Sells et al. 2022).

Effects of the Action Alternative

Seasonal Habitat

Parts of multiple units overlap areas of modeled denning habitat. Some of the proposed treatments include prescribed burning and whitebark pine restoration would not be implemented during the denning season. Some commercial units also occur in potential denning habitat.

It is unlikely that these units would be harvested during the denning period due to practical implementation constraints, however, a timing restriction would ensure that there would be no impacts to denning grizzly bears during the denning period (December 1 to March 31). All or portions of numerous units occur within potential spring habitat. Each unit was evaluated to determine if a spring timing restriction was appropriate (FW-GDL-TE&V-01). The timing restriction in specified units during the spring period (April 1 to June 30) would reduce the risk of project-related disturbance to grizzly bears during spring green up when natural foods may be limited to low elevations after winter months.

Forage, Cover, Connectivity

All proposed vegetation management would have a beneficial effect on forage conditions for grizzly bears by creating openings and open forest conditions. Regeneration harvest would remove cover in the long term. This treatment type is assumed to impact cover across the entire treatment unit. However, all proposed regeneration harvest would retain some of the existing overstory and/or patches of forest within units. Therefore, estimated effects are greater than what would occur on the ground through implementation of the project. These treatments include seed tree, shelterwood, prescribed burn, clearcut and group selection. Table 40 in Appendix F displays effects to forage and cover from the proposed action. Cover would be reduced by no more than 2 percent of available cover in any subunit. The amount of forage from areas with 25 percent canopy cover or less would increase by approximately 1 or 2 percent. Forage would also be improved in the short to mid-term in intermediate treatments. It could take up to 20 years for areas treated through regeneration harvest to again provide cover for grizzly bears. These regenerated stands could provide forage as early as the following year, with continued improvement over time. Intermediate and noncommercial treatments would affect cover by reducing canopy cover and tree density in the short-term but would retain cover qualities. In the long term, these treatments would benefit the retained trees by reducing competition for resources and would promote understory growth, improving cover quality more quickly than if no treatment occurred.

Cover would remain available in unaffected areas across the affected subunits and forest patterns would continue to contribute to connectivity of habitat for grizzly bear movement within and between home ranges, and dispersal between populations (FW-DC-WL-02). Grizzly bears would likely avoid large openings created by regeneration harvest while moving across the landscape. Regeneration treatments in twenty-one units (alone or in combination) would result in new even-aged openings over 40 acres (units 8, 21, 23, 25, 32, 33, 47, 49, 50, 63, 64, 65, 67, 69, 71, 71a, 80, 110, 403, 410, and 411). However, grizzly bears have been documented to use openings near forest edges (Stewart et al. 2013, Sells et al. 2022).

Once harvest activities are completed, post-harvest fuels treatments would occur. Understory trees, damaged trees, and brush may be slashed. Downed wood (in excess of retention requirements) may be excavator-piled, chipped, masticated, broadcast burned, or underburned. Piles within units and at landings would be burned following treatment. Where prescribed burning is used post-harvest, fireline and fuelbreak would be constructed by hand or using machines. Vegetation management in the proposed action would decrease the amount of available forage due to ground disturbance in treatment units. The decrease would be temporary, and foraging conditions could be returned to treatment units within five years of disturbance. Treatments would create more forest edge within the action area, which may be especially important to female grizzly bears when balancing foraging and security needs (Sells et al. 2022). Treatments would also promote the growth of understory

vegetation by opening the canopy and allowing more sunlight to reach the forest floor. This would improve foraging conditions for grizzly bears over the long term in the action area.

Sells et al. (2022) also found male grizzly bears were often attracted to riparian areas. They found that nearly a quarter of females mostly avoided riparian areas. This aligns with existing evidence that females with cubs will segregate from males and use different areas of the landscape. The analysis area includes over 19,063 acres of mapped RMZs that provide potential riparian foraging habitat for grizzly bears. Vegetation management would temporarily decrease available foraging habitat during implementation. Treatment is proposed for approximately 476 acres of outer RMZs and 145 acres of inner RMZ. This amounts to approximately five percent of the RMZ acreage in the analysis area. Forage conditions could return more quickly to these highly productive areas and production levels would increase following vegetation treatments. Despite temporary decreases in available forage due to disturbance, overall activities proposed with this project would benefit grizzly bear forage in the long term. Proposed regeneration treatment management would narrow some forested connections; connectivity of forested cover would not be severed through implementation of project activities (FW-GDL-RMZ-09).

Secure Core and Motorized Access

Disturbance from motorized access could alter grizzly bear travel and forage patterns in the action area. A review of scientific information has shown that motorized use of roads limited to contractor traffic such as logging may not be as detrimental to bears as roads open to the public (Proctor et al. 2019). Project activities would use open, gated, and barriered roads, as well as temporary and newly constructed system roads; the temporary and new roads would be made impassable after project use.

Motorized access for vegetation management in secure core would affect approximately 426 acres (2 percent of total secure core acres) in Dickey Java; 7 acres (less than 1 percent of total secure core acres) in Moccasin Crystal; 1,037 acres (5 percent of total secure core acres) Skyland Challenge; 149 acres (1 percent of total secure core acres) in Stanton Paola subunit; and 10 acres (less than 1 percent of total secure core acres) in Tranquil Geifer subunit with no affects to secure core in the Long Dirtyface subunit. Proposed routes in secure core include 0.22 miles of new routes to be made impassible and 0.10 miles of temporary routes in the Skyland Challenge subunit, and 0.44 miles of new routes to be made impassible and 0.10 miles of temporary routes in the Stanton Paola subunit. These activities would result in temporary reductions in secure core in Dickey Java, Skyland Challenge, Stanton Paola, and Tranquil Geifer subunits (Table 24) but would be compliant with FW-STD-IFS-03.

A total of 7.6 miles of new road would be added to the national forest road system and treated to be impassable (as defined by the forest plan) to wheeled motorized vehicles after completion of project activities (FW-STD-IFS-02). Temporary routes (.75 miles total) are also proposed and would be rehabilitated following timber harvest activities. Approximately 80 miles of NFS roads used as haul routes would be maintained in accordance with best management practices both before and after use for project activities (FW-STD-WTR-02 and FW-DC-IFS-07). All proposed roads and the use of restricted roads associated with this project were considered open at the same time for five years. This is necessary because the analysis cannot predict which road or unit the contractors would use at any given time. On-the-ground implementation of project activities affecting access management conditions would not exceed five years in the affected subunits to reduce the potential for disturbance or displacement of grizzly bears (FW-GDL-IFS-01).

Design features require annual implementation monitoring to track actual use and timing of access management changes and will inform future analysis in the affected subunits. Access conditions before, during, and after project activities are displayed in Table 24. There are no temporary access management changes proposed in the Long Dirtyface or Moccasin Crystal subunits. Dickey Java would have temporary reduction in secure core, but no effects to OMRD or TMRD. Skyland Challenge would have a nine percent temporary increase in OMRD, one percent increase in TMRD and three percent reduction in secure core. Stanton Paola would have a temporary two percent decrease in secure core with no temporary effects to OMRD or TMRD. Tranquil Geifer would have a temporary two percent decrease in secure core with no temporary effects to OMRD or TMRD.

All roads used for project activities that are currently closed to motorized public access, would remain closed to motorized public access during and after implementation of the project. Access conditions would be restored to pre-project levels within one year after completion of the project to reduce the duration of grizzly bear displacement or disturbance (FW-GDL-IFS-02). All these are ensured by incorporation of design features. Access conditions would continue to contribute to sustaining the recovery of the grizzly bear population in the Northern Continental Divide Ecosystem (FW-DC-IFS-01).

Table 24. Proposed action temporary changes to motorized access parameters in the affected subunits through the five years of planned implementation (2027-2031)

Subunit	Metric (percent)	Baseline	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Post-project
Dicky Java	OMRD	8	8	8	8	8	8	8
Dicky Java	TMRD	0	0	0	0	0	0	0
Dicky Java	CORE	86	85	85	85	85	85	86
Long Dirtyface	OMRD	0	0	0	0	0	0	0
Long Dirtyface	TMRD	0	0	0	0	0	0	0
Long Dirtyface	CORE	100	100	100	100	100	100	100
Moccasin Crystal	OMRD	8	8	8	8	8	8	8
Moccasin Crystal	TMRD	1	1	1	1	1	1	1
Moccasin Crystal	CORE	81	81	81	81	81	81	81
Skyland Challenge	OMRD	20	29	29	29	29	29	20
Skyland Challenge	TMRD	17	18	18	18	18	18	17
Skyland Challenge	CORE	65	62	62	62	62	62	65
Stanton Paola	OMRD	7	7	7	7	7	7	7
Stanton Paola	TMRD	3	3	3	3	3	3	3
Stanton Paola	CORE	84	83	83	83	83	83	84
Tranquil Geifer	OMRD	0	2	2	2	2	2	0
Tranquil Geifer	TMRD	2	2	2	2	2	2	2
Tranquil Geifer	CORE	89	87	87	87	87	87	89

The 10-year running average for temporary changes to access management conditions in the affected subunits would not exceed a 5 percent increase in open motorized route density, 3 percent increase in total motorized route density, and 2 percent decrease in secure core (FW-STD-IFS-03) (Table 25).

Since there are no proposed temporary access management changes in the Long Dirtyface and Moccasin Crystal subunits there are no values in the 10-year average calculations.

Table 25. Proposed action calculated 10 year running averages for temporary project increases to OMRD and TMRD and temporary decreases to Secure Core

Subunit	Metric	Year 7-16	Year 8-17	Year 9-18	Year 10-19	Year 11-20	Year 12-21	Year 13-22	Year 14-22
Dicky Java	OMRD	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
Dicky Java	TMRD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dicky Java	CORE	0.50	0.50	0.50	0.40	0.30	0.20	0.10	0.00
Long Dirtyface	OMRD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Long Dirtyface	TMRD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Long Dirtyface	CORE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Moccasin Crystal	OMRD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Moccasin Crystal	TMRD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Moccasin Crystal	CORE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Skyland Challenge	OMRD	4.50	4.50	4.50	3.60	2.70	1.80	0.90	0.00
Skyland Challenge	TMRD	0.50	0.50	0.50	0.40	0.30	0.20	0.10	0.00
Skyland Challenge	CORE	1.50	1.50	1.50	1.20	0.90	0.60	0.30	0.00
Stanton Paola	OMRD	1.50	1.50	1.50	1.50	1.50	1.20	0.90	0.60
Stanton Paola	TMRD	1.50	1.50	1.50	1.50	1.50	1.20	0.90	0.60
Stanton Paola	CORE	0.50	0.50	0.50	0.40	0.30	0.20	0.10	0.00
Tranquil Geifer	OMRD	1.00	1.00	1.00	0.80	0.60	0.40	0.20	0.00
Tranquil Geifer	TMRD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tranquil Geifer	CORE	1.00	1.00	1.00	0.80	0.60	0.40	0.20	0.00

Year number indicates years since plan implementation in 2019. Averages include years 7 through 22 (2025-2041).

Closure device monitoring would continue, and new issues would be addressed as soon as possible. These negative effects to OMRD, TMRD and secure core would be temporary and would be compliant with forest plan direction as well as other law, regulation, and policy. Design features further reduce these effects. Negative impacts to secure core and access management would be insignificant at the scale of a grizzly bear home range.

Disturbance

Increased human activity, mechanical activity, and motorized access could all lead to temporary disturbance of grizzly bears in the vicinity of activities. Specific amounts of disturbance to grizzly bears are difficult to predict from vegetation management activities, as motorized use and human activity may occur intermittently, localized in one unit or another, then relaxed as activity and disturbance shift to implement proposed activities elsewhere. Altogether 443 acres or less than one percent of commercial and noncommercial treatment is proposed in grizzly bear secure core. Any movements away from activities causing disturbance would be temporary and short distance.

Helicopter or unmanned aircraft system ignitions would be used to ignite upland prescribed burning units 700 and whitebark pine restoration units that require burning for site preparation. An interagency team of biologists reviewed literature on aviation effects to grizzly bears and produced a guide to effects in grizzly bear habitat (Anderson et al. 2009). While aerial ignition would include low altitude flights (less than 500 meters) over secure core, the displacement effects of this activity would not be prolonged as the ignition flights would occur during a short window (less than 48 hours per burn unit) and would not involve multiple trips/passes. Further aviation activity for monitoring would occur at higher altitudes where sound from the aircraft would likely not affect the bear. Aerial ignition would occur outside of denning seasons. Burning would likely occur during the fall period when bear foods are generally widespread and not concentrated on a particular aspect or elevation. Secure core would continue to provide security for grizzly bears if the prescribed fire was implemented. Prescribed fire is not expected increase human access within secure core after implementation (FW-GDL-FIRE-03). While some bears may be disturbed by helicopter activity and burning, it is unlikely that the potential disturbance would be long term or would interfere with patterns of breeding, feeding or sheltering.

Proposed road management and use associated with the project could also temporarily disturb grizzly bears during project implementation. Road use would increase in the portion of the action area where timber harvest operations are occurring. The risk of disturbance along roads would be greatest during hauling based on motorized use to and from active units. Human and mechanical activity associated with noncommercial activities would cause less disturbance but could cause short-term movement by bears if in the vicinity. Disturbance created by project activities would be insignificant at the scale of the subunit.

Across the Northern Continental Divide Ecosystem, human-caused mortality is the driving force behind grizzly bear survival rates (Costello and Roberts 2022). Causes of grizzly bear mortality have generally been due to factors beyond Forest Service control (for example, train collision, hunter mistaken identity, defense of life, or poaching), although most of these are related to conflicts at sites associated with frequent or permanent human presence. Multiple design features would be incorporated into the Granite Moccasin Project to reduce conflict**.**

Summer and winter recreation would continue in the project area. Motorized over-the-snow recreation exists in the project area. The project area does not propose any change in mapped motorized over-snow use or grooming. Overgrown roads cleared for project activities may indirectly allow for easier winter snowmobile access in the project area. Openings created through vegetation management activities may be used more easily by snowmobiles than existing forest stands. These conditions may result in easier motorized over the snow access in potential grizzly denning habitat contributing to motorized disturbance to denning bears.

Canada Lynx and Critical Habitat (Threatened Species)

Summary

The Granite Moccasin Project lies within nine lynx analysis units (LAUs)—Bear Creek, Challenge Granite, Dirtyface Spruce, Essex Java, Moccasin Nyack, Paola Ridge, Slippery Bill, Stanton Grant, and Vinegar Moose—which were used to analyze effects for Canada lynx and their critical habitat (USFS 2007, 2018a, b).There would be 154 acres of VEGS5 exemption acres applied across the Stanton Grant, Paola Ridge and Bear Creek LAUs. There would be 322 exemption acres and 124 exception acres for VEGS6 applied across the Staton Grant, Bear

Creek, Essex Java, Slippery Bill and Paola Ridge LAUs. Units with eligible exemption and exception acres were identified using an overlay with the HFRA (16)(B)-defined WUI layer displayed in project file Q-003.

Designated critical habitat within the affected LAUs ranges from 75 to 91 percent. The proposed action would increase potential lynx foraging habitat (PCE1a) and decrease potential denning habitat (PCE1c), while retaining a mosaic of forest habitats that allows lynx to travel and forage throughout the affected LAUs.

Issues

How does the proposed action affect Canada lynx foraging habitat (use of exemption and exception acres), denning habitat, connectivity and disturbance?

How does the proposed action affect Canada lynx critical habitat and its primary constituent elements (hereafter, PCE): foraging habitat (PCE1a), winter conditions (PCE1b), denning habitat (PCE1c), and matrix habitat (PCE1d)?

Assumptions and Methodology

Data used for analysis included Region 1 Vegetation Mapping Program (VMap) data, National Agricultural Imagery Program (NAIP) imagery, Forest Canada lynx habitat model, Kosterman/Holbrook modeled lynx habitats, and review of relevant and applicable science (project file Q-003). The structural stages of Canada lynx habitat were mapped for the Forest based on dominant tree species, tree size, and canopy cover and is described using terminology from the Northern Rockies Lynx Management Direction (NRLMD). This modeling provided a broad estimation of the structural stages of lynx habitat within the affected LAUs, which was verified through field review. This model was used along with the 2014 Canada lynx critical habitat layer to estimate effects to the primary constituent element and its four components. Discrepancies may exist in reported acres due to geographic information system (GIS) processes or rounding. A full description of assumptions for this analysis of Canada lynx and Canada lynx critical habitat is located in project file Q-003.

Analysis of project effects on Canada lynx was primarily based on an evaluation of consistency with Forest Plan direction (USFS 2018b). This includes FW-STD-WL-04, which applies the Northern Rockies Lynx Management Direction (NRLMD) Record of Decision (USFS 2007) as modified by the Forest Plan Record of Decision (ROD). For this timber harvest and fuel reduction project, effects to lynx habitat were analyzed based on the type of proposed vegetation treatment and the existing structural stage of lynx habitat. Acres of treatment proposed in lynx habitat were assessed using the broadscale mapping in the Forest lynx habitat model. This information was updated based on site-specific information on existing habitat characteristics from on-site visits of proposed treatment areas.

To evaluate compliance with forest plan standards and guidelines for Canada lynx and its critical habitat (USFS 2018b); the following indicators were used:

- Acres of potential Canada lynx habitat by structural stage and acres of Canada lynx critical habitat by primary constituent element affected by vegetation management
- Effects to lynx connectivity
- Level of disturbance

Scope of the Analysis

The Granite Moccasin Project is in the Bear Creek, Challenge Granite, Dirtyface Spruce, Essex Java, Moccasin Nyack, Paola Ridge, Slippery Bill, Stanton Grant, and Vinegar Moose LAUs. LAUs are large enough to include the home ranges of one female lynx and numerous snowshoe hares, and to represent the effects of vegetation management across the landscape. As described in the Lynx Conservation Assessment and Strategy, LAUs may also contain areas of non-habitat such as dry forest, open meadows, and sparsely vegetated areas, especially in mountainous regions (Interagency Lynx Biology Team 2013).

The project would lead to both short-term and long-term effects to Canada lynx and its critical habitat. Short-term effects include disturbance from proposed timber harvest, fuel reduction, road management, and associated activities. The period for completion of these activities is approximately 10 years; however, post-treatment burning could take longer to implement. These bounding captures the disturbance generated during implementation from equipment operation, increased vehicle traffic, road management, helicopter use, and any other disturbance that may result from increased human presence in the affected areas. The analysis of long-term effects considers the time it would take for treated stands to recover and provide potential foraging or denning habitat for Canada lynx. The project does not include activities that would permanently impact Canada lynx or their habitat.

Potentially Affected Environment

Habitat needs of lynx are detailed in the forest plan FEIS (volume 2, pp. 196-213) (USFS 2018a), its biological assessment (USFS 2017) and revised biological opinion (FWS 2022a), and are mostly ensured through consistency with coarse filter plan components for terrestrial ecosystem and vegetation and RMZs. Through standard FW-STD-WL-04, the Northern Rockies Lynx Management Direction, as modified, was incorporated into the forest plan. The most recent observations of Canada lynx within the analysis area is from a game camera in 2024. Confirmed genetics was collected in 2016 in the Pinnacle area. The Flathead National Forest regular monitors for lynx through bait stations and track surveys.

Canada lynx critical habitat and the primary constituent element components are detailed in the forest plan FEIS (volume 2, pp. 238-245). As of the 2014 revision by the U.S. Fish and Wildlife Service (FWS 2014), there are approximately 2,273,340 acres of designated critical habitat for lynx on the Flathead National Forest, which is entirely within the 9,783 square mile critical habitat unit 3. FW-DC-WL-05 states that boreal forest landscapes support a mosaic of differing forest successional stages, providing the physical or biological features essential to the conservation and recovery of the lynx population and applies specifically to lynx critical habitat mapped by the U.S. Fish and Wildlife Service.

The affected LAUs consist mainly of NFS land (97 percent) with other small private and state forest ownerships primarily along the northern board along the Highway 2 corridor (Table 41). Inventoried Roadless Areas occur across approximately 25 percent of the analysis area but much of this allows motorized trail and over-snow use. Wilderness comprises about 60 percent of the analysis area.

Forage/Denning/Primary Constituent Elements

All affected LAUs are dominated by cool-moist and cold PVTs capable of growing forest dominated by spruce and subalpine fir and likely to support alternate prey, such as red squirrels.

There are areas of warm-dry PVT in small pockets throughout the LAUs. Fire and past harvest have historically affected the vegetation throughout the analysis area. Denning habitat is abundant within mapped lynx habitat, primarily in the "other" (stem exclusion) and multistory structural stages across the affected LAUs. LAUs range from approximately 75 percent to 91 percent mapped Canada lynx habitat. No LAU has greater than 30 percent of its area in early stand initiation habitat (VEGS1) nor has any LAU has more than 15 percent regenerated in the last 10 years (VEGS2). Table 41 in Appendix F – Supporting Wildlife Data shows current condition of potential habitat for lynx in the affected LAUs.

Not all areas of the affected LAUs are designated as critical habitat for lynx. These areas of non-habitat provide matrix habitat (PCE1d) for travel within home ranges. The affected LAUs range from approximately 75 to 91 percent designated Canada lynx critical habitat. Denning (PCE1c) habitat is well distributed throughout affected LAUs due to the high amount of other and multistory habitats. Most areas of denning habitat have foraging habitat (PCE1a) nearby and are moist habitat types that are likely to support alternate prey, such as red squirrels. Critical habitat in the affected LAUs currently provides a mosaic of differing successional forest stages for lynx foraging, denning, and movement but is dominated by multistory and other habitat types. Table 42 in Appendix F displays the existing condition of potential habitat for lynx across critical habitat in the affected LAUs.

Vegetation management has occurred in all affected LAUs in the past and is expected to continue. At the lower elevations, timber harvest, salvage treatments, pre-commercial thinning, and fuel reduction across NFS lands have removed or altered lynx habitat, typically leaving fewer smaller trees, low limbs, snags, or large downed wood. Such areas can still function as lynx habitat but at reduced quality for a period. At mid to high elevations, past fire suppression has resulted in lack of normal disturbance patterns increasing amounts of dense mature forest habitat and lower recruitment of young stand initiation forage habitat.

Other vegetation management activities include tree planting, precommercial thinning, weed spraying, prescribed burning, and hazard tree and blowdown removal at trailheads and along open roads. Personal use firewood cutting, Christmas tree harvesting, and bough and cone collection have also affected vegetation in the affected LAUs and are expected to continue.

Lynx den sites are predominately found in mature boreal forest stands that have a large amount of cover and abundant coarse woody debris, such as downed trees and root wads (Squires et al. 2008). Den sites have also been associated with moister forest stands containing denser understory cover (Squires et al. 2006). Potential lynx denning habitat was assumed to be all areas modeled as potential multistory and other habitats.

Over-snow vehicle use could result in snow compaction which could benefit competitors to lynx. Approximately 25 percent of the NFS lands in the affected LAUs are open to over-snow motorized use and have approximately 37 miles of groomed over-snow vehicles trails or cross-country trails.

Disturbance

Motorized use would continue to occur on roads within the project area. Lynx does not avoid roads, except at high traffic volumes (USFS 2007, Ruggiero et al. 1999). Effects associated with the high speed and high traffic volumes of highways differ from those associated with forest roads. In Montana, forest roads with low vehicular or snowmobile traffic had little effect on lynx resource selection patterns (Interagency Lynx Biology Team 2013).

Squires et al. (2010, 2019) concluded that lynx did not avoid the subset of roads that were open to wheeled vehicles during the denning season or at other times. These and other activities, such as routine road maintenance, watershed improvements, and measures to control weeds, are foreseeable and are scheduled to occur.

Roads across the affected LAUs facilitate access for firewood cutting, hunting, trapping, and other activities. Firewood cutting along open roads has decreased downed logs, which in areas of existing lynx foraging habitat are particularly important for lynx and their prey as downed logs contribute to denning habitats and hiding cover for hares. Brushing of saplings along NFS roads in lynx habitat has reduced their value to snowshoe hares. Open and closed roads facilitate human access, contributing to the risk of mortality or displacement of lynx. Roads can also cause collision-related injuries or mortalities.

All human activities have the potential to disturb or displace Canada lynx. These include numerous recreational activities such as sightseeing, hiking, camping, rafting, mountain biking, huckleberry picking, fishing, hunting, snowmobiling, cross-country skiing, motorcycle and ATV riding, dispersed recreation, Special Use Permit activities, and other miscellaneous forest product gathering. Timber harvest, wildland fire suppression, fuels reduction, prescribed burns, road construction, maintenance and BMP, trail construction and maintenance, and noxious weed control could similarly disturb or displace lynx.

Connectivity

Current forest patterns contribute to connectivity of habitat for lynx movement within and between home ranges, and dispersal between populations (FW-DC-TE&V- 19). Current cover conditions in RMZs also contribute to habitat connectivity for lynx (FW-DC-RMZ-06). The analysis area contains two types of linkage areas that were identified by Squires et al (2013). This includes areas intended to connect large, disjunct blocks of mapped lynx habitat, and areas that are intended to provide connectivity within mostly contiguous habitat and are at risk or in need of increased permeability. Both are present in this analysis area.

Effects of the No-Action Alternative

The no-action alternative would maintain higher tree densities, providing cover and potential denning habitat for Canada lynx and its critical habitat. Continued forest succession would result in denser stands comprised of more shade-tolerant tree species. The availability of mature multistory forage would remain stable, as would habitat used by numerous species preyed on by Canada lynx. In the absence of wildland fire or other stand-replacing disturbance, stand initiation feeding habitat would gradually grow to stem exclusion reducing sapling snowshoe hare foraging habitat in the project LAUs. The fuel loading in many stands would increase the chance of large stand-replacing wildland fires in the area, which could have mixed results for lynx habitat. Stand-replacement disturbances would have negative effects on multistory forage which provides a type of long lasting and stable snowshoe hare foraging habitat for lynx. This type of forest structure is estimated to take approximately 40 years to recruit (Holbrook et al. 2018). Wildfire could reduce multistory forage throughout project LAUs. Denning habitat would decrease from wildfire, but snags and downfall would be recruited over time. Wildfire could increase potential foraging habitat in the stand initiation structural stage after approximately 20 years long-term as stands regenerate to provide lynx winter forage (Holbrook et al. 2018). Stand initiation structural stage is currently lower than current science recommends across the affected LAUs.

There would be no immediate effects to Canada lynx nor designated Canada lynx critical habitat because of implementing this alternative; there would be no change in the amount of potential denning habitat due to timber harvest.

Effects of the Action Alternative

Forage/Denning/Primary Constituent Elements

Data in Appendix F supports the analysis in this section; they show treatment acres within each lynx habitat structure by LAU; expected changes to lynx habitat and critical habitat and estimated post-project condition of lynx habitat and critical habitat by LAU (Table 43 through Table 45).

In lynx habitat, vegetation management included in the proposed action alternative would primarily affect stem exclusion/other lynx (non-forage) habitat and non-habitat across the affected LAUs. A total of 446 acres of multistory forage habitat would be affected by the proposed action (Bear Creek—24 acres, Challenge Granite—3 acres, Essex Java—48 acres, Paola Ridge—240 acres, Slippery Bill—121 acres, Stanton Grant—10 acres). Of the 446 acres of multistory forage affected, the project would treat 322 acres using exemptions to VEG S6 for fuels reduction in the HFRA (16)(B)-defined WUI, 121 acres of exception #4 to VEG S6 (Slippery Bill LAU) and 3 acres of exception #1 to VEG S6 (Slippery Bill LAU). A total of 154 acres of stand initiation habitat would be affected (Bear Creek—15 acres, Paola Ridge—28 acres, Stanton Grant—111 acres). Exemptions to VEG S5 would be used for treatment for these acres within the HFRA (16)(B)-defined WUI.

In lynx critical habitat, primarily PCE1c denning habitat would be affected from treatment of multistory foraging and stem exclusion/other habitat. PCE1a forage would also be affected. PCE1a habitat would increase by 1,926 acres across the affected LAUs. Early stand initiation PCE1a habitat would have the greatest increase (1,762 acres) through regeneration treatment primarily in other lynx habitat and thinning in stand initiation habitat.

Regeneration harvest and intermediate harvest treatments could take almost 40 and 20 years respectively to reach 50 percent predicted lynx use (Holbrook et al. 2018). Forest plan standard VEG S2 directs that no more than 15 percent of lynx habitat on NFS lands within an LAU be regenerated in a ten-year period. Including the proposed action, affected LAUs range from 0 to 5 percent regenerated in the last ten years (Table 45 in Appendix F). Standard VEGS1 directs that no LAU shall have more than 30 percent in early stand initiation habitat. Including the proposed action, the affected LAUs would range from 4 to 20 percent (Table 45 in Appendix F). The increase in early stand initiation habitat in the affected LAU would be beneficial to lynx over the long-term, as the stands would develop into stand initiation lynx foraging habitat over the next 20 years. Intermediate treatments in other lynx habitat and stem exclusion non-feeding habitat would reduce canopy cover density and allow retained understory to develop. This could lead to an increase in multistory lynx habitat and lynx forage (PCE1a) and denning habitat (PCE1c) more quickly than would have naturally occurred and be a benefit to these structures over the next 40 years. Proposed treatment in multistory and stand initiation structural stages would adversely affect forage habitat (PCE 1a) to lynx and its critical habitat in the short-term but is consistent with forest plan direction. Winter foraging habitat would remain well distributed across the project LAUs with the post-project composition ranging from 4 to 20 percent stand initiation and 40 to 67 percent multistory structural stages (Table 45 in Appendix F).

Regeneration treatments would be a mid-term benefit by increasing the amount of stand initiation habitat within the affected LAUs which are currently below recommendations (Kosterman et al. 2018).

The proposed action would reduce approximately 3,947 acres of lynx denning and critical lynx denning (PCE1c) habitat. The removal of fuels would reduce the probability of fire spreading to remaining denning habitat of higher quality. Squires et al. (2008) concluded that few lynx populations are limited by a lack of den sites given their large home ranges and low den site fidelity. Due to the abundant cover and large amounts of down woody debris, some old-growth forest types contain characteristics indicative of denning habitat. Design features in treatment areas would retain downed woody debris where available with higher retention in units outside of the WUI. Design features for snag requirements would be retained in each treatment area for future recruitment of lynx denning structures. Given forest plan direction, and information that denning habitat is widespread, the reduction of denning habitat is likely to have little impact on lynx and its critical habitat in the affected LAUs.

No additional grooming for public snowmobiling is proposed. Winter timber harvest in the Granite Moccasin Project is unlikely due to feasibility and timing restrictions to protect denning grizzly bears and wolverine. If winter harvest does occur, road plowing for access would limit snowmobile accessibility to the project LAUs. Motorized over-snow disturbance may disturb lynx; however, they would adapt travel patterns to use these areas when snowmobilers are not present. Openings created by vegetation management would regenerate until forest saplings grow tall enough to extend out above the snow which can take approximately 15 to 20 years. At which point snowmobiles would be prevented from using openings.

Disturbance

Road management activities and use of roads would affect lynx and lynx critical habitat in the affected LAUs. Road construction would affect vegetation in the direct vicinity of the road but would not change the overall function of the habitat patch. Approximately 7.6 miles of new system road to be made impassible and 0.8 miles of temporary road are proposed through mapped lynx habitat and critical lynx habitat.

Temporary roads would be rehabilitated at completion of project activities and would cease to function as roads. New roads would be added to the NFS road system and made impassible at the completion of harvest activities. All roads used for project activities that are currently closed to motorized public access would remain closed to motorized public access during and after implementation of the project and ensured through design features. Canada lynx could be disturbed during proposed road management. The potential for displacement from project activities is low given that lynx has been documented to be tolerant of motorized and human activity.

Prescribed burning would occur on approximately 987 acres. Helicopter, UAS, or hand ignition strategies would be used to implement burn units. It is anticipated that individual lynx may be disturbed during active burn periods. Given that lynx have been documented to be tolerant of motorized and human activity, the potential disturbance is expected to be limited in scope and duration (Squires et al. 2010). Any disturbance impacts to lynx because of prescribed burning would be limited to individuals and would have no impact on lynx populations.

Adult mortality for Canada lynx includes starvation in winter and early spring, predation by lions during non-snow periods, and human conflict (such as accidental trapping or malicious shooting) (Squires et al. 2010). Since the Granite Moccasin Project would result in a relatively small reduction to foraging habitat and no net increase in public motorized access, the project is not expected to increase the probability of lynx mortality. Trapping for Canada lynx is currently not permitted. Trapping season for other species is December 1 to February 15 for the project LAUs. Trappers can currently travel under their own power over snowed-in closed roads, over snowed-in trails, and on snow cross-country through forest stands to deploy traps anywhere within the project area. The proposed project does not include any additional groomed trails, and roads currently closed to public access would continue to be restricted during project implementation. Therefore, project-associated roads would facilitate little additional access during the winter months for trappers based on the trapping season, the terrain, and the snowpack in the project area.

Connectivity

Lynx have been documented to avoid open-canopied forest, including young forests covered by snow during the winter months (Squires et al. 2010, Squires et al. 2013, Holbrook et al. 2017, Holbrook et al. 2018). The Granite Moccasin proposed action would result in altered forest stands and a changed juxtaposition of forage habitat throughout the affected LAUs. While lynx forage in stands with dense understory conditions, lynx travel and dispersal has been documented through a variety of cover types (Squires et al. 2010, Squires et al. 2013). Regeneration harvests in several units would result in new even-aged openings larger than 40 acres, but none of these proposed treatments, alone or in combination, would exceed maximum opening sizes identified in table 21 of the forest plan (units 8, 21, 23, 25, 32, 33, 47, 49, 50, 63, 64, 65, 67, 69, 71, 71a, 80, 110, 403, 410, and 411). Lynx will likely avoid these natural openings. Travel patterns may change; however, connectivity would still exist. The project was designed so that areas of connectivity would persist between regeneration treatments. It was assumed that intermediate treatments would retain conditions that would allow for connectivity. Forest patterns would continue to contribute to lynx habitat connectivity within and between home ranges, and dispersal between populations (FW-DC-TE&V-19; NRLMD Guidelines HU G3, HU O2, and HU O4; and Objective All O1). In the long-term, treatments in other lynx habitat could promote quicker growth to multistory habitat and increase the juxtaposition of stand initiation and multistory habitat which has been identified as an important interface for lynx (Holbrook et al. 2017). Proposed treatments would help create a better mosaic of different forest successional stages than the existing condition, providing the physical or biological features essential to the conservation and recovery of the Canada lynx population (FW-DC-WL-05, FW-DC-TE&V-19). Proposed treatment (621 acres) within the inner and outer RMZ could temporarily alter travel patterns during implementation. This treatment makes up less than five percent of the riparian areas within the project area. Cover conditions in RMZs would continue to contribute to habitat connectivity for lynx (FW-DC-RMZ-06).

Currently, all affected LAUs are dominated by high density stem exclusion and multistory forage stands. Stand initiation structural stage is moderate in Moccasin Nyack (18 percent), Stanton Grant (13 percent) and Vinegar Moose (13 percent) but all LAUs are below recommendations for stand initiation forage habitat structural stage. The proposed action would increase the range of forest densities in a diverse pattern across the landscape (FW-DC-TE&V-13). Downed wood exists across the matrix of forested land, contributing to forest structural diversity and habitat (FW-DC-TE&V-17), and design features would ensure retention with higher retention required outside the WUI. The proposed action would maintain forest patterns and would continue to contribute to connectivity

of habitat for lynx movement within and between home ranges, and dispersal between populations (FW-DC-TE&V-19). Although some forested connections would be affected by proposed vegetation management, connectivity of forested cover would not be severed through implementation of project activities. Habitat in the affected LAUs would continue to support a mosaic of forest successional stages, providing the physical and biological features essential to the conservation and recovery of the Canada lynx population (FW-DC-WL-05). Activities proposed in matrix habitat would not create barriers to lynx movement.

North American Wolverine (Threatened Species) – Summary

The proposed project activities occur across all habitat types for male and female wolverine. While there may be some short- to mid-term effects to individuals (lasting up to 10 years), overall project impacts to wolverine are expected to be minimal. Dispersal habitat is not suitable for the establishment of home ranges or reproduction (FWS 2013). Activities occurring within primary and denning habitat would occur outside of the sensitive denning period (January 15- May 15) due to implementation feasibility or ensured through design features (PDF-WL-13). Connectivity would remain throughout the analysis area, and project activities would not preclude dispersal. It is not likely that project activities would result in impacts to breeding, sheltering, or foraging for individuals. Anticipated short- to mid-term effects include: impacts to cover and altered travel patterns; a slight increase in mortality risk from project roads for dispersing individuals; increased disturbance from over-snow vehicle use (which may increase in some areas in the short- and mid-term due to regeneration openings and road maintenance which can increase access opportunities); disturbance in food-caching areas where project activities (vegetation treatments and prescribed fire) occur in modeled deep persistent snowpack; and changes to wolverine travel patterns where regeneration treatments create large openings. Consultation with the U.S. Fish and Wildlife Service for wolverine will be completed on proposed activities for the Granite Moccasin Project.

Because project effects to wolverine are expected to be minimal, wolverine was not identified as a substantive issue for analysis and will not be discussed further in this document. More analysis and information used to demonstrate forest plan consistency and support the biological assessment for USFWS consultation can be found in project file Q018.

Connectivity

Summary

The proposed action may alter travel patterns to several wildlife species due to new openings and treatment within RMZ areas. Broadscale connectivity is not expected to be affected by the proposed action. The project was designed to maintain cover for a variety of species (FW-GDL-WL-DIV-06) and maintain distance to cover in RMZs (FW-GDL-RMZ-09, FW-DC-RMZ-06). U.S. Highway 2, county roads, and the Burlington Northern Santa Fe (BNSF) rail line which are outside of the Forest Service's jurisdiction, occur within and adjacent to the analysis area and can cause resistance to movement. They will continue to affect species' ability to move across the landscape. The analysis area contains two areas along U.S. Highway 2 that were identified as important areas for wildlife crossing. Changes in cover may alter travel patterns and how animals cross U.S. Highway 2, but treatment is not expected to affect animals' ability to cross the highway.

Issues

How will the proposed action affect forested cover and connectivity across the analysis area?

Assumptions and Methodology

This analysis assumed cover would be completely removed in regeneration treatments. Intermediate treatments may have reduced cover for a time, as these treatments reduce the density of trees and remove some understory components, but it was assumed that cover would remain. Discrepancies may exist in reported acres or miles due to geographic information system (GIS) processes or rounding.

To evaluate compliance with forest plan standards and guidelines for connectivity, the following indicators were used:

- Acres of forested cover affected by regeneration management and permeability across the landscape and through riparian corridors; and
- Effects to broad scale connectivity.

Scope of the Analysis

The Granite Moccasin project area was used as a spatial extent for analysis of effects to connectivity. This boundary contains all areas that would be affected by the proposed activities. It is large enough to capture the effects of the project and encompasses the home range for many of the wide-ranging species which makes it a biologically relevant boundary for the effects analysis.

The project would lead to both short-term and long-term effects on connectivity. Cover would be most highly impacted by regeneration treatments. Cover would return to those areas in the long term and stands would recover in approximately 20 years. Short-term disturbance from activities in these areas would be complete in approximately 5 to 10 years. Activities affecting access management would be completed in 5 years, but post-harvest and noncommercial activities may take longer to complete. The project does not include activities that would permanently impact connectivity.

Potentially Affected Environment

Habitat connectivity is discussed in detail in the forest plan FEIS in section 3.7.6 (pp. 262-267) (USFS 2018a).

Forested Cover

Forested cover occurs across 47,062 acres, about seventy percent of the analysis area. It's generally well distributed across the analysis area. Parts of the Skyland Creek area were highly affected by fire in 1998 and 2007 which have not recovered to the point of providing cover. RMZs cover about 19,063 acres, or twenty-eight percent of the analysis area. Riparian areas are well connected and distributed across the analysis area. Some connections have been affected by past timber harvest in the project area. Across the project area, a mosaic of stands and RMZs exists and provides connectivity for wide-ranging wildlife species.

Broadscale Connectivity

The Granite Moccasin project area includes the Coram, Nyack Pinnacle, Essex, and South Glacier connectivity areas (GA-MF-DC-04). Human development, transportation corridors including road and rail, and recreation all affect the permeability of a landscape. The Middle Fork River geology features rocky narrow canyons which can limit locations that wildlife can cross. Additional barriers to connectivity include the Burlington Northern Santa Fe (BNSF) rail line and the U.S. Highway 2 corridor. Wildlife movement across U.S. Highway 2 has been well studied looking at increasing highway traffic volume, and wildlife carcass and game trail locations (Waller and Graves 2018, Waller et al. 2020). Detailed movement information on black (Carroll et al. 2024) and grizzly bears (FWP collar data) has been collected throughout the corridor, but movement of most other species is not well studied. An ongoing study is looking at connectivity for mountain goats near the Walton overlook. The analysis area contains two areas along U.S. Highway 2 that were identified as important areas for wildlife crossing (FW-GLD-IFS-12).

Effects of the No-Action Alternative

The effects of the no-action alternative represent potential natural changes over time. No additional actions, such as timber harvest, fuel reduction, or road construction are proposed with this alternative. Traffic volume along U.S. Highway 2 is expected to increase and rail traffic is expected to remain at its existing rate. Under this alternative, the amount of cover would continue to increase. Without treatment, the probability of intense wildland fire would continue to increase in some areas, possibly resulting in the loss of extensive areas of cover and riparian areas.

Effects of the Action Alternative

Forested Cover

Proposed regeneration treatment in the project area would temporarily reduce forested cover by about 1,683 acres across the project area and could alter species travel and movement depending on their tolerance for open areas. Intermediate treatment would retain stand structure sufficient to maintain forested cover and allow movement for most species. Vegetation management is proposed on about 476 acres in outer RMZs and 145 acres in inner RMZs. Of those acres, 281 would see a reduction in forested cover from regeneration harvest. FW-GDL-RMZ-09 was considered during the development of the proposed action. These treatments are distributed across the landscape and would not sever connectivity. Design features would restrict treatments not to exceed 50 percent of category 4A outer RMZs in specified units to maintain undisturbed areas and cover (FW-DC-RMZ-01 & 03-06, FW-DC-TE&V-09). While the project would create openings, a network of forested cover would remain to provide for wildlife travel. Species have historically evolved with forest disturbances that create openings such as wildfire, avalanches or blowdown. The effects of the projects are designed within the natural range of availability for new openings and would maintain forest connectivity.

Broadscale Connectivity

See Grizzly bear, Canada lynx and Canada lynx Critical habitat sections above for more additional information specific to connectivity for those species. The ability of wide-ranging wildlife species to travel across the project area would be affected by proposed vegetation management but would maintain the potential to provide connectivity or linkage between larger areas of habitat.

No major ridgeline or riparian connections would be severed. A mosaic of stands would still exist as travel corridors and would maintain connectivity for wildlife. Limited vegetation removal would occur in RMZs and cover conditions in RMZs would still contribute to habitat connectivity for wildlife (FW-DC-RMZ-06). Compliance with all connectivity related plan components ensures connectivity would remain at multiple spatial and temporal scales.

Highways and county roads, which are outside of the Forest Service's jurisdiction, occur within and adjacent to the analysis area. They will continue to affect species' ability to move across the landscape. As these entities propose maintenance of these roadways, the Forest Service will support improvements to create better access and connectivity for wildlife (FW-GLD-IFS-12). The Burlington Northern Santa Fe (BNSF) rail line is also located within the Middle Fork corridor. The rail line can cause resistance to movement and has been a documented source of mortality for grizzly bears and other species. For many years, the Forest Service has coordinated with transportation agencies and railroad companies to reduce the risk of collisions with grizzly bears and other wildlife species.

Changes in cover, especially in areas where wildlife are known to cross U.S. Highway 2 may alter travel patterns. Recent science related to grizzly bear and elk movement was considered for this analysis. Grizzly bears are a highly mobile species and have been found to use riparian areas when traveling as well as moving along forest edge (Sells et al. 2022). Sells et al. (2022) reported that median step length (straight line distance between two successive GPS locations taken about every 3 hours) for GPS-collared female grizzly bears was 1,167 meters. A step length is the minimum movement distance in a time period because it is unlikely an animal is moving directly between two points. Given that females routinely move over a minimum of 1,000 meters in 3 hours (Sells et al. 2022), bears are capable of moving across large openings in short periods of time. The openings proposed by the project are within the natural range of variation that have occurred ecologically through past forest disturbances such as wildfire. Grizzly bears have evolved adapting to changing forest patterns associated with such disturbances, and the openings proposed would not inhibit grizzly bear movement or connectivity.

Connectivity for elk in the Middle Fork is likely most influenced by the highway and railroad than by the availability of forest cover. A study in Alberta using integrated step-selection analysis found elk selected habitat with higher forest cover when near roads; however, when crossing roads, elk selected locations in more open habitat (Prokopenko et al. 2017). The study considers the possibility that elk may select these openings to improve visibility or allow quick movement when crossing a road. Highway crossings tend to increase when these features occur within preferred habitat. In British Columbia, collared elk near a highway spent an average of 3.6 hours moving, with a mean step length of 261 meters per hour. During those movements, elk selected more strongly for higher forage biomass (which is correlated to forest openings) when they crossed the road at higher traffic volumes and avoided higher traffic volumes less strongly when there was more forage available at the target location. This supports the assumption that availability for forage is a large driver of elk movement even when considering the risks of crossing a major highway. Elk selected more strongly for higher forage biomass—typically associated with forest openings—when crossing roads at higher traffic volumes and avoided high traffic less strongly when greater forage was available at the target location. At the population level, when elk crossed more than once, they selected rewards and avoided risks but did not balance the two (Poulin et al. 2023).

The openings proposed under this project fall within the natural range of variation created historically by disturbances such as wildfire. Elk have evolved in landscapes shaped by such disturbance patterns, and the proposed openings are not expected to impede elk movement or reduce connectivity.

A design feature to incorporate leave patches within specified regeneration units adjacent U.S. Highway 2 will help provide cover for animals while crossing the highway. These studies and incorporated design features support the conclusion that the proposed openings near areas where wildlife are known to cross U.S. Highway 2 would not further exacerbate species ability to cross but may alter current travel patterns.

Forest Ungulates – Summary

The proposed project activities would have short- to mid-term adverse effects to individuals (lasting up to 10 years), overall project impacts to forest ungulates are expected to be minimal. Montana Fish Wildlife and Parks were consulted for this project and winter range habitat is limited to a few south facing slopes and the Patrol Ridge area. Little vegetation management is proposed in those areas. Cover and forage on summer range would be affected but it is not likely that project activities would result in impacts to breeding, sheltering, or foraging for individuals or effects at the population level. Anticipated short- to mid-term adverse effects include removal of cover and changes to travel patterns where regeneration treatments create openings, temporary disturbance from areas due to mechanical equipment and human presence. Anticipated short- to mid-term beneficial effects include an increase in forage habitat which the Montana Department of Fish, Wildlife and Parks support as needed in this landscape. Regeneration treatments would stimulate forage production over both the short and long term, improving conditions for forest ungulates in the project area. Intermediate treatments would maintain cover where it exists and increases forage production, as greater amounts of sunlight and moisture reach the forest floor. Because project effects to forest ungulates are expected to be minimal and consideration of those limited effects did not influence the design of the proposed action, forest ungulates was not identified as a substantive issue for analysis and will not be discussed further in this document. More analysis and information used to demonstrate forest plan consistency can be found in project file Q005.

Scenery

The full scenery analysis in the proposal record summarizes the methodology used and describes in more detail effects of the no action and proposed action on scenery and has additional details about the potentially affected environment, scope of analysis, and unit-level detail on desired scenic integrity objectives. Forest Service landscape architect field-reviewed treatment units of most concern (such as, units in Management Area 2a, seed-tree and regeneration units, and units with high scenic integrity objectives). Findings are summarized in this section.

Existing scenic integrity in treatment units in the project area varies from low to high, with about 84 percent of units meeting their desired scenic integrity objectives (SIOs) set by the forest plan. Some portions of the project area—specifically the utility corridor expansion units in Management Area 2a—do not currently meet their SIOs because existing infrastructure and associated vegetation patterns inherently reduce scenic intactness. The forest plan allows for utility corridors in Management Area 2a (MA 2a-SUIT-05: scenic and recreational river corridors are suitable for utility corridors); these utility corridors will never meet MA 2a's SIO of high as long as utilities are present, with or without action. Under either alternative, utility corridors will be visually apparent.

For all other thinning and prescribed burn units, the proposed action would result in short-term, noticeable changes to scenic character due to vegetation removal and modified stand structure; however, these effects would be shaped through project design features, with PDF-SCE-01 through 05 applied as relevant to specific units (see Appendix A), to mimic natural patterns and remain visually subordinate. Over the long term, the proposed action would enhance scenic stability by improving forest health and reducing the likelihood of large-scale disturbances that could cause substantial, lasting scenic degradation. Compared to taking no action—which would allow continued increase of tree density, increased insect and disease mortality, and elevated wildfire risk, the proposed action would better maintain or improve scenic integrity across most units. Overall, the proposed action is consistent with forest plan scenic character and scenic integrity direction and would support long-term scenic resilience.

Wild and Scenic Rivers

Summary

The proposed action includes approximately 401 acres of vegetation management treatments occurring within the designated Wild and Scenic River corridor (Management Area 2a) along the Middle Fork Flathead River, which is classified as recreational. All work occurs in the uplands, outside the riverbanks and channel of the river. Approximately 620 feet of NFS road is proposed in Management Area 2a. This new system road would use a historic road template to serve units 8 and 9. Short term effects are limited to temporary noise (recreation and wildlife outstandingly remarkable values) and minor, widely dispersed visual changes (scenery and recreation outstandingly remarkable values). Long-term effects are beneficial, as the project would improve forest resilience, reduce risk of high-severity wildfire, and reduce road sediment delivery through application of BMPs on existing NFS roads. These effects contribute to maintaining or improving fisheries and scenery outstandingly remarkable values. The proposed action would maintain the free-flowing condition, water quality, and outstandingly remarkable values for which the Middle Fork was designated.

Under the no-action alternative, short term effects are neutral, but long-term adverse effects may occur from increasing fuel loads, deferred maintenance on transportation infrastructure, and risk of large, unplanned disturbances, such as wildfire and disease and insect outbreaks, which could affect water quality, scenery, recreation, and fisheries outstandingly remarkable values.

Issues

According to statute and forest plan direction, management activities must protect the free-flowing condition of the river, water quality, and the river's outstandingly remarkable values. This section evaluates whether the no action and proposed action alternatives are consistent with those requirements and discloses effects to the identified values.

Assumptions and Methodology

Discussion on this topic relies on other resource analyses for this project and are referenced throughout. The forest plan provides management direction for designated wild and scenic rivers (Management Area 2a).

Scope of Analysis

The analysis area is the project area because this encompasses Management Area 2a (designated wild and scenic river corridor), adjacent slopes where vegetation activities occur, and tributaries that may receive impacts from proposed activities that then could have a downstream effect on the Middle Fork Flathead River. Because analysis shows the proposed action would have negligible effects on sediment delivery or water quality (see Aquatic Resource section) and the westernmost treatment unit is about 2 miles from the project area boundary, we determined it unnecessary to extend the analysis area further west and downstream outside of the project area. Short-term effects are effects during or shortly after implementation; long-term effects would develop over years or decades.

Potentially Affected Environment

The affected environment includes the wild and scenic river corridor (Management Area 2a) that occurs in the project area. The wild and scenic river corridor extends approximately one-quarter mile upland from each bank. This corridor is classified recreational. Highway 2 and the Burlington Northern Railroad parallel the river, ranging from adjacent to over one-quarter mile away. This results in variable highway and rail noise within the river corridor.

The corridor supports native trout species, including bull trout and westslope cutthroat trout, and other cold-water aquatic communities. All water quality beneficial use classifications are supported and consistent with forest plan watershed desired conditions (FW-DC-WTR-04; FW-DC-WTR-06). Recreation opportunities include dispersed camping, fishing, and rafting, with high float use and river access at Bear Creek, Essex, Paola, Cascadilla, and Moccasin Creek. Scenery is characterized by steep, continuous forested slopes and natural vegetation patterns that meet high scenic integrity objectives in some, but not all places.

Effects of the No-Action Alternative

Under the no-action alternative, vegetation management, road construction, and road BMP improvements would not occur. No short-term effects would be expected because scenery, recreation experience, and water quality would not be disturbed by proposed activities. However, long-term adverse effects are possible because without treatment, stand density would continue to increase, elevating the risk of high-severity wildfire. Such a fire could substantially alter scenic character, increase sediment delivery and degrade aquatic habitat, and result in post-fire temporary closures affecting recreational river access. Aging roads and culverts could continue to deteriorate, increasing the likelihood of failures that generate sediment pulses. These conditions could create both short- and long-term impacts on scenery, recreation, and fisheries outstandingly remarkable values.

Effects of the Action Alternative

Proposed activities would occur on approximately 401 acres in Management Area 2a, that is, the recreational river corridor (Table 26). These occur in upland settings away from the river. These treatments all occur in the WUI and include about 102 acres of utility corridor expansion. MA2a-SUIT-05 allows for the presence of utility corridors in certain Wild and Scenic River Corridors. These actions are needed to reduce tree densities and fuel loadings in the WUI as described in the Purpose and Need section.

Per the forest plan, the inner RMZ extends generally 150 feet upland from each side of the Middle Fork. Of the 401 acres proposed for treatment in Management Area 2a, approximately 14.8 acres of treatments are proposed within the inner RMZ. Of these, 13.4 acres are utility corridor expansion, which is allowed per FW-STD-RMZ-06.

Approximately 620 feet of NFS road is proposed in Management Area 2a. This new system road would use a historic road template to serve units 8 and 9. This segment of road is located outside of the riparian management zone, on the outer extent of the wild and scenic river corridor.

Table 26. Proposed activities in Management Area 2a

Treatment	Acres
Utility corridor expansion	101
Precommercial thinning	67
Commercial thinning	81
Improvement cuts	27
Seed tree regeneration	86
Shelterwood regeneration	39

The proposed action will not change the Middle Fork Flathead's free-flowing condition nor has it any bearing on the outstandingly remarkable value of geology. Design features PDF-CR-01 and -02 would protect outstandingly remarkable values of history and ethnography.

Water quality and Fisheries. In both the short- or long-term, sediment inputs to the Middle Fork Flathead River itself are not measurable above background levels and would have minimal impact on the river's water quality or fisheries ORV, and road best management practices would have a long-term beneficial effect. Project design features, best management practices, and the maintenance of RMZ functionality (USFS 2018b) ensure maintenance of the high-water quality of the Middle Fork. See Aquatic Resources section for more information.

Wildlife. The proposed action would result in temporary, localized effects on wildlife and habitat within Management Area 2a, but it would not diminish the wildlife outstandingly remarkable values. Effects are primarily associated with vegetation treatments in MA 2a. Project design features, including measures to reduce grizzly bear conflict and timing restrictions, would minimize impacts to species. No treatments would sever habitat connectivity, and no effects would occur to wildlife within the river itself. Treatments may modify cover and travel patterns for various species; these effects are further described in Connectivity section. No treatments are proposed within two miles of the Walton Mineral Lick or associated mountain goat escape terrain.

Recreation. The proposed action would have no short-term or long-term effects on recreational access to the river, encounter rates, or user numbers. During implementation, intermittent noise from equipment may be heard at times from the river; a short-term adverse effect; these sounds are temporary and would occur during the daytime.

Scenery. Units proposed for utility-corridor expansion in Management Area 2a do not meet their scenic integrity objective under either the no action or proposed action; however, MA 2a-SUIT-05 allows utility corridors within recreational river corridors (see Scenery section).

In all other thinning treatment units (see Appendix C), the proposed action would create limited, small-scale visual evidence of thinning or slash in the short term, visible from certain angles within the recreational corridor. Units are designed to avoid conspicuous lines or geometric patterns (PDF-SCE-01). Long-term effects are beneficial: treatments improve forest health, support scenic integrity objectives, and reduce the likelihood of large stand-replacing wildfires that could severely alter scenic character. Over time, treated stands develop more natural heterogeneity, contributing positively to scenery conditions.

Resources with Limited Effects

We found any adverse effects from the proposed action to be limited or negligible or both to the resources in this section. Therefore, these resources are not discussed in detail in this environmental assessment, and their effects are summarized below.

Air quality. The Flathead County Air Quality Pollution Control Program and the Montana/Idaho Airshed Group's Airshed Management System regulate smoke emission and burning. Project design features require compliance with the Clean Air Act, Flathead and MT/ID airshed group regulations; therefore, there would be minimal and limited effects to air quality from proposed activities (short-term adverse effects).

At-risk plant species. Several populations of Forest Service species of conservation concern, state-listed species of concern, and potential species of concern occur in the project area. Initial project design excluded these populations from proposed activities, and any undocumented populations or species are protected by PDF-PLANTS-01. Whitebark pine (federally threatened) occurs in the project area. Individuals occur infrequently as scattered seedlings, young saplings, and very rarely as mature trees in the uppermost elevations (above 5,500 feet) of the project area. Project activities may cause damage or mortality to whitebark pine. However, proposed silvicultural treatments and prescribed fire, guided by design features and a 2025 programmatic Biological Opinion (FWS 2025), are part of a restoration strategy that would result in long-term beneficial effects for the species (for example, reduced competition or improved habitat). The project record contains an analysis for at-risk plant species that has additional detail on effects and methodology used for these findings (project file J005).

Carbon cycling. The project was screened using information in the Flathead National Forest's Carbon White Paper (Reichenberg 2025) and no further project-specific analysis is warranted. Carbon analyses completed for recent projects on the Flathead National Forest (the Cyclone Bill, Rumbling Owl, and West Reservoir projects) found that project activities could result in temporary increases in carbon emissions (short-term adverse effects) but would likely lead to longer-term stabilization of carbon stocks (long-term beneficial effects). The activities proposed in the Granite Moccasin Project are similar in scope (similar proposed activities—prescribed burning and commercial and noncommercial thinning), scale (similar or fewer acres proposed for treatment), and intensity (similar nature of treatments), and occur in similar forest types. Studies indicate that common timber harvesting regimes in the region can quickly recover removed biomass (within a couple of decades) and that combining harvest with prescribed burning reduces fuel loads and risk of wildfire(Clyatt et al. 2017), thereby improving carbon stability (Halofsky et al. 2020, Hood et al. 2024). Additionally, soil accounts for the largest terrestrial body of stored carbon, and forestry practices that adequately protect soil integrity and soil cover while enhancing native species composition will maximize soil carbon storage (DeLuca and Hatten 2023). Ultimately, timber management can balance carbon storage and other desirable ecosystem services with sustainable harvest (DeLuca and Hatten 2023, DeLuca 2025).

Heritage resources. A heritage inventory, including field surveys, was completed for this project. Forest Service heritage resource staff completed a heritage inventory, including field surveys, for this project. No previously known or newly identified sites will be adversely affected by the proposed activities. With the implementation of design features PDF-CR-01 and 02, there are also no anticipated adverse effects to any currently unidentified cultural resources.

Non-native invasive plants. While project design features keep the risk of introducing new weed species low, there is a moderate to high risk of spreading existing infestations and a high risk of establishment (short- to long-term adverse effects). Persistence risk is high in regeneration harvest units, road construction zones, and other areas with substantial canopy cover removal (due to light availability), and moderate in units with other proposed vegetation treatment types. Design features (PDF-NNIS-02 and -03) aim to reduce spread and establishment before infestations persist; known infestations are then adaptively prioritized for treatment (FW-DC-NNIP-04, FW-OBJ-NNIP-01). The project record contains a risk assessment for non-native invasive plants that has additional information (project file J001).

Recommended wilderness areas. The only proposed activity that would occur in recommended wilderness areas is up to approximately 344 acres of hand planting of whitebark pine in units 610, 611, 612, 613, and 627 (see Appendix C). This activity would involve no mechanized or motorized use and is consistent with forest plan desired conditions, standards, and guidelines for recommended wilderness areas.

Recreation. During project implementation, there will be brief and localized interruptions (a short-term adverse effect) to dispersed recreation activities such as hunting, dispersed camping, and driving for pleasure. Noise may be heard by users recreated on or near the Middle Fork Flathead River during implementation. Developed recreation facilities like Devil Creek Campground, Challenge Cabin, and Zip's Place Cabin may experience short-term disruptions. NFS trails Puzzle Ridge, Granite Creek, and Morrison Creek may be temporarily closed for public safety while activities are underway. Fuel reductions will help prevent the loss of several developed recreation facilities due to fire for the short-term; this benefit will persist in the long-term until fuel loading increases from vegetation regrowth. Additionally, treatments may improve access and conditions for snowmobiling and backcountry skiing where currently allowed. Changes in vegetation structure may provide different recreation opportunities consistent with desired conditions. While landings near roads might indirectly create additional dispersed camping opportunities, rehabilitation will minimize their attractiveness. No changes to allowed over-snow use are proposed. The proposed action would not affect access to river-related recreation in the short-term or long-term.

Soils. The proposed action will meet forest plan management direction for the soil resource, and soil function and long-term productivity will be conserved. Short-term adverse effects of increased soil erosion and detrimental soil condition would occur from proposed activities. Specific soils concerns were addressed through initial unit selection, proposed unit treatments, and design features. For example, areas of slope instability exist in units in the Skyland area; adverse impacts are avoided through PDF-SOIL-08.

Wilderness. The Great Bear Wilderness's character is monitored through "wilderness character assessments," which uses multiple measures to assess untrammeled, natural, undeveloped, solitude/primitive recreation, and other qualities (see Bob Marshall Wilderness Complex Wilderness Character Baseline Assessment Report, 2022, R1-23-35).

Since no project activities are proposed within the wilderness, the proposed action is not expected to change most of these measures. However, one specific measure tracks enduring impacts to solitude originating from outside the wilderness boundary, defined as the total wilderness acres more than a ½ mile from adjacent external travel routes and developments. This currently stands at 268,568.53 acres, or 94 percent of the wilderness. The proposed action would not alter this baseline, as no new permanent external roads, structures, or developments will be constructed within one-half mile of the wilderness or its boundary. Three proposed units border the Great Bear Wilderness, where short-term auditory effects to solitude may occur. Equipment operations in units 027 and 029 could cause temporary noise, but a ridge forming the wilderness boundary would lessen these impacts. Whitebark pine restoration in unit 628 will also have short-term auditory effects; users on NFS trail #339 (Grant Ridge) may hear chainsaw operations, though these effects would be transitory. It is important to note that highway and railroad noise is already audible from this trail.

Other Environmental Impacts

Short- and long-term, beneficial, and adverse effects of the proposed action on the environment are discussed in the previous section.

Effects on Public Health and Safety

This project is designed, in part, to reduce community wildfire risk in the short-term by reducing stand density and treating fuels on the landscape, and in the long-term by increasing stand health, diversity, and resilience. Vegetation treatments reduce the likelihood of large, high intensity wildfires, which pose risks to life, property, public infrastructure, and evacuation routes. Prescribed burns generate temporary smoke but are conducted under conditions that promote good dispersion, producing far less smoke exposure than would occur under uncontrolled wildfire conditions. The planned prescribed burning and post-harvest fuels treatments would produce smoke, which can pose public health risks. All scheduled burning would be guided by smoke management plans to align with favorable wind and atmospheric conditions and minimize smoke impacts. Prescribed burns are planned using science-based decision-making to achieve desired ecological outcomes and limit air quality impacts; wildfires occur under unpredictable conditions. Wildfires tend to produce greater amounts of fine particulate matter, carbon monoxide, and pollutants of concern (such as formaldehyde and benzene) for each ton of fuel consumed, when compared to prescribed fires in comparable ecosystems (EPA 2021). See https://www.fs.usda.gov/rm/pubs_journals/rmrs/sycu/2024/sycu101_2024_smoke.pdf for more information and best-available science synthesis on the differences between wildfire and prescribed fire smoke and potential effects to human health.

Economic Effects

The forest products industry is crucial for Montana's economy and for maintaining healthy, resilient forested lands. The proposed commercial treatment is expected to produce approximately 25,000 ccf (12.5 million board feet) of timber, generating an estimated $393,979 in revenue (before noncommercial costs). Additionally, the project would create up to 83 direct and 69 indirect jobs, contributing up to $11,091,000 in labor income. These represent both short-term benefits (timber production, jobs) and long-term support for a sustainable wood products industry.

If the proposed action is not implemented, the Flathead National Forest would forgo this expected timber revenue and associated economic contributions. Vegetation treatments aimed at reducing fuel loading reduce long-term economic risks by protecting infrastructure, utilities, transportation corridors, recreational opportunities, and WUI communities and outweigh the upfront costs of proactive fuels management.

Effects to the Quality of Life of the American People

The forest plan gives management direction that provides for the social, economic, and ecological sustainability and multiple uses of the Forest's lands and resources. The plan was developed using collaborative and science-based approaches to promote the ecological integrity of the Forest while considering social and economic sustainability. National Forests are managed under the multiple-use principle where public lands must provide a variety of resources, services, and opportunities without impairing long-term productivity. Individuals apply their personal values to different resources or services in given areas, and this project may involve treatment actions, access disruptions, or priorities that conflict with individual desires or priorities at specific locations. In contrast, based on a long history of comments received from the public on the Hungry Horse Ranger District, we know that many individuals support active forest management and fuels reduction for a variety of reasons, including wildfire protection, economic contributions, ecological sustainability, and improved recreational opportunities. All proposed treatments were planned with an intent to move the landscape toward desired conditions explained in the Purpose and Need. Achieving these conditions within the project area would better allow for stable provision of the services from NFS lands the American people depend upon—clean water, recreational opportunities, wildlife habitat, and sustainable timber harvest, among others—thereby contributing to higher overall quality of life. The public health and safety effects described above also have concrete quality-of-life connections, as the direct and indirect impacts of wildfire are a pressing and worsening problem in the American west.

Irreversible and Irretrievable Commitment of Federal Resources

The term irreversible describes the permanent loss of a resource that cannot be replaced or returned to its original state. It applies to impacts to nonrenewable resources, like mineral or cultural resources, or impacts to resources like soil productivity that are only renewable over long periods of time. This project would not result in any irreversible impacts. The term irretrievable describes loss of production, harvest, or use of natural resources. The changes that result in these losses are not irreversible; the resource may be renewed, recovered, or restored for future use.

There would be irretrievable commitment of soil resources and potential timber production within the footprints of temporary roads and system roads planned for this project during the time those roads are in service. Once those roads are no longer needed, reclamation could return those soils to the productive land base. This would be a shorter-term irretrievable commitment for temporary roads (typically five years or less) while system roads may remain on the landscape for many decades.

Vegetation removal constitutes an irretrievable commitment for the time required to regrow biomass but does not result in permanent loss. For grizzly bear, regeneration treatments result in a loss of cover, but this is not irretrievable because dense sapling cover is expected to return within approximately 20 years.

Canada lynx foraging habitat proposed to be removed through use of exception and exemption acres would be irretrievably lost where those stands are thinned or harvested to meet fuels objectives; however, dense sapling forage conditions are expected to reestablish within approximately 20 to 40 years (once regenerated stands meet stand initiation conditions, or until thinned stands meet multistory forage conditions). Proposed vegetation treatments in areas currently providing ungulate cover (hiding cover) in summer range would result in irretrievable losses of cover until stands regrow and develop characteristics that provide hiding cover.

If the proposed action were not implemented, these irretrievable resource commitments would not be made, but the tangible benefits of the project would not be realized (reduced wildfire risk, improved forest health and resilience, economic benefits from timber harvest).

Other Environmental Reviews

This analysis is compliant with the following applicable laws and regulations:

Bald and Golden Eagle Protection Act – No active bald eagle nests are known within or near the action area, and no activities are proposed in or near potential breeding habitat. A project design feature requires implementation modifications if an active nest is discovered within 0.25 miles of project activities.

Endangered Species Act – Under the provisions of this Act, federal agencies are directed to seek to conserve endangered and threatened species and to ensure that actions are not likely to jeopardize the continued existence of any of these species. Biological assessments, which disclose the effects of the project on endangered and threatened species, are being prepared by our biologists. Required consultation with the U.S. Fish and Wildlife Service for endangered and threatened species will be completed on proposed activities for the Granite Moccasin project.

The project aligns with the Rangewide Whitebark Pine Programmatic for Forest Management Activities (FWS 2025) and the Rangewide Whitebark Pine Programmatic for Conservation Activities (FWS 2023).

Migratory Bird Treaty Act, and Executive Order 13186 of January 10, 2001 –Potential project impacts to migratory birds, including compliance with the MBTA and Executive Order 13186, were considered in this analysis.

National Historic Preservation Act – Section 106 Review - Heritage resource reviews have been completed on all areas to be impacted by ground disturbing activities, and the Section 106 review process has been completed. No heritage resources are expected to be affected by this action. Since the potential exists for unidentified sites to be encountered or disturbed during project activity, special provisions for protection will be included in all contracts used to implement this project (PDF-CR-01).

Consultation with Federally Recognized Tribes – The Granite Moccasin Project was included in cultural program consultation with affiliated Native American Tribes, in 2025 with the Confederated Salish & Kootenai Tribe and in 2026 with the 2026 Blackfeet Nation. Neither identified any concerns with the project activities nor identified any traditional cultural property areas within the project area.

Clean Water Act – The Forest Service follows and implements best management practices (BMP) to control non-point source pollution for all management activities to meet the intent of the Federal and State water quality laws and regulations and agency directives (PDF-AQ-01). The forest plan requires that BMPs be incorporated into project plans as the principal means to control non-point pollution sources and protect beneficial uses (Standard FW-STD-WTR-02).

All required permits will be obtained before project implementation. When work occurs within a streambed, streambanks, floodplain, or wetland, the Forest Service will submit a Joint Application (310 form 270) to the appropriate local, State and Federal agencies. Although the Clean Water Act provides exemptions for "normal farming, silviculture, or ranching activities" under Section 404(f)(1)(A), these exemptions do not relieve the Forest Service from obtaining required non-Federal permits such as SPA 124 permits from Montana Fish, Wildlife, and Parks, Floodplain Permits from City or County Floodplain Administrators or Navigable Rivers Land Use License/Easements from DNRC. Following the joint permitting process ensures compliance with applicable laws that protect streams, wetlands, floodplains, and other water-related features. Additional information on Montana stream permitting is available at http://dnrc.mt.gov/licenses-and-permits/stream-permitting.

Clean Air Act – Project activities would be coordinated to meet the requirements of the State Implementation Plans, Smoke Management Plan, and Federal air quality requirements.

Roadless Conservation Rule – The 2001 Roadless Conservation Rule generally prohibits cutting, selling, or removing timber in NFS inventoried roadless areas. However, an exception exists: Timber may be removed if the responsible official determines that the removal of generally small diameter timber is necessary for specific purposes, such as reducing the risk of uncharacteristic wildfire effects, as specified under § 294.13(b)(1). Additionally, any removal of small diameter timber must also maintain or improve one or more of the roadless area characteristics, including but not limited to: diversity of plant and animal communities; habitat for threatened and endangered species; and natural appearing landscapes with high scenic quality. Inventoried roadless areas across the forest were assigned different management areas under the forest plan.

About 61 percent (41,470 acres) of the project area occurs within inventoried roadless areas. Within the Granite Moccasin Project, Management Area 6a (low intensity vegetation management) and the WUI commonly overlap with these areas. This is important because the forest plan calls for maintaining lower tree densities in the WUI (FW-DC-FIRE-07), and timber harvest is allowed in Management Area 6a to achieve desired vegetation conditions. All treatments were designed to comply with the Roadless Rule by focusing on the removal of small diameter trees, defined in the forest plan as less than 10 inches in diameter (FW-DC-TE&V-10), and no road construction would occur. Project file O013 illustrates how treatments within the inventoried roadless areas are compliant with the Roadless Rule and differ from treatments outside these areas. Table 27 displays proposed treatment acres within roadless areas and their overlap with the WUI.

Table 27. Proposed treatments in inventoried roadless areas (IRA)

Treatment type	Total IRA Acres	IRA Acres within WUI (%)	IRA Acres Outside WUI (%)
Commercial Thin	258	244 (95%)	14 (5%)
Hardwood Release	19	19 (100%)	0
Improvement Cut	32	26 (82%)	6 (18%)
Total proposed commercial treatment	**308**	**288 (94%)**	**20 (6%)**
Precommercial Thin	44	44 (100%)	0
Understory Removal	14	14 (100%)	0
Hazardous Fuels Thin	31	31 (100%)	0
Prescribed Burn	240	223 (93%)	17 (7%)
WBP Restoration – Daylight/Release	293	0	293 (100%)
WBP Restoration – Daylight/Release and Plant	108	102 (94%)	6 (6%)
WBP Restoration – Planting*	832	139 (17%)	693 (83%)
WBP Restoration – Prescribed Burn and Plant	374	0	374 (100%
Total proposed noncommercial treatment	**1,936**	**559 (29%)**	**1,383 (71%)**
Utility Corridor Expansion (includes mechanical and hand thinning)	6	6 (100%)	0

* For this treatment, acre values reflect the sum of all portions of planting units that overlap with IRA. For example, 2 acres in Unit A plus 5 acres in Unit B results in 7 total acres of IRA-overlap considered in this treatment. Between 10 and 50 percent of each planting unit would receive treatment; see Table 1 and the Proposed Action section and Table 31 in Appendix C.

Ninety-five percent of commercial treatments in roadless areas occur in WUI. The remaining 5 percent of commercial treatments that are outside the WUI are limited to small portions of units designed to extend to natural geographic features to comply with the Roadless Rule's exception to timber harvest. Over 86 percent of total proposed treatments in roadless areas are noncommercial hand treatments that would reduce fuels within the WUI or restore whitebark pine. Where whitebark pine planting is proposed within recommended wilderness, no mechanized tools will be allowed. For whitebark pine restoration outside of recommended wilderness but within roadless areas, chainsaws will be used to reduce undesirable conifer competition in some units. For all treatments, stand-specific silvicultural prescriptions will be used to ensure treatments comply with the Roadless Rule.

Sikes Act – The Sikes Act establishes cooperative wildlife habitat management between federal agencies and state wildlife agencies. Forest Service wildlife biologists coordinated with Montana Fish, Wildlife & Parks, whose primary concerns included white-tailed deer winter range and potential increases in ungulate vulnerability along open roads. Design features retain full-crowned trees in white-tailed deer winter range and maintain vegetative screening along open roads and property boundaries.

National Forest Management Act – The NFMA requires the development, maintenance, amendment, and revision of land management plans (forest plans) for NFS lands. As a project authorized by the Forest Service, the activities in this project must be consistent with the applicable plan components (16 United States Code or USC 1604). This project was reviewed for consistency with the forest plan and designed to align with its direction. For example, all treatment units match the suitability of their respective management areas, and the project includes multiple design features to ensure compliance.

Montana Streamside Management Zone (SMZ) Law – The purpose of the Montana Streamside Zone Law is to protect the quality and quantity of forest waters and to conserve the integrity of Montana streamside zones. The law prohibits clear cutting, burning, equipment operation, road construction, slash disposal, or use of toxic material within at least 50 feet of any stream, lake, or other body of water. The DNRC must approve any exceptions to these prohibited practices. The SMZs are typically nested within RMZs that are defined in the forest plan. The RMZs generally provide a greater degree of protection than SMZs, so the proposed action complies with the State SMZ law.

Wetlands and Floodplains – Wetlands and floodplains are protected under Executive Orders 11990 and 11988, respectively. All wetlands and riparian zones are fitted with RMZs or SMZs to meet Forest Plan direction and Montana State Streamside Management Zone Law. Therefore, the proposed action would meet the requirements of these Executive Orders.

Agencies and Persons Consulted

The Forest Service engaged in discussions, provided proposal information, or both, with the following organizations, agencies, and persons during the development of this project. On December 30, 2025, we published the Granite Moccasin Project's proposed action document on the Flathead National Forest's website and invited input on the proposal and provided notice of use of the EAD authority. We received 262 comment submissions in response to the posting. These communications, along with supporting materials and references, are included in the proposal record.

- **Federal, State, and local agencies:** U.S. Department of the Interior, Fish and Wildlife Service, Montana State Historic Preservation Office, Montana Fish, Wildlife, and Parks, Montana Department of Natural Resources and Conservation, Flathead County Commissioners
- **Tribes:** Confederated Salish and Kootenai Tribes, Blackfeet Nation
- **Organizations and individuals:** Multiple environmental organizations, members from the timber industry including American Forest Resource Council, utilities and infrastructure contacts, permit holders, and the Flathead National Forest project updates email list.

Certifying Statement for Page Limit and Deadline

The responsible official certifies that this environmental assessment:

- Demonstrates the agency has thoroughly considered the factors mandated by NEPA;
- Represents the agency's good-faith effort to prioritize documentation of the substantive issues and most important considerations required by NEPA within the Congressionally mandated page limits;
- Reflects the agency's expert judgment;
- Addressed briefly, or left unaddressed, any issues or considerations that were, in the agency's judgment, comparatively not of a substantive nature;

- Represents the agency's good-faith effort to fulfill NEPA's requirements within the Congressional timeline (or within the minimally extended timeline) and this effort is substantially complete; and
- Includes an analysis provided by an interdisciplinary team that is adequate to inform and reasonably explain the responsible official's final decision regarding the proposed action or selected alternative.

Appendix A – Project Design Features

These project design features (PDF) are an integral part of the proposed action and are considered requirements should the proposed action be selected. Many concerns expressed during the public involvement processes were addressed through development of design features to avoid or reduce potential environmental impacts.

Forest Service directives (manual and handbook), forest plan standards and guidelines, and all other laws, regulations, and policies that relate to managing NFS land apply to the proposed activities and are repeated here only if clarification is required.

Air Quality

PDF-AIR-01: On the Flathead National Forest, prescribed burning is generally accomplished when dilution, dispersal, and mixing conditions are considered fair to excellent. Prescribed burning requires a permit from the Montana/Idaho Airshed Group and the burn must be implemented within the regulatory framework (FW-DC-AQ-01). This includes daily approval from the Flathead County Air Quality hotline and the Montana/Idaho Airshed Group.

Aquatics

PDF-AQ-01: Application of site appropriate best management practices (BMPs) for water quality and forestry management would follow guidance detailed in volume 1 of the National Core BMP Technical Guide and associated Forest Service manual direction, Montana Guide to the Streamside Management Zone Law & Rules and Montana Forestry BMPs. (FW-STD-WTR-02, FW-GDL-WTR-01, FW-STD-RMZ-01, FW-STD-RMZ-02, FW-STD-RMZ-06, FW-STD-IFS-06, FW-STD-IFS-07, FW-GDL-IFS-03, FW-GDL-IFS-04, FW-GDL-IFS-05, FW-GDL-IFS-06, FW-GDL-IFS-07, FW-GDL-IFS-09, FW-GDL-IFS-10)

Applies to all actions.

PDF-AQ-02: Hand treatment in inner RMZs as allowable through the forest plan (USFS 2018b) would avoid saturated areas and riparian vegetation while also being consistent with the State Streamside Management Zone Law & Rules ((Montana Department of Natural Resources & Conservation 2006). (FW-GDL-WTR-01, FW-STD-RMZ-01, FW-STD-RMZ-02, FW-STD-RMZ-06, FW-GDL-RMZ-01)

Applies to all hand treatments within RMZs.

PDF-AQ-03: No activities would be permitted within category 4a RMZs identified as fens, peatlands, or bogs. Treatment in previously unmapped or newly discovered RMZs would be consistent with the forest plan (USFS 2018b) and RMZ treatment elsewhere in the unit, unless otherwise prescribed by the Forest Hydrologist.

Applies to all treatments.

PDF-AQ-04: Mechanical treatment within the inner RMZ of both Marion Creek and Essex Creek may occur to salvage blow-down so long as equipment does not leave the existing roadway and the action is consistent with the State SMZ law. Downed timber in streams, on stream banks, or spanning streams shall be retained unless it compromises infrastructure or human safety.

Applies to unit 110.

PDF-AQ-05: To maintain free-flowing streams, new, replacement, and reconstructed stream crossing sites (culverts, bridges, and other stream crossings) would accommodate at least the 100-year flow, including associated bedload and debris. (FW-STD-WTR-02, FW-STD-IFS-06, FW-STD-IFS-07)

Applies to all new, replacement and/or reconstructed stream crossings.

PDF-AQ-06: Equipment storage, storage of fuels and toxicants, maintenance or refueling (other than for portable pumps associated with prescribed fire) would not be permitted within the RMZ. (FW-STD-RMZ-01, FW-STD-RMZ-03)

Applies to all activities.

PDF-AQ-07: All drafting hoses would be fitted with a minimum of a one-quarter inch screen to prevent intake of fish and other aquatic species. During the spawning season for native fish, pumping sites should be located away from spawning gravels. Consult the area fish biologist for site selection. (FW-GDL-WTR-05, FW-STD-WTR-01)

Applies to prescribed fire, dust abatement.

PDF-AQ-08: To protect spawning fish, eggs, and embryos, in-stream management activities (culvert installation, replacement, or removal) that may disturb native salmonids or that have the potential to directly deliver sediment to their habitats should be limited to times outside of spawning and incubation seasons for those species: Westslope cutthroat trout inoperable activity period is May 1 through July 15, bull trout September 1 through March 15 (FW-GDL-WTR-05) (Table 28).

Table 28. Inoperable periods for specific fish species

Forest Road Number	Westslope Cutthroat Trout Inoperable Period	Bull Trout Inoperable Period	Additional Guidance
1638	May 1 through July 15	None	One crossing in Lower Pinnacle Creek
1637	May 1 through July 15	None	Two crossings in Upper Pinnacle Creek
895F	May 1 through July 15	September 1-March 15	Proposed road S14, one crossing of unnamed tributary to Granite Creek
All other forest roads	May 1 through July 15	September 1-March 15	Consult area fish biologist

PDF-AQ-09: All drafting equipment would be cleaned prior to use within the project area (FW-GDL-WTR-07). Guidelines and recommendations from the Northern Rockies Coordinating Group and the National Wildfire Coordinating group can be found at Montana Fish, Wildlife, and Parks' website (https://fwp.mt.gov/binaries/content/assets/fwp/conservation/ais/reports/nrcg-how-to-guide-for-decontamination-of-wildfire-equipment-_1.pdf).

Applies to prescribed fire, stream dewatering (for culvert work), and dust abatement.

At-Risk Plant Species

At-risk plant species include those listed as threatened or endangered under the Endangered Species Act (for example, whitebark pine (*Pinus albicaulis*) and Spalding's catchfly (*Silene spaldingii*)), all plant species of conservation concern, and state-listed plant species of concern (SOC) documented in the Montana Natural Heritage Program database (for example, water howellia *(Howellia aquatilis*)).

PDF-PLANTS-01: If individuals or populations of any undocumented at-risk plant species are discovered during implementation, work will immediately stop in that area until the forest botanist can evaluate the site. Newly discovered individuals or populations will be protected as necessary to retain population viability. (FW-GDL-PLANT-DIV-02, FW-DC-PLANT-01, FW-DC-PLANT-03, FW-DC-PLANT-04)

PDF-PLANTS-02: Avoid damage to existing whitebark pine of all size classes to the extent possible. Applies to all units. (FW-DC-PLANT-01, FW-DC-PLANT-03, FW-DC-PLANT-04)

PDF-PLANTS-03: Felling of competing trees will be directional, away from any existing whitebark pine. Applies to activities in units 080, 094, 095, 600-608, 614-621, and 628. (FW-DC-PLANT-01, FW-DC-PLANT-03, FW-DC-PLANT-04)

PDF-PLANTS-04: Where felled trees are piled for burning, arrange slash pile edges at least 20 to 25 feet away from existing whitebark pine to avoid scorching. Applies to activities in units 080, 094, 095, 600-608, 614-621, and 628. (FW-DC-PLANT-01, FW-DC-PLANT-03, FW-DC-PLANT-04)

PDF-PLANTS-05: Reduce fuel loads adjacent to existing whitebark pine by pulling logs and slash at least 20 to 25 feet away and implement ignition patterns that minimize fire intensity to whitebark pine individuals. Applies to whitebark pine prescribed burn units 622-624. (FW-DC-PLANT-01, FW-DC-PLANT-03, FW-DC-PLANT-04)

PDF-PLANTS-06: Considering operational feasibility, implement ignition patterns that minimize fire intensity to whitebark pine individuals. Applies to prescribed burn unit 700. (FW-DC-PLANT-01, FW-DC-PLANT-03, FW-DC-PLANT-04)

PDF-PLANTS-07: The project will implement the following conservation measures from the Biological Opinion for the Rangewide Whitebark Pine Programmatic for Forest Management Activities: Forest Service Regions 1, 2, 4, and 5 (FWS 2025).

a. The Forest Service will provide education for identification of five-needle pines and implementation of the conservation measures.

b. Intentionally damaging or killing identified plus, elite, or phenotypically rust resistant whitebark pine tree will only occur in situations where health and human safety are at risk.

c. The Forest Service will take appropriate actions to protect high value agency investments for whitebark pine. These differ by region and may include seed orchards, genetically diverse areas, established high-quality cone collection areas, and whitebark pine reforestation sites.

d. Except where necessary to accomplish forest management goals or provide for human safety, forest management activities will retain whitebark pine trees that are free from insect or disease infestation or are otherwise healthy and cone-producing.

e. Where removal of whitebark pine may be necessary to accomplish forest management goals, whitebark pine trees with the highest reproductive potential (already cone producing, healthy, high crown ratio) will be identified as the highest priority to retain.

f. Reforestation goals for tree species other than whitebark pine will follow silvicultural prescription goals and will include considerations for whitebark pine regeneration where appropriate. Generally, existing whitebark pine trees will be avoided and will be considered as part of the target spacing of planted seedlings. Reforestation with whitebark pine will follow the Conservation Activities programmatic consultation.

g. Transportation and operations activities will be located to minimize impacts to mature whitebark pine trees where feasible. Existing disturbed sites and travel routes will be used to the maximum extent possible.

h. A Pesticide Use Proposal is completed and followed for all use of pesticides (USDA Form FS-2100-2).

i. Utilize appropriate buffers for pesticide applications that are based on the chemical, application method, site conditions, and size class of whitebark pine present, to avoid damage or mortality of whitebark pine.

Fuels

PDF-FUELS-01: Burn plans will be prepared prior to the use of prescribed fire. These plans will determine the environmental conditions and resources necessary to meet objectives and minimize the possibility of escape. (FW-DC-FIRE-05).

PDF-FUELS-02: Appropriate signing or other cautionary measures will be implemented in conjunction with prescribed burning to ensure public safety. Public notice will be given prior to prescribed burning activities. (FW-DC-FIRE-01)

PDF-FUELS-03: Prior to conducting prescribed burns, the Flathead National Forest will conduct the following activities to notify the local public of burning projects. These include but are not limited to posting news releases on social media sites, displaying maps and burn information at the local Forest Service office, and preparing a list of contacts for each prescribed burn to be notified by phone, site visit, or mail. (FW-DC-FIRE-06)

PDF-FUELS-04: Hazard trees, defined as a tree that has potential to cause property damage, personal injury or fatality in the event of failure, should be removed within two tree-lengths of structures, private property, administrative sites, fuel breaks, and portions of units along open roads to increase suppression safety and effectiveness. (FW-DC-FIRE-01, FW-DC-FIRE-05, FW-DC-FIRE-07, FW-GDL-FIRE-01) FW-GDL-FIRE-04).

Heritage

PDF-CR-01: If any newly discovered heritage resources are identified during project implementation, work in the area will stop and heritage staff will be contacted.

PDF-CR-02: To protect heritage resources, provisions shall be included in applicable contracts, agreements, and special-use permits for properties that are unevaluated, eligible for, or listed in the National Register of Historic Places (FW-STD-CR-01).

Non-Native Invasive Plant Species

PDF-NNIS-01: Off-road equipment would be power-washed or steam cleaned on the undercarriage and chassis before transport to the project area. Off-road equipment includes all logging and construction machinery for vegetation treatments, except for log trucks, chip vans, service vehicles, water trucks, pickup trucks, cars, and similar vehicles. This cleaning shall remove all soil, plant parts, seeds, vegetative matter, or other debris that could contain or hold seeds. All subsequent entries of equipment from outside the project area back to the project area shall be treated in the same manner as the initial entry. (FW-DC-NNIP-02)

PDF-NNIS-02: Herbicides will be sprayed within the road prism along designated haul routes before log hauling begins and after all purchaser activities are completed. Treatments would only occur from June 1 to July 15 or September 1 to September 30. Treatment of invasive plants would be consistent with the strategy outlined in the noxious and invasive weed control environmental assessment and finding of no significant impact. Specific roads and mileage would be prepared in consultation with the forest invasive species coordinator. (FW-DC-NNIP-02)

PDF-NNIS-03: To reduce the probability of establishment of new non-native invasive plant populations, areas where soils are disturbed by construction activities (for example, temporary road construction, landings, and skid trails) conducted or authorized by the Forest Service, should be reseeded as soon as practical, during the appropriate time of year, using certified weed-free native seed mixes. (FW-GDL-NNIP-01, FW-GDL-WL-03)

Recreation

PDF-REC-01: Trails should be protected during project implementation. Any damage to NFS trails during vegetation management activities, and associated site preparation and post-harvest fuels work, would be repaired.

PDF-REC-02: For public safety, workers would be required to post signs at access points warning the public of vegetation management activities and any closures. Public will be informed of road closures and other impacts to recreation access.

PDF-REC-03: Where feasible to minimize disruptions to administrative and public use, conduct operations in units that may require closures of NFS Trails 156 (Granite Creek) and 154 (Morrison Creek) in August and September.

Applies to: Units 090, 089, 097, 419, 418.

Scenery

PDF-SCE-01: Shape individual units, to the extent feasible, economically and technically, to create a natural-appearing unit. Vegetation treatment units should avoid symmetrical shapes, straight lines and angles, disproportionate (to surrounding untreated units) opening and cluster sizes, and artificial lines and patterns. Additionally, treatments should follow natural topographic breaks and changes in vegetation, treat the entire landform and along roadways and trails vary unit sizes, widths, shapes and distances from center lines as much as possible (FW-GDL-SCN-03).

Applies to all units with a desired scenic integrity objective (SIO) of high; this excludes units proposed for utility corridor expansion or whitebark pine restoration. Excluded units (the shorter list) are: 1, 2, 3, 5, 14, 44, 51, 55a, 200, 201, 800 (utility corridor expansion); and all 600-level units (whitebark pine restoration).

PDF-SCE-02: Along lands of other ownership boundaries, use irregular clumping and blending of unit edges to avoid introducing dominating lines that could result from introducing unnatural appearing edges (FW-GDL-SCN-03). Vegetation patterns should mimic adjacent vegetation patterns on lands not managed by NFS where feasible. This applies to units 1, 2, 3, 5, 7,8, 9, 10, 13, 13a, 14, 17, 29, 30, 40, 43, 100, 101, 101a, 400.

PDF-SCE-03: Tree marking paint on leave trees in these units would be assessed post-harvest, if needed the District may use brown paint to cover the tree marking paint to reduce the potential visual effects from open roads and recreational trails.

PDF-SCE-04: Stump heights on cut trees in these units would be assessed post-harvest, if needed the District may cut stumps lower to reduce the potential visual effects from open roads and recreational trails.

Soils

PDF-SOILS-01: All mechanized units that remove commercial products would be logged using designated skid trails. Equipment would occasionally leave the trails to access trees or accomplish other activities. (FW-DC-SOIL-01, FW-STD-SOIL-01, FW-STD-SOIL-02)
Applies to all mechanized treatment units.

PDF-SOILS-02: Skid trail spacing width must average at least 75 feet in all ground-based harvest units. The goal is to occupy less than 15 percent of the treatment area with disturbance from skid trails, temporary roads and landings associated with past and proposed activities. (FW-DC-SOIL-01, FW-STD-SOIL-01, FW-STD-SOIL-02)
Applies to all mechanized treatment units.

PDF-SOILS-03: All existing roads and skid trails would be reused to the extent feasible. If roads or trails cannot be reused, their extent and location must be considered when laying out additional skid trails. (FW-DC-SOIL-01, FW-STD-SOIL-01, FW-STD-SOIL-02)
Applies to all mechanized treatment units.

PDF-SOIL-04: In units 006, 008, 024, 046, 055, 061 all mechanical activities will be treated under winter conditions OR ensuring an adequate slash mat with dry soils to minimize detrimental soil disturbance and impacts to soils. If winter harvesting then it will be restricted to frozen ground or snow cover conditions.

Winter logging requires that there be enough snow to prevent muddy water from mixing into the snow where equipment operates. This generally requires about ten inches of settled snow, but required depth varies with the snow conditions. It takes more dry powder snow than wet dense snow to protect the soil surface. Soils must be frozen enough to prevent deformation of the soil surface where equipment operates.

In units 70, 75, 101 and 423, where winter harvesting is not feasible because of wildlife habitat, ensure an adequate slash map with dry soils to minimize detrimental soil disturbance and impacts to soils

Unit 800: If this unit is harvested with mechanical equipment, ensure sufficiently frozen or snow covered soils as described above. (FW-DC-SOIL-01, FW-STD-SOIL-01, FW-STD-SOIL-02)

Applies to Units 006, 008, 024, 046, 055, 061, 070, 075, 101, 423 and 800 and all other mechanical units harvested utilizing winter logging or logging over a slash-mat.

PDF-SOILS-05: Units not harvested under winter conditions will be harvested when soils are dry as determined by the hand feel method. Sale Administrators or Contracting Officer's Representatives will monitor soil moisture conditions prior to allowing equipment to begin operations in summer. This monitoring must be documented in the Timber Sale Inspection Report or Daily Diary.(FW-DC-SOIL-01, FW-STD-SOIL-01, FW-STD-SOIL-02)
Applies to all mechanized treatment units.

PDF-SOILS-06:

Machine piling treatments to reduce fuel loadings shall be implemented to minimize soil disturbance as follows:

- All mechanical piling will be accomplished with excavators.
- Restrict piling machinery to designated routes used for harvest operations where fuel loads are moderate or low. Where fuel loads are high (or designated routes do not exist), limit off-trail machine travel to no more than two passes on any piece of ground.
- Operators shall plan travel paths to make full use of the machine's capability (e.g., using full boom reach of machine) to limit ground disturbance and minimize number of off-trail passes needed to achieve treatment objectives.
- Where feasible, pile fuels on existing disturbances (e.g., skid trails and landings) to minimize additional detrimental soil impacts from burning.

(FW-DC-SOIL-01, FW-STD-SOIL-01, FW-STD-SOIL-02)
Applies to all mechanized treatment units.

PDF-SOIL-07: Mastication treatments to reduce fuel loadings shall be implemented to minimize soil disturbance as follows:

- When using a boom-mounted implement, operator shall plan necessary off-trail travel paths to make full use of the machine's capability (e.g., using the full boom reach of the machine) to limit ground disturbance and minimize the number of passes needed to achieve treatment objectives.

- When using a machine with a front-mounted fixed masticating head, work in long, linear swaths to the extent practicable to avoid unnecessary pivoting and turning, which results in soil displacement damage. Excavator-mounted implements are preferred.
- Operator should not allow masticating heads to contact the soil surface, which can result in detrimental churning and mixing of the soil.
- Machines shall make no more than two passes over any piece of ground (when not on primary skid trails or landings).
- Depth of masticated material should not exceed three to six inches depth, on average, to allow regeneration of the herbaceous layer and prevent detrimental soil heating in the event of wild- or prescribed fire. If greater depths are expected, use another removal method.

(FW-DC-SOIL-01, FW-STD-SOIL-01, FW-STD-SOIL-02)
Applies to all mechanized treatment units.

PDF-SOIL-08: Sustained slopes greater than 40 percent will be: 1) excluded from unit boundaries; 2) treated by hand; or 3) completed with cable systems or other mechanized approaches that adequately protect soils. Six units are proposed for potential tethered harvesting, of those six units 30, 31 and 76 do not have any soils concerns for tethered harvesting. Units 23, 25 and 32 have some potentially unstable soils. These units will be field reviewed (by a watershed specialist, preferably a Soil Scientist) prior to implementing tethered harvesting techniques to ensure that there aren't concerns with slope stability. Following field review, additional design features may need to be considered. In areas where landslide-prone soils exist, ground-based equipment will not operate on slopes over 40 percent (units: 18, 71, 76, 77, 98, 202, 203, 204 and 305).
(FW-DC-SOIL-01, FW-STD-SOIL-01, FW-STD-SOIL-02, FW-GDL-SOIL-01)
Applies to all mechanized treatment units.

PDF-SOILS-09: Prescribed burning prescriptions would be prepared and implemented to generally not exceed moderate soil burn severity conditions (Parsons et al. 2010).

PDF-SOIL-10: All temporary and obliterated roads would be reclaimed by any site-appropriate combination of the following:

- Removing any installed culverts or temporary bridges;
- Recontouring the entire template to natural ground contour (as shown in Figure 2);
- Pulling in berms and placing the topsoil back on the road surface;
- Where re-contouring is unnecessary due to lack of slope, scarifying with excavator teeth to a depth sufficient to ameliorate detrimental soil compaction (usually between two and 12 inches);
- Seeding with a native plant mix specified by the Forest Botanist;
- Placing woody material on the template; and
- Planting native shrubs/trees to augment natural vegetation.

(FW-DC-SOIL-01, FW-STD-SOIL-01, FW-STD-SOIL-02, FW-STD-SOIL-03, FW-STD-SOIL-04)
Applies to all temporary and obliterated roads.

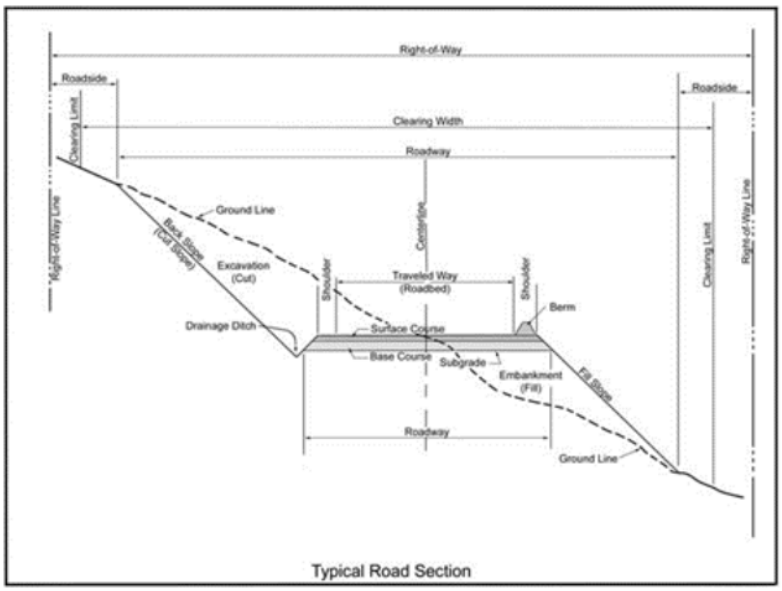

Figure 2. Diagram of typical road section

PDF-SOIL-11: Unit 70 and the proposed temporary road S11 may be located on soils that are potentially unstable. Both the unit and the proposed road location will be reviewed in the field prior to implementation to ensure stability is maintained (if possible, by a Soil Scientist or Hydrologist).

PDF-SOIL-12: Where tethered operations are approved, maintain ground cover in corridors or skid trails to minimize soil displacement and erosion. Where conditions allow, it is recommended that machinery operates on a slash mat within corridors and skid trails. Following harvest, slash would cover approximately 65 percent of the trail to a depth of approximately 2−3 inches (approximately 10-15 t/a) or other erosion control measures would be installed.

PDF-SOIL-13: Where tethered operations are approved, harvest activities must be mitigated by operation under constant tension. Harvest operations would not exceed 60 percent (or whatever slope is determined) slope.

PDF-SOIL-14: Designated tethered skid corridors would be spaced at least 50 feet apart.

Terrestrial Ecosystems and Vegetation

PDF-TEV-01: To promote future old growth, all harvest units adjacent to old-growth stands will leave all live trees greater than 17 inches diameter at breast height of the following species within 300 feet of old-growth edges: western larch, western white pine, black cottonwood, and ponderosa pine. (FW-GDL-TE&V-6)

Applies to units: 47, 49, 89, 90, 92, 93, 97, 402, 403, 418, and 423.

PDF-TEV-02: Treatment in units identified as old-growth would not modify the characteristics of the stand to the extent that stand density and trees per acre above a specific size and age class are reduced to below the criteria in Green et al. (2011). In addition, large, downed woody material (greater than 9 inches diameter at breast height), and/or large snags (greater than 15 inches diameter at breast height) would be retained to maintain old-growth characteristics and associated wildlife habitats within residual stands (FW-STD-TE&V-01).

Applies to units 50 and 100.

PDF-TEV-04: The desired range of downed wood varies by location, see Table 29.

Table 29. Desired downed wood condition by unit

Location	Desired downed wood condition*	Unit number
Within the WUI	8 to 12 tons per acre of material greater than 3 inches in diameter	6, 7, 8, 9, 10, 11, 13, 13a, 14, 17, 17a, 18, 18a, 20, 21, 23, 24, 25, 26, 30, 31, 32, 33, 36, 37, 42, 43, 44, 45, 46, 47, 47a, 49, 50, 51, 55, 55a, 56, 57, 58, 59, 59a, 61, 62, 63, 64, 65, 66, 66a, 66b, 67, 68, 70, 100, 101, 101a, 110, 400, 403, 406, 901, and 903
Outside WUI and within RMZ portions of all treatment units	25 tons per acre of the longest and largest diameter available	27, 28, 29, 69, 71, 71a, 73, 74, 75, 76a, 77, 77, 77, 77, 80, 81, 81, 82, 84, 85, 86, 87, 89, 90, 92, 93, 94, 98, 402, 411, 412, 415, 418, and 419.
Units adjacent to old-growth stands	Leave all material greater than 9 inches in diameter	47, 49, 89, 90, 92, 93, 97, 402, 403, 418, and 423

*Amounts of downed woody material are based on naturally occurring material to be left in units, where it is available.

PDF-TEV-05: Hardwood and mature cone-bearing whitebark pine trees would not be targeted for removal and would be left intact to the extent possible, considering operational feasibility. (FW-DC-TE&V-08 and -09)

PDF-TEV-06 – To avoid cutting trees on private property, Forest survey personnel must be contacted prior to implementing precommercial thinning activities in unit 302.

PDF-TEV-07: Within timber harvest units, all snags of western larch, ponderosa pine, and black cottonwood greater than 20 inches diameter at breast height shall be retained. Additionally, the minimum number of snags or live snag replacement trees to be retained within timber harvest areas are shown in Table 30 (GA-MF-STD-02, FW-GDL-RMZ-10, FW-GDL-TEV-10).

Table 30. Retention of snags and live trees

Unit(s)	Forest Type	Potential vegetation type	Minimum number of snags greater than 12” diameter at breast height.	Minimum number of snags or live replacement trees (greater than 15” diameter at breast height.)	Minimum number of snags or live replacement trees (greater than 20” diameter at breast height.)
RMZ Harvest areas	All	All	All available	All available	All available
All harvest units except those listed below	All except lodgepole pine	Cool moist	N/A	5	2
47, 49, 89, 90, 92, 93, 97, 402, 403, 418, and 423	All	All	All available	All available	All available

Unit(s)	Forest Type	Potential vegetation type	Minimum number of snags greater than 12" diameter at breast height.	Minimum number of snags or live replacement trees (greater than 15" diameter at breast height.)	Minimum number of snags or live replacement trees (greater than 20" diameter at breast height.)
17, 17a, 18, 18a, 21, 24, 26, 27, 37, 42, 43, 44, 51, 55, 55a, 56, 57, 58, 59, 59a, 61, 62, 63, 64, 65, 67, 68, 69, 70, 71, 71a, 73, 74, 75, 76, 76a, 77, 80, 81, 82, 84, 86, 87, 89, 90, 92, 93, 96, 97, 98, 100, 400, 406, 407, 408, 411, 412, 415, 418, 419, 423, 901, 902, 903	Lodgepole pine	All	N/A	2	1

[1]Upon agreement by the Forest Service, dead trees may be felled when necessary for safety under the State Safety Code. All dead trees which are required to be left standing and are felled for safety reasons shall be left on site.

PDF-TEV-08: Tree removal in units located within the inventoried roadless area would primarily occur within the small tree size class (up to 9.9 inches diameter at breast height).

Applies to all or portions of units: 10, 13a, 17, 18, 46, 47a, 55, 55a, 58, 59a, 61, 62, 92, 400, 406, 407, 901, 902, 903.

Transportation

PDF-TRANS-01: Impassable roads will remain on the inventoried National Forest Road system network. These roads will receive treatments designed to eliminate the need for maintenance or future entries to maintain road drainage. They will be left in a condition that presents minimal resource risk even if maintenance is not performed. Impassable roads do not contribute to the total motorized route density and will not be buffered for secure core; they will be managed as inaccessible to wheeled motorized vehicles and will meet the forest plan's impassable definition. All new system roads will be managed as impassable. Minimum treatments will include:

- Re-contouring the first 50 to 300 feet unless the road has other features that make the road impassable.
- In level topography, rock barriers and placement of natural debris will be used to make the road junction unattractive as a travel way and preclude motorized use.
- Culverts aligned with stream channels will be assessed for retention.
- Water bars shall be installed on ditched roads and placed to intercept ditch water near existing cross-drains. Spacing and placement shall be dependent on-site specific conditions.
- All disturbed areas will be seeded/mulched and stabilized through application of site appropriate BMPs.

Wildlife – Miscellaneous

PDF-WL-01: Hunting, transporting of hunters, and transporting of game would be prohibited by timber, road building, or other contract workers while working on or off roads closed to motorized vehicle use by the public.

PDF-WL-02: Personal use firewood gathering would not be allowed by contractors or other workers on newly constructed roads or any other roads not open to public motorized use.

PDF-WL-03: To maintain connectivity and movement of wildlife, leave patches at least 5 acres in size will be established within the unit. During layout the wildlife biologist will work with timber to establish the most appropriate location. Unit: 67, 43, 42, 45

PDF-WL-04: Newly constructed fire lines should be located away from public access points to prevent their use as motorized travel routes. FW-GDL-FIRE-03.

Units: where post-harvest prescribed fire is assigned.

Wildlife – Canada Lynx

PDF-WL-05: Effects from landscape prescribed fire unit 700 are intended to occur within the unit boundary. There is a small area that is outside WUI that will have potential desired fire effects. To accomplish this, no ignitions will occur within 300’ of the HFRA (16)(B)-defined WUI boundary.

Wildlife – Riparian Habitat

PDF-WL-06: Outer RMZ treatment in mapped category 4 A wetlands, excluding those identified as fens, peatlands, or bogs, would be allowed in up to 50 percent of their circumference to maintain undisturbed areas. Prioritize treatments to reduce conifer competition to hardwood tree species and early seral shrub species. (FW-DC-RMZ-01 & 03-06, FW-DC-TE&V-09) Units: 071, 071a and 101.

Wildlife – Timing Restrictions

PDF-WL-07: If an active gray wolf den or rendezvous site is discovered near proposed activities, wildlife biologist will be notified. Those activities would not occur within one-quarter mile of the site from April 1 to July 1 to reduce the risk of disturbance to breeding gray wolves (FW-GDL-WL DIV-05).

PDF-WL-08: If an active bald eagle nest is discovered near proposed activities, those activities, wildlife biologist will be notified. Those activities would not occur within one-quarter mile of the active nest site from February 1 to August 15 to reduce the risk of disturbance to nesting bald eagles (FW-GDL-WL DIV-05).

PDF-WL-09: If an active northern goshawk nest is discovered near proposed activities, wildlife biologist will be notified. Those activities would not occur within one-quarter mile of active nests from March 1 to August 15 to reduce the risk of disturbance to nesting northern goshawks (FW-GDL-WL DIV-05).

PDF-WL-10: To reduce the risk of disturbance to the grizzly bear population, project activities would not occur in spring habitat during the spring period (April 1 to June 30). Some management activities may need to be completed during the spring period to meet resource objectives. Implementors will consult district biologist in these situations. For any excepted activities, the duration of the activity and use of restricted roads may be limited (FW-GDL-TE&V-01).

Applies to Units: 18, 25, 26, 36, 42, 50, 51, 55, 61, 63, 64, 65, 66, 66b, 67, 71, 76, 77, 80, 89, 100, 110, 300, 301, 302, 304, 319, 400a, 406, 413, 418, 419, 423, 501, 502, 600, 601, 603, 605, 606, 608, 621, 622, 624, 800, 903

PDF-WL-11: To protect grizzly bear denning habitat, listed units should not be implemented December 1 – March 30:
Applies to Units: 27, 28, 67, 68, 70, 73, 76, 76a, 80, 81, 82, 85, 90, 92, 93, 97, 98, 94, 402, 407, 408, 410, 411, 412, 418, 423

PDF-WL-12: To avoid disturbance to sensitive denning locations, unit 623 will only be implemented during the fall burn window. (FW-GDL-WL DIV-05)

PDF-WL-13: To avoid disturbance to wolverine during the denning period, listed units should not be implemented January 15- May 15:
Applies to Units: 26, 27, 28, 29, 30, 31, 32, 33, 71,77, 076a, 80, 81, 85, 92, 93, 94, 95, 96, 97, 98, 402, 403, 407, 411, 423, 501

PDF-WL-14: To avoid disturbance to harlequin duck during the breeding season, list units should not be implemented April 15 – August 15 in consultation with the district wildlife biologist. (FW-GDL-WL DIV-05)
Applies to Units: 84, 89, 90, 418, 419

Wildlife – Grizzy Bear—Human Conflict

PDF-WL-15: Contractors, operators, and their employees will be informed of procedures for safely working and recreating in grizzly bear country and of food and wildlife attractant storage special order prior to beginning work and annually thereafter, to reduce the risk of grizzly bear-human conflicts (FW-GDL-WL-01).

PDF-WL-16: If a contractor, permittee, lessee, operator, or their employee elects to camp on NFS lands other than in a developed recreation site, the site should be evaluated and written authorization (for example, a campsite agreement that includes the food/attractant storage special order) should be provided before the campsite is established. The purpose is to reduce the risk of grizzly bear-human conflicts (FW-GDL-WL-02).

PDF-WL-17: If needed to resolve grizzly bear-human conflict situations, activities would be modified, cancelled, suspended, or temporarily ceased (FW-GDL-TE&V-04).

Wildlife – Grizzly Bear—Access Management

PDF-WL-18: Project is designed so that on-the-ground implementation of activities affecting access management conditions (for example, activities requiring use of temporary or restricted roads) would not exceed 5 years per subunit to reduce the potential of grizzly bears being disturbed or displaced (FW-GDL-IFS-01). Exceptions may be made where necessary, however, if an extension is required, reasons would be documented in writing prior to authorization of the extension.

PDF-WL-19: There would be no net decrease to the baseline for secure core and no net increase to the baseline open motorized route density or total motorized route density in the affected bear management subunits post-project (FW-STD-IFS-02).

PDF-WL-20: Access management conditions in each affected bear management subunit should be restored to pre-project levels within one year after completion of project activities to reduce the duration of grizzly bear displacement or disturbance due to project-related activities (FW-GDL-IFS-02).

PDF-WL-21: Motorized public access would remain restricted on closed roads during implementation. If berms are removed to access treatment units, install temporary gates or effective barriers as needed and berms would be reinstalled once project activities are complete (Lynx HU O2, Lynx HU O5, Lynx HU G3, FW-STD-IFS-02).

PDF-WL-22: Low-altitude helicopter and unmanned aerial systems (UASs) flights for implementation of prescribed burns would not occur from December 01 through June 30. This would reduce the risk of disturbance to wolverines in modeled wolverine maternal denning habitat (FW-GDL-WL-04) and would avoid disturbances during the grizzly bear denning and den emergence periods. In addition, helicopter use would be limited to no longer than 48 consecutive hours in duration to limit disturbance to grizzly bears.

PDF-WL-23: The 10-year running average for temporary changes to access management conditions will not exceed 5 percent increase in open motorized route density, 3 percent increase in total motorized route density, and 2 percent decrease in secure core (FW-STD-IFS-03).

1. Administrative motorized use may occur on restricted roads during the non-denning season. During the non-denning season, activities exceeding motorized use on restricted roads may occur on roads without limitation for implementation of project activities.
2. Activities that exceed administrative motorized use and contribute to open motorized route density calculations will be monitored annually during implementation. Exceptions may be made for exceeding administrative motorized use for roads in project area if annual implementation monitoring shows temporary increases in access densities are below that anticipated by the analysis and motorized use above administrative thresholds can be completed consistent with FW-STD-IFS-03.

Appendix B – Treatment Maps

This appendix contains maps showing treatments across the project area, west to east. Overlap occurs across the five maps.

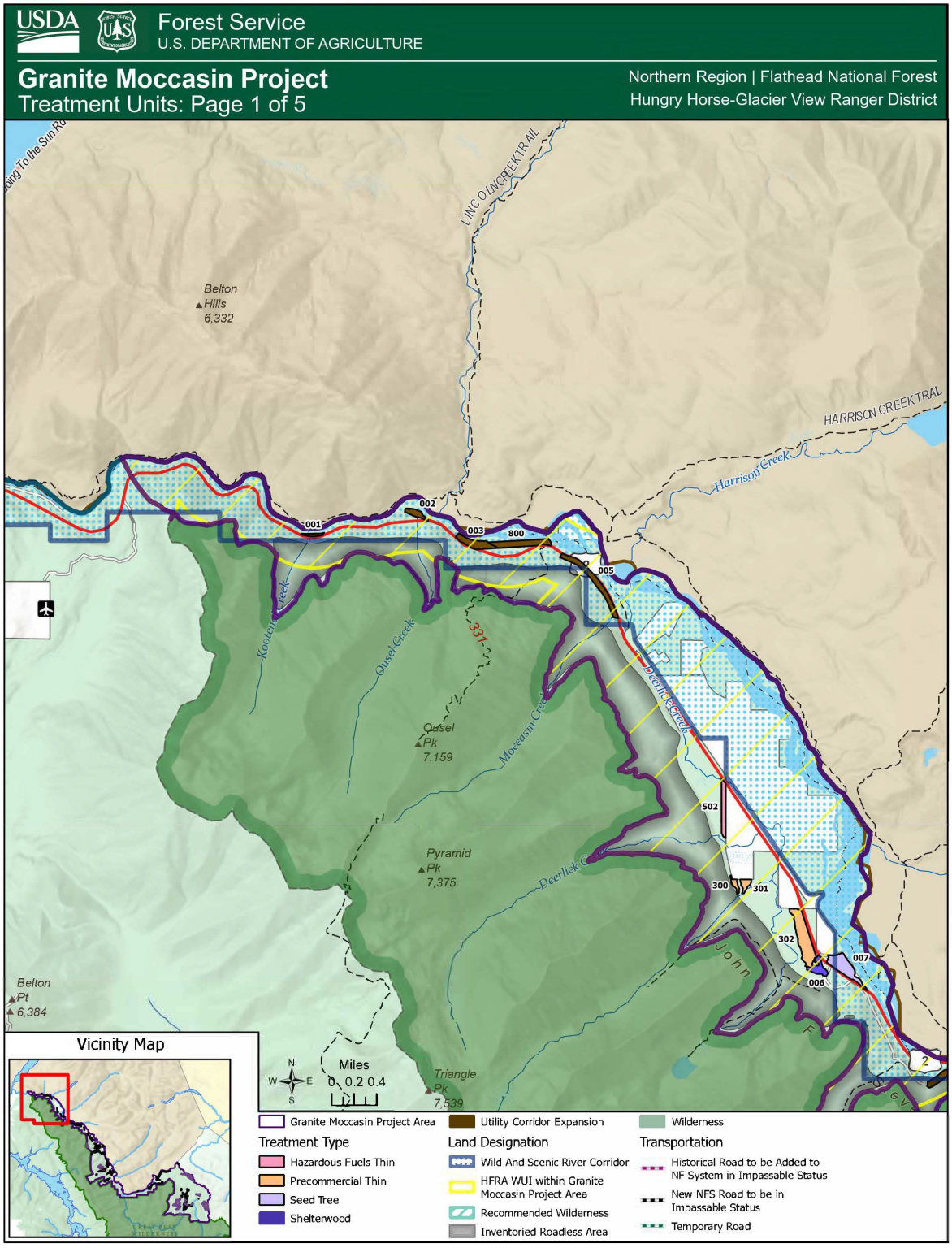

Figure 3. Granite Moccasin propose action, map 1 of 5

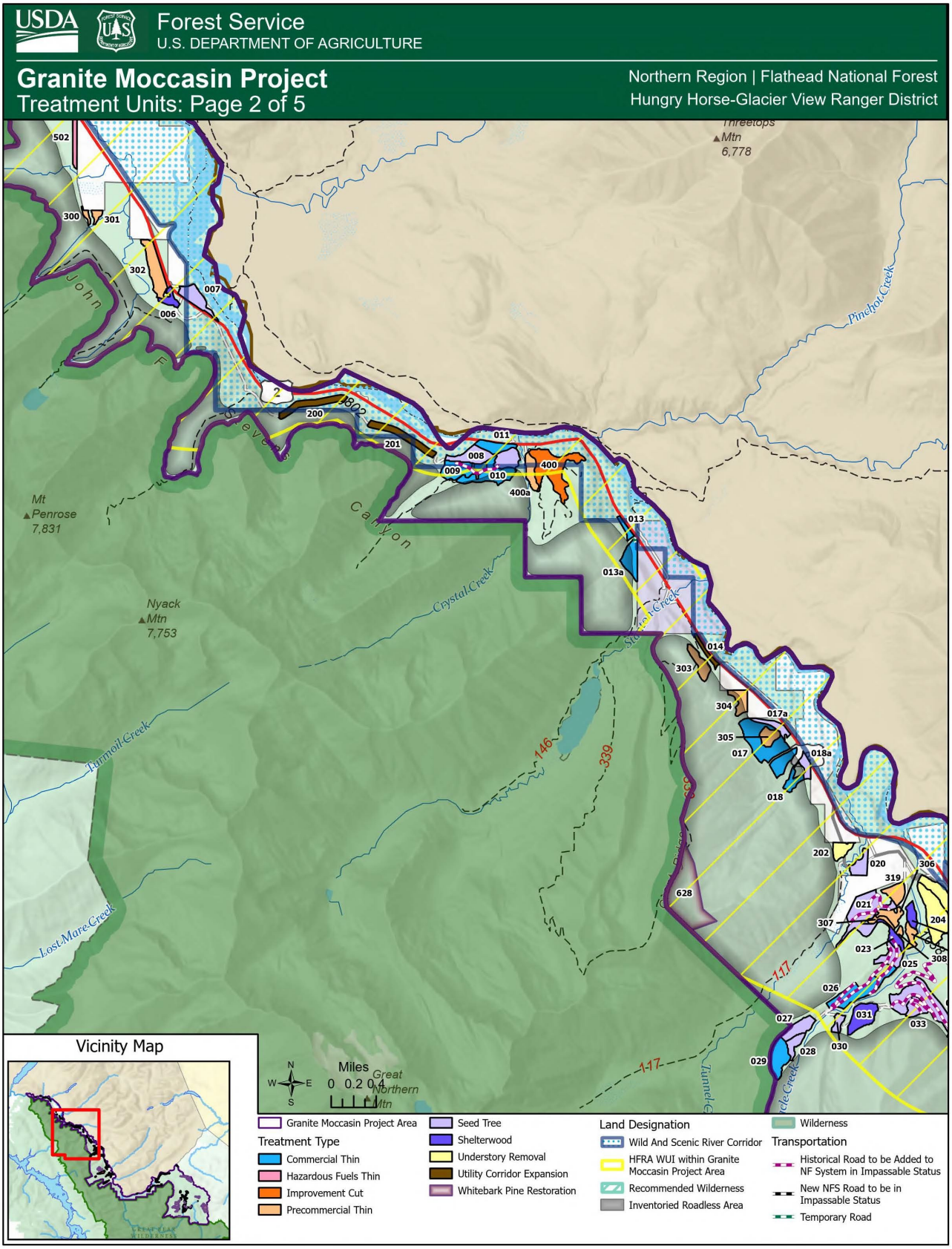

Figure 4. Granite Moccasin propose action, map 2 of 5

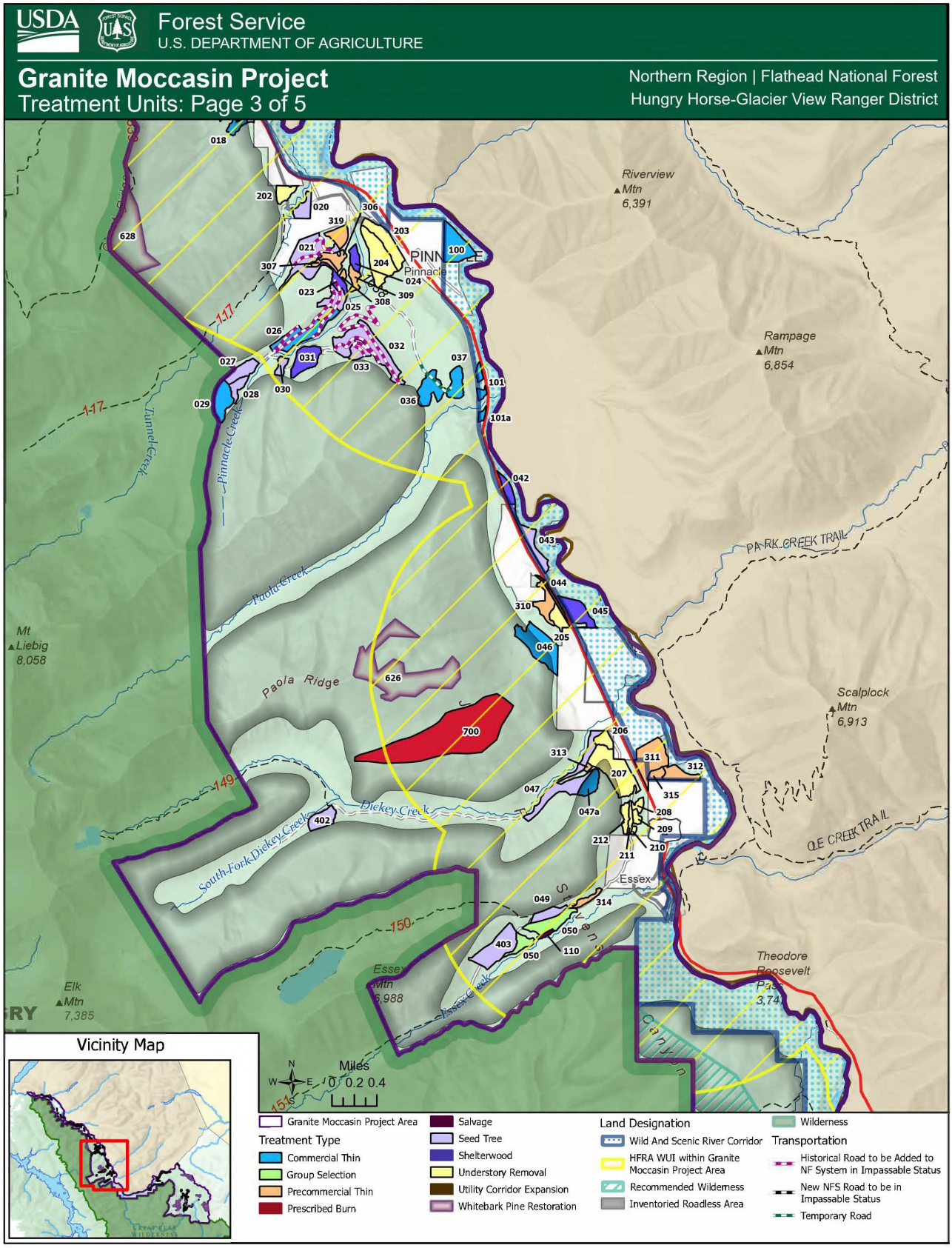

Figure 5. Granite Moccasin propose action, map 3 of 5

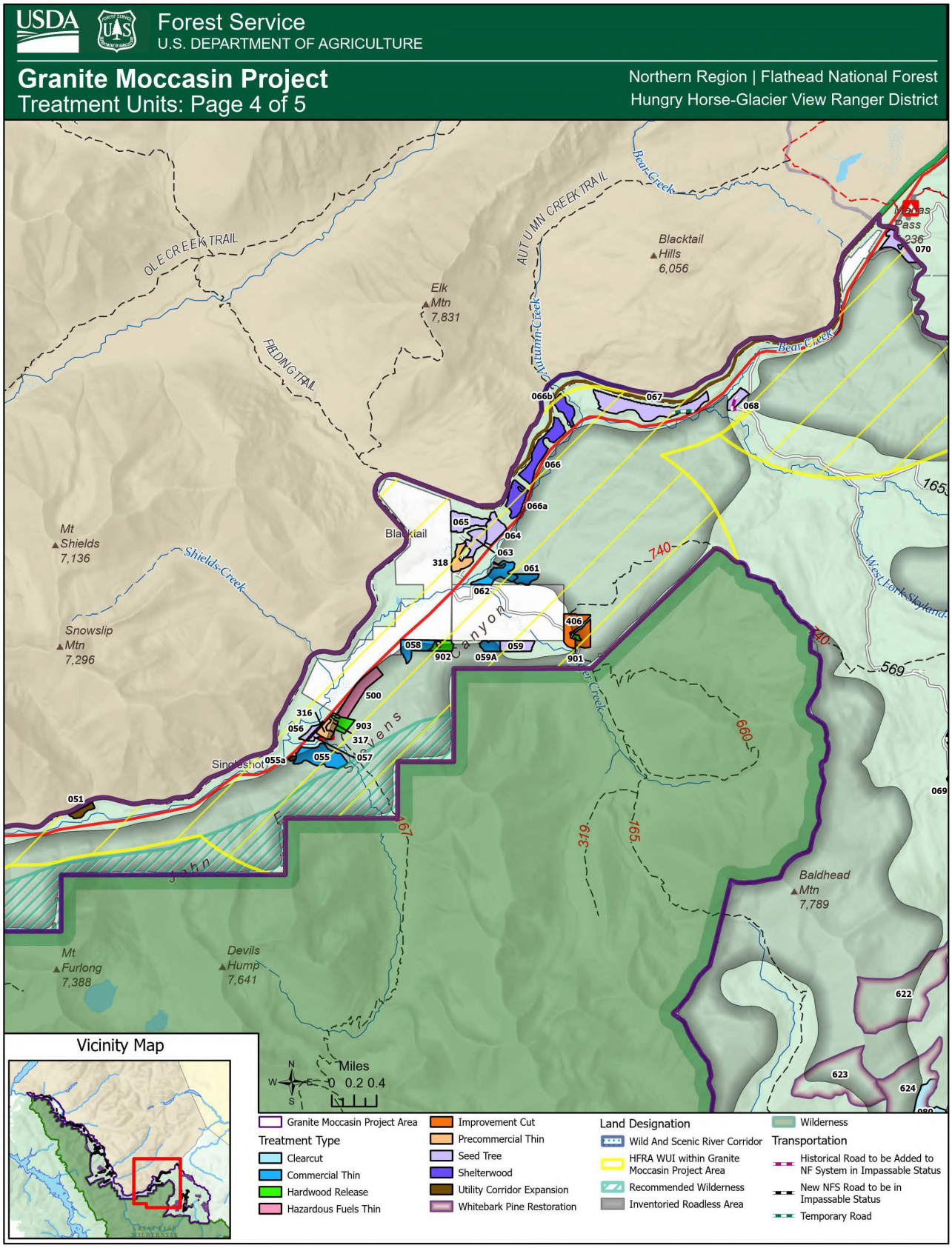

Figure 6. Granite Moccasin propose action, map 4 of 5

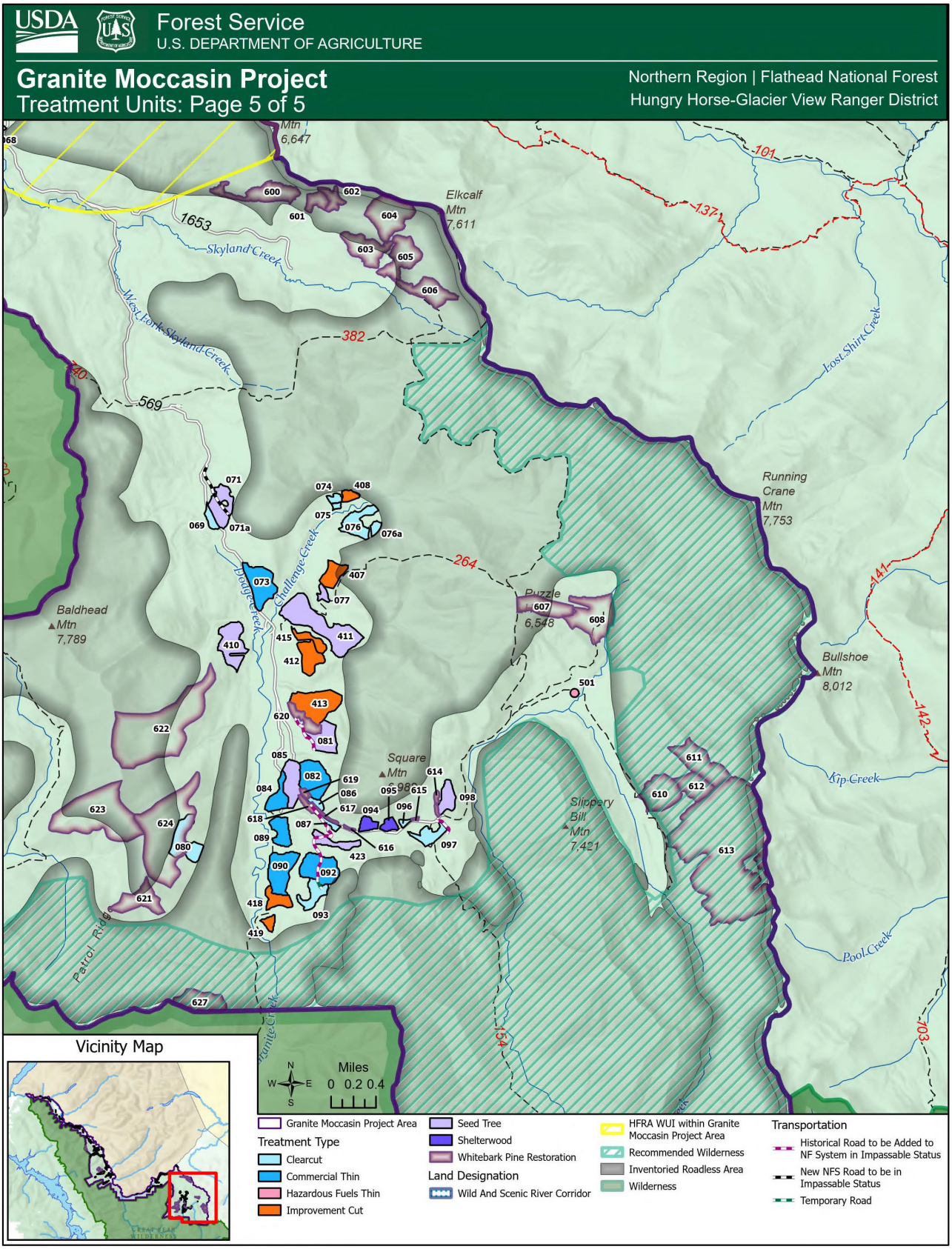

Figure 7. Granite Moccasin propose action, map 5 of 5

Appendix C – Proposed Vegetation Treatments by Unit

The following table provides a list of the proposed vegetation treatments by unit and which management area(s) they occur in. Locations of all treatments in the project area are displayed on maps in Appendix B.

Table 31. Proposed vegetation treatments by unit

Unit	Acres*	Treatment	Treatment Method	Management Area
001	2	Utility Corridor Expansion	Ground Based	2a
002	6	Utility Corridor Expansion	Ground Based	2a
003	14	Utility Corridor Expansion	Ground Based	2a
005	21	Utility Corridor Expansion	Ground Based	2a
006	12	Shelterwood	Ground Based	6a
007	23	Seed Tree	Hand	2a, 6a
008	45	Seed Tree	Ground Based	2a
009	30	Commercial Thin	Ground Based	2a, 6a
010	34	Commercial Thin	Ground Based	2a, 5c, 6a
011	16	Commercial Thin	Ground Based	2a
013	6	Commercial Thin	Ground Based	6a
013a	22	Commercial Thin	Ground Based	5c, 6a
014	7	Utility Corridor Expansion	Ground Based	6a
017	64	Commercial Thin	Ground Based	5c, 6a
017a	11	Seed Tree	Ground Based	6a
018	29	Commercial Thin	Ground Based	5c, 6a
018a	9	Seed Tree	Ground Based	6a
020	15	Seed Tree	Ground Based	6a
021	57	Seed Tree	Ground Based	6c
023	12	Shelterwood	Cable	6c
024	10	Shelterwood	Ground Based	6c
025	19	Seed Tree	Cable	6c
026	39	Commercial Thin	Ground Based	6b, 6c
027	19	Seed Tree	Ground Based	6b
028	12	Seed Tree	Ground Based	6b
029	27	Commercial Thin	Ground Based	6a, 6b
030	8	Seed Tree	Ground Based	6b
031	28	Shelterwood	Cable	6b
032	66	Seed Tree	Cable	6a, 6b, 6c
033	15	Seed Tree	Ground Based	6b
036	30	Commercial Thin	Ground Based	6a, 6c
037	20	Commercial Thin	Ground Based	6c
042	11	Shelterwood	Ground Based	2a
043	23	Seed Tree	Ground Based	2a
044	6	Clearcut	Ground Based	6c
045	28	Shelterwood	Ground Based	2a

Unit	Acres*	Treatment	Treatment Method	Management Area
046	55	Commercial Thin	Ground Based	6a, 6c
047	53	Seed Tree	Ground Based	6a, 6b, 6c
047a	17	Commercial Thin	Ground Based	6a
049	15	Seed Tree	Ground Based	6a, 7
050	40	Group Selection	Ground Based	7
051	8	Utility Corridor Expansion	Ground Based	6a
055	40	Commercial Thin	Ground Based	6a, 6c
055a	1	Utility Corridor Expansion	Ground Based	5c
056	5	Seed Tree	Ground Based	6a
057	3	Seed Tree	Ground Based	6a
058	21	Commercial Thin	Ground Based	5c, 6a
059	18	Seed Tree	Ground Based	6a
059a	10	Commercial Thin	Ground Based	6a
061	10	Commercial Thin	Ground Based	6a
062	23	Commercial Thin	Ground Based	6a
063	19	Seed Tree	Ground Based	6a
064	20	Seed Tree	Ground Based	6a
065	24	Seed Tree	Ground Based	6a
066	37	Shelterwood	Ground Based	6a
066a	24	Shelterwood	Ground Based	6a
066b	15	Shelterwood	Ground Based	6a
067	70	Seed Tree	Ground Based	6a
068	11	Seed Tree	Ground Based	6a
069	8	Clearcut	Ground Based	6b
070	20	Seed Tree	Ground Based	6a
071	17	Seed Tree	Ground Based	5c, 6b
071a	19	Seed Tree	Cable	6b
073	45	Commercial Thin	Ground Based	6b
074	5	Clearcut	Ground Based	6a
075	3	Clearcut	Ground Based	6a
076	31	Clearcut	Ground Based	6a
076a	6	Clearcut	Ground Based	6a
077	6	Seed Tree	Ground Based	6a
080	41	Clearcut	Ground Based	5c, 6a
081	31	Seed Tree	Ground Based	6b
082	44	Commercial Thin	Ground Based	6b
084	22	Commercial Thin	Ground Based	6a, 6b
085	33	Seed Tree	Cable	6b
086	5	Clearcut	Ground Based	6b
087	6	Clearcut	Ground Based	6b
089	23	Commercial Thin	Ground Based	6a
090	45	Commercial Thin	Ground Based	6a, 6b

Unit	Acres*	Treatment	Treatment Method	Management Area
092	47	Commercial Thin	Ground Based	5c, 6b
093	23	Clearcut	Ground Based	6b
094	10	Shelterwood	Ground Based	6a
095	9	Shelterwood	Ground Based	6a
096	3	Clearcut	Ground Based	6a
097	19	Clearcut	Ground Based	6a
098	20	Seed Tree	Ground Based	6a
100	40	Commercial Thin	Ground Based	2a
101	9	Commercial Thin	Ground Based	2a
101a	3	Commercial Thin	Ground Based	2a
110	3	Salvage	Ground Based	7
200	23	Utility Corridor Expansion	Hand	2a, 5a
201	24	Utility Corridor Expansion	Hand	2a, 5a
202	13	Understory Removal	Hand	6a
203	32	Understory Removal	Hand	6c
204	51	Understory Removal	Hand	6c
205	14	Understory Removal	Hand	6c
206	11	Understory Removal	Hand	6c
207	64	Understory Removal	Hand	6a. 6c
208	6	Understory Removal	Hand	6c
209	5	Understory Removal	Hand	6c
210	2	Understory Removal	Hand	6c
211	6	Understory Removal	Hand	6c
212	10	Understory Removal	Hand	6c
300	3	Precommercial Thin	Hand	6a
301	5	Precommercial Thin	Hand	6a
302	34	Precommercial Thin	Hand	6a
303	17	Precommercial Thin	Hand	6a
304	15	Precommercial Thin	Hand	6a
305	14	Precommercial Thin	Hand	6a
306	13	Precommercial Thin	Hand	6c
307	6	Precommercial Thin	Hand	6c
308	3	Precommercial Thin	Hand	6c
309	10	Precommercial Thin	Hand	6c
310	20	Precommercial Thin	Hand	6c
311	46	Precommercial Thin	Hand	2a, 6c
312	18	Precommercial Thin	Hand	2a
313	2	Precommercial Thin	Hand	6c
314	7	Precommercial Thin	Hand	7
315	8	Precommercial Thin	Hand	2a
316	8	Precommercial Thin	Hand	2a
317	6	Precommercial Thin	Hand	5c, 6a

Unit	Acres*	Treatment	Treatment Method	Management Area
318	16	Precommercial Thin	Hand	6a
319	15	Precommercial Thin	Hand	6c
400	60	Improvement Cut	Ground Based	2a, 6a
400a	16	Precommercial Thin	Hand	2a, 6a
402	21	Seed Tree	Ground Based	6a, 6b
403	48	Seed Tree	Ground Based	7
406	39	Improvement Cut	Ground Based	5c, 6a
407	22	Improvement Cut	Ground Based	5c, 6a
408	8	Improvement Cut	Ground Based	5c, 6a
410	45	Seed Tree	Ground Based	6b
411	92	Seed Tree	Ground Based	5c, 6a, 6b
412	28	Improvement Cut	Ground Based	6b
413	56	Improvement Cut	Ground Based	6b
415	14	Improvement Cut	Ground Based	6b
418	18	Improvement Cut	Ground Based	6a, 6b
419	7	Improvement Cut	Ground Based	6a
423	19	Seed Tree	Ground Based	6b
500	32	Hazardous Fuels Thin	Ground Based	5c
501	3	Hazardous Fuels Thin	Hand	6a
502	12	Hazardous Fuels Thin	Hand	6a
600	53	WBP Restoration – Daylight/Release	Hand	5c
601	16	WBP Restoration – Daylight/Release	Hand	5a, 5c
602	17	WBP Restoration – Daylight/Release	Hand	5a, 5c
603	49	WBP Restoration – Daylight/Release	Hand	5a, 5c, 6a
604	70	WBP Restoration – Daylight/Release	Hand	5a
605	51	WBP Restoration – Daylight/Release	Hand	5a, 6a
606	44	WBP Restoration – Daylight/Release	Hand	5a
607	43	WBP Restoration – Daylight/Release	Hand	5c, 6a
608	78	WBP Restoration – Daylight/Release and Plant	Hand	6a
610	56	WBP Restoration – Planting**	Hand	1b, 6a
611	62	WBP Restoration – Planting**	Hand	1b
612	35	WBP Restoration – Planting**	Hand	1b
613	492	WBP Restoration – Planting**	Hand	1b
614	5	WBP Restoration – Daylight/Release	Hand	6a

Unit	Acres*	Treatment	Treatment Method	Management Area
615	1	WBP Restoration – Daylight/Release	Hand	6a
616	2	WBP Restoration – Daylight/Release	Hand	6b
617	4	WBP Restoration – Daylight/Release	Hand	6b
618	6	WBP Restoration – Daylight/Release	Hand	6b
619	4	WBP Restoration – Daylight/Release	Hand	6b
620	19	WBP Restoration – Daylight/Release	Hand	6b
621	43	WBP Restoration – Daylight/Release	Hand	5c, 6a
622	229	WBP Restoration – RxB and Plant	Hand	6a, 6b
623	161	WBP Restoration – RxB and Plant	Hand	5c, 6a
624	193	WBP Restoration – RxB and Plant	Hand	5c, 6a
626	164	WBP Restoration – Planting**	Hand	5c
627	43	WBP Restoration – Planting**	Hand	1b
628	104	WBP Restoration – Daylight/Release and Plant	Hand	5a
700	240	Prescribed Burn	N/A	5c
800	18	Utility Corridor Expansion	Ground Based	2a
901	2	Hardwood Release	Ground Based	6a
902	10	Hardwood Release	Ground Based	6a
903	11	Hardwood Release	Ground Based	5c

*Only management area portions of units greater than 1 acre are listed in the table above.

**Planting is only expected to occur in portions (10 to 50 percent) of proposed WBP Restoration – Planting units. See treatment descriptions in the Proposed Action for additional information.

Management Area Direction

The forest plan provides an integrated set of management direction that provides for social, economic, and ecological sustainability and multiple uses of the Flathead National Forest's lands and resources. In addition to forestwide and geographic area direction, the forest plan designates management areas; these areas are assigned sets of plan components such as desired conditions, suitable uses, and in some areas either standards or guidelines or both. The Granite Moccasin project area is divided into the management areas shown in table 32.

Table 32. Management areas within the Granite Moccasin project area

Management area	Acres	Management area description
1b Recommended Wilderness	14,203 (21%)	Recommended wilderness areas preserve opportunities for inclusion in the National Wilderness Preservation System. The Forest maintains and protects the ecological and social characteristics that provide the basis for wilderness recommendation. Recommended wilderness areas are characterized by a natural environment where ecological processes such as natural succession, wildfire, avalanches, insects, and disease function with a limited amount of human influence.
2a Wild and Scenic Rivers	4,870 (7%)	Congressionally designated wild and scenic river. The recreation and scenic section of the Middle Fork of the Flathead River is in the project area.
5a Backcountry Non-Motorized Year-Round	6,007 (9%)	Backcountry area that provides for less developed recreation opportunities for year-round nonmotorized use.
5c Backcountry Motorized Over-Snow Vehicle Use	17,981 (27%)	Backcountry area that provides for less developed recreation opportunities for motorized over-snow vehicle use.
6a General Forest Low-Intensity Veg. Mgmt.	13,613 (20%)	A low intensity of timber harvest is expected in Management Area 6a, and regularly scheduled timber harvest would not occur (it is unsuitable for timber production). Management Area 6a is in areas with a higher level of other resource considerations or site limitations that would restrict active vegetation management compared to Management Area 6b or Management Area 6c.
6b General Forest Moderate-Intensity Veg. Mgmt.	4,973 (7%)	A medium intensity of timber harvest is expected to occur in Management Area 6b, and these areas will have regularly scheduled timber harvest (suitable for timber production). Management Area 6b is in areas where other resource considerations or site limitations are expected to restrict active vegetation more than in Management Area 6c.
6c General Forest High-Intensity Veg. Mgmt.	1,423 (2%)	A higher intensity of timber harvest is expected to occur in Management Area 6c compared to Management Area 6a or 6b, and these areas will have regularly scheduled timber harvest (suitable for timber production). Management Area 6c is in areas where other resource considerations or site limitations are expected to restrict vegetation treatments to a lesser degree than either 6a or 6b.
7 Focused Recreation Area	163 (1%)	Focused recreation areas typically feature certain types of recreation activities that take place near or at a large lake or reservoir, developed ski area, large campground, or trail system. Portions of the Essex Nordic Groomed Trail System occur in the project area.
Non-Forest Service	4,290	Not applicable

Geographic Area Direction

The forest plan divides the forest into six geographic areas and provides management direction specific to these areas that reflect community values and local conditions in the area. The Granite Moccasin project area is entirely within the Middle Fork Geographic Area. This project is consistent with all direction for the Middle Fork Geographic Area.

Appendix D – Example Existing Condition Images

Figure 8. Common condition of untreated or unburned stands within the project area

Figure 9. Douglas-fir mortality in Essex Creek caused by a complex of root disease and Douglas-fir beetle

Figure 10. An even-aged western larch stand of commercial size currently in need of thinning based on competition and crown closure

Appendix E – Past, Ongoing, and Reasonably Foreseeable Activities

These tables provides a summary of actions considered in the effects analyses for the Granite Moccasin Project because the responsible official determined this information supports reasoned decision making for this project (7 CFR 1b.5(b)(3). Resource specialists considered these past, ongoing, and reasonably foreseeable activities within their resource-specific analysis areas (as defined in their resource sections). In other words, the activities in this table overlap the Granite Moccasin analysis area in time or space, or both, and so these activities were considered in the environmental baseline. Ongoing activities include those where a decision has been made even if implementation has not started. Reasonably foreseeable are those projects in which proposals have been finalized or analysis is underway.

The appropriate resource specialist evaluated each action to determine whether it would affect the resource; this evaluation informs. Actions that were determined to have an effect are disclosed throughout the body of the environmental assessment within each resource section.

Table 33. Past, present, and reasonably foreseeable future actions: Vegetation management (excludes prescribed fire)

Activity	Past	Present (Ongoing)	Reasonably Foreseeable Future
Timber harvest (includes salvage cuts)	1950s = 22 acres 1960s = 1,560 acres 1970s = 2,473 1980s = 537 1990s = 893 2000s = 0 acres Since 2010 = 277 acres Total acres = 5,723	No commercial timber harvest is currently occurring within the project area. Salvage of dead trees by woodcutters is common within 100 feet from open roads.	None
Tree Planting	1950s = 0 acres 1960s = 0 acres 1970s = 669 acres 1980s = 630 acres 1990s = 771 acres 2000s = 1,093 acres Since 2010 = 453 acres Total acres = 3,616 acres	No planting activities are currently planned within the project area. The Paola Ridge (2018) fire totaled just over 1,100 acres and is still being assessed for natural regeneration. Natural regeneration is expected throughout the extent of this fire and planting is not expected to occur. Evaluation of those acres is planned for Fiscal year 2027.	None
Precommercial thinning	1950s = 0 acres 1960s = 14 acres 1970s = 0 acres 1980s = 298 acres 1990s = 175 acres 2000s = 0 acres Since 2010 = 28 acres Total acres = 515 acres	No sapling thinning is currently planned within the project area.	None

Activity	Past	Present (Ongoing)	Reasonably Foreseeable Future
Invasive Species Control	Since the 2010s, approximately 965 acres within the project area have been treated for invasive weeds. This includes 777 acres of pesticide application, 183 acres of biological control, and 5 acres of hand pulling, respectively.	Weed spraying is ongoing in the project area.	Spraying is expected to continue in these areas and others as needed in the foreseeable future.
Active Sales within Project Area	None	None	Timber sales resulting from decision of this project.

Table 34. Past, present, and reasonably foreseeable future actions: Fire/fuels

Activity	Past	Present (Ongoing)	Reasonably Foreseeable Future
Fuels Treatment Note that some of the acres in the Past treatment column are iterative in those activities occurred within the same footprint on different years. Yarding (1120) activities were not included based on those acres consistently overlapping with Piling acres within the same footprint.	Fuels Treatments: Piling of Material 1950s = 22 acres 1960s = 388 acres 1970s = 1,624 1980s = 370 acres 1990s = 339 acres 2000s = 0 acres Since 2010 = 101 acres Burning of Piled Material: 1960s = 495 acres 1970s = 20 acres 1980s = 377 acres 1990s = 437 acres 2000s = 26 acres Since 2010 = 238 acres Chipping of Piled Material: 1970s = 174 acres Rearrangement of Fuels: 1990s = 45 acres Since 2010 = 305 acres Fuel Break: 1990s = 3 acres Since 2010 = 116 acres Site Preparation for Natural Regeneration: 1950s = 22 acres 1960s = 366 acres 1970s = 772 acres 1980s = 133 acres 1990s = 49 acres Since 2010 = 155 acres	There are no ongoing projects within the Granite Moccasin project area that have project-specific unaccomplished fuels treatments. However, utility companies are continuously cutting hazard trees that could impact the utilities, and ongoing right-of-way clearing and maintenance underneath powerlines is likely to occur.	Utility companies are continuously cutting hazard trees that could impact the utilities, and ongoing right-of-way clearing and maintenance underneath powerlines is likely to occur
Prescribed Fire	Prescribed fire has occurred on 1,918 acres since the 1960s. 90 acres since 2000 from the 2018 Paola Fire: Broadcast: 1,396 acres Underburn and Jackpot Burning: 522 acres	536 acres of prescribed fire were proposed under the Middle Fork Fuels project that have not been completed to date. Opportunities to complete these are continually evaluated.	None

Activity	Past	Present (Ongoing)	Reasonably Foreseeable Future
Wildfire History	Between 1982 and 1929 over 21,000 acres burned within the project area. Between 1929 and 1992 a relatively fire-free interval persisted with under 1,000 burning during that period. Beginning in 1998 fire again became more prevalent with just over 12,000 acres burning between 1998 and 2011. Most recently the Granite and Sheep (2015) fires as well as the Paola Ridge (2018) fire burned nearly 5,000 acres total with just under 2,000 acres burned within the project area boundary. Those fires posed significant threats to local communities. The project area has an abundant and robust wildfire history. Focusing on the most recent large wildfires starting after 2000. In 2001 Ear Fire, 2007 Skyland, 2011 Puzzle, 2015 Granite and Sheep, to the most recent 2018 Paola Ridge	No fires are currently burning within the project area.	Lightning and human caused fires will continue to occur and be suppressed within the project area.
Hazard Tree, Firewood, and Blowdown Removal	Ongoing at trailheads and along open roads.	Ongoing at trailheads and along open roads.	Ongoing at trailheads and along open roads.

Activity	Past	Present (Ongoing)	Reasonably Foreseeable Future
Wildfire suppression activities	Lightning has been the major cause of wildfires in this project area. Efforts to suppress wildfire can include surface disturbing actions to create fire line and fuel breaks which may alter hydrologic processes and contribute sediment to area streams. Depending on fire location, values at risk, and resources available, fire managers have that ability to manage fires on the landscape utilizing different methods other than full suppression. The recent wildfires within the project area boundary that have been suppressed, have typically been less than five acres. Fire variety of suppression activities occur and will continue to occur as needed to protect values at risk.	Lightning has been the major cause of wildfires in this project area. Efforts to suppress wildfire can include surface disturbing actions to create fire line and fuel breaks which may alter hydrologic processes and contribute sediment to area streams. Depending on fire location, values at risk, and resources available, fire managers have that ability to manage fires on the landscape utilizing different methods other than full suppression. The recent wildfires within the project area boundary that have been suppressed, have typically been less than five acres. Fire variety of suppression activities occur and will continue to occur as needed to protect values at risk.	Lightning has been the major cause of wildfires in this project area. Efforts to suppress wildfire can include surface disturbing actions to create fire line and fuel breaks which may alter hydrologic processes and contribute sediment to area streams. Depending on fire location, values at risk, and resources available, fire managers have that ability to manage fires on the landscape utilizing different methods other than full suppression. The recent wildfires within the project area boundary that have been suppressed, have typically been less than five acres. Fire variety of suppression activities occur and will continue to occur as needed to protect values at risk.

Table 35. Past, present, and reasonably foreseeable actions: Recreation

Activity	Past	Present (Ongoing)	Reasonably Foreseeable Future
Trails	Continued maintenance of developed trails	Continued maintenance of developed trails	Continued maintenance of developed trails.
Public Recreation	Sightseeing, hiking, backpacking, horseback riding, camping, boating, hunting, biking, fishing, snowmobiling, cross-country skiing, huckleberry picking, driving for pleasure, and dispersed recreation occurs in the project area.	Sightseeing, hiking, backpacking, horseback riding, camping, boating, hunting, biking, fishing, snowmobiling, cross-country skiing, huckleberry picking, driving for pleasure, and dispersed recreation occurs in the project area.	Sightseeing, hiking, backpacking, horseback riding, camping, boating, hunting, biking, fishing, snowmobiling, cross-country skiing, huckleberry picking, driving for pleasure, and dispersed recreation occurs in the project area. The Three Forks of the Flathead Joint Comprehensive River Management Plan is currently under development.
Recreation special use permits on NFS land	Ski trail grooming, outfitting and guiding, commercial Nordic skiing, concession campground, recreation residences, Essex Townsite, Challenge Cabin rental (winter only)	Ski trail grooming, outfitting and guiding, commercial Nordic skiing, concession campground, recreation residences, Essex Townsite, Challenge Cabin rental (winter only)	Ski trail grooming, outfitting and guiding, commercial Nordic skiing, concession campground, recreation residences, Essex Townsite, Challenge Cabin rental (winter only), The Three Forks of the Flathead Joint Comprehensive River Management Plan is currently under development.

Table 36. Past, present, and reasonably foreseeable actions: Access management

Activity	Past	Present (Ongoing)	Reasonably Foreseeable Future
NFS Road maintenance.	Road maintenance is a past, present, and reasonably foreseeable activity in the project area.	Road maintenance is a past, present, and reasonably foreseeable activity in the project area.	Road maintenance is a past, present, and reasonably foreseeable activity in the project area.
Aquatic Restoration (stream crossing improvements, culvert removal, road decommissioning)	Aquatic restoration activities to address road sediment delivery, hydrologic function, aquatic organism passage, and road/stream connectivity have not occurred in project area watersheds.	No current aquatic restoration projects are planned within project area watersheds.	None

Table 37. Past, present and reasonably foreseeable actions: Other Activities

Activity	Past	Present (Ongoing)	Reasonably Foreseeable Future
Private land development	None Anticipated	None Anticipated	None Anticipated
Non-recreation special use permits on NFS land	Fiber optic cable lines, powerlines, telephone and communication lines, private mobile radio service, communications facilities, weather stations, oil and gas pipelines, water transmission lines, DOT easements, railroad right-of-ways, private access roads, research studies, resource monitoring sites, military training areas, service buildings, signs, use and maintenance of hay cultivation fields	Fiber optic cable lines, powerlines, telephone and communication lines, private mobile radio service, communications facilities, weather stations, oil and gas pipelines, water transmission lines, DOT easements, railroad right-of-ways, private access roads, research studies, resource monitoring sites, military training areas, service buildings, signs, use and maintenance of hay cultivation fields	Fiber optic cable lines, powerlines, telephone and communication lines, private mobile radio service, communications facilities, weather stations, oil and gas pipelines, water transmission lines, DOT easements, railroad right-of-ways, private access roads, research studies, resource monitoring sites, military training areas, service buildings, signs, use and maintenance of hay cultivation fields
Forest products gathering	Personal use firewood cutting, Christmas tree harvesting, bough and cone collection, and huckleberry picking are all past, current, and reasonably foreseeable activities in the project area.	Personal use firewood cutting, Christmas tree harvesting, bough and cone collection, and huckleberry picking are all past, current, and reasonably foreseeable activities in the project area.	Personal use firewood cutting, Christmas tree harvesting, bough and cone collection, and huckleberry picking are all past, current, and reasonably foreseeable activities in the project area.
Grazing	None	None	None
Pits and Quarries	14 pits and quarries exist within project area. All have been used for material in the past.	14 pits/quarries exist within project boundary. Pits within the project area have limited activities occurring at this time.	It is possible that some of the gravel pits in the project area may be needed for road activities associated with Granite Moccasin.

Appendix F – Supporting Wildlife Data

The data in this appendix support the analyses provided in the Environmental Impacts sections for grizzly bear and Canada lynx.

Grizzly Bear – Potentially Affected Environment

Table 38. Estimated seasonal habitat in the affected subunits, in acres and percent of total

Subunit	Total acres	Denning habitat[1]	Spring habitat[2]
Dicky Java	26,571	11,296 (42%)	6,780 (25%)
Long Dirtyface	38,560	17,385 (45%)	9,228 (24%)
Moccasin Crystal	22,680	6,266 (28%)	8,707 (38%)
Skyland Challenge	30,621	18,499 (60%)	7,552 (25%)
Stanton Paola	23,377	8,412 (36%)	7,534 (32%)
Tranquil Geifer	42,574	20,246 (48%)	12,557 (30%)

[1]Modeled grizzly bear denning habitat for the Northern Continental Divide Ecosystem based on analysis and modeling by Rick Mace in 2014.

[2]Spring habitat estimated considers aspect, elevation, riparian areas, and proximity away from open roads.

Table 39. Estimated existing habitat providing potential forage and cover in affected subunits, in acres and percent of total

Subunit	Total acres	Forage[1]	Cover	Water	Urban
Dicky Java	26,571	11,791 (44%)	14,457 (54%)	245 (1%)	77 (0%)
Long Dirtyface	38,560	13,683 (35%)	24,719 (64%)	157 (0%)	0 (0%)
Moccasin Crystal	22,680	6,760 (30%)	15,498 (68%)	317 (1%)	105 (0%)
Skyland Challenge	30,621	10,181 (33%)	20,396 (67%)	4 (0%)	40 (0%)
Stanton Paola	23,377	7,408 (32%)	15,607 (67%)	249 (1%)	112 (0%)
Tranquil Geifer	42,574	9,602 (23%)	32,607 (77%)	202 (0%)	163 (0%)

[1]Stands identified as sparsely vegetated, herb, shrub, deciduous, transitional, or canopy cover of less than 25 percent.

Grizzly Bear – Effects of the Action Alternative

Table 40. Estimated reduction in hiding cover by proposed vegetation management in the affected bear management subunit, in acres and percent of cover

Subunit	Total acres	Existing cover Acres (% of total)	Post-project cover Acres (% of total)	Reduction in hiding cover Acres (% of cover)	Existing Forage Acres (% of total)	Post-project forage Acres (% of total)	Increase in forage Acres (% of total)
Dicky Java	26,571	14,457 (54%)	13,987 (53%)	470 (1%)	11,791 (44%)	12,262 (46%)	470 (2%)
Long Dirtyface	38,560	24,719 (64%)	24,719 (64%)	0 (0%)	13,683 (35%)	13,683 (35%)	0 (0%)
Moccasin Crystal	22,680	15,498 (68%)	15,332 (68%)	166 (0%)	6,760 (30%)	6,926 (31%)	166 (1%)
Skyland Challenge	30,621	20,396 (67%)	19,912 (65%)	484 (2%)	10,181 (33%)	10,665 (35%)	484 2%)
Stanton Paola	23,377	15,607 (67%)	15,319 (66%)	289 (1%)	7,408 (32%)	7,696 (33%)	289 (1%)
Tranquil Geifer	42,574	32,607 (77%)	32,374 (76%)	232 (1%)	9,602 (23%)	9,835 (23%)	232 (1%)

Canada Lynx – Potentially Affect Environment

Table 41. Estimated existing condition of potential lynx habitat by structural stage in acres and percentage of lynx habitat in the affected LAUs

Lynx Analysis Unit	Total Acres	Lynx Habitat Acres (% of total)	Early Stand Initiation[1] Acres (% of lynx habitat)	Stand Initiation[2] Acres (% of lynx habitat)	Multistory[3] Acres (% of lynx habitat)	Other[4] Acres (% of lynx habitat)	Percentage Regenerated in 10 years*
Bear Creek	24,415	19,344 79%)	2,092 (11%)	1,835 (9%)	9,789 (51%)	5,628 (29%)	0%
Challenge Granite	18,472	16,860 91%)	1,625 (10%)	1,383 (8%)	7,169 (43%)	6,683 (40%)	0%
Dirtyface Spruce	16,256	12,843 (79%)	1,632 (13%)	1,002 (8%)	8,150 (63%)	2,059 (16%)	0%
Essex Java	17,607	13,294 (76%)	2,309 (17%)	665 (5%)	8,572 (64%)	1,749 (13%)	0%
Moccasin Nyack	20,664	13,542 (66%)	568 (4%)	2,458 (18%)	9,109 (67%)	1,407 (10%)	0%
Paola Ridge	13,838	10,431 (75%)	1,636 (16%)	635 (6%)	5,887 (56%)	2,273 (22%)	1%
Slippery Bill	13,938	12,294 (88%)	1,496 (12%)	537 (4%)	5,440 (44%)	4,821 (39%)	0%

Lynx Analysis Unit	Total Acres	Lynx Habitat Acres (% of total)	Early Stand Initiation[1] Acres (% of lynx habitat)	Stand Initiation[2] Acres (% of lynx habitat)	Multistory[3] Acres (% of lynx habitat)	Other[4] Acres (% of lynx habitat)	Percentage Regenerated in 10 years*
Stanton Grant	22,986	17,590 (77%)	920 (5%)	2,427 (14%)	10,833 (62%)	3,410 (19%)	0%
Vinegar Moose	25,510	20,561 (81%)	2,428 (12%)	2,742 (13%)	8,246 (40%)	7,145 (35%)	0%

[1]Stand initiation structural stage where trees are not tall enough to protrude above the snow in winter; may provide summer foraging habitat.

[2]Stand initiation structural stage with sufficient above the snow vegetative density to provide winter foraging habitat.

[3]Multistory structural stage with many age classes and vegetation layers with sufficient density to provide winter foraging habitat; may provide denning habitat.

[4]Other (stem exclusion) structural stage with closed canopy and limited understory or with multistory structure without sufficient density to provide winter foraging habitat; may provide denning habitat.

Table 42. Estimated existing condition of critical habitat by PCE in the affected lynx analysis units, in acres and percent of critical habitat

LAU	Critical Habitat Acres	Early Stand Initiation[1]	Stand Initiation[2]	Multistory[3]	Other[4] (stem exclusion)	Matrix Habitat[5]
Bear Creek	24,415 (100%)	2,092 (9%)	1,835 (8%)	9,789 (40%)	5,628 (23%)	5,071 (21%)
Challenge Granite	18,472 (100%)	1,625 (9%)	1,383 (7%)	7,169 (39%)	6,683 (36%)	1,612 (9%)
Dirtyface Spruce	16,256 (100%)	1,632 (10%)	1,002 (7%)	8,150 (50%)	2,059 (13%)	3,412 (21%)
Essex Java	17,606 (100%)	2,309 (13%)	665 (4%)	8,574 (49%)	1,749 (10%)	4,313 (24%)
Moccasin Nyack	16,928 (82%)	568 (3%)	2,454 (14%)	9,032 (53%)	1,361 (8%)	3,513 (21%)
Paola Ridge	13,836 (100%)	1,336 (12%)	635 (5%)	5,887 (43%)	2,271 (16%)	3,408 (25%)
Slippery Bill	13,938 (100%)	1,496 (11%)	537 (4%)	5,440 (39%)	4,821 (35%)	1,644 (12%)
Stanton Grant	22,849 (99%)	920 (4%)	2,427 (11%)	10,833 (47%)	3,407 (15%)	5,263 (23%)
Vinegar Moose	25,510 (100%)	2,428 (10%)	2,742 (11%)	8,246 (32%)	7,145 (28%)	4,949 (19%)

[1]Early stand initiation structural stage does not yet provide winter snowshoe hare habitat because the trees have not grown tall enough to protrude above the snow in winter; early stand initiation is a component of the boreal forest CH mosaic of successional stages – relates to PCE1a.

[2]Stand initiation structural stage that currently provides winter snowshoe hare habitat because the trees have grown tall enough to protrude above the snow in winter– relates to PCE1a.

[3]Multistory structural stage with many age classes and vegetation layers that provide snowshoe hare habitat, dense horizontal cover – relates to both PCE1a - and PCE1c.

[4]Stem exclusion structural stage - closed overstory canopy with limited understory vegetation; does not provide snowshoe hare habitat because they do not provide enough dense horizontal cover – likely relates to PCE1c.

[5]Matrix habitat includes dry forest habitat types, rock outcrops, sites dominated by dry grass/forb/shrubs, low elevations – PCE1d.

Canada Lynx – Effects of the Action Alternative

Table 43. Estimated acres of potential lynx habitat by structural stage proposed to be treated in affected LAUs

LAU	Total Acres	Lynx Habitat Acres	Early Stand Initiation[1] (not providing winter forage)	Stand Initiation[2] (winter forage)	Multistory[3] (forage)	SE/Other[4] (non-forage)	Non-habitat
Bear Creek	24,415	19,344 (79%)	316	15	24	450	0
Challenge Granite	18,472	16,860 (91%)	0	0	3	1,344	0
Dirtyface Spruce	16,256	12,843 (79%)	0	0	0	0	0
Essex Java	17,607	13,294 (76%)	10	0	48	55	0
Moccasin Nyack	20,664	13,542 (66%)	0	0	0	0	147
Paola Ridge	13,838	10,431 (75%)	66	28	240	604	0
Slippery Bill	13,938	12,294 (88%)	645	0	121	31	0
Stanton Grant	22,986	17,590 (77%)	32	111	10	66	0
Vinegar Moose	25,510	20,561 (81%)	0	0	0	162	0
Total Acres Affected	Not applicable	Not applicable	1,069	154	446	2,713	147

[1]Stand initiation structural stage where the trees are not tall enough to protrude above the snow in winter; may provide summer foraging habitat.

[2]Stand initiation structural stage with sufficient above the snow vegetative density to provide winter foraging habitat.

[3]Multistory structural stage with many age classes and vegetation layers with sufficient density to provide winter foraging habitat; may provide denning habitat.

[4]Other (stem exclusion) structural stage with closed canopy and limited understory or with multistory structure without sufficient density to provide winter foraging habitat; may provide denning habitat.

Table 44. Summary of estimated changes to potential lynx habitat by structural stage through proposed vegetation management in affected LAUs, shown in increases and decreases in acres

LAU	Early Stand Initiation[1] (not providing winter forage)	Stand Initiation[2] (winter forage)	Multistory[3] (forage)	Other[4] (non-forage)
Bear Creek	290	-15	-24	-252
Challenge Granite	423	0	-3	-420
Dirtyface Spruce	0	0	0	0
Essex Java	103	0	-48	-55
Moccasin Nyack	0	0	0	0
Paola Ridge	417	-28	-240	-149
Slippery Bill	26	0	-121	95
Stanton Grant	503	-111	-10	-381
Vinegar Moose	0	26	0	0

LAU	Early Stand Initiation[1] (not providing winter forage)	Stand Initiation[2] (winter forage)	Multistory[3] (forage)	Other[4] (non-forage)
Total Change (Acres)	1,762	-128	-446	-1,163

1 Stand initiation structural stage where the trees are not tall enough to protrude above the snow in winter; may provide summer foraging habitat.

2 Stand initiation structural stage with sufficient above the snow vegetative density to provide winter foraging habitat.

3 Multistory structural stage with many age classes and vegetation layers with sufficient density to provide winter foraging habitat; may provide denning habitat.

4 Other (stem exclusion) structural stage with closed canopy and limited understory or with multistory structure without sufficient density to provide winter foraging habitat; may provide denning habitat.

Table 45. Estimated post-project condition of potential lynx habitat by structural stage in affected LAUs

Lynx Analysis Unit	Total Acres	Lynx Habitat Acres (% of total)	Early Stand Initiation[1] Acres (% of lynx habitat)	Stand Initiation[2] Acres (% of lynx habitat)	Multistory[3] Acres (% of lynx habitat)	Other[4] Acres (% of lynx habitat)	Percentage Regenerated in 10 years*
Bear Creek	24,415	19,344 (79%)	2,382 (12%)	1,820 (9%)	9,765 (50%)	5,377 (28%)	1%
Challenge Granite	18,472	16,860 (91%)	2,048 (12%)	1,383 (8%)	7,166 (43%)	6,263 (37%)	3%
Dirtyface Spruce	16,256	12,843 (79%)	1,632 (13%)	1,102 (8%)	8,150 (63%)	2,059 (16%)	0%
Essex Java	17,607	13,294 (76%)	2,412 (18%)	665 (5%)	8,524 (64%)	1,694 (13%)	1%
Moccasin Nyack	20,664	13,542 (66%)	568 (4%)	2,458 (18%)	9,109 (67%)	1,407 (10%)	0%
Paola Ridge	13,838	10,431 (75%)	2,053 (20%)	607 (6%)	5,648 (54%)	2,123 (20%)	5%
Slippery Bill	13,938	12,294 (88%)	1,522 (12%)	537 (4%)	10,823 (43%)	3,029 (40%)	0%
Stanton Grant	22,986	17,590 (77%)	1,423 (8%)	2,316 (13%)	10,823 (62%)	3,029 (17%)	2%
Vinegar Moose	25,510	20,561 (81%)	2,428 (12%)	2,742 (13%)	8,246 (40%)	7,145 (35%)	0%

[1] Stand initiation structural stage where the trees are not tall enough to protrude above the snow in winter; may provide summer foraging habitat.

[2] Stand initiation structural stage with sufficient above the snow vegetative density to provide winter foraging habitat.

[3] Multistory structural stage with many age classes and vegetation layers with sufficient density to provide winter foraging habitat; may provide denning habitat.

[4] Other (stem exclusion) structural stage with closed canopy and limited understory or with multistory structure without sufficient density to provide winter foraging habitat; may provide denning habitat.

*Number of acres regenerated within mapped lynx habitat (VEG S2)

Table 46. Estimated acres of lynx critical habitat by PCE proposed to be treated

LAU	Critical Habitat Acres	PCE1a – Stand Initiation, Early Stand Initiation, and Multistory	PCE1c – Denning Habitat	Stem Exclusion, Non-foraging	PCE1d – Matrix Habitat
Bear Creek	19,344	355	473	450	0
Challenge Granite	16,860	3	1,347	1,344	0
Dirtyface Spruce	12,843	0	0	0	0
Essex Java	13,293	58	103	55	0
Moccasin Nyack	13,415	0	0	0	0
Paola Ridge	10,429	334	844	604	0
Slippery Bill	12,294	766	152	31	0
Stanton Grant	17,587	153	866	856	0
Vinegar Moose	20,561	0	162	162	0
Total PCE Acres		1,669	3,947	3,502	0

Note: Some acres are shown in more than one column. Multistory PCE 1a also provides PCE 1c denning habitat. The same is true of “Stem-exclusion non-foraging” due to the amount of downfall and the proximity of feeding habitats.

Table 47. Summary of estimated changes to critical habitat, shown in increases and decreases in acres

LAU	Critical Habitat (Acres)	PCE1a – Stand Initiation, Early Stand Initiation, and Multistory	PCE1c - Denning Habitat	Stem Exclusion, Non-foraging	PCE1d - Matrix Habitat
Bear Creek	19,344	252	-275	-252	0
Challenge Granite	16,860	420	-423	-420	0
Dirtyface Spruce	12,843	0	0	0	0
Essex Java	13,293	55	-103	310	0
Moccasin Nyack	13,415	0	0	0	0
Paola Ridge	10,429	149	-389	-149	0
Slippery Bill	12,294	-95	-26	95	0
Stanton Grant	17,587	1145	-392	-381	0
Vinegar Moose	20,561	0	0	0	0
Total change		1,926	-1,608	-797	0

Note: Some acres are shown in more than one column. Multistory PCE 1a also provides PCE 1c denning habitat. The same is true of “Stem-exclusion non-foraging” due to the amount of downfall and the proximity of feeding habitats.

Table 48. Estimated post-project condition - lynx critical habitat by structural stage in affected LAUs in acres

LAU	Critical Habitat (Acres)	Early Stand Initiation[1]	Stand Initiation[2]	Multistory[3]	Other[4] (stem exclusion)	Matrix Habitat[5]
Bear Creek	24,415 (100%)	2,382 (10%)	1,820 (7%)	9,765 (40%)	5,377 (22%)	5,071 (21%)
Challenge Granite	18,472 (100%)	2,048 (11%)	1,383 (7%)	7,166 (39%)	6,263 (34%)	1,612 (9%)
Dirtyface Spruce	16,256 (100%)	1,632 (10%)	1,002 (6%)	8,150 (50%)	2,059 (13%)	3,412 (21%)
Essex Java	17,606 (100%)	2,412 (14%)	665 (4%)	8,523 (48%)	1,694 (10%)	4,313 (24%)
Moccasin Nyack	16,928 (82%)	568 (3%)	2,454 (14%)	9,032 (53%)	1,361 (8%)	3,513 (21%)
Paola Ridge	13,836 (100%)	2,053 (15%)	607 (4%)	5,648 (41%)	2,122 (15%)	3,408 (25%)
Slippery Bill	13,938 (100%)	1,522 (11%)	537 (4%)	5,319 (38%)	4,916 (35%)	1,644 (12%)
Stanton Grant	22,849 (99%)	1,423 (6%)	2,316 (10%)	10,823 (47%)	3,026 (13%)	5,263 (23%)
Vinegar Moose	25,510 (100%)	2,428 (10%)	2,724 (11%)	8,246 (32%)	7,145 (28%)	4,949 (19%)

[1] Early stand initiation structural stage does not yet provide winter snowshoe hare habitat because the trees have not grown tall enough to protrude above the snow in winter; early stand initiation is a component of the boreal forest CH mosaic of successional stages – relates to PCE1a.

[2] Stand initiation structural stage that currently provides winter snowshoe hare habitat because the trees have grown tall enough to protrude above the snow in winter– relates to PCE1a.

[3] Multistory structural stage with many age classes and vegetation layers that provide snowshoe hare habitat, dense horizontal cover – relates to both PCE1a - and PCE1c.

[4] Stem exclusion structural stage - closed overstory canopy with limited understory vegetation; multistory structural stage with many age classes and vegetation layers that do not provide snowshoe hare habitat because they do not provide enough dense horizontal cover – likely relates to PCE1c.

[5] Matrix habitat includes dry forest habitat types, rock outcrops, sites dominated by dry grass/forb/shrubs, low elevations – PCE1d.

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