Greenhorn Vegetation Project
APPENDIX A:
Wildlife Report
Biological Evaluation

JENNA ROOSE
Madison District Wildlife Biologist

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Introduction

This report provides an analysis of the environmental baseline and effects to terrestrial wildlife from implementation of the proposed Greenhorn project located on the Madison Ranger District, Beaverhead-Deerlodge National Forest (BDNF), also referred to as "The Forest".

Forest Service policy (FSM 2672.4) requires review of all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on Threatened, Endangered and Sensitive (TES) wildlife species. The Biological Evaluation (BE) is the means for documenting effects (FSM 2672.43). This document serves as the BE for sensitive species. A Biological Assessment (BA) for impacts to threatened Canada lynx and grizzly bears will be prepared separately to meet Endangered Species Act (ESA) Section 7 requirements.

The BE process (FSM 2672.43) consists of the following steps:

i) Pre-field review - a list of potentially affected species is identified after reviewing official Federal and State lists, observation, and habitat data;

ii) Field reconnaissance - the project site is visited, habitats described, and any incidental sign or sightings of animals are recorded. If suitable habitat exists and/or a species is likely to occur in the vicinity, then it is given due consideration regardless of direct evidence found during the site visit. There may be cases where systematic surveys for animals are appropriate, depending on the issues surrounding the project.

iii) Conflict determination - The biologist considers the project design and the existing habitat conditions to determine the effects, if any, the project would have on species. If the potential for adverse conflict exists:

(1) The project may be modified so as to remove the conflict; or

(2) If the project cannot be modified

(a) Formal consultation (or conference) with the U.S. Fish and Wildlife Service (USFWS) is initiated for Federally listed (or proposed) species; and

(b) An analysis of the significance of effects is initiated and further steps are taken for Forest Service Sensitive species.

Summary of Effects to Wildlife Species

Table 1 summarizes the effects to wildlife species analyzed in detail by alternative. These species were analyzed in detail because they have the greatest potential to experience effects (direct or indirect/habitat) from the proposed action, they are ESA listed species or Regional Foresters Sensitive Species and the proposed action was modified and design features were included to minimize effects to these species.

A comprehensive list of Regional Foresters Sensitive Species and Management Indicator Species can be found in Table 21. Other species and habitat features that were brought up during the public comment period are specifically addressed following the Listed species. This includes migratory birds, Rocky Mountain Elk, Moose, Northern Goshawk, Great Gray Owl, species associated with snags and effects to wildlife connectivity and linkages.

Table 1. Summary of effects determinations to wildlife species analyzed in detail by alternative

Species	Status	Alternative 1: No Action	Alternative 2: Proposed Action
Canada Lynx	ESA Threatened	NE	NLAA
Grizzly Bear	ESA Threatened	NE	LAA
North American Wolverine	ESA Proposed	NE	No Jeopardy
Bighorn Sheep	Regional Forester-Designated Sensitive Species	MIIH	MIIH
Greater-sage grouse		MIIH	MIIH

NE= No effect.
NLAA= May affect, not likely to adversely affect (NLAA).
NI= No impact.
MIIH= May impact individuals or habitat, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.
MIVH= May impact individuals or habitat and would likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Wildlife Design Features

All design features for wildlife can be found in the Design Feature Appendix C.

Analysis Methods and Assumptions

Species Considered—Pre-Field Review

Species considered in this analysis include those listed as Federally threatened or endangered on the Beaverhead-Deerlodge NF (USFWS 2021) and Forest Service Sensitive Species. Table 1 and Table 21 provides a list of those species, as well as a summary determination for the project. Management Indicator Species (MIS) including elk, wolverine and mountain goat were also considered to further assess project compliance with Beaverhead-Deerlodge NF (BDNF) Plan.

Field Reviews

Field examinations to determine the suitability of habitats in the Greenhorn project area were conducted by wildlife technicians, biologists, and timber/silvicultural technicians, annually from 2017-2023. Specific surveys and findings are addressed within species analysis sections in this report, and field reports are in the Project Record. Survey results created project design features specific to the proposed action to minimize effects to species found in the analysis area. Information collected by the BDNF in the

past 15 years from species specific surveys conducted during Forest-wide monitoring or past project survey work was reviewed, with results related to the project area detailed in species sections below where applicable. Montana Fish Wildlife and Parks (MTFWP) provided information on the known locations and use areas for wolves, grizzly bears, and game species from aerial surveys as well as from hunting and trapping data.

Methods

There are detailed methodology sections for each species analyzed in detail below.

Federally Listed Species

Threatened Canada Lynx

Methodology and Data Sources

For this project, lynx habitat was assessed at multiple spatial scales. A broad-scale habitat map was used for assessing habitat conditions at the scale of the Lynx Analysis Unit (LAU). Details of this mapping effort are summarized below, with specifics available in the Project Record. On-the-ground habitat evaluations were conducted throughout the LAU during project design to field-verify the broad-scale map, and to assess the suitability of the area proposed for treatment.

The Northern Rockies Lynx Management Direction (NRLMD) is consistent with recent science that has been published regarding lynx habitat and populations. A review of recent information and science concluded that the NRLMD is consistent with recent information, and thus is applicable as a management strategy (USDA FS 2013, 2018). Several research papers have been published in the past few years that emphasize the importance of connected patches of mature forest for supporting reproductively successful female lynx (Holbrook et al. 2017; Kosterman et al. 2018; Squires et al., 2013).

Development of this project considered this science and sought to retain existing patches and mature multi-storied lynx habitat and encourages the development of other stands into mature multi-storied conditions where applicable.

In 2009, the USFWS designated lynx critical habitat, and revised that designation in 2014 (CFR 79 177), based primarily on the current known distribution of lynx. The Greenhorn project area is NOT within Critical Habitat, and no discussion of Critical Habitat is included in this analysis.

Fine Scale Habitat Assessments

Areas proposed for treatment were field verified to see whether the habitat was a lynx habitat type, and to determine the existing structural stage. This was done in many areas of the LAUs during project development in the field using walk-through exams and surveys. Any areas that are a lynx habitat type that are currently in a structural stage that provides lynx foraging (i.e., supports moderate to high snowshoe hare densities) are excluded from treatment.

Habitat classifications and definitions use the definitions from the NRLMD as follows:

> Early Stand Initiation: Vegetation in the early stand initiation structural stage is not yet tall enough to provide winter habitat for snowshoe hare, while later stand initiation habitat currently provides winter snowshoe hare habitat.

Stand Initiation: Suitable forest habitats in the stand-initiation structural stage have the potential to provide year-round habitat for lynx where the trees are tall enough to protrude above the snow in the winter. Areas that are in an early stage of stand initiation may not provide suitable winter habitat but would provide suitable habitat during the summer months (Interagency Lynx Biology Team (ILBT) 2013).

Stem Exclusion: The stem-exclusion structural stage represents young stands that have self-pruned and no longer provide winter snowshoe hare habitat.

Mature; Multi-storied was approximated from existing vegetation data, local knowledge of the area, and validated in the field.

Other: All other forested structural stages were included as "Other" and are closed canopy lacking dense horizontal cover; these types generally do not provide winter snowshoe hare habitat.

Some of the proposed units in this project are outside of a defined LAU because they are below the elevations that have deep winter snow and are comprised of drier forest types (See LAU Map). These portions of the project area, which fall outside of mapped LAUs and do not provide habitat for lynx, were not further considered in lynx effects analysis, except for qualitative assessment of connectivity between LAUs.

In 2020, in close coordination with Northern Region Renewable Resource staff in the Regional Office, the BDNF updated the lynx habitat mapping process, intended to identify "mapped lynx habitat" to which the NRLMD applies. The update incorporated: 1) improved vegetation classification data, 2) improved GIS mapping techniques, and 3) improved methods of identifying elevational thresholds for mapping snow depths. The updated mapping process and procedures are well documented and described in a July 2020 habitat mapping documentation process paper (Gatlin et al. 2020 in USDA FS 2021) prepared by BDNF Forest Biologist Jennifer Gatlin and other staff on the Forest. The Regional office review found that, "the 2020 lynx habitat mapping update completed by the BDNF is consistent with mapping update processes summarized in the Regional Forester's 2016 memo (Marten, 2016), and consistent with mapping direction provided in the 2000 Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al., 2000). In addition, refined LAU delineations are consistent with criteria provided in the 2000 LCAS and meet Standard LAU S1 in the NRLMD. Overall, the updated mapping process has resulted in a much-improved map of lynx habitat on the BDNF." (Hanvey, 2020 in USDA FS 2021).

All timber harvest units were surveyed on the ground to assess the presence of mature, multi-story and stand initiation stands that provide winter snowshoe hare habitat. According to USDA Forest Service (2007a), "horizontal cover is the visual obscurity or cover provided by habitat structures that extend to the ground or snow surface primarily provided by tree stems and tree boughs, but also includes herbaceous vegetation, snow, and landscape topography." Horizontal cover provides a measure of the stands' value as snowshoe hare habitat and are of interest used to evaluate compliance with NRLMD Standard VEGS6.

Treatment of snowshoe hare habitat in multi-storied mature or late successional forest or in stand initiation structural stage is **not proposed** in this project.

Resource Indicators and Measures

This analysis focuses most heavily on vegetation management and effects to lynx and lynx habitat, since that is the primary activity that could affect lynx under this project. Resource measures for the Canada lynx are based on habitat components that have been identified as important for this species; as well as habitat connectivity, which has been identified as a primary consideration for secondary unoccupied areas (ILBT 2013). The conservation strategy indicates that the focus of management in secondary areas is on

"providing a mosaic of forest structure to support snowshoe hare prey resources for individual lynx that infrequently may move through or reside temporarily in the area," and that landscape connectivity should be maintained to allow for movement and dispersal.

Denning habitat is also an important component of habitat on the landscape for Canada lynx. However, denning habitat was not selected as a resource indicator for this project because the availability of den sites generally does not appear to be a limiting factor for this species (ILBT 2013). The structural components of lynx den sites are common features in both managed and unmanaged stands. Because lynx have large home ranges and low den site fidelity, most lynx populations are not limited by a lack of immediate den sites (Squires et al. 2008). Additionally, treatment is not proposed in mature, multi-storied forests which has the highest probability of den site characteristics. At the time of this writing, no known lynx dens occur on the Forest, although it is possible dens may be detected in the future.

Table 2. Resource indicators and measures for Canada lynx

Resource Indicator	Measure
Adherences with all NRLMD Standards, Focus on Veg. management standards	Vegetation Management Standards Connectivity (addressed as its own indicator below)
Lynx Habitat Effects	Number of acres of lynx habitat affected by the project and projected effects to quality of habitat
Disturbance Effects	Project timing and duration

Vegetation Management Standards

Lynx habitat, as defined in the NRLMD, “occurs in mesic coniferous forests that experience cold, snowy winters and provide a prey base of snowshoe hares” and consists primarily of lodgepole pine, subalpine fir, and Engelmann spruce (NRLMD page 528, USDA FS 2007a). Dry forest types do not provide lynx habitat (Ibid). Horizontal cover has been documented as a key habitat component for this species because of its importance for snowshoe hares (Squires et al. 2010), and the importance of horizontal cover continues to be confirmed by recent research (Holbrook et al. 2016).

Winter foraging habitat appears to be the most critical component dictating lynx population size and distribution (Squires et al. 2010). Therefore, managing for a mosaic of habitats that are providing high snowshoe hare densities—both in winter and in summer—and minimizing lynx habitat that is temporarily unsuitable, is a desired condition for lynx habitat in LAUs. That means maximizing, to the extent possible, stands of mature multi-story spruce-fir forests that provide year-round habitat, particularly in winter. Managing for a mosaic of habitats also means providing for pulses of disturbance, where appropriate, that will regenerate spruce-fir and other mesic forest types that, as they reach advanced regeneration, will provide dense habitat to support high densities of snowshoe hares.

Research by Holbrook et al. (2017) suggests that a combination of young regenerating forests and mature forest is important for Canada lynx. The young regenerating forests provide abundant habitat for snowshoe hare, and the mature forest provides a more efficient structure for hunting. Thus, retention of existing mature forests is important while also promoting development of additional multi-story mature habitats as well as young regenerating forests. Similarly, the research conducted by Kosterman et al. (2018) suggests that the greatest reproductive success for lynx occurs where the core area of a female lynx home range includes abundant and connected mature forest and intermediate amounts of small-diameter regeneration forest (Hanvey 2018). This research emphasizes the importance of connected multi-story mature habitats with high levels of horizontal cover in combination with regenerating forests for Canada lynx.

Lynx habitat within the LAUs is classified based on a model that uses VMAP data and information regarding actions such as timber harvests and insect and disease infestations. Understanding of lynx habitat has improved over time based on new information and data, including the 2015 and now 2018 Region 1 VMAP (satellite vegetation mapping data for Region 1 of the Forest Service).

Additionally, the habitat classifications of the model in the proposed project were verified based on on-the-ground determinations made by silvicultural staff regarding timber stand structural stages.

The NRLMD provides allowances for those pulses of disturbance to regenerate lynx habitat, without compromising the amount and arrangement of mature multi-story habitat. Two standards (Veg S1 and Veg S2) address the quantity of temporarily unsuitable winter snowshoe hare habitat and rate of management-induced change at the scale of an LAU (USDA FS 2007a, FEIS, p. 27).

> Veg S1 limits to 30 percent per LAU the amount of lynx habitat that can be in an unsuitable condition. Unsuitable lynx habitat is young regenerating forests where the trees are generally less than 10 to 30 years old, and the vegetation has not yet grown tall enough to support snowshoe hares during all seasons.
>
> Standard Veg S2 limits to 15 percent per decade the amount of lynx habitat that can be made unsuitable because of timber harvest. These two standards serve as cumulative effects thresholds for lynx at the home range scale. As directed by the NRLMD, stand-replacing wildfire, high intensity prescribed burning, and regeneration timber harvest are the mechanisms by which lynx habitat may be rendered "temporarily unsuitable."

In addition to the above standards, the NRLMD established standards that address the quality of winter snowshoe hare habitat, which is a limiting factor for lynx persistence.

> Standard Veg S5 limits precommercial thinning in winter snowshoe hare habitat in the stand initiation stage (with some exceptions in the Wildland-Urban Interface (WUI)).
>
> Standard Veg S6 limits all vegetation management activities that reduce winter snowshoe hare habitat in multi-story forests, with some exceptions for WUI.

Connectivity Standards

NRLMD Standard All S1 indicates that "new or expanded permanent development and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area" (USDA Forest Service 2007b).

Habitat connectivity is defined as those areas that consist of an adequate amount of vegetation cover arranged in a way that allows lynx to move around (NRLMD ROD; USDA FS 2007b). Maintaining habitat connectivity means to provide enough of this cover to conserve lynx. It does not mean to keep the status quo. Habitat connectivity can be maintained as long as there is enough cover for lynx to move through an area. The juxtaposition of existing development and vegetation structure must be considered to evaluate compliance with this standard. Management direction found in the land management plans to retain riparian cover provides for lynx movement between and within vegetation management units (NRLMD FEIS p. 181; USDA FS 2007a). Generally, vegetation treatments do not impede lynx movement (NRLMD FEIS Comment Response, USDA FS 2007a).

Individual lynx maintains large home ranges depending on abundance of prey (NRLMD Vol. 1, p. 141, USFA FS 2007a). Lynx are highly mobile and have propensity to disperse long distances. While lynx tend to move through cover, they have also been known to cross large openings and as such, openings such as those created by timber harvest activities are not considered barriers. No natural or human-caused barriers that prohibit movement of lynx have been identified (NRLMD Vol.1 p. 181, USFA FS 2007a).

Little information is available about the effects of roads and trails on lynx or its prey, but there is no evidence that lynx avoid or are displaced by unpaved roads (NRLMD Vol 1, p. 182, USFA FS 2007a). Roads may reduce lynx habitat by removing cover. However, along less traveled roads, vegetation on the road shoulders and surface provides good hare habitat. Studies have also shown that lynx neither prefer nor avoid forest roads, and that low road densities do not appear to affect lynx habitat selection (Ibid).

Existing Condition

Lynx Habitat in the Project Area and LAUs

Lynx Habitat Structural Stages

Current structural stages of lynx habitat in the Greenhorn project are summarized by LAU displayed in Table 3. These structural stages are the best available representation, based on available data at the LAU scale.

Specific descriptions of these structural stages are as follows:

Table 3. Lynx habitat within LAUs

LAU Name	LAU Total Acres	Total Lynx Habitat Acres	Stand Initiation Acres (% of lynx Habitat)	Early Stand Initiation Acres (% of lynx Habitat)	Multi-story Acres (% of Lynx Habitat)	Other (does not provide forage e.g. stem exclusion) (% of Lynx Habitat)
GR-01	54027	17107	73.76 (0.4%)	2266.54 (13%)	6572.12 (38%)	8185.78 (48%)
GR-03	81151	20408	13.43 (.07%)	5055.79 (25%)	10503.58 (51%)	4835.51 (24%)

Environmental Effects

Alternative 1: No Action

Maintaining existing condition is not expected to negatively impact lynx. Lodgepole pine stands would not be actively regenerated, so high quality foraging habitat would not be created. However, habitat exists for this species. Because there is no action proposed, cumulative effects are not anticipated.

Alternative 2: Proposed Action

Direct and Indirect Effects for Canada Lynx

Vegetation Management Standards.

Standard Veg S1 - None of the LAUs associated with the project area currently exceed 30 percent of the lynx habitat in an early stand initiation stage (see Table 3 above).

Standard Veg S2 - None of the LAUs associated with the project area currently exceed 30 percent of the lynx habitat in an early stand initiation stage (see Table 3 above).

Standard Veg S5 - There are no aspen exception areas will be used in this project. No lynx habitat is identified for daylight thinning for aspen. All aspen within proposed treatment units is outside of mapped lynx habitat and had field confirmation.

Standard Veg S6 - The proposed action would not reduce snowshoe hare habitat in multi-story mature or late successional forests.

Connectivity Standard.

All S1- No permanent development is planned in the project. Vegetation treatments would not create a barrier to lynx movements in and between the LAUs on the Greenhorn Mountains and the linkage areas to the north and southeast.

Habitat connectivity would be maintained for lynx movement and this project meets the standard for the following reasons. Units have forested cover around their perimeter; units would have snags and downed logs retained to meet Forest Plan direction; and understory vegetation would increase with increased sunlight over time.

The layout and arrangement of units within each LAU do not create any barriers to movement within or between LAUs (see maps). Forested habitat that has structure and cover can facilitate lynx movement and remains untreated between proposed treatment units during and after implementation. Habitat connectivity would be maintained for lynx movement; this project meets the standard.

Effects to Habitat

The proposed action would result in direct effects to lynx habitat through changes in stand structure and species composition by regeneration harvest, pre-commercial thinning harvest, upland cutting, and prescribed fire actions. There would also be potential disturbance effects to lynx (indirect effects) due to increased traffic, human activity, and equipment use during project activities (harvest activities plus non-commercial aspen, riparian, shrub and grass enhancement).

However, because lynx are not known in this area, and most of the activity is outside of an LAU or associated with habitat that is not considered high quality habitat, direct effects to lynx are unlikely and discountable.

Subalpine fir and spruce provide the most suitable structure and composition to provide habitat for lynx (Holbrook et al 2017). Holbrook et al 2016 also noted the importance of young dense stands of lodgepole pine for snowshoe hares. None of this preferred type of habitat is proposed for treatment in the Greenhorn Vegetation Project.

Approximately 99 percent of the lynx habitat proposed for treatment is currently in a condition that is not high quality for snowshoe hares or lynx. These stands have open understories and are lacking horizontal cover. This proposal would primarily treat lodgepole pine and Douglas-fir stands and would not affect the most suitable lynx habitat (see LAU Maps). None of the highest quality habitat (multi-story mature or stand initiation) is proposed for treatment. Because none of this habitat will be treated effects to lynx are insignificant.

Post implementation, the same percentage of habitat that is available within each LAU currently will remain available to lynx (Table 5. Post-project implementation lynx habitat within affected LAUs) Habitat target for treatment either early stand initiation or other will remain in those categories after treatment therefore percentages available will stay at 13% for ESI and 48% in Other in GR-01 and 23% ESI and 24% Other in LAU GR-03 (Effects to lynx from this habitat treatment will be insignificant as the habitat remains available to them and is what is treated is low quality.

Table 4: Acres of Lynx Habitat Proposed for Treatment

LAU Name	Total Acres Treated Within LAU	Total Lynx Habitat Acres Treated	Stand Initiation Acres Treated (% of lynx Habitat)	Early Stand Initiation Acres Treated (% of lynx Habitat)	Multi-story Acres Treated (%of Lynx Habitat	Other (does not provide forage e.g. stem exclusion) Treated (% of Lynx Habitat)
GR-01	6930	1042.86	0 (0%)	0.04 (1%)	0 (0%)	1036.78 (99%)
GR-03	913	30	0 (0%)	0 (0%)	0 (0%)	30 (100%)

Table 5. Post-project implementation lynx habitat within affected LAUs

LAU Name	LAU Total Acres	Total Lynx Habitat Acres	Stand Initiation Acres (% of lynx Habitat)	Early Stand Initiation Acres (% of lynx Habitat)	Multi-story Acres (% of Lynx Habitat)	Other (does not provide forage e.g. stem exclusion)(% of Lynx Habitat)
GR-01	54027	17107	73.76 (0.4%)	2266.97 (13%)	6572127 (38%)	8194.22 (48%)
GR-03	81151	20408	13.43 (0.07%)	4602.01 (23%)	10947.97 (54%)	4844.79 (24%)

Disturbance Effects

In addition to the Northern Rockies Lynx Management Direction standards and guidelines, which address the main activities known to affect lynx and their habitats, there is a potential for disturbance from implementation of the salvage and commercial thinning a well as from connected harvest operations actions such as prescribed burning and aspen enhancement projects. It is possible that this lynx could venture into the action area LAUs, however lynx are not known. There is a chance that a lynx traveling through the proposed units during implementation could be disturbed and move to nearby suitable habitats throughout these LAUs. A majority of the most suitable lynx habitat is not proposed for treatment, especially the highest quality, which minimizes effects to lynx. Although the potential for displacement during project implementation exists, it is unlikely/discountable.

Overall, the project would maintain, and in the future result in a slight improvement of, a mosaic of young to older stands, as recommended in the revised Lynx Conservation Assessment and Strategy (Interagency Lynx Biology Team, 2013).

Cumulative Effects for Canada Lynx

Future state timber harvest, small scale mining, and hunting/recreation are actions that could affect lynx or lynx habitat in the analysis area. There are no known timber sales on either private or state lands planned currently in lynx habitat within the LAUs analyzed in the project. There are no known lynx in the analysis area, although an individual is in the LAU adjacent to the project area. Therefore, it is possible

lynx could travel through the analysis area. Small private mining operations and recreational activities such as hunting could add cumulatively to potential disturbance from project actions (discountable).

According to Squires et al 2010, dry forest types, like those that occur across most of the project area, do not provide lynx habitat. This project area does have small pockets of preferred lynx habitat and habitat for snowshoe hares. This project complies with the Northern Rockies Lynx Management Direction and provides a range of habitat types for lynx across the analysis area. Kosterman et al. (2018) found that connectivity between patches of mature forest with dense understories correlates positively to lynx reproduction. Kosterman et al. (2018) also found that patches of regenerating forest correlate positively to lynx reproduction especially when they are in a matrix with favorable hunting opportunities for lynx. The NRLMD ensures that a mix of vegetation structural stages will occur on the landscape and retain connectivity for lynx.

At this time there two recent sightings on the Forest with no known reproduction. This project would not preclude lynx from moving through the project area. It is anticipated that a Canada lynx could travel through the analysis area regardless of the noise and activity from this project.

Minor impacts to lynx attributed to trapping (not permitted in the analysis area), winter recreation and use of road and trail network are recognized but are not considered major impacts due to consideration of best available science and information documenting lynx presence and persistence in areas with winter recreation and road and trail networks.

Likelihood of measurable negative cumulative effects to lynx or lynx habitat from the proposed action and future private land activities are expected to be low because:

1. The action complies with all standards and guidelines in the NRLMD which are designed to minimize impacts to lynx.

2. Only currently unsuitable habitat in the analysis area is expected to be affected.

3. The activities generally impact habitat not preferred by this species or its prey.

Determination for Canada Lynx

The proposed action may affect, but is not likely to adversely affect Canada lynx. The proposed action would have no effect on designated critical habitat, as there is none designated within the project area.

The proposed action is not likely to adversely affect Canada lynx because:

- Lynx habitat targeted for commercial treatment is currently in a condition that does not provide high quality lynx habitat. All high quality habitat will remain within these units. Effects to lynx habitat would be insignificant.

- The project maintains a mosaic of forest structures and successional stages, which is the conservation measure described in the revised LCAS for vegetation management in secondary areas.

- The project involves temporary forest road construction and road maintenance but would not significantly increase the traffic speed or volume on forest roads.

- The project does not impede lynx movement and does not reduce habitat connectivity in identified linkage areas.

- All treatments comply with the NRLMD standards and guidelines and are not expected to preclude any future use of the area by lynx.

Threatened Grizzly Bear

Methodology and Data Sources

Spatial and temporal bounds of analysis area. The analysis area for grizzly bear is the Greenhorn Bear Analysis Unit (BAU) as all the proposed actions are within this area and it has all the year-round habitat essential for a grizzly bear to persist successfully. It is roughly the size of a female's home range. The temporal bounds for effects analysis include project disturbance effects during implementation which is approximately 10 years. The analysis area is large enough to include a female grizzly bear's home ranges, and is representative of effects from the proposed action. It is large enough to evaluate the ability of the habitat to support grizzly bears, but small enough to not obscure the effects of the proposed action. It includes low elevation riparian habitats including calving areas and winter range and mid and higher elevations with forested and open habitats. All the actions are contained within this area.

Home range sizes of grizzly bears vary in relation to food availability, weather conditions, and interactions with other bears. In addition, individual bears may extend their range seasonally, or from one year to the next (USDI FWS 1993) and the home ranges of adult grizzly bears frequently overlap. In the lower 48 States, annual home range sizes for female grizzly bears are approximately 150 square miles. For males, annual home ranges vary from 110-540 square miles, but average approximately 309 square miles (LeFranc et al. in USFWS 2011).

Resource Indicators and Measures

Grizzly bears are opportunistic feeders and will prey or scavenge on almost any available food. Plants with high crude protein content and animal matter are important food items. The search for food has a prime influence on grizzly bear movements. Upon emergence from the den, grizzly bears move to lower elevations, drainage bottoms, avalanche chutes, and ungulate winter ranges where their food requirements can be met. Throughout spring and early summer grizzly bears follow plant phenology back to higher elevations. In late summer and fall, there is a transition to fruit and nut sources, as well as herbaceous and animal matter. This is a general pattern; however, bears will go where they can meet their food requirements (USDI 1993).

Table 6 lists the indicators and measures used for the grizzly bear analysis.

Table 6. Resource indicators and measures for grizzly bear

Resource Indicator	Measure
Impacts to Secure habitat	• Changes in Open Motorized routes, Temp Road Mileage and illegal motorized access • Helicopter Effects Timing and Acres
Habitat Effects	• Denning Habitat Impacted Acres • Cover Habitat impacted Acres • Foraging Habitat impacted Acres
Disturbance Effects	• Timing and Duration of Noise and Activity

Secure Habitat

While grizzly bears die from natural causes on occasion, human-caused mortality is the driving force behind grizzly bear survival rates (USDI Fish and Wildlife Service 2011).

Throughout all recovery ecosystems, most management removals of grizzly bears result from conflicts at sites associated with frequent or permanent human presence. Unsecured attractants such as garbage, human foods, pet and livestock foods, bird food, livestock carcasses, wildlife carcasses, barbeque grills, compost piles, orchard fruits, or vegetable gardens are usually the source of these conflicts and subsequent removals (USDI Fish and Wildlife Service 2011). Distance to human settlement is a contributing factor in mortality risk for grizzly bears (Schwartz et al. 2012).

In general, grizzly habitat requirements are determined by large spatial needs for foraging, winter denning, behavior, and security. Large roadless areas are ideal as year-round grizzly habitat as roads can displace bears depending on tolerance of bears. Furthermore, roads can increase mortality risk if humans that hunt bears use the roads. However, grizzly bears can and do survive in roaded areas if tolerance for their presence is high.

The management of human use levels through access route management has been documented as one of the most powerful tools available to balance the needs of grizzly bears with the needs and activities of humans. It has been documented in several research projects that unregulated human access and development within grizzly bear habitat can contribute to increased bear mortality and affect bear use of existing habitat (IGBC 1998). Secure habitat must also provide the basic seasonal habitat requirements for grizzly bears and should be representative of seasonal habitats available to bears in the entire analysis area (IGBC 1998). Grizzly bear secure habitat in this analysis is defined as areas more than 500 meters from an open or gated motorized access route (USDA FS 2006).

Denning Habitat

For three to six months during winter, grizzly bears enter dens in an adaptive behavior which increases survival during periods of low food availability, deep snow, and low air temperature (Craighead and Craighead 1972). Dens are usually dug on steep slopes where wind and topography cause an accumulation of deep snow and where snow is unlikely to melt during warm periods. Dens are generally found at high elevations well away from human development (USDI 1993).

Cover Needs

While grizzly bears make extensive use of forest cover, especially during the day when day-bedding, they generally prefer to operate in a landscape with a variety of habitat formations ranging from dense interior forest to open meadowlands (Dood et al. 2006). Optimal grizzly bear cover is wooded areas interspersed with grass- and shrubland. In Yellowstone National Park, grizzly bear preferred open areas that were near areas of cover, and grizzly bears used daybeds in timbered areas that are near feeding sites. Grizzly bears located in the timber tended to be far from openings more often in spring (32 percent) and fall (30 percent) than in summer (18 percent) Bears observed in the open were more frequently near timber cover during the spring than in summer or fall (Blanchard 1980).

Foraging Habitat

The search for food is a primary influence on grizzly bear movements. Bears feed on animal or highly digestible vegetable matter that is high in starch, sugars, protein, and stored fat. When they emerge from the den, they seek lower elevations, drainage bottoms, avalanche chutes, and ungulate winter ranges where their food requirements can be met. Throughout late spring and early summer, they follow plant

maturity back to higher elevations. In late summer and fall, there is a transition to fruit and nut sources (including whitebark pine), as well as other plant materials. This is a generalized pattern as individual bears are trying to survive and go where they can best meet their food requirements.

For this analysis, we consider high-quality spring foraging grizzly bear habitat as being characterized by snow-free forested and open habitats that afford fresh green-up of grasses, roots, and bulbs as well as foraging opportunities for small rodents. This may include riparian areas, meadows, open grassy parklands, and avalanche chutes. Aspect (east, west and south facing) and lower elevations help differentiate spring habitat from summer and fall seasonal habitats and should be taken into consideration when evaluating how quality spring habitat evolves over the length of the season (for example, from den emergence to later in the season). Big-game winter ranges and spring calving or fawning areas are often located at lower elevations and warmer aspects, too, and provide additional opportunities for scavenging winter-kill carcasses and elk calf or deer fawn depredation during the spring season. Whitebark pine is also a foraging habitat analyzed below.

Existing Condition

Grizzly bears are known to be year-round residents on the BDNF, in the Madison Ranger District. The project area is not located within the Yellowstone Recovery Zone (RZ) but is identified as within the Demographic Monitoring Area (DMA). There have been several occurrences of grizzly bears documented within the project area including a documented female with young.

Denning habitat. Hibernating grizzly bears can be easily aroused, and they have been known to exit dens when disturbed by seismic or mining activity, or other human activity. There are 17,353 acres of modeled grizzly bear denning habitat within the analysis area (Greenhorn BAU) out of a total of 70,890 acres. Modeled denning habitat accounts for approximately 24 percent of the analysis area. Refer to the Modeled Grizzly Bear Denning Habitat map at the end of this report.

Cover Habitat. There are approximately 35,806 acres of forested cover habitat in the action area which includes all tree cover, deciduous and evergreen. This is approximately 51 percent of the action area. The remaining habitat components are shrub and herb (47 percent of the BAU) with a smaller component of sparse vegetation and standing water. Generally, shrub habitats in the action area could provide cover for small bears, but were conservatively not included as primary cover habitat for daybedding as it was noted in Yellowstone National Park that grizzly bear preferred open areas that were near areas of cover and grizzly bears use daybeds in timbered areas near feeding sites.

Foraging Habitat. There is an abundance of foraging habitat in the action area available to grizzly bears. High elevation, low elevation and big game (particularly elk) calving habitat and winter range is present, in addition to whitebark pine, numerous shrubs that produce berries and forbs and grasses. Foraging habitat is not considered a limiting factor for grizzly bears in this area.

Secure Habitat - Motorized Roads and Trails. Grizzly bear secure habitat is defined as areas more than 500 meters from an open motorized access route and greater than 10 acres in size (IGBC 1998). Based on this definition, there are approximately 38,613 acres (54 percent) of secure areas within the analysis area. Refer to the Grizzly Bear Secure Area map.

Table 7: Secure Area Acres within the Analysis Area

Secure Areas	Acres of Secure Habitat	Percent Secure Habitat
Greenhorn BAU	38,613	54%

Environmental Effects

Alternative 1: No Action

Under the no-action alternative, there would be no direct impacts to grizzly bears. Additionally, there would be no direct impacts to denning habitat, secure habitat, or to the potential for interactions with humans. Similarly, ongoing conifer encroachment and forest succession would not be anticipated to have significant adverse effects on denning habitat, secure habitat, or the potential for interactions with humans. Therefore, the no-action alternative would not be anticipated to result in significant effects to grizzly bears.

Alternative 2: Proposed Action

Direct and Indirect Effects for Grizzly Bear

Secure Habitat Effects

Motorized Roads and Trails.

Use of temporary roads in modeled secure areas during implementation may displace grizzly bears. Temporary roads are scattered across the project area to access timber units that are either too large to skid to the landing or are not adjacent to a main route. These temporary roads would be decommissioned following their use for implementation.

Because the project would be implemented over the course of several years, the temporary roads are not expected to all be open at the same time for the duration of the project, however it is possible that they would be open simultaneously. Temporary roads would be constructed and decommissioned as needed for implementation. However, for this analysis we analyzed the maximum possible impact scenario with all the routes being open at the same time for the duration. This displays the maximum possible effect to grizzly bear secure habitat.

The proposed action would result in the construction of 4.7 miles of temporary roads. These roads would not permanently modify open route densities, as temporary roads are obliterated following project completion. Temporarily adding these miles to the road densities during implementation would not measurably increase the road densities in the Landscape or Hunting District beyond current densities (these would remain at 0.7 miles per square mile).

Current open motorized road and trail densities in the Gravelly Landscape and Hunting District 330 are at 0.7 miles per square mile. Linear miles of roads are 514 miles in the Landscape and 74.9 in the Hunting District. The existing road condition does not have adverse effects to bears.

Temporary roads temporarily decrease the total effectiveness of secure areas approximately 0.3% during implementation, or 132 acres (from 38,613 to 38,481 acres) (Table 8). Based on this, it's reasonable to assume that the remaining secure habitat would be available for use by grizzly bears throughout implementation (refer to Grizzly Bear Secure Areas map). This reduction is mostly associated with temporary roads along Timber Creek road units T1-T5 (See secure area map). These units are adjacent to Timber Creek Road which is open to motorized travel all summer long. Because the change in this secure block is along the edges of the already large secure block of habitat, impacts from these temporary roads to grizzly bears are expected to be so small they are insignificant and similar to the effect from the main Timber Creek Road.

Less than one acre of timber harvest in unit T2 would be implemented in a secure area. All the other timber units would be considered not secure during implementation as they would have a temporary road or are already adjacent to an open motorized route which is not considered to be secure habitat.

In summary, although the proposed action would lead to a small (0.3 percent) decrease in secure area during implementation through construction of temporary roads, this impact is expected to be insignificant.

Table 8: Secure Habitat Before, During and After Implementation

Secure Habitat	Acres Secure Before and After	Acres Secure During	Percent Impacted During Implementation
Greenhorn BAU	38,613 acres (54% of project area)	38,481 acres (54% of project area)	0.3%

Illegal Motorized Access

Illegal motorized access situations are typical of what would be expected for a Forest in Montana. Even with ongoing efforts, some individuals may continue to break the law and illegally access parts of the Forest. The Forest's efforts minimize areas of chronic and recurring use to the extent possible. Throughout the Greenhorn BAU, there is minimal known illegal motorized access. Two small sections of illegal motorized access have been identified by District personnel and were added to the secure area map. The north one is 497 feet, or 0.09 miles, the southerly one is 694 feet, or 0.13 miles. Both of these routes are adjacent to open motorized routes and are not within mapped secure areas. Generally, when illegal motorized access areas are located, the Forest attempts to block access to these areas as soon as possible. These illegal routes were marked with a sign prohibiting off-road use and will be blocked with a barrier. While illegal motorized access has the potential to affect individual grizzly bears, the amount known in this BAU is insignificant as they are within areas mapped as not secure for grizzly bears.

Illegal motorized access could occur anywhere in the BAU. However, the location, duration, and timing of effects resulting from such illegal use that the Forest Service is not aware of is unknown. The probability of long-term illegal motorized access and the probability of illegal access coinciding with the presence of grizzly bears is anticipated to be low (because of the knowledge of the BAU by District personnel) but generally is unpredictable year to year.

Although the effects of illegal motorized access are considered in the baseline for the proposed action, a change to the metrics used by the Forest to assess baseline access conditions would not occur as such use was not authorized, carried out, or funded by the Forest. Also, illegal motorized access would most likely result in short-term, temporary effects to grizzly bears as opposed to a permanent change in motorized access conditions because the Forest corrects the situation as soon as they are able. The timing for corrections may vary depending on seasonal or weather conditions, and the type of correction needed (for example, corrections may range from replacing a broken lock to replacing a broken gate or fixing a barrier, to redesigning or constructing a new barrier).

As such, the potential consequences to grizzly bears are uncertain. However illegal motorized access is expected to be temporary and is not likely to collectively cause an adverse effect because most Forest users follow travel regulations. When illegal use is observed, or when user-created routes become apparent, the Forest corrects the situation as soon as they are able.

Helicopter Effects

Helicopters may be used for implementation of prescribed burns during the time grizzly bears are in their dens and during den emergence (March-May), and also during the fall when this area is heavily used by

hunters. It is known that low-flying aircraft have the potential to affect grizzly bears, ranging from basic observation of the aircraft to temporary movement out of an area. After den emergence, females with cubs of the year often hang around their den site until the cubs are large enough to move through the neighboring snowpack.

It is known that low level helicopter use (<500m) such as used for prescribed fire, if over a long duration (greater than 48 hours) can negatively impact grizzly bears (Guide to Effects Analysis of Helicopter Use in Grizzly Bear Habitat, Montana/Northern Idaho Level 1 Terrestrial Wildlife Biologists Team, September 2009). However, when considering long-term habitat effects, aircraft activities which do not use or require roads may not pose the same chronic displacement effects or mortality risks that road-based operations do.

Helicopter use is a transitory event, whereas roads are typically chronic features on the landscape that facilitate access for people into bear habitat long after a project is complete. Consequently, while short-term helicopter activities may impact grizzly bears in high quality habitat, they do not impart the same chronic habitat effects as roading habitat. Thus, a "reduction in" or "loss of" in habitat should not result from most helicopter projects except those that are recurrent (repeated over and over the same area). If repeated, low altitude flights continue into multiple seasons, the effects upon grizzly bear behavior (i.e., avoidance and more than just temporary displacement) may become more long lasting.

Helicopter activity would be targeted to a potential burn window and the preferred timing is spring (when there is enough snowpack in the forested stands to act as a fuel break into these forested habitats). The length of time could be up to 7 days of daylong helicopter activity; displacement is likely. To implement a given burn unit, there would generally be 3 or 4 days of burn activity with continuous helicopter activity. There would be minimal ground support for aerial operations. The prescribed fire area would be useable to grizzly bears immediately after 1-7 days of implementation per unit. It is likely 1-2 prescribed fire units would get burned during each season. There are 13 burn units proposed with this project. Based on this information, inclusion of the design feature to minimize effects to bear and in coordination with bear biologists with Montana Fish, Wildlife and Parks, it is reasonable to assume that this will not result in a long-lasting avoidance of the area by grizzly bears.

Temporary effects are expected where the helicopter is flying low (below 500 m) and repeatedly in a pattern over the prescribed fire unit and up to within ¼ mi of the unit (flight path for safety concerns and terrain features). When the helicopter flies to and from the units proposed for aerial ignition, these flights are not low elevation (will not be below 500m) and will be done the minimum necessary for helicopter operations (generally no more than a few times daily).

Below is a table of each prescribed fire aerial ignition units and the estimated acres of secure habitat and percent of the total secure habitat during implementation that may experience temporary and short-term effects from the noise and operation of the helicopter. Only the units listed below will use aerial ignition to implement. Percentages range from less than 1% to near 7% of the total amount in the Greenhorns GBAU.

Table 9: Helicopter Activity Secure Habitat Acres in Prescribed Fire Units

Unit Number Or 1/4mi Unit Buffer	Acres Within GB Secure Area	Percent of Total Secure Habitat
B1	1418	3.68%
B1 Buff	691	1.80%
Total B1 Unit and Buffer Acres	***2109***	**5.48%**
B11	72	0.19%
B11 Buff	414	1.08%

Total B11 Unit and Buffer Acres	***486***	**1.26%**
B12	84	0.22%
B12 Buff	641	1.67%
Total B12 Unit and Buffer Acres	***725***	**1.88%**
B13	111	0.29%
B13 Buff	99	0.26%
Total B13 Unit and Buffer Acres	***210***	**0.55%**
B3	1512	3.93%
B3 Buff	974	2.53%
Total B3 Unit and Buffer Acres	***2486***	**6.46%**
B4	501	1.30%
B4 Buff	732	1.90%
Total B4 Unit and Buffer Acres	***1233***	**3.20%**
B5	200	0.52%
B5 Buff	443	1.15%
Total B5 Unit and Buffer Acres	***643***	**1.67%**
B7	871	2.26%
B7 Buff	335	0.87%
Total B7 Unit and Buffer Acres	***1206***	**3.13%**
B8	1711	4.45%
B8 Buff	422	1.10%
Total B8 Unit and Buffer Acres	***2133***	**5.54%**
B9	930	2.42%
B9 Buff	393	1.02%
Total B9 Unit and Buffer Acres	***1323***	**3.44%**
E10	0	0.00%
E10 Buff	6	0.02%
Total E1 Unit and Buffer Acres	***6***	**0.02%**
E11	12	0.03%
E11 Buff	103	0.27%
Total E11 Unit and Buffer Acres	***115***	**0.30%**
E12	10	0.03%
E12 Buff	89	0.23%
Total E12 Unit and Buffer Acres	***99***	**0.26%**
Total Acres	**12768**	**33.18%**

If grizzly bears are observed within the unit, ignition would not occur at elevations below the individuals, and would occur in a pattern that would allow the bear or bears to be able to leave the prescribed fire unit. Bears without cubs are expected to be able to move out of the prescribed fire unit more easily into other neighboring areas that are not burned. Because all of the burn units will not be implemented simultaneously, there are adjacent areas within the analysis area that yearlings to adult bears can be displaced to and are free from disturbance.

After den emergence, females with cubs of the year often hang around their den site until the cubs are large enough to move through the neighboring snowpack. Because females with cubs are restricted during this time, there is a potential that cubs would not be able to move out of the flight path or be able to follow their mother closely during disturbance and displacement from the helicopter.

If a female with new cubs of the year (COY) are seen at the den site at any time near or within a prescribed fire unit, ignition would not occur at that time. Discussions regarding the bear family group and the prescribed burn area would determine if the prescribed burn could occur or be rescheduled for later date. However, because detection probability cannot be 100 percent, it is impossible to fully mitigate the potential effects to cubs of the year to zero (significant effects). There are no known dens within the project area but a female with cubs has been documented to use the project area.

Displacement effects to bears from prescribed fire units during the fall are similar to effects during the spring, except the difference is the higher potential for a displaced bear to encounter a hunter when disturbed, cubs are much larger, and snow is not an impediment for movement out of the unit. As human-grizzly bear conflicts increase in the Gravelly Mountains south of the project area, displacement into adjacent areas with hunters is possible. Mitigation measures that require surveying the prescribed fire units prior to implementation and implementing closure areas for hunters would minimize disturbance to these bears. However, because the area will be signed closed during burning operations, and hunters will be notified prior to activities, and there are adjacent unroaded areas nearby for the bears to displace to, direct effects to bears from displacement in the fall are small.

Habitat Effects

Denning Habitat

Hibernating grizzly bears can be easily aroused and they have been known to exit dens when disturbed by seismic or mining activity, or other human activity. There are 17,353 acres of modeled grizzly bear denning habitat within the analysis area (Greenhorn GBAU) and approximately 4,442 acres of modeled denning habitat within proposed treatment units. Approximately 26 percent of the modeled denning habitat within the project area will have treatment units or have disturbance near modeled habitat from noise (helicopter for prescribed fire). This is approximately 6.2 percent of all habitats available in the Greenhorn GBAU (70,890 acres) and 26% of the available denning habitat in the GBAU.

Table 10 below explains the acreage of modeled denning habitat by treatment type.

Table 10. Acres of modeled denning habitat within treatment units

Treatment Type	Denning Acres Within Unit	Percent of Total Denning Habitat (17,353 acres)
Commercial Thin and RX Fire	346	2%
Conifer Removal RX Fire	426	2.5%*
Regeneration Harvest	10	0.01%
Prescribed Fire	3,660	21%*
Total	4,442	26%

*denning habitat is within the unit but NOT targeted for treatment

Fifty percent or less of prescribed burn units would have fire within them and the target is not to treat forested habitats (denning habitat), as burns would be targeted for openings, encroachment work, and aspen. This type of habitat is not modeled as denning habitat but is adjacent to denning habitat. Prescribed fire treatment is not anticipated to significantly alter the characteristics of denning habitat, as this habitat is not targeted for treatment. Denning habitat is not part of the type of habitat that would be burned during implementation because it is generally dense forest, steep slopes with higher canopies (insignificant effects). Short term effects from the helicopter activity is addressed in the helicopter effects section below.

Timber harvest thinning and regeneration harvest are anticipated to have the highest level of potential site disturbance and impact to denning habitat because trees would be cut in these areas, and there would be associated noise and human activity from the timber harvest. It is expected that if a den is located in a proposed unit, denning bears could be disrupted during project activities. There are no known or historic den locations in the project area, or within any of the proposed units, and the area is surveyed annually by the Interagency Grizzly Bear Study Team (IGBST) for grizzly bears, and specifically for females with cubs of the year (COY). The Timber Creek area is also highly popular with mountain lion hunters and the area is open to motorized use all winter and the units are adjacent to Timber Creek Road, which also decreases the probability that a grizzly bear would den in any of the proposed units in Timber Creek since they are very close to this open road.

Approximately 10 acres of modeled denning habitat would be treated by regeneration harvest in the analysis area (0.1 percent) and 345.6 acres (2 percent) would be treated with commercial thin activities. This is approximately 2.1 percent of the available denning habitat in the project area and these areas are not known to have denning bears and den locations near these main roads are unlikely.

Changes in Cover

Some research indicates that grizzly bears don't utilize harvest units until 10 years after treatment (MDNRC 2010), whereas other research found that grizzlies utilized recent clearcuts (Nielson et al 2004). Other studies indicate that intermediate aged clearcuts (approximately 30 years of age) were selected throughout the year, whereas recent and old clearcuts were utilized largely early in the year and again between early August and denning season (Nielson et al 2004).

Changes in available cover are expected throughout the project area where there are proposed actions, particularly in the timber units where a majority of cover for bears would be removed from thinning trees. Bears are known to feed in timber units after implementation and cover habitat can increase in these areas due to increased sunlight reaching the ground and less competition from overstory trees. This can result in a short-term impact but a long-term benefit.

There are approximately 1,069 acres of timber harvest proposed in the project and 35,806 acres of forested cover habitat in the action area which includes all tree cover, deciduous and evergreen. In the prescribed fire units, forested habitats with closed canopies that are ideal for cover are not targeted for treatment, so this habitat would remain in these units for bear day-bedding. Prescribed fire proposed in this project is targeted for more open habitat types and is not anticipated to significantly alter the characteristics of this type of cover habitat. This leaves 97 percent of the forested cover habitat available for bears

Prescribed fire is targeted to enhance open and shrubland habitats that serve as foraging habitat. This is addressed below. Tall shrubs may be capable of producing cover for bears, and it is expected that in areas where this is occurring, a reduction of cover will occur until the shrubs regrow. However, a majority of the shrubs are not at a height that provides substantial cover for bears. Generally, shrub habitats in the analysis area could provide cover for small bears but were conservatively not included as primary cover habitat for daybedding as it was noted in Yellowstone National Park that grizzly bear preferred open areas that were near areas of cover and grizzly bears use daybeds in timbered areas near feeding sites.

Foraging Habitat Effects

The prescribed fire units would target early successional forests and grasslands which is expected to increase foraging habitat for bears by increasing quality of shrub and grassland habitats. Most of the prescribed burn units are adjacent to large blocks of cover, making them bear habitat. Impacts to foraging

habitat in these areas would be short term (generally 1 to a few growing seasons at a maximum depending on precipitation) as the positive effects from the fire would invigorate the grass and forb habitat.

The conifer removal encroachment units are not anticipated to negatively impact foraging habitat from these treatments. Grass and shrub habitat would be positively impacted by prescribed fire in the long term. High elevation bear habitats such as avalanche chutes are not targeted for treatment. Habitat for Grizzly bear prey (such as moose and elk) exists throughout the analysis area and would continue to be present and abundant during and after project implementation.

Effects to whitebark pine are not expected to be significant because of the added design features to protect whitebark pine, and since whitebark pine will not be harvested in the proposed timber units. Because effects to whitebark pine are expected to be insignificant, there is no anticipated effect to grizzly bears related to availability of this food source in the project area. It is possible that beneficial effects to whitebark pine would result from proposed prescribed fire units that reduce competing vegetation within whitebark pine stands.

Disturbance Effects

Generally, most timber harvest activity will take place during the summer, fall and winter months and prescribed fire will take place during the spring and fall. Fall is the only time where both activities could be taking place and have the highest probability of disturbing bears in the action area. Winter activity would have the lowest amount of disturbance to bears as this is during denning season where bears are generally inactive. Duration of the prescribed fire units is a few days of high activity, and the timber harvest units are generally low activity but ongoing for numerous weeks and months when compared to fire units. Because the timber harvest units are adjacent to open roads, disturbance impacts are expected to be minimal as this habitat is lower quality than more secure habitat throughout the project area where most of the bear activity is during the fall. Timber harvest could be implemented for the next 1-10 years depending on timing of the timber sale and operation of the purchaser. Once sold, the activities are completed within 5 years. Disturbance during the spring from prescribed fire activity is summarized in the displacement effects section above and could be high, even with mitigation measures in place. Prescribed fire implementation could go as long as 10 years, with 1-2 units being implemented each burn window (spring and fall). Bears may avoid areas of the most activity and could shift activity to times outside of implementation and during nighttime or temporarily leave the area during implementation. Overall, most activities would not overlap in space and time during the majority of the year and the activities will be spread out in the next 10 years and are considered temporary which minimizes disturbance impacts to bears in the long term (insignificant effects).

Cumulative Effects for Grizzly Bear

There are many past and ongoing activities which have contributed to the current condition for grizzly bears. These effects are accounted for in the description of the existing condition and are not addressed further here. Habitat changes have occurred mainly from wildfires or small-scale aspen enhancement projects and that is shown in the habitat condition that is described in the baseline for each habitat metric. There are small areas of private lands within the analysis area that may also have vegetation management activities and that would also be displayed in the existing vegetation condition description.

Activities which may disrupt denning habitat are limited as this habitat is generally remote and free from human disturbance. Few spring hunting seasons exist such as spring black bear and turkey seasons. Turkeys are generally found in the lower elevations of these areas outside of denning habitat. Spring bear hunters always have the possibility of encountering a grizzly bear. Impacts to denning habitat may be impacted by proposed activities on adjacent Bureau of Land Management (BLM) land, including treatments associated

with the Middle Ruby River project. The Ruby River Habitat project to enhance moose winter range is adjacent to the project area. This project avoids spring bear season and enhances moose winter habitat which is beneficial to foraging bears in the area. That project does not impact denning habitat.

Proposed vegetation management projects on BLM lands may have temporary roads or other disturbances that could temporarily disturb grizzly bears utilizing secure areas. This is anticipated to have similar displacement effects as the Greenhorn Vegetation Project as they are short term and temporary and usually associated with roads which is considered not secure habitat for grizzly bears.

It is expected that grizzly bears could easily move to other areas in the Greenhorn project area during implementation, as most of the project area will be free from disturbance and there is no anticipated timeframe for implementation of the BLM timber sale units. However, there would continue to be a large proportion of secure area available for use by grizzly bears each year, as implementation of projects is spread over several years.

The most common cause of mortality for grizzly bears is human caused (self-defense, livestock related or mistaken identity). Ongoing recreation and livestock grazing would continue to result in the potential for human-grizzly bear interactions and conflicts. These ongoing effects are part of the baseline condition for the potential for human interactions.

Outfitters and guides operate within the GBAU mostly in the fall along with public hunting and recreation. Grizzly bears from the GYE population have been expanding their range, which may result in an increase in the potential for human-grizzly bear conflicts over time. The most common cause of mortality for grizzly bears is human caused (self-defense during hunting season, livestock related or mistaken identity during hunting season). Ongoing recreation, hiking, camping, mountain biking and livestock grazing would continue to result in the potential for human-grizzly bear interactions and conflicts. These ongoing effects are part of the baseline condition for the potential for human interactions. There have been no management removals of grizzly bears in this GBAU, however annually a few grizzly bear conflicts occur and are expected to continue.

Additionally, there are annual road races and mountain bike races that occur along the main motorized route in the GBAU (the Gravelly Range Road FS 290 road). As human use increases on the public lands – we expect recreation volume to increase.

Other activities include federal lands routine administrative use and field data collection, mining, non-commercial firewood gathering, noxious weed inventory and treatments, private ranching and farming, public lands non-recreation special uses (such as fiber optic line along roads), roads and trails maintenance, and snowmobile trail grooming.

The Interagency grizzly bear study team and Montana Fish, Wildlife and Parks routinely fly to count for a variety of animals within the entire state and Beaverhead-Deerlodge National Forest, including the project area. Generally, these flights are done with a fixed wing aircraft at elevations that are documented to not measurably effect grizzly bears. No cumulative effects to grizzly bears from this activity are expected.

Determination for Grizzly Bear

The proposed action **May Affect and is Likely to Adversely Affect Grizzly Bears**.

The proposed action may affect and is likely to adversely affect individual grizzly bears because:

- There is the potential to impact females with cubs during den emergence (significant effects) or disturbance to bears from helicopters associated with the prescribed fire units during fall in a very popular hunting area.

- Approximately 26 percent of the available habitat for denning would be impacted by noise from the proposed actions, and a majority during spring emergence from dens from the spring prescribed fire units. However, a majority of the denning habitat in the prescribed fire units would remain available because late seral and closed canopy forested habitats are not targeted for treatment (insignificant effect). Approximately 2 percent of denning habitat in the project area would be impacted from timber units (insignificant effect).

- Cover will be reduced for bears along Timber Creek Road and Idaho Creek from the timber sale activity by 1,069 acres which is 3 percent of the forested cover habitat available in the project area, leaving 97 percent of the forested cover habitat available for bears (insignificant effects).

- Secure habitat in the project area will be reduced by 132 acres from temporary road building to timber units which is a 0.3 percent reduction in available secure habitat in the project area (insignificant effects).

- Impacts to individuals may occur, however it is not expected to limit population expansion or growth in this area of the BDNF or the Yellowstone area as the population has continued to increase and expand in this area of the BDNF despite increased annual conflicts and mortalities.

- Additionally, most of this project is within the Demographic Monitoring Area (DMA) of the Yellowstone population. Within the DMA, the population and mortalities are closely monitored, and mortality rates have a threshold (based on the population estimate) to ensure that the Yellowstone grizzly bear population is maintained through time.

North American Wolverine

Indicators and Measures

Table 11 lists the indicators and measures used for wolverine analysis.

Table 11. Resource indicators and measures for wolverine

Resource Element	Resource Indicator	Measure
Habitat	Primary and Maternal Habitat	Acres

Analysis Methods and Assumptions

The wolverine is known in the Gravelly Mountain Range and it is reasonable to assume is present within the neighboring Greenhorn Mountains and the project area. The majority of observations (14) occurred as part of a study conducted in the area with recaptures of several individuals between 2004 and 2008.

Existing Condition and Status

Wolverines occur naturally in low densities, and current population levels and trends are not definitely known (USDI 2013). However, there is evidence that their population is increasing (USDI 2013) and that

wolverines are expanding both within areas currently occupied, as well as into suitable habitat not currently occupied (USDI 2013). Wolverines use a variety of habitats, including those altered by management activities and fire, and can persist in areas with dispersed or developed winter recreation activities (Heinemeyer et al. 2017). Wolverine occurrence is strongly tied, but not limited, to the presence of deep, persistent snow (Copeland et al. 2010) while denning habitat appears to have an obligate relationship with the deep persistent snow zone. Wolverines have large home ranges; food availability is probably the driving factor in determining home range size. Wolverines have a high dispersal capability and are able to move successfully through highly altered landscapes.

Wolverines are not associated with a specific vegetation type and land management activities are not considered a threat to the wolverine (USDI Fish and Wildlife Service, 2013), so changes in vegetation types will not be analyzed in detail.

Inman et al. 2013 developed data layers for the purposes of "…wolverine conservation, including population and land management decisions, especially at the scale of the population, i.e. western United States." These wolverine habitat predictions (areas suitable for survival, reproduction and dispersal) "…were developed using radio-telemetry data collected in the Yellowstone Region of the United States and Resource Selection Function (RSF) modeling...." The Gravelly and Madison Landscapes of the Beaverhead-Deerlodge National Forest were included in this effort. Four data layers were developed:

- Primary wolverine habitat – "areas suitable for long-term survival (use by resident adults);"
- Male dispersal habitats – "areas used briefly, i.e. on the order of days or weeks rather than months or years, by male wolverines, while moving between patches of primary habitat;" and,
- Female dispersal habitats – "areas used briefly, i.e. on the order of days or weeks rather than months or years, by female wolverines, while moving between patches of primary habitat;" and,
- Maternal habitat – "areas of high enough quality that female wolverines are capable of locating natal dens and rendezvous sites within."

According to Inman et al. their "…estimate of primary habitat and the spring snow model of Copeland et al. (2010) matched well, concurring across greater than 96 percent of the western United States. This level of agreement derived from different approaches, i.e., a global-scale bioclimatic envelope and a regional telemetry-based RSF [Resource Selection Function], suggests that distribution of wolverine habitat is fairly well described."

Table 12: Existing Maternal, Primary, and Dispersal Habitat in the Action Area.

Type of Wolverine Habitat (based on Inman et al. 2013)	Area (Acres)
Maternal (Denning)	1,030
Primary	21,664
Dispersal Male	70,890
Dispersal Female	69,068

Maternal and primary stands are primarily situated at higher elevations and have relatively low road densities when compared to dispersal habitat, which occupies lower elevation areas with higher levels of human access. Primary and maternal habitats support a wide range of potential wolverine prey, including small and medium-sized mammals, deer, elk, moose, bighorn sheep, and mountain goat.
Much of the action area is currently open to recreational activities, including snowmobiling, backcountry skiing, hunting and other activities.

While dispersal habitat is displayed in Table 12, these areas generally are not suitable for the establishment of wolverine home ranges and reproduction (USDI Fish and Wildlife 2013). Dispersal habitat generally lies between primary and maternal habitat (which is restricted to higher elevations); it is used to move between patches of suitable high elevation habitat or for other exploratory movements. The entire action area is modeled as dispersal male habitat.

Environmental Effects

Alternative 1: No Action

Under the no-action alternative, there would be no direct impacts to wolverines or their habitat. Normal forest succession and conifer encroachment would continue to occur. Because this species is highly mobile and uses a range of habitat types, these ongoing processes would not likely have a significant effect on wolverines.

Alternative 2 – Proposed Action

Direct and Indirect Effects for Wolverine

The proposed action has overlap with areas of persistent spring snow however, these treatments are focused on south, southwest, and west-facing slopes where conifer encroachment has occurred, and fire would not be anticipated to spread significantly onto north-facing slopes where persistent snow would be more prevalent. As such, the actual acreage of persistent spring snow areas would be close to zero as it would be covered in snow.

Thus, there would be sufficient potentially suitable wolverine habitat outside of treatment areas. Treatments may temporarily disturb individual wolverines and potentially modify habitat use to undisturbed areas. However, because of the highly mobile nature of this species and the presence of undisturbed suitable habitat, the project would not be anticipated to have significant adverse effects on wolverines. It is possible if wolverines are denning near areas of helicopter based prescribed fire activity, animals could be impacted by the noise and human activity. Because there are no known dens in the project area, and the area will be surveyed prior to implementation for grizzly bear dens and activity, effects to wolverines are unlikely.

Table 13: Effects of the Greenhorn project' s proposed vegetation treatments, in acres and as a proportion of the total across the action area.

Wolverine Habitat	Acres Conifer Removal and RxFire	Acres RxFire	Acres Commercial Thin and RxFire	Acres Regeneration Harvest	Total Acres of Treatment	% of Habitat Within the Wolverine Analysis Area Affected by Treatment Type
Maternal	0	217	0	0	217	21%
Primary	237	3955	92	16	4300	20%
Dispersal Male	4866	11130	1048	2	17080	24%
Dispersal Female	4151	11110	1048	22	16345	24%

[1]As a proportion of the total acreage of wolverine habitat in the action area.

Mechanical equipment use would temporarily increase human disturbance in the action area through noise associated with machinery, increased traffic, and increased human presence. This could result in temporary disturbance to wolverines, including interruptions to dispersal, foraging, and other activities.

Use of the existing road system and construction and decommissioning of temporary project roads (to be completed prior to contract close-out) to implement the proposed activities would result in additional disturbance above background levels in the action area.

A vast majority (over 75%) of affected primary wolverine habitat lies in areas that are unroaded, where no logging is proposed. Winter disturbance (associated with implementation) would be minimized in primary and maternal habitat. This would be consistent with recommendations provided by Kortello and others (2019) to reduce mechanized use of roads (including disturbance associated with harvest) in the winter.

Up to 4.7 miles of temporary project routes would be constructed (and subsequently decommissioned) in wolverine primary habitat. There would be no temporary road construction in wolverine maternal habitat. Burning of piles and or accumulations of slash in proposed treatment units would contribute additional disturbance in the action area during implementation. As activity fuel loading would determine the need for piling of slash and/or jackpot burning in units, the actual number of acres affected would not be known until after implementation of vegetative treatments. This activity would have variable impacts on vegetation; where more contiguous, burning would stimulate growth of understory grasses and forbs. Disturbance associated with harvest-related traffic on roads could result in temporary interruptions to wolverine dispersal, foraging, and other activities. Wolverine may temporarily avoid treatment areas while implementation and human disturbance are occurring.

The best scientific and commercial information available indicates that only the projected decrease and fragmentation of wolverine habitat or range due to future climate change is a threat to the continued existence of the species.

Current information does not indicate that other potential stressors such as land management activities proposed under the Greenhorns Project (or other activities such as recreation, infrastructure development, and transportation corridors) pose a threat to the DPS (USDI Fish and Wildlife Service 2013). Land management activities (principally timber harvest, wildland firefighting, prescribed fire, and silviculture) can modify wolverine habitat; however, the wolverine is a generalist species that appears to be little affected by changes to the vegetative characteristics of its habitat (ibid).

While dispersal activities could be affected to some degree, these habitats are not suitable for the establishment of home ranges and reproduction and are generally not for used for foraging (USDI Fish and Wildlife Service 2013). Dispersal between populations is needed to maintain genetic diversity. Any disruption of dispersal or other exploratory movements would be temporary and would occur at a small scale when compared to the large home range size of wolverines. Wolverine have been documented to persist and reproduce in areas with high levels of human use and disturbance including developed alpine ski areas and areas with motorized use of snowmobiles (Heinemeyer et al. 2012, USDI Fish and Wildlife Service 2013, and Heinemeyer et al. 2019). This suggests that wolverine are able to adjust their use within their home ranges to avoid disturbance (Heinemeyer et al. 2012).

The proposed actions would not pose a threat to the persistence of the wolverine. As such, although the project may disturb individual wolverines, the proposed project would not result in significant adverse effects to wolverine habitat or persistence.

Cumulative Effects for Wolverine

A variety of past and ongoing activities have contributed to the existing condition of general forest habitat for the wolverine. These activities include, timber harvest, livestock grazing, prescribed fire, wildfire, and other activities. As these activities have resulted in existing conditions, they are accounted for in the existing condition description for the project and are not discussed in detail. Note that the majority of past activities

are not considered a threat to the persistence of the species. Similarly, the primary ongoing and future activities (grazing, vegetation treatments, prescribed fire, etc.) in the project area and analysis area for the wolverine have been determined to not pose a threat to the persistence of the species. Ongoing activities on private lands in the analysis area that may continue include residential development and occupancy, firewood gathering, recreational activities, and commercial activities (horseback rides, guiding). These activities would generally occur at lower elevations (where the vast majority of private lands is present) outside of primary and maternal habitat; in addition, a portion of these activities are outside modeled dispersal habitat. Those activities that occur in dispersal, primary, and maternal habitat have the potential to disturb wolverine that are passing between suitable habitat patches or that are resident in primary and maternal habitat (the areas generally selected for home range establishment, foraging, and reproduction).

As these activities are occurring and are expected to continue in the future, it is unlikely that wolverine would avoid these areas to a greater degree than what may be currently occurring. There is no evidence that human development, infrastructure development, and associated activities are preventing wolverine movements between suitable habitat patches (USDI Fish and Wildlife Service 2013 and 2018).

When these effects are combined with the temporary disturbance associated with the proposed Greenhorns project, the cumulative impact on wolverine is expected to be insignificant. Trapping is the biggest threat, and the State of Montana has closed trapping for wolverines indefinitely. Accordingly, the proposed action is not anticipated to result in significant cumulative impacts to the wolverine.

Determination for Wolverine

The proposed action is not likely to jeopardize the continued existence of the North American wolverine DPS. My determination is based on the following rationale:

- Project activities will not contribute to the identified Primary or Secondary threats to the wolverine DPS (climate change, inadequate regulation of climate change, harvest, and small population size).
- None of the proposed activities are considered a threat to the DPS (USDI Fish and Wildlife Service 2013 and 2018).
- The individual project activities and cumulative actions will result in relatively small-scale disturbances in relation to the large wolverine home range size, and wolverine are able to adjust to and co-exist with moderate levels of disturbance.
- The projects and cumulative effects will not result in barriers to dispersing individuals.
- The risk of mortality from collisions with vehicles would remain very low.
- This project may result in changes in prey distribution and availability in the short term as potential prey avoid treatment areas and respond to changes in vegetation in treated stands. Some effects may last up to 15 to 20 years as regenerated stands grow and develop a new understory layer comprised of shrubs and trees.
- In the long-term, treatments are expected to improve summer and winter habitat for elk and mule deer by stimulating forage production. Improvements in forage conditions may improve the health of big game herds, which would aid in maintaining a sustainable prey base for wolverines.

- Land management activities (timber harvest, silvicultural activities, prescribed fire, etc.) would modify wolverine habitat in the action area. The vast majority of treatments in primary and maternal habitat would be prescribed fire. The wolverine is a generalist species that appears to be little affected by changes to the vegetative characteristics of its habitat; land management activities such as those proposed under the Greenhorn Project are not a primary or secondary threat to wolverine (USDI 2013).
- Proposed mechanical treatment activities would occur at a relatively small scale when compared to the home range of wolverine. At the home range scale, wolverine would adjust their use (within their home ranges) to avoid disturbance. Research indicates that wolverine are able to survive and reproduce in areas that experience high levels of human use and disturbance (USDI 2013).
- Wolverine may temporarily avoid areas where implementation is actively occurring. Any movements away from activities causing disturbance would be temporary and short in distance.

Regional Forester-Designated Sensitive Species

The sensitive species analysis in this report meets the requirements for a biological evaluation as outlined in Forest Service Manual (FSM) 2672.42. Forest Service sensitive species are designated by the Forest Service Regional Office, and often include state species of concern or other species for which population viability is a concern. The Forest Service is directed to address sensitive species according to the following objectives (FSM 2600, Ch. 2670.22):

a) Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.

b) Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.

c) Develop and implement management objectives for populations or habitat of sensitive species.

The Region 1 Sensitive Species List was last approved in February 2011 (and updated in August 2011 to include whitebark pine). The general descriptions of sensitive species that follow were largely adapted from the Montana Animal Field Guide, an online cooperative project of the Montana Natural Heritage Program and Montana Fish, Wildlife and Parks.

Table 14 below provides a list of the sensitive species analyzed in detail. Table 21 at the end of this report explains the rationale for not analyzing several species in detail, which lack suitable habitat or would otherwise not be substantially impacted by the proposed project.

Table 14. Sensitive species analyzed in detail

Species	Analyzed in Detail	Rationale for Analysis
Bighorn sheep (*Ovis canadensis*)	Yes	Species known to occur in project area and project effects may impact individuals or habitat.
Greater sage-grouse (*Centrocercus urophasianus*)	Yes	Potentially suitable habitat within project area and project effects may impact individuals or habitat.

Species	Analyzed in Detail	Rationale for Analysis
Flammulated owl (*Psiloscops flammeolus*)	Yes	Species recorded near project area and project effects may impact individuals or habitat.

Bighorn Sheep

Indicators and Measures

Table 15. Resource indicators and measures for bighorn sheep

Resource Indicator	Measure
Disturbance Effects	Timing and Intensity of activities
Changes to field of vision in cliff areas, enhance security	Acres modified Disturbance to sheep
Changes to quality of forage in winter range	Acres modified Disturbance to sheep

Existing Condition and Status

The Greenhorn bighorn sheep herd is present within the project area. Bighorn sheep were extirpated from the area, but the Greenhorn herd was reestablished with transplants of 30 bighorn sheep in 2003 and 39 sheep in 2004 (MTFWP 2010). Montana Fish, Wildlife and Parks has established a population goal of 125 bighorn sheep for this herd. As of May 2023, thirty-seven bighorn sheep observations and a minimum known post-winter (April 2023) population of 56 individuals were documented by Montana Fish, Wildlife and Parks area biologist, which is up from 42 in 2022 and 2021. This represents the minimum number of bighorns known alive and not a known total population. Given the large and geographically diverse area the Greenhorn herd uses, it's unlikely every individual sheep was documented.

Bighorn sheep may use a variety of habitat and vegetation types, but three principal habitat components have been identified which drive habitat suitability for this species (MTFWP 2010). The three primary habitat components for bighorn sheep are: 1) escape cover and terrain; 2) high visibility; and 3) winter range. Escape cover and terrain consists of slopes 60 percent or greater with occasional rock outcroppings. There should also be adjacent open foraging areas. Winter range generally is in low elevation areas on south-facing slopes with escape cover and proximity to foraging areas (MTFWP 2010). MTFWP specifically defines winter range as "escape terrain which receives less than 25 cm (approximately 10 inches) of snowpack." Bighorn sheep may use a variety of habitats where these primary components are met. Because of the need for high visibility, semi-open to open vegetation types are preferred habitats (MNHP 2017a).

Forest succession and woody plant encroachment into grasslands and shrublands has been identified as a habitat management issue for bighorn sheep (MTFWP 2010). Additionally, MTFWP goals for the Greenhorn herd include maintenance and improvement of habitat conditions on winter range to provide adequate forage and maintenance, and improvement of habitat conditions on summer and fall habitats to encourage use of public lands rather than movement onto private lands (MTFWP 2010).

Security. MTFWP produced a model to characterize bighorn sheep habitat using slope. This model does not include tree cover, so the model over-estimates habitat by including more densely timbered areas which do not provide quality habitat for this species. The model identifies general escape terrain (areas of greater

than 60 percent slope), winter lambing habitat (escape cover with a southern exposure), and summer habitat (areas within 300 meters of all escape cover).

The model identifies approximately 2,657 acres of general escape habitat within the larger Greenhorn herd range (analysis area). This acreage accounts for approximately 7 percent of the analysis area.

Winter range. The model identifies 3,956 acres of winter lambing habitat within the analysis area. This acreage accounts for approximately 9 percent of the analysis area.

Notably, the model does not distinguish between winter and lambing habitats because it does not account for snow depths. Average snow depths in the project area limit suitability of winter habitat in much of the high elevations in project area. MTFWP's range map for bighorn sheep identifies most of the project area as summer habitat, with some winter habitat identified in the southwestern and central portions of the project area *(ibid).* Observations of bighorn sheep generally confirm the mapped range. Shrubs can be an important food source in winter when snow cover reduces access to bunchgrasses.

Environmental Effects

Spatial and temporal boundaries. The spatial analysis boundary for bighorn sheep is the range of the Greenhorn bighorn sheep herd as mapped by MTFWP (98,442 acres).

The temporal effects analysis scale for bighorn sheep is the same for direct, indirect, and cumulative effects. Short-term effects could occur during project implementation, approximately 10 years. Long-term effects would be post-project implementation for approximately 50 years.

Alternative 1: No Action

Under the no-action alternative, habitat treatments would not be conducted. Forest succession and woody plant encroachment into grasslands and shrublands has been identified as a habitat management issue for bighorn sheep. Additionally, MTFWP goals for the Greenhorn herd include maintenance and improvement of habitat conditions on winter range to provide adequate forage and maintenance, and improvement of habitat conditions on summer and fall habitats to encourage use of public lands rather than movement onto private lands (*ibid*).

The no-action alternative would not address the potential impacts of forest succession and woody plant encroachment into bighorn sheep habitat. Habitat security would be expected to decrease under this alternative as forest succession and conifer encroachment would continue to occur, thereby decreasing the openness and visibility of portions of the project area.

Forest succession and conifer encroachment in open areas would also generally reduce the quality of winter range over the long term, as grass and shrub species would be partially displaced by conifers.

Alternative 2: Proposed Action

Direct and Indirect Effects for Bighorn Sheep

General Security. The proposed action would include treatments to enhance 833 acres of general escape habitat, which accounts for approximately 12 percent of the total escape habitat (general and winter) located within the analysis area. Thus, considerable areas of escape habitat (88 percent) would remain undisturbed and available for use by bighorn sheep during implementation. Beneficial effects to bighorn sheep from removing trees in this escape terrain are expected. It is also expected that preferred grasses and forbs will be enhanced as a result of the prescribed fire activities. Proposed vegetation treatments would generally

create more open conditions, which would improve visibility for bighorn sheep. More open habitat with improved visibility would generally benefit bighorn sheep and facilitate movement in the Greenhorn herd area.

Winter range. The proposed action would include treatments within 1,892.8 acres of winter/lambing habitat, which accounts for approximately 48 percent of the winter habitat located within the analysis area. Additionally, fire was excluded from 137 of this habitat and will have mechanical treatments only, minimizing the potential effects to very dry sites, mitigating effects to sheep winter range habitat. Any activities during the winter in mapped bighorn sheep winter range are prohibited.

Disturbance. Implementation of the project may result in impacts to the species as individuals may be disrupted by noise associated with the proposed treatments. Approximately 8,700 acres bighorn sheep modeled habitat (winter, escape and summer) could see disturbance by project implementation noise and activity. However, not all modeled habitat is currently suitable habitat as forested areas were not excluded from the model (bighorn sheep generally require sight distance and not found often in the trees). Additionally, not all units would see disturbance the same year. On average, 1-2 encroachment and or prescribed fire burn units would be treated annually, minimizing the potential impact to sheep from noise. A minimum of 38 percent of the habitat would be available at any time of the year to these sheep during implementation (acres not proposed for treatment) and likely much more due to the scale of implementation.

It is anticipated that bighorn sheep would be able to move into these undisturbed habitats during implementation. It should also be noted that treatments would occur over several years. Therefore, all modeled escape habitat, winter and summer would not be disturbed each year, and the actual available undisturbed habitat would be greater than disclosed here. Additionally, the majority of implementation would occur outside of the winter season, thereby reducing potential impacts to this species while utilizing winter range. This was incorporated into project design features. Any activities during the winter in mapped bighorn sheep winter range are prohibited.

Treatment of encroaching conifers would improve the openness of potential bighorn sheep habitat, thereby improving security for this species. Similarly, the treatments would improve the availability of forage, including winter forage, as removal of conifers would allow reestablishment of grasses, forbs, and shrubs.

Additionally, a design feature was added to treat and map cheatgrass within units in big game winter range. This will have beneficial effects to wintering big game.

Summarily, although the project may result in short-term disturbance impacts to bighorn sheep during implementation of the project, it is anticipated that the project would ultimately benefit bighorn sheep through improving habitat conditions by increasing the openness of treatment habitats and increasing the availability of forage, including winter forage.

Cumulative Effects for Bighorn Sheep

A variety of past and ongoing activities including timber harvest, livestock grazing, prescribed fire, wildfire, and other activities have contributed to the existing condition for bighorn sheep. As these activities have resulted in the existing condition, they are accounted for in the existing condition description and are not discussed in detail. Past activities ultimately resulted in the extirpation of bighorn sheep from the project area.

Ongoing activities, which may affect bighorn sheep include recreation and livestock grazing. Additionally, the Bureau of Land Management (BLM) has approved similar vegetation treatments to those proposed by this project. BLM vegetation treatments would be conducted on the western portion of the Greenhorn

Mountains adjacent to the proposed project area. It is anticipated that the BLM project would also benefit bighorn sheep habitat.

In addition to the resource elements analyzed above, respiratory disease in bighorn sheep is identified as a major concern, as bighorn sheep are highly susceptible to diseases often carried by domestic livestock. However, it should be noted that there is an ongoing study in Montana evaluating the role of disease, habitat, individual condition, and herd attributes on bighorn sheep demographics. Preliminary results indicate that most populations host respiratory disease agents but do not display apparent demographic effects from the presence of disease (Garrott et al. 2018). This ongoing research suggests a more complex relationship where habitat quality and individual health likely play a role in the potential for adverse effects from respiratory disease. There are several grazing allotments which are authorized for domestic sheep grazing located south of the project area. This project does not address grazing allotments. Accordingly, the proposed project is not anticipated to affect the likelihood of bighorn sheep encountering domestic sheep.

Because the proposed action is anticipated to benefit bighorn sheep and their habitat, aside from short-term impacts resulting from disturbance during implementation, the proposed action is not anticipated to result in significant adverse effects to bighorn sheep. The proposed action in combination with BLM treatments should result in a net positive effect to the Greenhorn bighorn sheep herd.

Determination for Bighorn Sheep

The Greenhorn Vegetation Project may impact bighorn sheep individuals or habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Greater Sage-grouse

Analysis Methods and Assumptions

In 2015, the BDNF Forest Plan was amended, along with several other forests in the Great Basin area, by the Greater Sage Grouse Record of Decision for Idaho and Southwest Montana, Nevada, and Utah (Sage-grouse Record of Decision (ROD) (USDA Forest Service 2015). The amendment guides management of habitat for greater sage-grouse and is applicable to areas designated as sage-grouse habitat management areas or within buffers of active leks. A portion of the southern half of the project area has been mapped as a "general habitat management area (GHMA)," which are areas that are "occupied seasonal or year-round habitat outside of primary habitat management areas (PHMA)." GHMAs are areas of lower priority for habitat management. PHMAs are areas with the "highest value for maintaining sustainable sage-grouse populations," and a third classification, "sagebrush focal areas," are those areas that are recognized strongholds for sage-grouse that have the highest densities of the species. There are no PHMAs or sagebrush focal areas within the project area.

Indicators and Measures

Table 16. Resource indicators and measures greater sage-grouse

Resource Indicator	Measure
Brood Rearing/Summer habitat	Acres of sagebrush habitat treated in general habitat management area (GHMA)
Disturbance Effects	Timing and duration of activities within sage-grouse habitat

Existing Condition and Status

Distribution and habitat requirements. Approximately 14,302 acres the project area is identified as GHMA, however only 4,196 acres (30 percent) is considered sage-grouse habitat (sagebrush).

The GHMA in the project area intends to correspond to a sage-grouse corridor that connects the Ruby sage-grouse habitat and distribution with the Centennial mapped distribution of greater sage-grouse. The sagebrush habitat within the GHMA represents the portion of the project area with the greatest potential to provide habitat for sage-grouse. The remainder of the project area is forested and/or does not provide essential sage-grouse habitat.

Forested habitats included in this GMHA are excluded as forested stands are not considered sage-grouse habitat. The current sagebrush habitats available in the project area are best categorized by the units proposed for treatment in the conifer removal units (shaded green in Sage-grouse Map). These units are sagebrush uplands that are currently being encroached by conifers from edge forested habitats.

Therefore, the analysis provided herein will address the sagebrush habitat within the GHMA within the project area (analysis area) and is summarized below. Approximately 30% of the GMHA habitat in project area is sagebrush habitat. And a majority of that (24%) is preferred by sage-grouse habitat (10-24% cover).

Table 17: Project Area Sagebrush Habitat within GHMA

Percent Xeric Shrub Canopy Cover	Acres	Percent
0 to 9	232	2
10 to 25	3421	24
Greater than 25	543	4
Total	4,196	30%

As shown in Greater Sage-grouse map at the end of this report, the analysis area is not within the distance preferred by nesting sage-grouse as all leks are farther than 6.2 miles away. Research indicates that up to 95 percent of nests occur within 6.2 miles of active leks. Therefore, the analysis area generally not used by sage-grouse for nesting and early brood rearing.

The greatest potential use of the project area by sage-grouse would be during the late summer brood-rearing phase. Brood-rearing occurs between May and August and habitats include wet meadows, burned areas, near riparian areas, farmland and other areas that usually have less dense sagebrush canopy than nesting habitats and generally have a higher proportion of grasses and forbs in the understory. May through August is the time these habitats have the most nutrients and growth which correspond to the timeframe that grouse are seen in this area. The most recent sage-grouse observation in the project area was a female with 7 juveniles during July 2017 within Unit E16.

Diverse plant communities with abundant insect populations are especially important to chicks, as their diet consists of forbs and insects. The Sage-grouse ROD recognizes the importance of removing invading conifers into sage-grouse habitats and to maintain desired habitat conditions (Forest Service 2015, p. 81). It also defines desired conditions for this type of habitat by a number of measures listed below.

Table 18: Brood Rearing/Summer Habitat Desired Conditions for Greater Sage-grouse at the Landscape Scale, Seasonal Use Period from June 16 to October 31 (Forest Service 2015)

Sagebrush Canopy Cover	10-25%
Sagebrush Height	16-32 inches

Perennial grass and forb canopy cover	>15%
Riparian areas/mesic meadows	Proper Functioning Condition
Upland and riparian perennial forb availability	Preferred forbs are common with several preferred species present
Sagebrush cover adjacent to riparian areas/mesic meadows	Within 328 feet

Brood-rearing/Summer habitat within the analysis area. Site-specific analysis was conducted in habitat within the project area during the late brood-rearing season. A random sample of 52 points within potential sage-grouse habitat within treatment units were assessed relative to habitat suitability. Primary habitat features analyzed included sagebrush canopy cover, sagebrush height, and herbaceous ground cover, as these metrics are used in the assessment of late brood-rearing habitat outlined in the Sage-grouse Habitat Assessment Framework (HAF). Additionally, these metrics have desired conditions outlined in the sage-grouse forest plan amendment listed above. Conifer cover was also measured, as conifer cover as low as 4 percent has been found to adversely affect sage-grouse (Baruch-Mordo et al. 2013 and Severson et al. 2016).

Data gathered through the HAF indicate that 52 percent of the assessed sites appear to provide suitable late brood rearing habitat and 48 percent either unsuitable or having intermediate suitability (8 percent and 40 percent respectively).

It should be noted that the HAF procedure did not necessarily account well for the presence of trees in the proximity of the site when not located within the site, and sites were specifically selected in areas that did not have trees. The abundance and proximity of trees to most sampling sites, especially around the edges of the proposed units, reduces the suitability of these sites for use by sage-grouse and is not adequately shown in the summary above. Considering that information, approximately half of the random sites were suitable, and half were not.

However, high quality and suitable habitat for sage-grouse as represented by the data collected above is not targeted for treatment in this project and the project is designed to see minimal fire effects in these areas. The project is designed to targeted areas that are encroached by conifers (not currently good sage-grouse habitat) which are mostly edges of the units and pockets of conifers within units.

Environmental Effects

Spatial and temporal boundaries. As discussed previously, the spatial boundary for direct and indirect effects for greater sage-grouse is the sagebrush habitats within the GHMA mapped in the project area (refer to Greater Sage-grouse Map).

The temporal effects analysis scale is the same for direct, indirect, and cumulative effects. Short-term effects could occur during project implementation, approximately 10 years. Long-term effects are post-project implementation up to 20 years, which is the approximate period for sagebrush recovery following burning in this area.

Alternative 1: No Action

The no-action alternative would not result in direct impacts to sage-grouse or their habitats. However, conifer encroachment into historic sagebrush habitats would continue to occur under this alternative.

Conifer expansion, particularly by Douglas-fir and lodgepole pine, in sagebrush ecosystems has exacerbated the reduction of sage-grouse habitat and is considered to be the most significant threat to their

habitat on the Beaverhead-Deerlodge National Forest, where conifer canopy cover is found to negatively impact sagebrush cover (Grove et al. 2005). Conifer expansion negatively impacts habitat quality by providing nesting and perching habitat for predators of sage-grouse (Coates et al. 2014; Howe et al. 2014; Prochazka et al. 2017). Sage-grouse are sensitive to the presence of conifers when selecting nesting sites, avoiding areas within 800 meters and as little as three percent canopy cover (Severson et al. 2016). Lek abandonment has been found to occur at as low as four percent conifer cover (Baruch-Mordo et al. 2013) and research suggests that sage-grouse which avoided areas of encroaching conifer experienced increased rates of survival (Coates et al. 2017). Removal of conifers has been shown to immediately increase the probability of nesting in the short term (Severson et al. 2017) and improves nesting success (Sandford et al. 2017a and 2017b). The presence of conifers also impacts habitat quality by shading out perennial native grasses and forbs that provide forage for sage-grouse, especially during brood rearing of chicks.

As such, habitat for sage-grouse would be expected to decline over time under the no-action alternative as a result of continued conifer encroachment into sagebrush habitats.

Alternative 2: Proposed Action

Direct and Indirect Effects for Greater Sage-Grouse

As described in the existing condition section above, suitable habitat for sage-grouse is available within the analysis area however is limited to the late summer/brood-rearing season. The only sage-grouse observation in the project area was July 2017 in Unit E7 which was a female with 7 juveniles.

Acres late summer/brood rearing habitat and Impact. Based on site specific observations, vegetation data and review of aerial imagery, areas considered habitat are currently those classified as xeric shrubs within the project area in GHMA which is 4,196 acres. Approximately 2,022 acres are in prescribed fire units and 964 acres are in encroachment units which is 2,986 acres. This is approximately 71% of the sagebrush habitat within the mapped GHMA habitat in the project area.

Of these acres, minimal fire effects are expected on the majority of the highest quality sage-grouse habitat (un-encroached, 10-25% canopy cover) and a mosaic of fire effects are expected along the marginal and edge habitats which are likely calorized as forested or habitat greater than 25% cover (low value to sage-grouse). It is estimated the mosaic burn would show fire effects across 25% of the lowest value habitat to sage-grouse (618 acres or 20% of the habitat available) and anticipated ignitions would occur on 50 percent or less of the prescribed units when weather conditions are conducive to low to mixed severity (Table 19).

Ultimately, it is anticipated that the proposed project would benefit sage-grouse habitat by reducing conifer encroachment, thereby creating more open sagebrush habitats which would be preferred by this species. Additionally, conifer encroachment areas are targeted for treatment, greatly reducing the number of acres actually treated within each proposed unit.

Table 19. Treatment acreages within GHMA in the project area by habitat type

Habitat Type	Unit Type	Acres Sage-grouse Habitat Treated in GHMA, by Canopy Cover		Percent of GHMA Sagebrush in the Project Area
Nesting/Brood Habitat	Prescribed Burn Units	2,022		48%
		Cover 0 to 9%	13	
		10 to 25%	1582	
		Greater than 25%	426	

Habitat Type	Unit Type	Acres Sage-grouse Habitat Treated in GHMA, by Canopy Cover		Percent of GHMA Sagebrush in the Project Area
	Encroachment Units	964		23%
		Cover 0 to 9%	174	
		10 to 25%	785	
		Greater than 25%	5	
Total		2,986		71%

Short term effects of prescribed fire are expected in a mosaic pattern on approximately 20% of the lowest quality habitat available to sage-grouse in the analysis area for the next 1-10 years with an average of 1-2 units having prescribed fire activity per year. Acres of habitat per unit range from 0.2 acres – 402 acres. With an average of 1-2 units of activity per year, and including effects on the highest quality of habitat, up to 23% of the available habitat would have annual short-term effects (two largest units with the highest quality sage-grouse habitat E16 and B7).

This is a maximum level of effect as most units are lower quality and fire effects will be focused on the lowest quality habitat that is encroached with trees. Fire effects in a high precipitation zone like this project area are shown to increase the prevalence of forbs and increase sage and herbaceous vigor overall which will have a long-term positive effect on sage-grouse. Short-term vegetation effects are a reduction in cover which is expected immediately after the prescribed fire and until vegetation regrows, likely a season of growth and then will become high quality foraging habitat. Areas seeing only mechanical treatment effects are not expected to see a reduction in forb cover and will immediately benefit sage-grouse by a reduction in conifer presence.

The project would comply with the sage-grouse forest plan amendment. Compliance is outlined in Table 30. The standards and guidelines provided in the table are a subset of the standards and guidelines from the sage-grouse Forest Plan amendment and represent those that are most applicable to the project, including all general and greater sage-grouse habitat standards and guidelines.

Summarily, the proposed action would ultimately improve 2,986 acres of sage-grouse habitat in the long term within the analysis area by reducing conifer encroachment, increasing the prevalence of forbs, and increasing sage and herbaceous vigor overall. Mechanical treatments in combination with prescribed burning would provide the greatest benefit for habitat restoration over the long term.

The proposed action was designed to minimize potential adverse effects to sage-grouse habitats and to enhance upland habitats that sage-grouse prefer. Prescribed fire would be conducted in coordination with Montana Fish wildlife and Parks local area biologist and comply with the Sage-grouse ROD standards and guidelines for prescribed fire which is to move the area toward desired conditions (Table 18). Prescribed burning would be conducted under conditions (relatively high soil and fuel moistures) that would promote a mosaic of burn patterns and intensities with the majority of burning occurring at low or moderate intensities, which is designed to enhance habitat, having long term positive impacts.

Disturbance Effects: Although treatments would reduce sagebrush cover temporarily, and implementation may disturb sage-grouse if present, un-burned sagebrush would remain available adjacent to and within treatment units and immediate fire effects from implantation in an area are generally expected for 1-2 seasons of activity. As mentioned previously, a maximum disturbance effect of 23% of the habitat is possible in one year, if both units with the most high-quality habitat are treated in the same

year. Forty-one percent of the units are impacting less than 100 acres of habitat (3% of total available) with 35% of the units potentially disturbing between 100-200 acres of habitat (3-7% of total high-quality habitat available).

Nevertheless, high quality habitat for sage-grouse is not targeted for treatment and the project is designed to see minimal fire effects in these habitats. The estimate above is the maximum effect expected from disturbance. The project is designed to targeted areas that are encroached by conifers which are mostly edges of the units and pockets of conifers within units. This encroached habitat is not high-quality, and one would not expect sage-grouse to be using these areas.

Sage-grouse are sensitive to the presence of conifers and research suggests that sage-grouse which avoided areas of encroaching conifer experienced increased rates of survival (Coates et al. 2017). The presence of conifers also impacts habitat quality by shading out perennial native grasses and forbs that provide forage for sage-grouse, especially during brood rearing of chicks. Additionally, burning of conifers in these sagebrush areas may also provide benefits by increasing the prevalence of forbs that are an important food source during the late brood-rearing period. Both prescribed fire and mechanical treatments increase the cover of native perennial herbaceous vegetation (a key component of sage-grouse habitat) and abundance of food (arthropods and plants) that greater sage-grouse chicks are known to prefer (Miller et al. 2014; Davies et al. 2014).

Prescribed fire in these encroachment units is targeted to take place prior to summer brood-rearing season (June 16) which also minimizes potential disturbance to grouse. As use of the analysis area by sage-grouse is very limited (only one observation in the project area), it is anticipated that sage-grouse would be able to use undisturbed habitats within and in the vicinity of the analysis area during treatment. Short-term disturbance effects are possible but overall disturbance effects are not expected because the treatment would be prior to sage-grouse using this higher elevation late summer habitat.

Cumulative Effects for Greater Sage-Grouse

A variety of past activities have contributed to the current condition for sage-grouse within the project area. The effects of past activities are accounted for in the description of the existing condition. Therefore, they are not discussed further here. There are no other projects proposed for the project area that would be likely to impact sage-grouse or their habitats.

The primary ongoing activity with the potential to adversely affect sage-grouse is livestock grazing. Appropriate grazing management will be achieved through implementation of the Forest Plan which states, “Use of forage by domestic livestock will maintain or enhance the desired structure and diversity of plant communities on grasslands, shrub lands, and forests. Use will be managed to maintain riparian function as defined in the allotment management plan.” Additionally, grazing would comply with Forest Plan Amendment standards specific to sage-grouse**.**

Weeds already exist in these units. Pretreatment of noxious weeds and invasive plants like cheat grass, is identified as a priority. Based on these considerations for livestock management, the proposed project, in combination with other activities, would not result in significant adverse effects to sage-grouse or their habitats.

Determination for Greater Sage-grouse

The Greenhorn Vegetation Project may impact Greater sage-grouse individuals or habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Flammulated Owl

Indicators and Measures

Table 20. Resource indicators and measures for flammulated owl

Resource Element	Resource Indicator	Measure
Limiting factor: sufficient nesting habitat	Flammulated owl habitat	Units/acres treated
Short-term displacement and/or mortality during the reproductive period from noise and operations during project implementation	Activities that occur during project implementation	Units/acres treated

Analysis Methods and Assumptions

Samson (2006) conducted a region-wide conservation assessment for the flammulated owl based on a principle-based approach to population viability analysis. He used: peer-reviewed science; all known inventory and observation data; vegetation data from Forest Inventory and Analysis; scientific information on the minimum dispersal distances for species, their home range, and body sizes; and well-known conservation principles to assess the availability of suitable habitat, calculate a habitat threshold, and ultimately assess short- and long-term viability on each forest in Region One.

According to Samson (2006), "short-term viability of the flammulated owl in the Northern Region is not an issue, given the following: 1) no scientific evidence exists that the flammulated owl is decreasing in numbers; 2) increases in the extent and connectivity of forested habitat have occurred since European settlement; 3) well-distributed and abundant flammulated owl habitat exists on today's landscape; and, 4) the level of timber harvest (8,581 ha of 9,045,255 ha or 0.0009 percent of the forested landscape in the Northern Region) is insignificant."

The Montana Natural Heritage Program (2021) has two indirect breeding records approximately 3.5 miles east of the Greenhorn project area: one in June of 2005, and one in July of 2007 (MNHP 2021).

Flammulated owls show a preference for ponderosa pine habitat. There is no ponderosa pine habitat in the proposed project area. However, flammulated owls may also use aspen and dry open Douglas-fir habitats (MNHP 2021) provide potentially suitable habitat for this species. As this is a migratory species, effects analysis is focused on the reproductive season and nesting habitat. MNHP created a flammulated owl habitat model and that was used in this analysis.

Existing Condition and Status

The flammulated owl is a small insectivorous Neotropical migratory owl that is currently listed as a Montana Species of Concern and a U.S. Forest Service Sensitive. In the Northern Rockies, breeding habitat consists primarily of low- to mid-elevation montane forests with low to moderate canopy closure, a large tree component, snags, and a brushy understory. Older ponderosa pine forests and ponderosa pine and Douglas-fir forests appear to be preferred (Wright 1996). Flammulated owls have also been found breeding in older Douglas-fir forest types, and to a lesser extent in grand fir, western larch, spruce-fir, lodgepole pine, and aspen habitats.

At the home range scale, they were positively associated with non-forest openings and the presence of snags and large trees at the micro-habitat scale. They prefer mature growth with open canopy and avoid dense

young stands. Flammulated owls are secondary cavity nesters that often use old pileated woodpecker or northern flicker cavities. Nest cavities may be used for several years.

Approximately 3,610 acres of potential habitat is scattered throughout the project area where Douglas-fir. Of this total, approximately 1,853 acres occur in the proposed units. There is no moderately suitable habitat within the timber harvest units.

Environmental Effects

Spatial boundary and temporal scale. The Greenhorn project area is the direct, indirect, and cumulative effects spatial boundary for flammulated owl.

The temporal effects analysis scale for flammulated owl is the same for direct, indirect, and cumulative effects. Short-term effects could occur during project implementation, approximately 10 years. The long-term temporal scale is 100 years from implementation of stand regenerating treatments, because that is approximately the time it would take for harvested stands to be of sufficient diameter for nesting, which are mature and old Douglas-fir stands with large snags.

Alternative 1: No Action

If no action were to occur in the project area, short-term negative effects to nesting individuals and long-term beneficial effects to flammulated owl habitat would not occur. Ongoing mortality and susceptibility of trees to insect and disease in the proposed timber harvest units could increase tree cavity nesting habitat for woodpecker species, and therefore potential nesting habitat for flammulated owls, which often use woodpecker nest holes in trees. Thinning in dense stands of Douglas-fir and mixed Douglas-fir habitat would not occur, which would continue to result in conditions not suitable for the flammulated owl, which prefer open structure in conifer forests. Without prescribed fire in aspen habitat, potential nesting habitat for the flammulated owl across the project area would not occur.

Alternative 2: Proposed Action

Direct and Indirect Effects for Flammulated Owl

Sufficient nesting habitat. Short-term effects to nesting habitat could occur to owl habitat from the loss of nest sites in trees or snags, or the abandonment of young resulting in loss of annual recruitment because of disturbance from project operations. However, it should be noted that flammulated owls appear to be very tolerant of human disturbance (Hayward & Verner 1994).

In the timber harvest units, there is no moderately or highly suitable mapped flammulated owl habitat. No effects to flammulated owl habitat are expected in these units. Additionally, mechanical vegetation treatments will retain all snags greater than 15-inch DBH, except for hazard trees and 4.3 live trees per acre, which is a positive for cavity nesters like flammulated owls. The number of hazard trees that may be felled is anticipated to be low and dispersed across the timber units. In addition, the proposed action would comply with forest plan standards for retention of snags (refer to the vegetation report for details on snags). Both measures meet Forest Plan Wildlife Standard 3.

Long-term vegetation treatments in the Douglas-fir stands are anticipated to benefit flammulated owl habitat, by reducing stand densities, creating a more open structure, which provides more favorable conditions for this owl species.

The direct effects of the proposed action on Douglas-fir stands in the non-timber units would be fire effects on approximately 25% of the 1,854 acres of moderately suitable habitat. As these owls prefer open pine-fir

stands with some clumpy vegetation for roosting, the proposed action should improve habitat for these birds. The Ecosystem Research Group (ERG) states that, "at the treatment unit scale, there is an immediate benefit to flammulated owl potential habitat by simplifying understructures (Hayward and Verner 1994) from improvement cuts in Douglas-fir" (ERG 2010). Additionally, to protect another important component of flammulated owl habitat, no large snags would be removed in any of the thinning treatments and live trees would be left within the units for snag recruitment.

The aspen habitats in prescribed fire units may also improve flammulated owl habitat, as they have been known to use aspen in some parts of the country (MNHP 2021).

In reference to flammulated owls, Smith (2000) stated, "Understory fire may enhance old growth for nesting, openings for foraging, and the landscape context for nest sites." Although positive for flammulated owls, the underburning does, however, have the potential to reduce shrub cover, which is habitat for flammulated prey species in the short term. The underburns are planned to produce a mosaic effect in the vegetation. Although some areas may be broadcast burned, much of the area would be jackpot burned.

Summarily, the majority of flammulated owl habitat would not be subject to significant impacts (approximately 25% of 1,854 acres which is approximately 464 acres or 13% of the available habitat in the project area), snags would be retained in accordance with forest plan standards, and treatments would generally improve habitat conditions for this species. Therefore, the proposed action would not result in significant adverse effects to flammulated owl habitat.

Displacement or mortality to individuals. Short-term direct effects could occur to individual owls (injury, mortality, displacement from nest sites and loss of breeding season, displacement from foraging areas) during implementation of treatments. Prescribed fire would generally occur prior to nesting season in the spring or in fall and areas are surveyed prior to implementation to minimize effects to individuals. Therefore, prescribed fire is not anticipated to result in significant adverse effects to nesting individuals. Post-breeding individuals may be exposed to smoke, but it is anticipated that individuals would be able to temporarily relocate (fly) to other available habitat within the project area. This possibility is also unlikely, as surveys are required prior to implementation and the project is designed to protect active nest sites (see Appendix C).

Cumulative Effects for Flammulated Owl

Past actions in the project area have contributed to the current condition of flammulated owl habitat. These have included past timber harvest and wildfires. No other reasonably foreseeable actions are expected to occur in the project area that would affect flammulated owl habitat.

Determination for Flammulated Owl

The Greenhorn Vegetation Project may affect flammulated owl individuals or habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Regional Foresters Sensitive Species List, Forest Plan MIS and Species of Interest and Determinations (Biological Evaluation) and Migratory Birds

Table 21. Summary of effects determinations to special status wildlife species

Species	Status	Determination Alternative 1: No Action	Determination Alternative 2: Proposed Action	Discussion Effects from Proposed Action
Monarch Butterfly (*Danaus plexippus)*	**ESA Candidate**	**NI**	**MIIH**	This species requires open grasslands, foothills, valley bottoms, roadsides, pastures, and suburban areas with sufficient milkweed for breeding and/or sufficient nectar resources from flowers during breeding and migration. This project area does not have sufficient milkweed for breeding but does have nectar resources. Prescribed fire from the proposed project should enhance flowering forbs which could benefit migrating monarchs. Other proposed actions are not expected to impact the species.
American Peregrine Falcon (*Falco peregrinus anatum*)	Regional Foresters Sensitive Species	NI	NI	Not known or suspected in the project area
Bald Eagle (*Haliaeetus leucocephalus*)		NI	MIIH	Bald eagles routinely forage along the Ruby Road and have been seen scavenging on roadkill along the Timber Creek Road. There are no known nests within the project area and the activities associated with the project are not expected to impact bald eagles' ability to persist, forage and roost in this area in the long term. Eagles are highly mobile and adaptable to disturbance and human uses and are expected to continue to increase over time.
Bighorn Sheep *(Ovis canadensis)*		NI	MIIH	Overall beneficial effects by removing trees out of escape terrain and enhancing winter range habitat in the project area

Species	Status	Determination Alternative 1: No Action	Determination Alternative 2: Proposed Action	Discussion Effects from Proposed Action
Black-backed woodpecker (*Picoides arcticus*)		NI	MIIH	Black-backed woodpeckers are not known in the project area due to their preferred habitat is 5-7 years post fire. However, the species is possible in the analysis area. The commercial thinning activities would reduce future snags by reducing stand density, which, in turn, reduces tree mortality from insects and disease. However, because of the retention of existing snags in compliance with forest plan standards and the presence of snags outside of treatment areas, it is not anticipated that the proposed action would have a significant adverse effect on snag-dependent species such as the black backed woodpecker. Individual tree torching from prescribed fire activity could also create habitat for this woodpecker.
Flammulated owl (*Otus flammeolus*)		NI	MIIH	See analysis above.
Fisher (*Martes pennanti*)		NI	NI	Not known or suspected in the project area
Great Basin pocket mouse (*Perognathus parvus*)		NI	NI	Not known or suspected in the project area
Greater Sage-Grouse *(Centrocercus urophasianus)*		NI	MIIH	Overall beneficial effects by removing trees out of sagebrush habitats in the project area. See analysis above.
Gray wolf (*Canis lupus*)		NI	MIIH	Known in the project area, short term disturbance is possible but overall benefits from enhancing prey species habitats. This heavily hunted species is resilient through time.
Harlequin duck (*Histronicus histronicus*)		NI	NI	Not known or suspected in the project area
Northern bog lemming (*Synaptomys borealis*)		NI	NI	Not known or suspected in the project area. No impact to bog habitat.

Species	Status	Determination Alternative 1: No Action	Determination Alternative 2: Proposed Action	Discussion Effects from Proposed Action
North American Wolverine (*Gulo gulo luscus)*		NI	MIIH	See analysis above. Wolverines are expected to occur in the project area. Wolverines are highly mobile, occur at high elevations. Wolverines are not expected to be limited by the proposed actions in the project, high elevation denning habitat will not be impacted and in the long term, wolverine prey species will benefit from the habitat restoration units which would indirectly benefit wolverine.
Pygmy Rabbit (*Brachylagus idahoensis*)		NI	NI	Not known or suspected in the project area
Spotted bat (*Euderma maculatum*)		NI	NI	Not known or suspected in the project area
Townsend's big eared bat (*Corynorhinus townsendi*)		NI	MIIH	This bat species is not known to occur in the project area however individuals are always possible. Because of the retention of existing snags in compliance with forest plan standards and the presence of snags outside of treatment areas, it is not anticipated that the proposed action would have a significant adverse effect on snag-associate species such as this bat. Individual tree torching from prescribed fire activity could also create habitat for this species.
Trumpeter Swan (*Cygnus buccinator*)		NI	NI	Not known or suspected in the project area
Elk	Management Indicator Species	No change to secure habitat for elk	Temporarily reduces secure habitat for elk	Temporary roads would reduce secure habitat during implementation however no change in open motorized road and trail densities. Elk numbers are at all-time record highs in this area and impacts to secure habitat during implementation may increase hunter harvest, which maybe contribute to MTFWPs goal to reduce elk numbers in this area to objective.
Mountain Goat		No change in High-elevation snowmobile use	No change in High-elevation snowmobile use	Not known or suspected in the project area
Wolverine		Security of denning habitat from snowmobile impacts	The proposed action would not affect accessibility of the project area for winter recreation.	This species is not analyzed in detail relative to its role as a management indicator species for the BDNF Forest Plan because there is no change in amount of snowmobile access in wolverine denning habitat.

NE= No effect.

NLAA= May affect, not likely to adversely affect (NLAA).

NI= No impact. MIIH= May impact individuals or habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Migratory Birds

Executive Order 13186 directs agencies to take actions to protect migratory birds. Federal agencies are generally directed to minimize or avoid adverse impacts to migratory birds when conducting agency actions, restore and enhance the habitat of migratory birds, abate, or prevent detrimental alteration of the environment for the benefit of migratory birds, and consider the potential impact of actions on migratory birds during the NEPA process. Further, Executive Order 13186 emphasizes a focus on species of conservation concern. Accordingly, the potential impact of the proposed project on migratory birds is addressed herein, with a focus on species identified as a concern for conservation.

The USFWS revised the Birds of Conservation Concern in 2008, incorporating the North American Bird Conservation Institute's Bird Conservation Regions. The Northern Rocky Mountains (Bird Conservation Region 10) overlaps the Greenhorn Project area. The table below lists those species identified by the USFWS as being of conservation concern, and where Federal agencies are encouraged to "…minimize effects of their activities on identified species" (USDI FWS 2021). The table below also indicates the potential presence or absence in the analysis area and discusses the potential effects of the project. One of these species, the flammulated owl, is analyzed as a sensitive species in this report.

Effects Summary for Migratory Birds

As indicated in the table below, implementation of the proposed treatments would potentially temporarily affect some individuals. Project activities that occur during the migratory bird breeding season could result in the physical destruction of occupied nests, which would likely result in egg/nestling mortality. Disturbance associated with project activities during the nesting season could cause reduced parental care or nest abandonment, which could affect nestling survival rates, and possibly result in reproductive failure for some breeding pairs. Birds may change nest locations in response to human disturbance. Alternate nest sites may be less suitable in terms of security and thermal cover, availability of foraging habitat, perch sites, and other important habitat components. Project activities that occur after July 15 would have the least impact on breeding birds, since most young birds have fledged and are independent of the nest by that time.

As indicated in the table below, sage habitat is expected to benefit from the implementation of this project. Prescribed fire will remove a small amount of sagebrush; however, un-burned sage habitat within and adjacent to the units would still be available during time of implementation for a majority of the project area. Removing conifers from the sage parks and diversifying sage age classes would improve sagebrush-associated species' habitat in the long term by reducing fragmentation, improving sage brush vigor, and reducing predator pressure. Cowbird parasitism is listed as a potential threat to some Birds of Conservation concern. Parasitized nests may be abandoned or dismantled; re-nesting may occur in some cases (Sedgwick & Knopf 1988), although fewer eggs may be laid (Holcomb, 1974). Reduction of conifer encroachment into sage shrublands may help to reduce the impact of cowbirds on Neotropical migrants.

Many forest-associated species would benefit from the timber treatments by creating a more open structure.

Ultimately, the proposed treatments would help to restore historic conditions and contribute to a mosaic of diverse habitat components, features, and structures in order to provide suitable habitat for the diversity of migratory birds that use the project area. The project ultimately meets the intent of Executive Order 13186, by restoring habitat for migratory birds and implementing measures to minimize potential adverse impacts on migratory birds.

Existing Condition and Environmental Effects

Effects spatial boundary and temporal scale. The Greenhorn Vegetation Project area for migratory birds is the direct, indirect, and cumulative effects spatial analysis boundary. The temporal effects analysis scale for migratory birds is the same for direct, indirect, and cumulative effects. Short-term effects could occur during project implementation, approximately 10 years. Long-term effects are post-project implementation, up to 50 years.

Table 22. Birds of conservation concern in Bird Conservation Region 10* and effects of the proposed action

Species	Habitat or Structural Component	Existing Condition	Effects of Proposed Action
Western grebe (*Aechmophorus occidentalis*)	Freshwater lakes and marshes.	A summer resident of Montana however this species preferred habitat is not available in the project area.	The project would not affect suitable habitat. No effect.
Clark's grebe (*Aechmophorus clarkia*)	Very large lakes and reservoirs and nests on mats of aquatic plants.	A migratory resident of Montana, however this species preferred habitat is not available in the project area.	The project would not affect suitable habitat. No effect.
Black swift (*Cypseloides niger*)	Nest on cliffs and in steep canyon habitats.	Cliffs and steep canyon habitat may be available in the project area but is not targeted for any treatment.	The project would not affect suitable cliff habitat. No effect.
Calliope hummingbird (*Selasphorus calliope*)	Open montane forest, meadows, and burned areas. Montana Partners in Flight (PIF) (2000) noted that these birds use regrowth areas after logging or fire (shrub-sapling seral stage 8–15 years after deforestation) for nesting and that they tend to establish territories in open shrub areas with viewing posts.	Breeding summer resident of Montana. Habitat is available in the project area and the species is known to be present in adjacent burned areas.	Although there could be some disturbance short term to these birds if they are within the proposed treatment areas during implementation, the lodgepole harvest and burning should improve habitat for this species in the long term.
Rufous hummingbird (*Selasphorus rufus)*	Generally cool environments. Principally secondary succession communities and openings, forested and brushy. Typically nests in second growth and mature forests	Habitat is present in the project area as it nests in second growth and mature forests in shrubs and drooping lower branches of trees. A known summer resident of Montana.	Shrub and second growth forest habitat will be enhanced and maintained in the project area which should improve habitat for this species in the long term.

Species	Habitat or Structural Component	Existing Condition	Effects of Proposed Action
Broad-tailed hummingbird (*Selasphorus platycercus*)	No specific habitat information is available for Montana. Reported use in surrounding states (Idaho, Wyoming, and Colorado) includes habitat similar to that found in Montana and may include ponderosa pine (Pinus ponderosa) and aspen (Populus tremuloides) groves, as well as mountain meadows and pinyon-juniper woodlands	The project is outside of the species known range in Montana.	Species not expected to be present. No effect.
Yellow Rail (*Coturnicops noveboracensis*)	Wet sedge meadows and other wetlands containing grasses, rushes and bulrushes Presence of the Yellow Rail is most commonly dictated by water depth, specifically one that fluctuates throughout the breeding season, i.e., wet in the early part of the breeding season and relatively dry (no standing water) by July or September.	The project is outside of the known range of the species in Montana.	The project would not affect the species or habitat. No effect.
Mountain plover (*Charadrius montanus*)	Primary habitat use in Montana during breeding season includes heavily grazed, shortgrass prairie sites and prairie dog colonies.	This project is outside of range of the species in Montana.	The project would not affect the species or habitat. No effect.
Lesser Yellowlegs (*Tringa flavipes*) (nonbreeding)	Migratory species in Montana. During migration, it occurs along mudflats and shallow ponds, often with vegetated shorelines. Sometimes they occur in flooded fields	Migratory habitat is not within the project area. Migratory habitat in the spring is likely present at lower elevations on private property in the Ruby valley.	The project would not affect suitable habitat. No effect
Willet (*Tringa semipalmata*)	Western breeding range on the prairies, uses short, sparse cover in wetlands and grasslands; on semiarid plains near bodies of water; in grasslands associated with shallow wetlands; to a lesser extent cropland	Habitat is present for the willet and generally this type of habitat (wetlands associated with or near grasslands).	The project would enhance grassland habitats by removing competing conifers. This should improve habitat for this species in the long term.

Species	Habitat or Structural Component	Existing Condition	Effects of Proposed Action
Franklin's gull (*Leucophaeus pipixcan*)	Preferring large, relatively permanent prairie marsh complexes, the Franklin's Gull builds its nests over water on a supporting structure of emergent vegetation. Nesting is noted to occur in cattails and bulrushes. During migration, including the Bozeman area, the Franklin's Gull can be found feeding on dry land, especially in cultivated fields prior to planting	The project area is outside of the nesting range for this species in Montana. Generally, the forested and upland habitats of the project area on National Forest lands are not preferred migratory habitats like cultivated fields.	The project would not affect preferred migratory habitat. No effect.
California gull (*Larus californicus*)	California Gull prefers larger lakes, but also occurs on ponds and rivers, especially in spring and fall. In Montana, colonies are typically located on islands	Ponds and lakes are known in the project area however large lakes are not. The project is designed to enhance riparian areas by removing competing conifers.	Large lakes or ponds will not be impacted by this project.
Black tern (*Chlidonias niger*)	Black Tern breeding habitat in Montana is mostly wetlands, marshes, prairie potholes, and small ponds. However, several locations are on man-made islands or islands in man-made reservoirs. Across all Montana sites where Black Terns are present, approximately 30%-50% of the wetland complex is emergent vegetation	Wetland habitats exist in the project area but are not targeted for any treatment.	The project would not affect suitable habitat. No effect.
Flammulated owl (*Psiloscops flammeolus*)	Refer to write-up provided in Sensitive Species section of report.	Refer to write-up provided in Sensitive Species section of report.	Refer to write-up provided in Sensitive Species section of report.
Long-eared owl (*Asio otus*)	Long-eared Owls are most often observed in hedgerows, woody draws, and juniper thickets. They are predominantly open-country hunters. Associated with deciduous woods near water in the West. Considered Secure S5 in Montana.	Habitat is present in the project area and the species has been documented in the general area.	The proposed actions that enhance open habitats and aspen habitats near water have the potential to benefit this species project would enhance grassland habitats by removing competing conifers. This project should improve habitat for this species in the long term.

Species	Habitat or Structural Component	Existing Condition	Effects of Proposed Action
Lewis's woodpecker (*Melanerpes lewis*)	Open forest and woodland. Strongly associated with fire-maintained old-growth ponderosa pine and riparian cottonwood forest. Large, soft snags (recently decayed). This species also uses live aspen with heart rot for nesting due to the open character of aspen stands (Newlon and Saab 2011). These birds have a preference for open canopy and old growth in dry forest types with large, soft snags.	Potential habitat in Douglas-fir and aspen, but not preferred burned ponderosa pine. High-density vegetative conditions, including conifer encroachment, have negative effects (MPIF 2000).	The proposed prescribed fire in and the conifer removal should improve habitat for this species. Snags would be retained in accordance with Forest Plan standards. Although shrub habitat may be reduced in the short term, the burning should produce better forage in the long term through additional snag recruitment and increased shrub production.
Williamson's sapsucker (*Sphyrapicus thyroideus*)	Montane conifer forest, as well as aspen woodland, large diameter trees, and snags for their nesting requirements.	Potential habitat in treatment units in aspen and conifer stands. Williamson's Sapsuckers appear to be highly restricted to large diameter trees and snags except when nesting in aspen (MPIF 2000).	The proposed project should benefit this species in the long term. Snags would be retained in accordance with Forest Plan standards. Although there could be some disturbance to this species during implementation, with the abundance of snags remaining in the analysis area and the aspen improvements, habitat should improve for this species in the long term.
Olive-sided flycatcher (*Contopus cooperi*)	Montane conifer forest especially burned areas with snags. Hutto and Young (1999) found olive-sided flycatchers were more abundant in early post-fire habitats than in any other major cover type, although they had similar occurrences in seed-tree cover types.	They appear to occur more frequently in disturbed than in undisturbed forests in the northern Rocky Mountains. Habitat is present within the project are and will be created from the proposed action.	"Olive-sided flycatchers appear to benefit from the creation of edge and forest openings, and therefore, should be most common in managed forests of the northern Rocky Mountains" (MPIF 2000). Therefore, treatments should help create and improve habitat for these birds. Other than short-term displacement, the proposed action should benefit this species.
Pinyon jay (*Gymnorhinus cyanocephalus*)	Pinyon Jays are closely associated with pinyon-juniper habitat in the southwestern U.S., but in Montana they occur in low-elevation ponderosa pine and limber pine-juniper woodlands. They build bulky cup nests of twigs and grasses and place them on horizontal limbs of pines. The few nests reported from Montana have been in ponderosa pines	This project is outside of the range of the species in Montana.	No effect.

Species	Habitat or Structural Component	Existing Condition	Effects of Proposed Action
Evening grosbeak (*Coccothraustes vespertinus*)	In Montana, the Evening Grosbeak breeds in mixed coniferous and spruce-fir forests of western Montana. Several studies suggest that the Evening Grosbeak is more abundant in mature forests with high structural diversity	Habitat is present for the species in the project area but mature forests with high structural diversity are excluded from treatment.	Because this species preferred habitat (mature forests with high structural diversity) is excluded from treatment. No effect to this species is anticipated.
Black rosy finch (*Leucosticte atrata*)	Alpine tundra in summer, lower on mountain slopes in winter. Nests in crevices in cliffs and talus among glaciers and snowfields above timberline.	No habitat in analysis area.	No effect.
Cassin's finch (*Haemorhous cassinii*)	Open coniferous forests of interior western mountains. Post-fire habitats and selectively logged sites are used extensively (MPIF 2000).	This bird is common in Montana. As they occur in every major forest type and every timber harvest regime (Hutto and Young 1999), potential habitat is located within the project area.	Cassin's finches showed positive responses in pole-sapling clearcuts and partial cuts (Hejl et al. 1995). Burning may provide some post-fire habitat. Other than short-term displacement, this project is expected to benefit this species.
Thick-billed longspur (McCown's longspur) (*Rhynchophanes mccownii*)	Semi-arid shortgrass steppe, characteristically open with sparse vegetation, provides nesting habitat; so do structurally similar habitats like overgrazed pastures	The project is outside of the range for this species in Montana.	No effect.
Bobolink (*Dolichonyx oryzivorus*)	Nests built in tall grass and mixed-grass prairies. Prefers "old" hay fields with high grass-to-legume ratios	The species has declined due to loss of meadows and hayfields. There are abundant hayfields adjacent to the project area throughout the Ruby valley. The project area is not considered tall grass or mixed grass prairie.	Habitat is not present in the project area (tall grass or mixed grass prairie). No effect.

*USDI FWS, 2021

Cumulative Effects for Migratory Birds

A multitude of past actions has contributed to the existing conditions for migratory birds. These past activities are accounted for in the discussion of the existing condition and are not discussed further. There are also a variety of ongoing and proposed activities that may affect migratory birds, including other vegetation treatments, wildfire, recreation, livestock grazing, and others. Because the proposed project would generally (as described above) benefit migratory birds by restoring habitat conditions, it would not be anticipated to result in significant adverse cumulative effects. Ultimately, the proposed action would help to offset the adverse effects of some past and on-going activities, such as livestock grazing and fire suppression.

Additional Wildlife Analysis in Response to Public Comment

The following species and habitats were specifically raised during the public comment, and it was asked that we address impacts in more detail.

Rocky Mountain Elk

Resource Indicators and Measures

Table 23. Resource indicators and measures for elk

Resource Element	Resource Indicator	Measure
Security	Open motorized road and trail density	Changes in density of open motorized road and trail density (miles per square mile)
Security	Secure Areas	Acreage and scale of impact to secure blocks of habitat
Critical Time Period	Winter Range	Scale and acreage of impact to winter range and transitory range

Analysis Methods and Assumptions

Elk are identified in the BDNF Forest Plan as a Management Indicator Species for security habitat. Accordingly, elk are analyzed herein regarding security habitat. Security is defined by MTFWP (2004) as the protection inherent in any situation that allows elk to remain in a defined area despite an increase in stress or disturbance associated with the hunting season or other human activities. Forested cover for hiding and thermal benefits do not appear to be the best metrics for elk analysis, especially for hunted populations (Unsworth et al. 1993; Hayes et al. 2002; Cook et al. 2005; and Rumble and Gamo 2011). Additionally, a study by Proffitt et al. (2013) looked at elk security, hunter access, and other variables relative to the effects on adult female elk in the Greater Yellowstone Ecosystem (GYE). This study found that elk selection for areas restricting hunting access was greater than selection for security habitat. Further, they found that the density of roads open to motorized use was the strongest predictor of elk distribution.

As such, the density of open motorized roads and trails (OMRTD) is used as the metric for elk security. The Forest Plan has established OMRTD goals for the Gravelly Landscape, broadly, and for Hunting District 330 (the Hunting District encompassing the project area) to address elk security and wildlife security more broadly. The OMRTD goal for the Gravelly Landscape applies year-round, except for the fall hunting season. The goal is 0.7 miles of road per square mile. The OMRTD goal for Hunting District 330 applies to the fall rifle big game season and is 0.7 miles per square mile or less.

Existing Condition and Status

The current OMRTD for the Gravelly Landscape and for Hunting District (HD) 330 during the fall rifle big game season is at 0.7 miles per square mile, which meets the Forest Plan goal.

Additionally, the Forest Plan defined secure areas based on a buffer around open motorized roads and trails. Specifically, secure areas are those areas greater than 10 acres in size that are 1/3 of a mile or more from a route open to motorized vehicles. The current acreage of secure areas within the project area is displayed in Table 25; refer also to the Secure Area General Season and Fall Season maps). Secure areas account for

over 60 percent of both the project area and larger analysis area in both the general season and the fall hunting season.

Montana's Elk Management Plan has a population objective of 8,000 observed elk for the Gravelly Elk Management Unit (EMU), the EMU that encompasses the project area. The EMU objective range is 6,400 to 9,600 elk; 8,509 elk were observed in 2023, at the upper end of the objective range. The current estimated post-harvest elk population assumes that eighty percent of elk are observed.

Table 24, below, shows the estimated population from MTFWP data for the last several years. As shown in the table, the population has been relatively stable with numbers routinely at or well above the objective level since 2008, as the management objective is 6,400–9,600 observed elk post hunting season.

Table 24. Estimated number of elk for the Gravelly EMU by year

Year	Estimated Number of Elk
2023	8,509
2022	10,771
2021	11,917
2020	10,600
2019	10,690
2018	9,895
2017	9,552
2016	8,673
2015	10,643
2014	10,402
2013	9,531
2011	9,653

Environmental Effects

Spatial boundary and temporal scale. The spatial boundary for the direct, indirect, and cumulative effects analysis is elk Hunting District 330. The temporal effects analysis scale for elk is the same for direct, indirect, and cumulative effects. Short-term effects could occur during project implementation, approximately 10 years. Long-term effects are post-project implementation up through the time where the effects of vegetation treatments would no longer be discernible, approximately 50 years.

Alternative 1: No Action

Under the no-action alternative, there would be no modification to the OMRTD or to the acreage of secure habitat available. As such, there would be no impact to elk and other big game security.

Alternative 2: Proposed Action

Indicator 1: OMRTD. As the proposed action does not include any new permanent roads, it would not modify the OMRTD. Temporary roads would not be open to the public. Therefore, the project would not result in impacts to the OMRTD, and the project area would remain compliant with forest plan standards for OMRTD.

Indicator 2: Summer and Fall Secure Areas. As the proposed action does not include any new permanent roads, it would not modify the acres of secure area over the long term. However, as the project would require the construction of 4.7 miles of temporary roads for implementation, there would be a decrease in

the availability of secure area during implementation of the project. These temporary roads would not be open for use by the public. Nevertheless, increased motorized access by individuals implementing the project would reduce the acreage of secure areas.

Table 25, below, shows the amount of secure area within the project area, during the summer and fall. The calculation of secure area provided for implementation is based on the total mileage of temporary roads. However, implementation of the project would take several years and temporary roads would not all be operational at the same time, as temporary roads would be constructed as needed for implementation and then decommissioned following their use. As such, the actual reduction in secure area at any given time would actually be less than that calculated here.

Table 25. Secure area within the project area before, during, and after project implementation

Area and Season	Existing and Post Implementation Secure Acres	Secure Areas During Implementation	Change in Secure Area
General Season Project Area	27,474	27,288	-119 acres or -0.7%
Fall Season Project Area	29,047	28,645	-402 acres or -1.4%

The amount of secure area would be reduced by less than one percent during implementation for the general season and 1.4 percent in the fall season. As such, the decrease in secure area that would occur during implementation would be negligible. Further, the impact would be temporary, as it would be limited to implementation. The amount of secure area would return to pre-implementation numbers following implementation and decommissioning of temporary roads.

The stability of the elk population in the Gravelly Elk Management Unit, as documented above, suggests that maintaining the current level of secure area meets the needs of elk in this area.

Finally, the proposed vegetation treatments would ultimately be anticipated to benefit elk and other big game by helping to restore a mosaic of habitat structure that more closely resembles historic conditions within the project area. Elk and other big game generally benefit from a landscape with a mosaic of habitat types and structures that meet different needs for the species (cover, forage, etc.). Reducing conifer encroachment would improve the availability of forage in shrublands, while thinning treatments would improve available forage within Douglas-fir stands. Similarly, prescribed burning would stimulate growth of desirable forage for elk and other big game, as elk are documented to use burned sites more than un-burned sites for foraging (Van Dyke and Darragh 2006).

Indicator 3: Winter Range

Elk winter range is mapped within the project area, most specifically the southern end of the project area associated with Timber Creek Road and the Ruby and Warm Springs area (See elk winter range maps). Generally, elk do not congregate in these areas during the winter as these areas are adjacent to winter open motorized routes which are popular to snowmobiles and also truck traffic to mountain lion and wolf hunters and furbearer trappers. Similar to transition and summer range habitats, reducing conifer encroachment in elk winter range would improve the availability of forage in shrublands. Similarly, prescribed burning would stimulate growth of desirable forage for elk, as elk are documented to use burned sites more than un-burned sites for foraging. Overall, negative impacts to elk winter range are expected to minimal as elk move out of this area to the neighboring game ranges during hard winter and the treatments proposed will enhance the quality of winter range in the long term.

Additionally, a design feature was added to treat and map cheat grass within units in big game winter range. This will have beneficial effects to wintering big game.

Cumulative Effects for Elk

A variety of past actions have contributed to the existing condition for elk and big game security within the project area, such as timber harvest, livestock grazing, wildfire suppression, hunting, and road construction associated with these activities and others. The impacts of these past actions are accounted for in the description of the existing condition for this species, and, as such, are not discussed in detail.

The primary ongoing activity that contributes to elk and other big game security is hunting. The stability of the elk population in the Gravelly EMU suggests that hunting harvest levels have not had an adverse impact on elk security in the area. Other proposed vegetation treatment projects within the larger analysis area would be expected to benefit habitat for elk and other big game. Additionally, other projects would not be anticipated to increase the OMRTD or to decrease the amount of secure area. There may be temporary roads associated with other projects that would temporarily decrease the amount of secure area. However, as the proposed action would decrease the amount of secure area by less than one percent during implementation, the proposed action, in combination with other activities, would not be anticipated to result in a significant adverse effect to security habitat for elk and other big game.

Moose

Analysis Methods and Assumptions

Several comments were received during scoping for the project regarding concerns for moose; therefore, moose will be analyzed here relative to the concerns raised during the combined scoping and comment period for the project.

The concerns raised regarding moose focused on impacts to its winter range and availability of hiding and security habitat for this species and other big game. Security habitat is addressed in this report under the analysis for elk, as elk are the management indicator species for security habitat for the BDNF. Accordingly, the analysis provided here will focus on the potential impacts to winter habitat for moose.

Moose have been documented within the project area, with occurrences documented from summer and late fall. There are numerous documented occurrences of moose along the Upper Ruby River south of the project area during winter. The Ruby River corridor adjacent to the project area has critical moose winter range.

Table 26. Resource indicators and measures for moose

Resource Element	Resource Indicator	Measure
Winter Habitat	Willow flats and subalpine fir, mapped winter range	Acreage and Scale of Impact to Moose Winter range

Existing Condition and Status

During the winter, moose generally use willow flats or mature conifer forests. Availability of suitable forage and snow depth appear to be primary factors driving winter habitat use (Burkholder 2012; Poole & Stuart-Smith 2005). Studies of moose in the Gravelly Mountains have documented that willow is the principal component of the winter diet (Knowlton 1960; Peek 1963). Mature conifer forests with a closed canopy

appear to provide a refuge from deeper snow in late winter (Burkholder 2012; Innes 2010). Where moose can move to lower elevation areas where snow depth generally remains less than 35 inches, mature conifer does not appear to be a major winter habitat, as moose tend to congregate in riparian floodplains in these areas (Innes 2010).

Studies suggest that moose in the Gravelly Mountains typically prefer to congregate in lower elevation willow flats rather than mature conifer forests for winter habitat (Knowlton 1960; Peek 1963). The Upper Ruby River, located just south of the project area, provides important winter habitat for moose in this area. Nevertheless, moose may also use higher elevation mature conifer forests as winter habitat in the area. Mature conifer habitats may also provide thermal benefits for moose as they may suffer from heat stress when temperatures rise above 23 degrees Fahrenheit in the winter. When conifer forests are used during the winter, moose appear to prefer subalpine fir habitats (Knowlton 1960).

Significant willow flats are not present within the project area. Preferred subalpine fir, spruce and mixed spruce/fir forests and wet grass/shrublands compose approximately 15 percent (6,410 acres) of the project area.

Environmental Effects

Spatial boundary and temporal scale. The direct and indirect effects spatial analysis boundary for moose is the Greenhorn Project Area. Short-term effects could occur during project implementation, approximately 10 years. Long-term effects are post-project implementation for 50 years.

Alternative 1: No Action

Under the no-action alternative, there would be no direct impact to preferred winter habitats. Ongoing forest succession and fire suppression may result in an increased risk of stand-replacing wildfire, which could have significant impacts on subalpine fir habitats. Additionally, ongoing conifer encroachment would be anticipated to continue and would continue to reduce the hydrology of riparian areas.

Alternative 2: Proposed Action

Mitigation. There are mitigation measures to protect riparian areas from treatment effects. Refer to the Aquatic Resource Report for additional information regarding these mitigation measures.

Direct and Indirect Effects for Moose

In general, subalpine fir and spruce forested moose habitat is not targeted for treatment. Habitats such as wet grass and wet shrub located within prescribed fire units are also not the main target for treatment as the purpose is to enhance upland habitats, not wet areas that moose prefer. Moose are often location within the project area and are also known to come into areas of cutting and harvest (Especially during the winter) to forage on downed tree branches. Although habitat is located within treatment units boundaries, this habitat type is not targeted for treatment, as treatments are targeting drier Douglas-fir forest types. These fir and spruce areas are principally within prescribed burn units where the burns will target conifer encroachment in the drier areas of the treatment units. Although there may be some limited spread of prescribed fire into moister areas, subalpine fir habitats would not be anticipated to see significant effects from prescribed fire. Accordingly, the project is not anticipated to have significant adverse effects on subalpine fir habitat that provides potential winter habitat and thermal cover.

In addition, treatments would target conifer encroachment into aspen stands and upland habitats. Because aspen can be an important component of winter diet (Knowlton 1960), these treatments would be anticipated to benefit moose habitat in the long term.

Although riparian willow habitat within the project area is negligible, treatments of encroaching conifer would improve hydrologic conditions within these areas. As such, the capacity for riparian areas within the project area to support shrubby species such as willow would be improved by implementation of the project.

A majority of the commercial harvest will occur after the spring when moose calve their young and a majority of the prescribed burning will take place prior to moose calving which minimizes disturbance effects to moose. Overall, this project is expected to have short term effects to summering moose habitat and could cause moose to move into adjacent areas during implementation. Long term effects to moose are expected to be positive by enhancing foraging habitat quality.

Cumulative Effects for Moose

A variety of past actions, such as conifer encroachment, hunting, wildfire, and timber treatments, have contributed to the existing condition for moose. These past actions are accounted for in the description of the existing condition for this species and are therefore not discussed further.

Ongoing activities that may continue to impact winter habitat of moose include livestock grazing and other vegetation treatments. Where livestock browse shrubs for forage, they may affect moose habitat. Generally, management of livestock grazing in the area reduces their impact on riparian areas. The Ruby River Moose Habitat Improvement Project was completed along the Ruby River in 2023, south of the project area. The project, which began in the summer of 2018, improved conditions within approximately 325 acres of the willow flats that are generally preferred as wintering habitat for moose in this area.

Accordingly, the proposed project, in combination with other activities, is not anticipated to result in significant adverse effects to moose winter habitat. Cumulative activities are anticipated to improve wintering habitat for moose in the Gravelly Mountains area.

Determination for Moose

The proposed action is not anticipated to result in significant adverse effects to moose winter habitat. Ultimately, it is anticipated that treatments would benefit moose wintering habitat over the long term.

Great Gray Owl

Analysis Methods and Assumptions

The great gray owl is not on the Region 1 Sensitive Species list or on the USFWS Birds of Conservation Concern list (USDI FWS 2008). Accordingly, this species is discussed relative to compliance with Forest Plan Wildlife Habitat Standard 9, which directs that known active nests should be protected.

Existing Condition and Status

A pair of great grey owls were observed near unit T6. This area will be resurveyed until active status can be determined.

Two incidental visual observations of great gray owls occurred during project goshawk surveys in August 2017: one was a confirmed great gray owl observation in a tree and in flight in Unit T5. Two nights of great gray owl taped-playback surveys were conducted June 21 and 22, 2017, along Timber Creek Road in the project area following a protocol developed for Oregon and Washington (USDA Forest Service and BLM 2004). The survey efforts consisted of 45 call stations. No great gray owls were detected during survey efforts. Great Gray owls are also known near unit T6 and have been observed annually by survey (2021-2023) near this unit along the edge of the sagebrush upland openings. No nests have been detected.

There are approximately 12,218 acres of modeled great gray owl habitat in the project area.

Environmental Effects

Alternative 1: No Action

Under the no-action alternative, typical forest succession and conifer encroachment would continue to occur. Because this species prefers more open habitats for foraging, ongoing succession and conifer encroachment may reduce some habitat suitability over time. However, as no prescribed fire and timber treatments would be conducted, there would be no disturbance to nesting great gray owls, if present in the project area.

Alternative 2: Proposed Action

Habitat Effects: There are approximately 12,218 acres of modeled great gray owl habitat in the project area and approximately 2,503 acres are within a proposed treatment unit which is 20% of the habitat available. Within this portion of the habitat within treatment units, short term effects from commercial harvest, noise activity and change in structure and composition of habitat is expected. Less than ¼ of the habitat that is available to great gray owls. This leaves a majority of the habitat available yearlong for great gray owls.

Disturbance: Great gray owls could potentially be disturbed in the short term from foraging or flying through the project area during implementation due to noise, traffic, machinery and possibly smoke. Because mitigation avoids known active nest sites, and surveys are required proper to implementation, nestlings are not expected to be impacted from smoke. There no known nest sites. Adult owls that may get impacted from this activity are expected to be transient and able to fly to other suitable habitats adjacent, within and outside the project area to forage during the project activities.

Because mitigation measures, impacts to these owls will be minimized and foraging habitat for owls should be benefitted. No negative long-term or substantial effects are expected.

Cumulative Effects To Great Gray Owl

A multitude of past actions has contributed to the existing conditions for great gray owls. These past activities are accounted for in the discussion of the existing condition and are not discussed further. There are also a variety of ongoing and proposed activities that may affect owls and owl habitats, including wildfire, recreation, livestock grazing, and others. Because the proposed project would generally (as described above) benefit owls by restoring habitat conditions and is designed to minimize any potential disturbance to birds, it would not be anticipated to result in significant adverse cumulative effects.

Northern Goshawk

Analysis Methods and Assumptions

Northern goshawks were removed from the Region 1 Sensitive Species list in 2007. They were added to the BDNF Forest Plan Standard 9 to protect nests because they were identified as a species of interest through public comments, appeals, or litigation (USDA Forest Service 2009). Forest Plan Standard 9 also protects threatened, endangered, proposed, candidate, and sensitive bird species' (including goshawks) nests during critical times of the year. Mitigation has been added to the proposed action to protect active nests.

The Montana Natural Heritage Program has created habitat suitability models for numerous species including the Northern Goshawk. This model was used to estimate acres of suitable habitat in the project area.

Existing Condition and Status

No confirmed records of northern goshawks occur in the Greenhorn Project Area. The closest record is 3 miles south of the project area. Northern goshawk surveys were conducted within a majority of the proposed treatment unit boundaries in July and August 2017. Survey efforts consisted of 116 call points. No goshawk responses were detected. Two incidental (unconfirmed) reports of a goshawk near timber unit T3 occurred in August 2017 not associated with the project goshawk surveys. Goshawks have the ability as any other bird to fly through and over habitats foraging at any time. Subsequent efforts to locate individuals and nests were unsuccessful. Sites were revisited in 2021, 2022 and 2023 and no goshawks were detected.

Samson (2006) estimated the Northern Region provides critical habitat that far exceeds the threshold for viability of the goshawk (more than 32 times). Habitat is currently widespread and abundant, and predicted to continue to be widespread and abundant over the next 50 years despite the current mountain pine beetle outbreak (ERG, 2010). Habitat for goshawks are not considered limited on the forest and in general, the project activities do not target known goshawk home ranges.

There are approximately 12,760 acres of modeled goshawk habitat in the project area.

Environmental Effects

Alternative 1: No Action

If no action were to occur, there would be no immediate risk to nesting goshawks. Over the long term, forest succession would continue to occur, resulting in a general increase in canopy cover in the project area. However, there would also be an increase in the risk for insect outbreaks. Were a major insect outbreak to occur, it would also increase fire risk, and ultimately result in a greater potential for a significant decrease in canopy cover in the project area, thereby reducing potential nesting habitat.

Alternative 2: Proposed Action

Direct and Indirect Effects to Northern Goshawks

Disturbance Effects: There are no known active goshawk nests within the project area. Therefore, the project would not affect known goshawk nests. If any are found or reported, these nests would be protected. Reported incidental observations of this species occurred near unit T3. However the units were resurveyed in 2021, 2022 and 2023 and no known active sites were found and no goshawks observations or vocals were detected. Direct effects to nesting goshawks is not expected.

If active nests of this species are detected during implementation, then areas surrounding the nests would be protected until fledged birds would be capable of leaving the nest area (about mid-July). The required mitigation for this species will minimize potential effects to nesting birds. Because goshawks are very vocal and aggressive birds that defend nests during the spring, it is unlikely an active nest within these proposed harvest units would go undetected. Based on this, it is reasonable to assume direct effects to birds during nesting season is unlikely.

Prescribed fire units will be surveyed prior to implementation within modeled habitat where appropriate, if implementation will take place during the nesting period. This will also minimize the potential to impact nesting birds.

Northern goshawks could potentially be disturbed in the short term from foraging or flying through the project area during implementation due to noise, traffic, machinery and possibly smoke. Because there are no known or suspected home ranges of goshawks in this area, birds that may get impacted from this activity are expected to be transient and able to fly to other suitable habitats adjacent, within and outside the project area to forage during the project activities. Burning is not expected to occur during nesting season as the proposal is for spring or fall birds, which is generally outside of known goshawk nesting season. This species is known to prefer mature forests with open understories and the majority of the proposed actions in mature forests are designed to maintain or enhance large trees by commercial thinning and retaining all old growth in every unit when identified.

Habitat effects: Approximately 5,548 acres of modeled goshawk habitat is mapped within proposed treatment units. This is approximately 43 percent of the modeled goshawk habitat in the project area. Approximately 4,129 acres of this habitat is within proposed prescribed fire units where 25 percent of the habitat is expected to have fire effects. In all likelihood even less of this habitat would have fire effects as the target for treatment is dry Douglas-fir habitat and small diameter trees within uplands. This type of habitat could be goshawk foraging habitat, but in generally, goshawks prefer forested canopies for hunting and foraging, minimizing the potential effects to their habitat. In the long term, a majority of the proposed actions will enhance the understory and retain large trees, which will enhance goshawk foraging habitat and retain nest trees.

Cumulative Effects To Northern Goshawks

A multitude of past actions have contributed to the existing conditions for goshawks. These past activities are accounted for in the discussion of the existing condition section and are present in the description of the habitat available for this species and are not discussed further.

There are also a variety of ongoing and proposed activities that may affect goshawks and goshawk habitats, including wildfire, recreation, and others. Because the proposed project would generally (as described above) benefit goshawks by restoring understory vegetation habitat conditions in certain areas, avoid goshawk habitats in general, and is designed to minimize and potential disturbance to birds, it would not be anticipated to result in significant adverse cumulative effects.

Species Associated with Snags and Downed Wood

The Forest Plan outlines standards relating to snags and downed wood. Compliance with these standards is outlined in the Vegetation Report.

The commercial thinning activities would have the potential to reduce snag recruitment by reducing stand density, which, in turn, reduces mortality from insects and disease. However, because of the retention of existing snags in compliance with forest plan standards and the presence of snags outside of treatment areas, it is not anticipated that the proposed action would have a significant adverse effect on snag-dependent species.

Similarly, proposed treatments would have the potential to reduce the amount of downed wood available. However, treatments would comply with forest plan standards for presence of downed wood. As such, the proposed action would not be anticipated to result in significant adverse effects to species associated with downed wood.

Connectivity and Linkages

Connectivity is defined as “the degree to which the landscape facilitates or impedes movement” (Taylor et al. 1993). Thus, the primary concern with connectivity for wildlife is providing connections between core areas or habitat, such as large protected areas, and across areas of less suitable habitat. The Forest Plan identifies contributing to wildlife linkages between landscapes as a goal. Forest Plan options to meet goals for contributing to connectivity include:

- Maintaining Forest Service ownership at highway and road crossings.
- Consolidating ownership at approach areas to highway and road crossings substantiated by empirical data as necessary to facilitate wildlife movement.
- Providing secure habitat at the landscape scale to facilitate large animal movement.

Connectivity and linkages across the landscape necessarily vary by species depending on habitat needs, tolerance of disturbance, and other factors. The discussion provided here will address connectivity at the broader landscape scale, rather than focusing on specific species. Species-specific analysis is provided in the analysis for that species as appropriate (such as Canada lynx).

Existing Condition

Montana Fish, Wildlife and Parks has mapped coarse-landscape connectivity across the state as part of their Crucial Habitat Assessment. This analysis includes identification of large natural areas or large intact blocks of natural habitat. Large natural areas are those areas of relatively intact native habitat with low levels of anthropogenic impact. These areas are considered sources and destinations of wildlife species moving across the landscape. The project area is generally identified by MTFWP as being part of a larger, intact natural area encompassing the Snowcrest and Gravelly Ranges. As such, the project area functions largely as a source and destination for wildlife and does not represent an impediment to wildlife connectivity. The project area also functions to provide connectivity between larger protected areas and associated intact habitat, such as the Greater Yellowstone Ecosystem. Accordingly, the project area may provide both important core habitat and connectivity habitat between larger habitat blocks.

Environmental Effects for Connectivity

The proposed project does not involve changes in land ownership, and, as such, would not modify connectivity for wildlife as it relates to Forest Service ownership of highway and road crossings (the first two points identified as means to meet Forest Plan goals to contribute to connectivity). Similarly, the project does not propose new permanent roads, so it would not result in a permanent modification to secure habitat for wildlife. Refer to the Elk section for additional information regarding wildlife security, as elk is identified as the Management Indicator Species for secure habitat. Ultimately, although construction of temporary roads would reduce secure habitat during implementation, the reduction would be negligible. As such, the proposed action would continue to provide secure habitat at the landscape scale.

As discussed in preceding sections, the proposed vegetation treatments would have variable effects on habitat quality, depending on the species considered. Accordingly, treatments would similarly have variable effects on connectivity for species. However, as stated previously, connectivity is addressed here at a broader scale. The proposed treatments would result in a more diverse mosaic of habitat types and structures across the project area. The diversification of habitat would be expected to benefit connectivity, broadly, by meeting habitat needs for a variety of species, rather than focusing on a single species. While treatments may alter wildlife movement through the project area, the treatments would not be anticipated to impede movements or have a significant adverse impact on movements throughout the project area.

The project area would continue to serve as both a source and destination for wildlife movements while providing important connectivity between larger blocks of habitat.

Compliance

Statutory and Regulatory Consistency

Table 27. Summary of statutory and regulatory consistency

Regulatory Requirement	Alternative 2: Proposed Action
Endangered Species Act	There are two listed species (Canada lynx and Grizzly Bear) with the potential to occur within the project. The proposed action is compliant with the Endangered Species Act, as a consultation is ongoing with USFWS.
Migratory Bird Treaty Act	The proposed action would comply with the Migratory Bird Treaty Act. The project is generally anticipated to benefit migratory birds by moving portions of the project area toward historic conditions. Refer to the Migratory Birds Section of this report.

Forest Plan Compliance

Compliance with the BDNF forest plan has been addressed as appropriate throughout this report. The table, below, provides a summary of compliance with forest plan standards. Refer also to the tables provided in the Canada lynx and greater sage-grouse sections of this report for details regarding compliance with forest plan amendments focused on those species.

Table 28. Forest plan compliance for wildlife standards

Forest Plan Standards for Wildlife	Compliance: Yes or No	Why Alternative 2: Proposed Action Complies or Does not Comply
1. From October 15 to December 1 hunting units that exceed open motorized road and trail density (OMRTD) objectives will have no net increase in designated open motorized road and trail mileage (over the hunting unit).	Yes	This project will not change existing OMRTDs and will follow travel management timing restrictions.
2. Landscapes that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage.	Yes	This project will not change existing OMRTDs and will follow travel management timing restrictions.
3. Snag direction identifies minimum average snags per acre greater than 15-inches DBH to be retained, except where they pose a safety hazard to operators and/or the public. The per acre snag requirements do not apply to the treatment units if analysis shows the levels of snags would be met for the project area as a whole.	Yes	Snags standard will be met through the project area. Retain all snags greater than 20” dbh, (except for hazard trees). In addition, to meet the minimum average snags per acre (Forest Plan, Table 12), retain all snags 15 inches dbh or greater and 4.3 live trees per acre (over 15 inches). Refer to the Appendix B of the EA.

Forest Plan Standards for Wildlife	Compliance: Yes or No	Why Alternative 2: Proposed Action Complies or Does not Comply
4. Do not reduce the number of live trees greater than 10-inches DBH per acre in regeneration harvest treatment units (to provide future snags) below 0.9 live trees/acre in the lodgepole vegetation category.	Yes	Do not reduce the number of live trees greater than 10" dbh per acre in regeneration harvest treatment units below the levels shown in FP table 13. Refer to the Appendix B of the EA.
5. Sheep allotments	Not Applicable	This project does not involve sheep allotments.
6. Grizzly bear amendment	Yes	This project meets the Grizzly bear amendment and the most recent biological opinion for the entire 2009 Beaverhead-Deerlodge Forest Plan.
7. Lynx Management direction	Yes	This project meets lynx management direction.
8. Sagebrush/sage grouse	Yes	There are 2 active leks within 18 km of the project area (VC Hill and Sage Creek – Ruby. Treatments would occur within the 18 km buffer. However, treatments do not remove sagebrush. Additionally, site specific analysis has indicated that prescribed fire would benefit sage-grouse habitat and move it toward desired conditions which is compliant with the Sage-grouse ROD (Forest Service 2015) in Appendix B.
9. Mitigate, through avoidance or minimization, management actions around known active nests of TES bird species, if those actions would disrupt reproductive success during the nesting period (includes great gray owls and goshawks).	Yes	This standard is incorporated into the design features/mitigation measures for the proposed action.
10. Abandoned mines	Not Applicable	The proposed action does not involve abandoned mines.
11. Implement terms and conditions for wolves in northwest Montana recovery area until such time as the wolf is de-listed.	Yes	The gray wolf is currently delisted, and this species is now analyzed as a sensitive species.
12. Provide habitat for species requiring large woody debris in forested habitat types, by retaining post-project outcomes for regeneration harvest of the following: lodgepole—6 pieces per acre with small end diameter equal to or greater than 8 inches and 10-ft long; Douglas-fir—6 pieces per acre with small end diameter equal to or greater than 12 inches and 10-ft long.	Yes	Woody debris would be retained in compliance with this standard. Refer to the Greenhorn Vegetation Resources report.

Canada Lynx and Greater Sage-Grouse Forest Plan Amendment Compliance Tables

Table 29. Consistency with Northern Rockies Lynx Management Direction guidelines

Direction	Northern Rockies Lynx Management Direction	Consistency
Standard ALL S1	New or expanded permanent development and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.	No permanent development planned in the project. Vegetation treatments would not create a barrier to lynx movements in and between the LAUs on the Greenhorn Vegetation Mountains and the linkage areas to the north and southeast.
Standard VEG S1	If more than 30% of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.	**None of the LAUs associated with the project area currently exceed 30% of the lynx habitat in an early stand initiation stage. Refer to the Canada lynx analysis in the report for additional details.**
Standard VEG S2	Timber management projects shall not regenerate more than 15 % of lynx habitat on NFS lands in an LAU in a 10-year period.	**There has been no regeneration in the last ten years and the proposed action would not result in more than 15 percent. Refer to the Canada lynx analysis in the report for additional details.**
Standard VEG S5	Precommercial thinning projects that reduce snowshoe hare habitat may occur from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat only under certain exceptions, such as daylight thinning of planted rust-resistant white pine where 80% of the winter snowshoe hare habitat is retained.	There are no aspen exception areas will be used in this project. No lynx habitat is identified for daylight thinning for aspen.
Standard VEG S6	Vegetation management projects that reduce snowshoe hare habitat in multi-story mature or late successional forests may occur only: 1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements; 2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or 3. For incidental removal during salvage harvest (e.g., removal due to location of skid trails).	**The proposed action would not reduce snowshoe hare habitat in multi-story mature or late successional forests. Refer to the Canada lynx analysis in the report for additional details.**
Guideline VEG G1	Vegetation management projects should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority should be given to stem-exclusion, closed-canopy structural stage stands for lynx or their prey (e.g., mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat.	The project as designed would enhance shrub habitats and is not in conflict with this guideline.
Guideline VEG G4	Prescribed fire activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.	No permanent travel routes or firebreaks would be created for or through burning activities.

Direction	Northern Rockies Lynx Management Direction	Consistency
Guideline VEG G5	Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.	A considerable amount of habitat for alternate prey will remain within LAUs. The project would contribute to maintaining a matrix of diverse habitat types and structures across the landscapes composing the LAUs.
Guideline VEG G10	Fuel treatment projects in the WUI, as defined by HFRA, should be designed considering standards VEG S1, S2, S5, and S6 to promote lynx conservation.	This project is not a fuel treatment project. The applicable standards have been met for the project.
Guideline VEG G11	Denning habitat should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees ("jack-strawed" piles). If denning habitat appears to be lacking in the LAU, then projects should be designed to retain some coarse woody debris, piles, or residual trees to provide denning habitat in the future.	Coarse woody debris, piles, and residual trees would be retained in the project area. See Project design features for coarse woody debris and snag requirements, which would help to provide denning habitat in the future within the proposed units.
Guideline HU G9	On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.	No permanent roads would be constructed. Construction of temporary roads would occur, and these temporary roads would be decommissioned after project completion. Temporary roads for the project would not be open to public access and public use would be prevented during project implementation.

Table 30. Project compliance with greater sage-grouse Idaho and southwest Montana plan amendment

Standard or Guideline Number	Description of Standard or Guideline	Project Compliance
GRSG-GEN-ST-004-Standard	In priority habitat management areas and sagebrush focal areas, do not issue new discretionary written authorizations unless all existing discrete anthropogenic disturbances cover less than 3% of the total greater sage-grouse habitat within the Biologically Significant Unit and the proposed project area, regardless of ownership, and the new use will not cause exceedance of the 3% cap.	Project area not located within a priority habitat management area or sagebrush focal area.
GRSG-GEN-ST-005-Standard	In priority, general, and important management areas, and sagebrush focal areas, only allow new authorized land uses if, after avoiding and minimizing impacts, any remaining residual impacts to the greater sage-grouse or its habitat are fully offset by compensatory mitigation projects that provide a net conservation gain to the species, subject to valid existing rights by applying beneficial mitigation actions.	The project does not authorize new land uses.
GRSG-GEN-ST-006-Standard	Do not authorize new surface disturbing and disruptive activities that create noise at 10dB above ambient measured at the perimeter of an occupied lek during lekking (from March 1 to April 30) from 6 p.m. to 9 a.m.	Because of the distance of proposed treatment activities from documented active leks, activities would not result in noise levels greater than 10dB at the perimeter of occupied leks.
GRSG-GEN-GL-007-Guideline	During breeding and nesting (from March 1 to June 15), surface disturbing and disruptive activities to nesting birds should be avoided.	As described in the existing condition section, the project area does not support nesting sage-grouse because of the distance from active leks
GRSG-GEN-GL-008-Guideline	When breeding and nesting habitat overlaps with other seasonal habitat, habitat should be managed for breeding and nesting desired conditions.	Proposed treatments that would reduce conifer encroachment are anticipated to improve potential breeding and nesting habitat for sage-grouse.
GRSG-GEN-GL-009-Guideline	Development of tall structures within 2 miles from the perimeter of occupied leks, as determined by local conditions (e.g., vegetation or topography), with the potential to disrupt breeding or nesting by creating new perching/nesting opportunities for avian predators or by decreasing the use of an area, should be restricted within nesting habitat.	As a vegetation management project, the proposed action would not result in development of tall structures and is not within 2 miles of a lek and the project is not within nesting habitat
GRSG-GRSGH-ST-027-Standard	Design habitat restoration projects to move towards desired conditions.	Desired conditions for sage-grouse habitat were considered in development of the proposed action. It is anticipated that treatments would benefit sage-grouse habitat over the long term. Removing encroaching conifers would improve availability of habitat. Similarly, the mosaic of burned areas which would be created would help to meet the variable seasonal needs by reducing sage where it is more abundant than desired and increasing availability of forbs.

Standard or Guideline Number	Description of Standard or Guideline	Project Compliance
GRSG-GRSGH-GL-028-Guideline	When removing conifers that are encroaching into greater sage-grouse habitat, avoid persistent woodlands (i.e., old growth relative to the site or more than 100 years old).	Conifer encroachment would target trees expanding into sagebrush habitats. Persistent woodlands would be retained.
GRSG-GRSGH-GL-029-Guideline	In priority, important, and general habitat management areas and sagebrush focal areas, actions and authorizations should include design features to limit the spread and effect of undesirable non-native plant species.	There are several design features and mitigation measures incorporated into the proposed action to minimize the potential for spread of non-native plant species.
GRSG-GRSGH-GL-030-Guideline	To facilitate safe and effective fire management actions, in priority, important, and general habitat management areas and sagebrush focal areas, fuel treatments in high-risk areas (i.e., areas likely to experience wildfire at an intensity level that might result in movement away from greater sage-grouse desired conditions) should be designed to reduce the spread and/or intensity of wildfire or the susceptibility of greater sage-grouse attributes to move away from desired conditions.	Proposed treatments would reduce conifer encroachment and contribute to a mosaic of sagebrush conditions which would reduce the potential for high-intensity wildfire that would be more likely to move sage habitats in the project area away from desired conditions for sage-grouse.
GRSG-GRSGH-GL-031-Guideline	In priority, important, and general habitat management areas and sagebrush focal areas, native plant species should be used, when possible, to maintain, restore, or enhance desired conditions.	Any seeding or planting of vegetation done for the project (e.g., when decommissioning temporary roads) within the GHMA would use native species.
GRSG-GRSGH-GL-032-Guideline	In priority and important habitat management areas and sagebrush focal areas, vegetation treatment projects should only be conducted if they maintain, restore, or enhance desired conditions.	The project area is not located within a priority or important habitat management area or sagebrush focal area.
GRSG-FM-ST-042-Standard	In priority, important, and general habitat management areas, and sagebrush focal areas, do not use prescribed fire in 12-inch or less precipitation zones unless necessary to facilitate restoration of greater sage-grouse habitat consistent with desired conditions for pile burning.	The project area is not located within a 12-inch or less precipitation zone. Prescribed fire in this project is necessary to facilitate restoration of this habitat to attain desired conditions

Standard or Guideline Number	Description of Standard or Guideline	Project Compliance
GRSG-FM-ST-043-Standard	In priority, important, and general management habitat management areas, and sagebrush focal areas, if it is necessary to use prescribed fire for restoration of greater sage-grouse habitat consistent with desired conditions, the associated National Environmental Policy Act analysis must identify how the project would move towards greater sage-grouse desired conditions, why alternative techniques were not selected, and how potential threats to greater sage-grouse habitat would be minimized.	The proposed project would ultimately move the project area towards desired conditions for sage-grouse by removing encroaching conifers. As described in the existing condition section and above, conifer encroachment has significantly limited potentially suitable sage-grouse habitat within the project area. Conifer removal would generally improve habitat for this sage-grouse. Mechanical treatments in conjunction with prescribed burning were determined to be the most effective means of controlling encroaching conifers to target all conifers and provide the greatest long-term benefit. Because the project area is unlikely to currently support significant sage-grouse activity, project activities are not anticipated to impact sage-grouse directly. Burning treatments would be conducted under conditions that would minimize loss of sagebrush habitat. Ultimately, the proposed project would improve potential sage-grouse habitat within the project area. Additional details regarding effects and benefits to sage-grouse are included in the species analysis in the report.
GRSG-FM-GL-044-Guideline	In wintering or breeding and nesting habitat, sagebrush removal or manipulation, including prescribed fire, should be restricted unless the removal strategically reduces the potential impacts from wildfire or supports the attainment of desired conditions.	This project is within late summer brood-rearing habitat and not wintering, breeding, or nesting.
GRSG-FM-GL-045-Guideline	In planned fuels management activities or part of an overall vegetative management strategy to mitigate the impacts of wildfire in priority and general habitat management areas and sagebrush focal areas, when reseeding in fuel breaks, fire-resistant native plant species should be used if available or consider using fire-resistant non-native species if analysis and/or best available science demonstrates that non-native plants will not degrade greater sage-grouse habitat in the long-term.	Fuel breaks for the proposed project will predominantly use natural features (rockslides, streams, open meadows, etc.) or existing roads. Any constructed fire line would likely be hand line and would use Minimum Impact Suppression Tactics (MIST). These lines would be rehabilitated following project implementation and native species would be used for re-seeding.

Standard or Guideline Number	Description of Standard or Guideline	Project Compliance
GRSG-FM-GL-050-Guideline	In priority, important, and general habitat management areas and sagebrush focal areas, prescribed fire prescriptions should minimize undesirable effects on vegetation and/or soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of hydrophobicity).	Prescribed fire activities would be conducted to minimize adverse effects. Burns would be implemented under conditions that would generally prevent high-intensity fire. Burns would generally be at low to moderate intensity which would reduce impacts to soils. Similarly, fire intensity would be such that there would be a mosaic of burned areas with most. As such, there wouldn't be significant adverse effects to desirable perennial plant species.
GRSG-FM-GL-051-Guideline	In priority, important, and general habitat management areas and sagebrush focal areas, roads and natural fuel breaks should be incorporated into planned fuel-break design to improve effectiveness and minimize loss of existing sagebrush habitat.	Fuel breaks for the proposed project will predominantly use natural features (rockslides, streams, open meadows, etc.) or existing roads. Such features would be used to the extent possible. Any constructed fire line would likely be hand line and would use Minimum Impact Suppression Tactics (MIST). These lines would be rehabilitated following project implementation and no reseeding is anticipated

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