Biological Assessment for Canada Lynx

Effects of the 2009 Revised Forest Plan and the Northern Rockies Lynx Management Direction

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for:
Beaverhead-Deerlodge National Forest

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Contents

Tables

Figures

Introduction

This Biological Assessment (BA) analyzes the potential effects of implementing the 2009 Beaverhead-Deerlodge National Forest Land and Resource Management Plan (Forest Plan or Plan) including application of the Northern Rockies Management Direction on the threatened Canada lynx (*Lynx canadensis*) and its habitat within the administrative boundary of the Beaverhead-Deerlodge National Forest (BDNF or "Forest"). This document conforms to legal requirements set forth under section 7 of the Endangered Species Act (ESA) (19 U.S.C. 1536 (c), 50 CFR 402.12 (f) and 402.14). Section 7(a)(1) of the ESA requires federal agencies to use their authorities to further the conservation of listed species. Section 7(a)(2) requires that federal agencies ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of federally listed species, or destroy or adversely modify designated critical habitat. This assessment responds to a change in lynx occupancy status from "unoccupied" to "occupied" on the BDNF that was determined in September 2020.

This Biological Assessment is programmatic in scope. It provides the framework for future site-specific actions that are subject to section 7 consultation but does not authorize, fund, or carry out future site-specific actions. Future project-level activities must be consistent with the direction in the Forest Plan and must undergo its own National Environmental Policy Act (NEPA) planning and decision-making procedures, including the appropriate ESA section 7 consultation. The most current data and scientific information available at the time of this writing serves as the basis for this analysis. A revised Biological Assessment may be prepared for this species if new information reveals effects in a manner or to an extent not considered in this assessment.

Need for Re-assessment Based on Changed Conditions

The Canada lynx is a threatened species with secondary/peripheral lynx habitat occurring on the Beaverhead-Deerlodge National Forest. There is no designated critical habitat within the administrative boundaries (USDI 2014).

On September 15, 2020, the Western Lynx Biology Team (WLBT) concluded the BDNF met the provisions for an "occupied" Forest as defined in the 2006 Amended Conservation Agreement, based on recent lynx detections on the BDNF (WLBT 2020; Appendix A). The WLBT recommended all mapped lynx habitat on the BDNF is considered "occupied" (ibid). This includes all mountain ranges except for the Tendoy and eastern portion of the Beaverhead mountain ranges south of Highway 324 and south of Interstate 15 (ibid). As such, the Forest is now required to apply the Northern Rockies Lynx Management Direction (NRLMD or "lynx management direction") rather than consider it consistent with Wildlife Habitat Standard 7 and the Record of Decision for the NRLMD (USDA 2007a). This qualifies as "new information" which triggers reassessment of the *Biological Assessment for Canada Lynx, Effects of the 2009 Revised Forest Plan* (Roberts 2019).

Consultation History

In 2007, the Northern Region of the Forest Service reinitiated consultation on the effects of the Northern Rocky Mountains Lynx Amendment on Threatened, Endangered, and Proposed Vertebrate and Invertebrate Species (Bertram 2007). This assessment proposed amendments to Land and Resource Management Plans that replaced interim strategies occurring under Conservation Agreements (USDA & USDI 2000;2005;2006). U.S. Fish and Wildlife Service (USFWS) concluded that the continued implementation of Forest Plans that incorporated the NRLMD may result in some adverse effects to lynx, although would not likely jeopardize the continued existence of this species within the contiguous United

States (USDI 2007). For unoccupied Forests (as the previous status of the Beaverhead-Deerlodge), forest plans would be amended but the provisions of the NRLMD would not be implemented until these areas become occupied (ibid). As a result, the NRLMD was incorporated into the 2009 Revised BDNF Forest Plan as Wildlife Standard 7. The Biological Opinion also set a term and condition for reasonable and prudent measure (RPM #3) for unoccupied forests. These forests are required to develop and complete an acceptable protocol to survey unoccupied lynx habitat in secondary areas (ibid). Efforts to detect lynx on the BDNF began in 1999 and continue to the present to meet this requirement (Appendix B).

The Beaverhead-Deerlodge National Forest revised the Forest Plan in 2009. However, effects to Canada lynx were not disclosed in a biological assessment as part of this action as the Forest was considered unoccupied by this species at the time. In 2013, the US Fish and Wildlife Service determined the species "may be present" on the Beaverhead-Deerlodge National Forest and updated the "Threatened, Endangered, and Candidate Species for the Beaverhead-Deerlodge National Forest" list to include lynx as a transient with secondary/peripheral lynx habitat on the Forest.

The Forest prepared a biological assessment that analyzed the winter motorized and winter non-motorized allocations from the revised Forest Plan Record of Decision and reaffirmed the selection of the modified Alternative 6 in 2016 (Roberts 2016). This alternative allocates approximately 40 percent of the Forest as a non-motorized winter setting and excludes winter motorized use from wilderness and recommended wilderness. Winter motorized travel is authorized from December 1 to May 15. The Forest received a letter of concurrence for the "may affect, not likely to adversely affect" determination for the Canada lynx and winter motorized and non-motorized use was not expected to result in significant effects to transient lynx or reduce an individual's ability to move through an area (USDI 2016).

In 2017, an amended incidental take statement was issued from U.S. Fish and Wildlife Service for occupied forests based on updated information submitted in March of that year (USDI, 2017b). Level of incidental take was quantified through the use of surrogate measures in the form of exemptions and exceptions to NRLMD vegetation standards for fuels treatment projects within the wildland-urban interface (WUI) and precommercial thinning projects; however, this biological opinion excluded the Beaverhead-Deerlodge National Forest because of its unoccupied status (ibid).

In 2019, the BDNF consulted on the effects of implementing the 2009 Revised Forest Plan on Canada lynx because of a Montana District Court order (Christensen 2018). The BDNF received a letter of concurrence (USDI 2019) from FWS on 2 July, 2019 for a "may affect, not likely to adversely affect Canada lynx" determination as part of the *Biological Assessment for Canada Lynx, Effects of the 2009 Revised Forest Plan* (Roberts 2019). This assessment and concurrence determined effects to lynx from Forest Plan management actions would be minimal and would not significantly affect how transient lynx would use habitat (USDI 2019).

In September 2020, the Western Lynx Biology Team determined that the BDNF met the provisions of "occupied" for lynx (WLBT 2020; Appendix A). The BDNF initiated the current consultation with an email (12 November 2020; C. Ford of USDA Forest Service to J. Bush of US Fish and Wildlife Service).

Determination of Effects

Implementation of the proposed action *may affect, is likely to adversely affect* the Canada lynx and will have *no effect* on Canada lynx designated Critical Habitat as none exists in the action area.

Proposed Action

The Beaverhead-Deerlodge National Forest proposes to apply the management direction in the NRLMD in conjunction with existing direction in the 2009 Beaverhead-Deerlodge Revised Forest Plan (Forest Plan; USDA 2009) and requests changes in exception and exemption acres. Because lynx occupancy changed from unoccupied to occupied, the Northern Rockies Lynx Management Direction now applies to management actions and decisions on the Beaverhead-Deerlodge National Forest in mapped lynx habitat. Habitat on the Forest may support long and/or short term residential use if and when structural conditions provide high horizontal cover suitable for supporting high densities of snowshoe hares (WLBT, 2020; Appendix A). Classification of secondary/peripheral habitat on the Forest does not change as part of this action.

In general, the NRLMD and the Forest Plan contain the following direction:

- Goals, which are general descriptions of desired results to be achieved sometime in the future with no specific date and are used to develop objectives (Forest Plan);
- Objectives form the basis for site-specific project planning by providing concise and measurable statements to achieve goals (NRLMD and Forest Plan);
- Standards, which are mandatory constraints applied to projects to meet or maintain the desired condition or conditions, avoid or mitigate undesirable effects, or meet legal requirements (NRLMD and Forest Plan); and
- Guidelines, which are management actions that should be used to meet objectives although deviations from guidelines is possible (NRLMD).

The NRLMD establishes direction to provide for the recovery and conservation of the Canada lynx on occupied Forests. It provides direction for forest management activities that could affect lynx and their habitats or the habitat of snowshoe hares, their primary prey. Standards and guidelines for vegetation management, over-the-snow winter recreation, developed recreation (primarily ski areas), minerals and energy development, forest roads, and linkage areas avoid or reduce the potential for adverse effects on lynx. Per the Record of Decision for the NRLMD, it is expected guidelines would be followed as they provide basic design criteria to meet objectives and acknowledge risk factors for individual lynx; however, based on site-specific conditions, there may be a reason not to follow a guideline (USDA 2007a). The assumption that guidelines are followed was also an important consideration for the biological assessment and resulting biological opinion for the NRLMD (Bertram 2007, USDI 2007). If guidelines are not followed, rationale (and subsequent consultation, if necessary) should be documented within the project record but a Forest Plan amendment is not required (USDI 2007). A site-specific forest plan amendment is required where standards are not met (ibid).

The Record of Decision (ROD) for the Northern Rockies Lynx Management Direction requires National Forests occupied by Canada lynx with mapped habitat to apply the management direction within the NRLMD (USDA 2007a). The ROD also suggests that National Forests containing unoccupied lynx habitat should consider lynx management direction; however, the direction is not mandatory (ibid). The Beaverhead-Deerlodge National Forest followed the NRLMD per the Regional Forester's memo (Tidwell 2009) despite its previous unoccupied status (USDA 2007a, USDI 2017b) and incorporated the NRLMD into the Forest Plan as Wildlife Standard 7 per direction in the 2007 Biological Opinion (USDI, 2007).

Previous consultation on the NRLMD listed allowable exemptions and exceptions for each Forest under some vegetation standards (Bertram 2007 [Table 12], USDA 2007b [Appendix K]). Claiming exemption (WUI under VEG S5 and S6) or exception acres (all others specified under VEG S5 and S6) occurs when

a Forest utilizes the categories that permit lynx or hare habitat removal under specific circumstances. Some project areas require treatments to lynx habitat that may render the habitat temporarily or permanently unsuitable due to an ecological or community safety need. Due to the update in mapped lynx habitat and the need for tracking of exceptions and exemptions, the BDNF requests an increase in exception acres as part of Vegetation Standards 5 and 6 and a reduction in WUI exemption acres in Vegetation Standards 5 and 6 (Table 1). Appendix D documents rationale for these requests. Exception or exemption acres can apply to any subcategory within the standard (e.g., within 200 feet of administrative sites, aspen, research, etc.; refer to Appendix D) as long as the total amount is not exceeded for the standard.

It is important to note that tracking exceptions and exemptions for projects occurring prior to this analysis was not considered "take" as the effects to transient lynx was determined to be insignificant (Roberts 2019 and USDI 2019). Projects on the BDNF occurring after consultation from this biological assessment may use exception or exemption acres identified under the 2020 updated mapping effort as described in this document. If additional habitat updates occur based on new science, exception or exemption acres will not change unless additional consultation occurs.

Table 1. Exception or exemption acres requested for the Beaverhead-Deerlodge National Forest.

Exception or Exemption Category	Requested exception or exemption acres
VEG S5 – precommercial thinning that reduces snowshoe hare habitat from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat	6,200
VEG S6 – vegetation management projects that reduce snowshoe hare habitat in multi-store mature or late successional forests	390
VEG S5 and VEG S6 WUI – 6% of mapped lynx habitat within an administrative boundary[a]	88,910

[a] Exemption acres for WUI were assigned by grouping VEG S5 and VEG S6 categories, thus repeated numbers indicate a total across a category, not a sum (e.g., 88,910 acres is the total for both VEG S5 and VEG S6 WUI categories).

The Forest Plan established direction for all resource management activities on the Beaverhead-Deerlodge National Forest and identifies forest-wide desired future conditions, goals, objectives, and standards for a variety of social values and environmental factors. These values and factors include air quality, American Indian rights and interests, aquatic resources, economics and social values, fire management, heritage resources, infrastructure, lands, livestock grazing, minerals (including oil and gas), recreation and travel management, scenic resources, soils, special designations (e.g., wilderness, national scenic trails, historic sites, scenic byways, and research natural areas), timber management, vegetation, and wildlife habitat. Six key areas in the revised plan considered in this analysis include vegetation management (including timber and fuels), fire management, lands, range management (including grazing), recreation and travel management, and minerals (including oil and gas).

This programmatic analysis discloses anticipated effects to Canada lynx from implementing the 2009 Beaverhead-Deerlodge Revised Forest Plan using the standards and guidelines in the Northern Rockies Lynx Management Direction, including the use of exception and exemption acres. It focuses on categories of forest management, including project-related connected actions, that could affect lynx and lynx habitat and are reasonably expected to occur during the life of the Forest Plan. Forest Plan direction that supports objectives, guidelines, and standards in the NRLMD is documented in Appendix H.

Effects Analysis Boundaries

The geographic boundary for this analysis includes the entirety of the Beaverhead-Deerlodge National Forest except for the Elkhorn Landscape (Figure 1). The BDNF covers 3.39 million acres across 8 counties (Table 2) in southwestern Montana. Its mountain ranges include developed recreation areas, Wilderness, and roadless areas. Elevations range from cold desert at 5,000 to 6,500 feet to true alpine habitat types at more than 10,000 feet. The Forest features a variety of habitat types, including forest, meadows, sagebrush, and grasslands, all which provide a range of wildlife habitats.

The Helena-Lewis and Clark National Forest jointly manages activities on the Elkhorns Landscape with the Beaverhead-Deerlodge National Forest. This biological assessment does not include effects from management actions on the Elkhorn Landscape because the revised Forest Plan for the Helena-Lewis and Clark National Forest covers this administrative area. Effects to lynx are documented in the Biological Assessment for Threatened, Endangered, and Proposed Terrestrial Wildlife Species for the 2020 Forest Plan for the Helena-Lewis and Clark National Forest (Clark and Kemp 2020).

Table 2. Area of counties within the Beaverhead-Deerlodge National Forest.

County	Beaverhead-Deerlodge area (acres)	Percentage of Forest
Beaverhead	1,375,607	40
Deer Lodge	210,335	6
Gallatin	40	<1
Granite	474,713	14
Jefferson	360,434	11
Madison	695,861	21
Powell	85,547	2
Silver Bow	189,594	6

The boundary for cumulative effects includes modeled lynx habitat within and outside of the BDNF (refer to the *Cumulative Effects* section for further descriptions).

The life of the Forest Plan serves as the temporal bounds for this analysis. Because timeframes for amendment or revision of the Plan is uncertain, this analysis uses fifteen years from the date of consultation (2036) to disclose anticipated effects to Canada lynx and its habitat. Amendments or revisions of the Plan before this date may trigger additional consultation for this species.

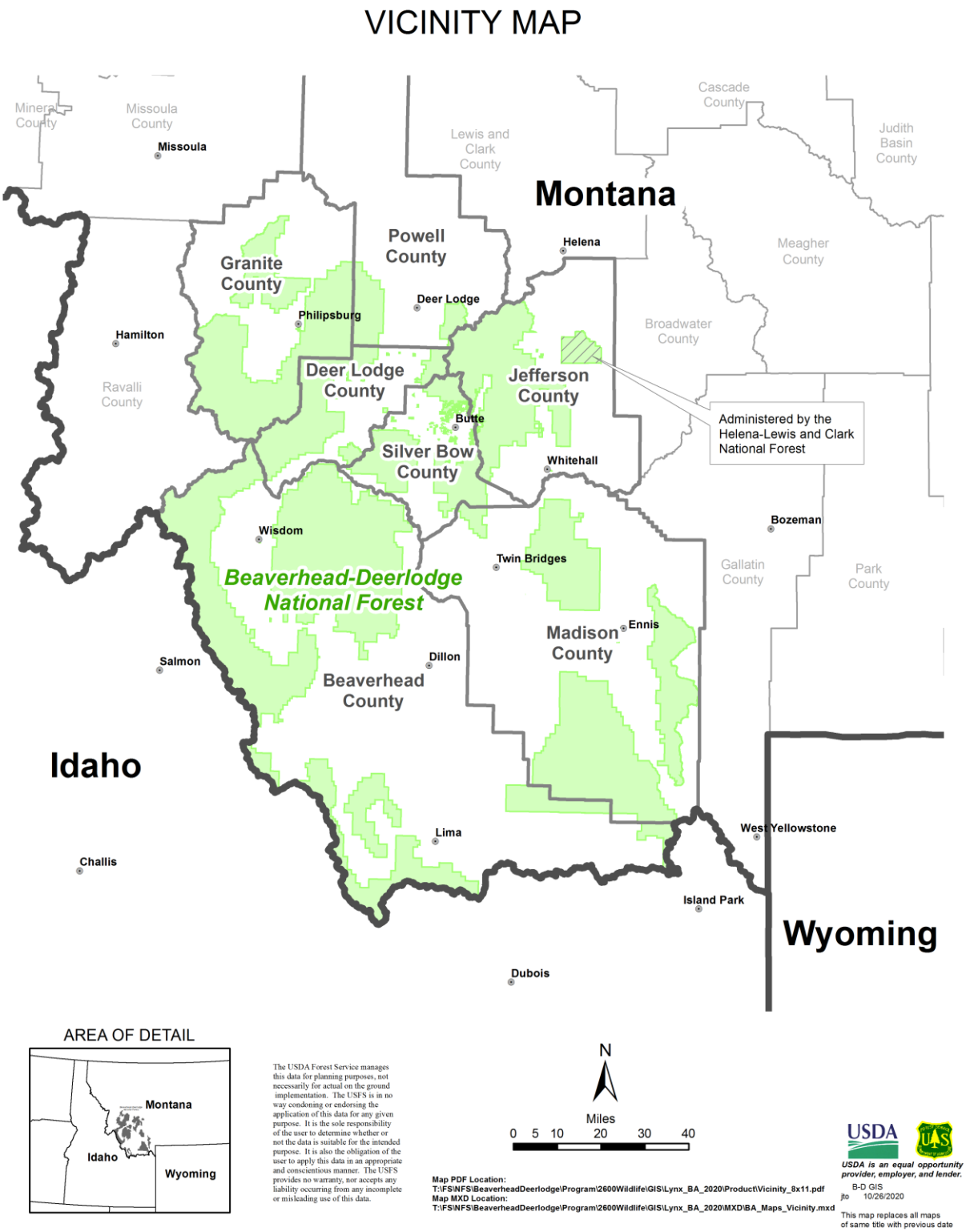

Figure 1. Vicinity map of the Beaverhead-Deerlodge National Forest.

Assumptions

1. Geospatial data presents a unique set of issues when comparing coarse and fine data to obtain acres, miles, or other units of measure. In tables of summarized data in this analysis, the displayed values are independently rounded. These values may not sum to the displayed total for this reason. The displayed total is the actual total of the individual, unrounded values. Summarized totals of the same area may differ due to the varying resolution (scale) of input data sets. These differences are insignificant and typically result in less than 0.01 percent of the total area.
2. Effects described in this document are based upon actions described in the Forest Plan within the sideboards of the NRLMD standards and guidelines. It is not possible to quantify the magnitude of effects to individual lynx due to the nature of this analysis and the unknown location of resident or dispersing lynx for future site-specific projects.
3. This analysis is based on projections of changes in future activities and the potential for current activities to affect the Canada lynx or its habitat. Affected acres described in this document represent estimated ranges or the maximum number of potentially affected habitat based on the best available information. Projected acres utilize the 2020 updated lynx habitat model to disclose potential effects and set the current existing conditions. If the Forest exceeds the maximum area or miles affecting lynx as disclosed in this document, the BDNF will reinitiate consultation for this species (however, refer to assumption 8 for exceptions and exemptions to Vegetation Standards). The numbers in this document do not represent the level of precision needed for project level planning or analysis, so additional project-level consultation is expected to occur in the future.
4. Identified exception and exemption acres disclosed in this document for past actions used the 2001 lynx habitat mapping model. If the project record contained a biological assessment and concurrence from FWS but is not implemented, the project is considered a past action.
5. Future projects (without a current consultation or signed decision at the time of this writing) will utilize the 2020 updated habitat model.
6. The lynx habitat model and identified structural stages may differ from on-the-ground conditions, but acres presented in this analysis represents the best available information. It is possible this may change in the future as information about habitat may be updated per Standard LAU S1. Programmatic effects to lynx from actions described in the Forest Plan should remain the same.
7. Structural stages are dynamic and change over time. Acres presented in this report represent the best available information, although this is subject to change due to future projects and other disturbances, such as wildfire or beetle infestation. Natural events (e.g., fire and beetle kill), vegetation management, and fire management activities contribute to alterations in structural stages.
8. Individual counties develop and update Wildland-Urban interface (WUI) boundaries on various schedules. Although the BDNF does not approve WUI boundaries, the Forest partakes in collaboration efforts to develop WUI definitions within each county as part of Community Wildfire Protection Plans (CWPP). For purposes of this analysis, the most recent CWPP WUI boundaries are used with the understanding that this may change in the future as urban areas develop.
9. Exception and exemption acres under Vegetation Standards 5 and 6 will not change unless the BDNF reconsults, even if WUI boundaries are modified from county CWPP recommendations or lynx habitat is updated or modified with new information. If the Forest exceeds these acres, additional consultation will occur.
10. The Forest incorporated the NRLMD as Wildlife Standard 7 in the Forest Plan, thus recently completed projects (since 2009) and future projects should continue to apply the NRLMD in

conjunction with the Forest Plan. Guidelines are assumed to be followed except where compelling reasons such as protections of other species at risk or protection of public safety are an issue (Bertram 2007).

Canada Lynx (*Lynx canadensis*) – Threatened

Species Description and Life History

Lynx habitat and life history traits are reviewed in a variety of literature and other publications (Ruggiero et al. 1999, Ruediger et al. 2000, 2007b, USDA 2007a, Squires et al. 2010, Interagency Lynx Biology Team 2013, e.g., Holbrook et al. 2017a, Kosterman et al. 2018) and are not extensively described in this document. In brief, dense horizontal cover, persistent snow, and snowshoe hare densities to support lynx are common habitat attributes (USDA 2007b, Interagency Lynx Biology Team 2013). In the northern Rockies, this habitat generally occurs between 3,500 and 8,000 feet in elevation (USDA 2007b).

Primary vegetation that contributes to lynx habitat includes subalpine fir habitat types dominated by cover types of Engelmann spruce and alpine fir, Douglas-fir, and seral lodgepole pine (Ruediger et al. 2000, USDA 2007b). In extreme northern Idaho, northeastern Washington, and northwestern Montana, cedar-hemlock habitat types serve as primary vegetation when intermixed with subalpine fir habitat types in areas with heavy snow accumulation (ibid). Primary vegetation supports foraging, denning, and young-rearing. Secondary vegetation consists of other cool, moist habitat types (e.g., Douglas-fir, grand fir, aspen) that may also contribute to lynx habitat where intermingled and immediately adjacent to primary vegetation (Ruediger et al. 2000). Aspen is considered secondary habitat for lynx by providing cover and foraging for snowshoe hare (all seasons except winter) and alternative prey species (yearlong) (Ruggiero et al. 1999).

Lynx habitat also constitutes habitat for snowshoe hares, the primary prey for lynx. Snowshoe hares require a diversity of age classes and structural stages within forested areas, although the highest abundance is associated with high horizontal cover (Hodges 1999). To provide context for this analysis, stand structural stages as identified in the NRLMD (USDA 2007b) are described in Table 3. Stages within lynx habitat that do not fit into categories identified in the NRLMD are classified as “other”. Structural stages are dynamic because successional stages change over time. Immediately after a disturbance, the removal of live trees and shrubs does not support snowshoe hares and lynx (Holbrook et al. 2018). As vegetation regrows, the burned or harvested areas develop into summer hare habitat. During this “early stand initiation” stage, if there is sufficient horizontal cover and adjacent forest edge, lynx may forage for hares in the regenerating forests during the summer months. Then, after approximately 10 to 30 years, trees and some shrubs will have grown tall enough to have branches at the snow surface and dense enough to provide winter food and cover for hares. During the next couple of decades, the “stand initiation” phase may provide high-quality winter snowshoe hare habitat (Squires et al. 2010, Kosterman 2014), depending upon the species composition and density of regenerating trees. As the trees continue to grow, stands dominated by shade intolerant species such as lodgepole pine may move into the “stem exclusion” stage, in which the crowns close, shading out understory vegetation, and the tree branches grow out of reach of the hares. The denser the regenerating forest stand, the faster trees such as lodgepole pine lose their lower live branches and grow out of reach of hares. Given enough time (several to many decades) and absent another stand-replacing disturbance, within-stand competition and disturbances such as windthrow and forest pathogens will usually create canopy gaps that enable the stand to develop into the “understory reinitiation” stage, which is one type of older multistoried forest structure (Oliver and Larson 1996, USDA 2007b). This mature, multi-storied structure with a dense understory supports

abundant and accessible hares (Squires 2010, Holbrook et al. 2017b) and is positively associated with reproduction success in female lynx (Kosterman et al. 2018). However, in the boreal forests of the northern Rocky Mountains where stand-replacing wildfire is a dominant landscape process, not all forest stands will reach the mature stage. Instead, they may burn or may stagnate in the stem exclusion stage.

Table 3. Descriptions and contributions of stand structural stages to snowshoe hare and Canada lynx habitat.

Stand Structural Stage	Habitat Description	Snowshoe Hare Habitat?[a]	Canada Lynx Habitat?[a]
Early Stand Initiation (ESI)	• Occurs after a stand-replacing fire or regeneration harvest with the establishment of new seedlings. • Trees do not protrude above snow in winter.	• Not immediate habitat; winter habitat after approximately 10-30 years if trees are dense enough and tall enough to protrude above snowline. • Could provide summer habitat if dense enough.	• Not habitat immediately after a disturbance, but grows into habitat. • May be summer habitat depending on density and height.
Stand Initiation (SI)	• Occurs after a stand-replacing disturbance, such as fire, a regeneration harvest, or blowdown. • Trees are all about the same age and size; single-story layer of shrubs and trees establish and develop. • Trees protrude above snow in winter. • Occurs until trees self-prune such that live limbs no longer touch the snow surface during winter to provide forage for hares.	• Potential year-round habitat after a minimum of 10-30 years following a disturbance event. • Winter snowshoe hare habitat if trees protrude above snow and are dense enough to support hares. • May provide summer habitat until trees self-prune.	• Can provide denning habitat if there is enough coarse woody material. • Winter foraging habitat.
Stem Exclusion (SE)	• Trees grow fast; limited understory because little light reaches the forest floor. • Closed canopy. • Trees are tall enough to protrude above snow in winter but live forage is not available near the ground.	• Not foraging habitat; live tree crowns are too high to provide forage and understory and dead/down material is too limited.	• Can provide denning habitat if there is enough coarse woody material. • Not considered foraging habitat as habitat for hares is lacking.
Mature; Multi-Storied (MMS)	• Many age classes and vegetation layers exist, including large, old, or decaying trees. • Trees are tall enough to protrude above snow in winter and live forage is available near the ground. • Often high horizontal cover.	• Year-round snowshoe habitat as long as understories are dense enough to provide habitat for hares and are within reach.	• Denning habitat in areas of large coarse woody material. • Year-round foraging habitat.

Stand Structural Stage	Habitat Description	Snowshoe Hare Habitat?[a]	Canada Lynx Habitat?[a]
Other	• Any forested stand that does not fall into any other category (e.g., larger diameter, homogeneous stands of whitebark pine, Engelmann spruce, and Douglas-fir). • Occurs in mid-late seral stand conditions that appear like stem exclusion, with smaller, isolated, and intermixed pockets of hare summer foraging habitat within canopy gaps. • Trees are tall enough to protrude above snow in winter but live forage is may not be available near the ground.	• Not winter foraging habitat; live tree crowns are too high to provide forage and understory and dead/down material is too limited. • Summer hare habitat is isolated and unlikely to support a population of hares, if any.	• Can provide denning habitat if there is enough coarse woody material. • Lynx may travel through these areas but foraging is unlikely.

[a]Timeframes listed in this table differ slightly compared to the more specific timelines used to delineate lynx habitat on the BDNF. Timeframes used in the 2020 updated mapping effort utilized known conditions on the ground for this area of southwest Montana based on professional judgement (Appendix C). However, general timeframes are maintained for descriptions in this analysis as approximate timeframes are needed to disclose growth time between structural stages.

In winter, lynx forage primarily in mid- to high-elevation forests (4,134 – 7,726 feet) composed of mature, large diameter (greater than 11 inches DBH) trees and select forests with relatively dense horizontal cover, more abundant hares, and deeper snow (Squires et al. 2010). Preferred forests have a multistory structure with dense horizontal cover provided by the young trees in the understory and conifer boughs touching the snow surface, which could support snowshoe hare populations at varying snow depths throughout the winter. Engelmann spruce and subalpine fir are the dominant tree species in forests used by lynx, but these forests also contained a mix of other conifer species including lodgepole pine, western larch, and Douglas-fir. The primary limiting factor for Canada lynx in northwest Montana appears to be suitable winter foraging habitat (ibid).

In summer, lynx in northwest Montana also utilize early successional forest with dense horizontal cover provided by shrubs, saplings, and small diameter trees in slightly higher elevations compared to winter (Squires et al. 2010). These conditions can occur in forests burned by wildfire, regenerated by insects or disease, or regenerated by timber harvest.

The availability of den sites during the winter and spring is also important to lynx. Coarse woody debris provides kittens with protection from extreme temperatures, precipitation, or predators (Moen et al. 2008, Interagency Lynx Biology Team 2013). Lynx dens in northwest Montana are typically found in multistory stands of spruce-fir forests with dense horizontal cover and abundant coarse woody debris; more specifically, 80 percent of dens were in mature forest stands and 13 percent in mid-seral, regenerating stands (Squires et al. 2008). Young stands that were either naturally sparse or mechanically thinned were seldom used (ibid). Denning habitat is generally abundant across the coniferous forest landscape of northwest Montana and is not likely to be limiting for lynx (Squires et al. 2008;2010).

Known Distribution on the Beaverhead-Deerlodge National Forest

Appendix B consists of a summary report of Canada lynx detections on the Forest (Gatlin, 2020). This report documents surveys and passive detections, locations, and years where detections occurred. There

are no known lynx dens on the Beaverhead-Deerlodge at the time of this writing, although it is possible dens may be detected in the future.

In short, formal surveys on the BDNF occurred since 1999 using the National Lynx Detection Protocol (McKelvey et al. 1999), methods outlined in Halfpenny et al. (1995) and Squires et al. (2004), or modifications of these protocols. Detections prior to 2018 are considered "unverified" as eDNA or photographs do not exist. However, detections were recorded in the Anaconda, Flint Creek, and Pioneer Mountain ranges, with verified sightings occurring within the Anaconda range in 2018-2020 (Gatlin, 2020). In 2020, a male lynx was detected at Storm Lake in the Anaconda Range (the same male from previous detections) and a new, female lynx was genetically confirmed in the Beaverhead Range (ibid).

Affected Environment

The revised strategy (Interagency Lynx Biology Team 2013) identifies anthropogenic influences on lynx and lynx habitat, described in two tiers (Table 4). First tier anthropogenic influences can directly affect both snowshoe hare and lynx populations. Second tier anthropogenic influences include those that research and management experience has shown to be less likely to have substantial effects to lynx and their habitat. Forest management practices allowed under the Plan fall within both tiers of anthropogenic influences and are analyzed within this document.

Table 4. Anthropogenic influences on Canada lynx and lynx habitat as identified in the Lynx Conservation Assessment and Strategy (Interagency Lynx Biology Team 2013).

First Tier	Second Tier
Vegetation management	Incidental trapping
Wildland fire management	Recreation
Habitat fragmentation	Mineral and energy exploration and development
Climate change	Illegal shooting
	Forest/backcountry roads and trails
	Domestic livestock grazing

The effects to lynx and lynx habitat from the key categories of the BDNF Forest Plan and the associated NRLMD management direction are evaluated in this Biological Assessment. This includes all first-tier influences identified in Table 4, including: vegetation management, fire management, and other activities that may lead to habitat fragmentation such as lands. Climate change is assessed in the cumulative effects section of this document. Second tier influences are also assessed, including range management (domestic livestock grazing), recreation and travel management (forest/backcountry roads and trails), and minerals, oil and gas. Incidental trapping and illegal shooting are addressed in the cumulative effects section. Some actions on the Forest and NRLMD management directives fall outside of these key influences. These actions and directives are addressed within the *Other Management Activities and Issues* section of this analysis. This analysis utilizes the 2020 lynx habitat update for assessment of existing conditions (Appendix C).

Canada Lynx Habitat on the Beaverhead-Deerlodge National Forest

The BDNF is considered secondary/peripheral habitat rather than core habitat as defined by the recovery outline (USDI 2005). Secondary areas may contribute to lynx persistence by providing habitat to support lynx during dispersal movements or other periods, with animals likely returning to core areas (ibid). In

contrast, core areas contribute directly to long-term persistence and lynx reproduction and have persistent verified records of lynx occurrence over time (ibid). In peripheral areas, the majority of historic lynx records are sporadic and correspond to periods following high lynx populations without evidence of long-term presence of reproduction that might indicate colonization of sustained use by lynx (ibid). The importance of secondary or peripheral areas to the persistence of lynx in the United States is not clarified in the recovery outline (ibid); thus speculation on lynx persistence on the BDNF is not included as part of this analysis.

In 2020, the BDNF updated the lynx habitat model and associated LAUs based on improved vegetation and snow-depth datasets (Appendix C). This process resulted in 1,625,806 acres of lynx habitat within 78 LAUs (ibid). Ninety-one percent (1,481,830 acres) of modeled lynx habitat is within lands managed by the BDNF with the other nine percent (143,975 acres) residing in land under other ownership (including inholdings) (Table 5). The BDNF also classified the updated lynx habitat polygons into vegetation structural stages to further evaluate snowshoe hare habitat across the forest with the understanding that structural stages are dynamic (ibid).

Appendix E displays the current area and estimated percentages of structural stages within the updated lynx habitat model for each LAU. Overall, a majority of LAUs are comprised of vegetation structural stages classified in the "other" category (43 percent), followed by mature multi-storied (26 percent), stem exclusion (16 percent), early stand initiation (13 percent), and stand initiation (2 percent) (Table 5).

Table 5. Lynx habitat within structural stages across all LAUs.

Structural Stage	Total Lynx habitat (acres/percent)	Lynx habitat in LAUs under BDNF management (acres/percent)	Lynx habitat in LAUs under other ownership (acres/percent)[a]
Early Stand Initiation	203,815/13	187,919/13	15,896/11
Stand Initiation	36,935/2	36,023/2	911/<1
Stem Exclusion	266,856/16	254,317/17	12,539/9
Mature; Multi-storied	420,873/26	382,777/26	38,097/26
Other	697,325/43	620,793/42	76,532/53
Total	**1,625,805/100**	**1,481,830/91**	**143,975/9**

[a]This total includes inholdings within the BDNF and lands outside of the external Forest boundary managed by private, state, or other federal entities.

The BDNF provides some, although scattered, available year-round habitat for lynx and prey species. Under the current habitat model, 28 percent of lynx habitat on the BDNF is considered "foraging" for lynx (those stands in stand initiation and mature, multi-storied structural stages; Table 5). Mature, multi-storied stands contribute to the majority of foraging habitat (26 percent) and provide year-round habitat for both lynx and snowshoe hares. The rest of the lynx habitat (72 percent) managed by the BDNF consists of "non-foraging" areas for lynx (early stand initiation, stem exclusion, and "other"). Of this habitat, 13 percent is within the early stand initiation stage, which may provide some foraging opportunities for snowshoe hares in the next 10 to 30 years, depending on its last disturbance (e.g., logging, wildfire, insect or disease). Lands in the "other" category and those in stem exclusion make up the majority of non-foraging habitat (42 and 17 percent, respectively). In these categories, live tree crowns are generally too high to provide winter forage for hares, and contains limited dead and down material, although could provide small, isolated patches of hare habitat in the summer. A majority of the habitat on the BDNF would not likely support foraging opportunities for lynx until altered by management activities or natural disturbances.

Habitat is further classified by dominant cover type (VMap 18, Dominant mid-60s attribute) to consider effects to lynx habitat where species-specific tree stands are targeted for vegetation management activities. Most of the lynx habitat on the BDNF is within the mixed conifer cover type (56 percent), followed by lodgepole pine (23 percent) and Douglas-fir (7 percent) (Table 6).

Table 6. Area and percentage of lynx habitat within specific cover types across all LAUs, including lands outside of the Beaverhead-Deerlodge National Forest.

Cover Type	Total lynx habitat (acres)	Percentage within LAUs
Lodgepole pine	378,531	23
Subalpine fir	3,953	<1
Douglas-fir	105,714	7
Spruce	12,012	1
Whitebark pine	28,673	2
Ponderosa Pine	168	<1
Limber Pine/Juniper	1,940	<1
Mixed conifer[a]	906,651	56
Hardwoods	6,491	<1
Disturbance/Transitional Forest[b]	181,675	11

[a]Mixed conifer cover type generally consists of three or more tree species within the shade tolerant and shade intolerant categories, which include mixtures of lodgepole pine, Douglas-fir, Engelmann spruce, subalpine fir, among others.

[b]Disturbance/Transitional Forest is categorized as any area in transition due to an event such as beetle kill or wildfire and consists of seedlings, grass, shrubs, or bare soil.

Vegetation Management

Five vegetation management categories may influence lynx and lynx habitat on the Forest. These include timber harvest, aspen restoration, conifer encroachment removal, special forest products, and other actions associated with vegetation management (e.g., temporary road construction; analyzed in the *Other Management Activities and Issues*).

The BDNF divides vegetation management areas into three categories: those that are suitable for timber production (the management of tree stands for industrial or consumer use), areas unsuitable for production, but where harvest is allowed for another reason (managing fire risk, aspen restoration, salvage, etc.), and areas that are unsuitable for production and no harvest is allowed (fragile soils, wetlands, areas withdrawn by an act of Congress, etc.). Overall, 65 percent of lynx habitat on the Forest is eligible for harvest. Of that amount, only 14 percent is considered suitable for timber production with 51 percent unsuitable for production but harvest is allowed for other objectives (Table 7).

Table 7. Acres and percentages of lynx habitat within timber suitability categories.

Timber Suitability	Lynx habitat (acres)	Lynx habitat (percentage)
Suitable for timber production	224,836	14
Not suitable, harvest allowed for other objectives[a]	828,758	51
Not suitable, no harvest allowed[b]	459,978	28

[a]Lynx habitat within the forest boundary contained in private inholdings are included in this category.

[b]Lynx habitat outside of the external BDNF boundary are included in this category.

In addition, the Forest Plan contains some components for treating specific tree species (e.g., Douglas-fir, lodgepole pine, aspen; refer to the Vegetation Management objectives). Of suitable timber in lynx habitat, a majority is in the mixed conifer, "other" stage (28 percent) followed by lodgepole pine in the stem exclusion stage (18 percent). Similarly, where timber isn't suitable for production, but harvest is still permitted, the majority of stands in modeled lynx habitat are mixed conifer in the "other" stage (32 percent) with mature, multi-storied mixed conifer stands in less, but similar frequencies (25 percent). Where harvest is not suitable or permitted, a majority of lynx habitat consists of mature, multi-stored mixed conifer stands (29 percent) and mixed conifer stands in the "other" category (23 percent). Lynx habitat outside of the Forest boundary maintains a similar pattern with "other" mixed conifer making up a majority (29 percent) followed closely by mature multi-storied mixed conifer stands (28 percent) (Table 8).

Table 8. Area and percentages of structural stages within vegetation cover types across all LAUs, displayed by suitable timber categories.

		Cover Type within LAUs (acres/percent)									
Structural Stage	**Total (acres/percent)**	**Lodgepole Pine**	**Subalpine fir**	**Douglas-fir**	**Spruce**	**Whitebark Pine**	**Ponderosa Pine**	**Limber Pine/Juniper**	**Mixed conifer**	**Hardwoods**	**Disturbance /transitional forest**
Suitable for timber production											
Early Stand Initiation	32,512/14	2,942/1	10/<1	487/<1	2/<1	31/<1	0/0	2/<1	1,716/1	2/<1	27,320/12
Stand Initiation	13,080/6	6,149/3	1/<1	677/<1	1/<1	43/<1	0/0	3/<1	4,671/2	15/<1	1,520/1
Stem Exclusion	40,817/18	39,363/18	0/0	1,120/<1	0/0	0/0	0/0	0/0	0/0	0/0	335/<1
Mature; Multi-Storied	35,840/16	0/0	7/<1	0/0	188/<1	0/0	0/0	0/0	35,645/16	0/0	0/0
Other	102,586/46	19,957/9	3/<1	19,440/9	1/<1	372/<1	0/0	17/<1	62,451/28	345/<1	0/0
Total	**224,836**	**68,411/30**	**21/<1**	**21,723/10**	**192/<1**	**447/<1**	**0/0**	**23/<1**	**104,484/46**	**361/<1**	**29,175/13**
Not suitable, timber harvest allowed for other objectives											
Early Stand Initiation	72,032/9	3,279/<1	13/<1	1,059/<1	25/<1	150/<1	1/<1	17/<1	6,460/1	17/<1	61,011/7
Stand Initiation	19,349/2	6,805/1	7/<1	754/<1	48/<1	81/<1	0/0	2/<1	10,227/1	41/<1	1,383/<1
Stem Exclusion	148,896/18	145,557/18	0/0	2,897/<1	0/0	0/0	0/0	0/0	0/0	0/0	443/<1
Mature; Multi-Storied	209,577/25	0/0	80/<1	0/0	1,335/<1	0/0	0/0	0/0	208,162/25	0/0	0/0
Other	378,906/46	47,215/6	89/<1	51,057/6	463/<1	9,759/1	0/0	900<1	265,090/32	4,332/1	0/0
Total	**828,759**	**202,857/24**	**188/<1**	**55,767/7**	**1,871/<1**	**9,991/1**	**1/<1**	**918/<1**	**489,939/59**	**4,390/1**	**62,8378**
Not suitable, no harvest allowed											
Early Stand Initiation	90,537/20	4,512/1	44/<1	97/<1	39/<1	118/<1	0/0	19/<1	4,256/1	0/0	81,453/18
Stand Initiation	4,081/1	580/<1	35/<1	25/<1	133/<1	155/<1	0/0	0/0	2,900/1	0/0	252/<1
Stem Exclusion	66,850/15	66,764/15	0/0	83/<1	0/0	0/0	0/0	0/0	0/0	0/0	3/<1
Mature; Multi-Storied	142,888/31	0/0	1,971/<1	0/0	8,862/2	0/0	0/0	0/0	132,055/29	0/0	0/0
Other	155,622/34	18,952/4	1,115/<1	10,267/2	281/<1	15,809/3	0/0	854/<1	108,027/23	317/<1	0/0
Total	**459,979**	**90,809/20**	**3,165/1**	**10,473/2**	**9,316/2**	**16,082/3**	**0/0**	**873/<1**	**247,237/54**	**317/<1**	**81,708/18**
Lynx habitat outside of Forest external boundary (not treatable by the BDNF)											
Early Stand Initiation	8,734/8	275/<1	15/<1	73/<1	0/0	20/<1	0/0	12/<1	390/<1	7/<1	7,943/7
Stand Initiation	425/<1	66/<1	0/0	184/<1	13/<1	0/0	0/0	0/0	143/<1	7/<1	11/<1
Stem Exclusion	10,295/9	9,815/9	0/0	480/<1	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Mature; Multi-Storied	32,569/29	0/0	144/<1	0/0	531/<1	0/0	0/0	0/0	31,894/28	0/0	0/0
Other	60,211/54	6,298/6	421/<1	17,015/15	88/<1	2,133/2	166<1	115/<1	32,566/29	1,409/1	0/0
Total	**112,234**	**16,454/15**	**580/1**	**17,752/16**	**632/1**	**2,153/2**	**166/<1**	**127/<1**	**64,992/58**	**1,423/1**	**7,955/7**

Timber Management

Effects to lynx and lynx habitat in this category are caused by timber actions, including:

- Pre-commercial thinning (non-commercial): removal of individual or stands of trees before trees reach marketable maturity;
- Regeneration harvest (commercial): clear cuts with reserves, shelterwood or seed tree cuts where there are little to no seedlings or saplings established in the understory;
- Salvage harvest (commercial): intermediate harvest, where seedling, saplings, or residual stocking levels are sufficient for stocking purposes, generally at or above 200 trees per acre; and
- Commercial thin harvest (commercial): intermediate harvest, leaving generally in the range of a density of 40-80 basal area, which equates to removing 30-70 percent of the pre-existing stand densities (this treatment is generally focused in Douglas-fir dominated vegetation types).

Timber management also includes conifer removal for research purposes (e.g., demonstration plots) or whitebark pine restoration. Harvest or public availability (via special forest products) of competing trees is considered a by-product of these activities.

Since 2009, the Forest treated or signed decisions for approximately 60,574 acres of timber management projects, including those that utilized precommercial thinning. Of these, the Forest analyzed 28,649 acres as lynx habitat under the former model. Harvest treatments occurred on 27,612 and 1,563 acres of non-foraging and foraging habitat, respectively.

The BDNF commercially treats approximately 1,400 to 1,800 acres per year. Of these, 70 to 90 percent (980 to 1,710 acres) are considered suitable for timber production with 10 to 30 percent (140 to 540 acres) classified as not suitable, but harvest is permitted for other objectives. Although changes may occur, the May 2020 five-year program of work indicates this trend will continue. It is anticipated treatment acres will likely change between 2024-2034 to an equal 50 percent split between suitable and not suitable but allowed categories (although more likely to treat suitable timber). This is due to treatment location rotations and the availability of fiber products and aligns with the BDNF long-term sustainable yield goal (A. Brennick, pers. comm., 11 August 2020).

Recent Regional Office direction indicates timber harvest will likely increase in pace and scale. This direction could cause the BDNF to increase commercial treatments 3,000 to 4,000 acres per year. It is highly probable the BDNF will focus on the lower end of that range (A. Brennick, pers. comm., 11 August 2020). Although unlikely, it is possible the Forest could commercially treat a total of 60,000 acres by 2036.

Aspen Restoration

Aspen restoration activities focus on felling conifer and/or using prescribed fire on 67,000 acres across the Forest (Forested Vegetation Aspen Component Objective). The goal of this activity is to increase the aspen component and improve aspen health by removing competing conifers. Aspen stands in need of restoration contain a variety of structural conditions from stand initiation, stem exclusion, and multi-storied stands. Some stands contain small pockets of foraging habitat for snowshoe hare, lynx, or alternative prey species. Typical aspen stands on the BDNF do not show up as a separate cover type as many stands are dominated by other species of conifers. Stands that contain these dominate cover types (e.g., Douglas-fir, lodgepole pine) are thinned to promote the aspen component. Felled conifers may

remain on site, are sold, or reduced via jackpot burning to reduce fuel loading. Other aspen treatments include broadcast burning, exclusion fences, and tree girdling.

Since 2009, the BDNF restored approximately 8,669 acres of aspen which included 2,211 acres of lynx habitat under the former habitat model. Over the next 15 years, aspen treatments will likely increase to 1,000-3,500 acres per year. If the maximum acres are treated within the next fifteen years, an estimated 52,500 acres of aspen would be restored by 2036 (78 percent of the goal established in the Forest Plan).

Conifer Encroachment Removal

The Forest Plan contains a vegetation objective to reduce conifer encroachment in riparian areas, shrublands, and grasslands on 74,000 acres (Vegetation Objective: grassland/shrubland/riparian) over the life of the plan. Douglas-fir or western junipers are typically the species removed to increase or maintain shrub-steppe and grassland habitats. Conifer removal in these areas typically occurs via hand-felling with chainsaws, scattering or piling cut trees, and disposal of slash with pile, jackpot, or broadcast burning in shrub-steppe habitat. Another method for slash removal consists of masticating and spreading wood chips across a site. Piling and bunching felled small-diameter trees may follow removal of material for biomass.

Since 2009, the BDNF reduced conifers on approximately 4,563 acres, of which 19 acres were considered lynx foraging habitat under the former habitat model. It is estimated the Forest will treat 1,000 to 2,000 acres annually within the next 15 years. If the maximum projection occurs, the Forest could treat up to 30,000 acres by 2036 (41 percent of the conifer reduction objective in the Forest Plan).

Special Forest Products

The Forest also produces miscellaneous non-commercial forest products such as post and poles, Christmas trees, and firewood. Individuals or small groups of people conduct these activities and are generally well-dispersed across the landscape. These actions may be concentrated in one area if products are readily available, but activities are generally dispersed temporally. For example, personal use post and pole harvests occur in approved areas open for a year or more, whereas firewood and Christmas tree harvest is directed by travel management guidelines, access to the product, and guidelines outlined in the permits. Since 2009, 33 acres of non-foraging (early stand initiation, stem exclusion, and other structural stages) lynx habitat has been treated for post and pole use.

Fire Management

Historically, fire suppression policies resulted in fire exclusion from most ecosystems on the BDNF which resulted in overstocked and similar-aged stands. The Forest Plan addresses this condition by emphasizing hazardous fuels treatments in wildland-urban interface (WUI) areas and locations where existing stocking conditions exceed historical conditions. Wildland fire use is also an available option to reduce hazardous fuels. Prescribed fire plans are developed on the BDNF to best utilize fire management as a vegetation management tool.

Fire management activities that may affect lynx and lynx habitat on the Forest include fuels treatments (vegetation management in specific areas and planned ignitions, including prescribed fire) and wildland fire (unplanned ignitions). Recent treatments focus on hazardous fuels reduction, timber harvest and subsequent burning, prescribed fires for wildlife habitat improvements (such as in aspen), and mechanical fuel removal (analyzed in *Vegetation Management*) (USDA BDNF, 2009). The current trend increases treatment acres in the wildland-urban interface and in areas considered outside historical conditions compared to current conditions (ibid). Resources objectives are also met by using wildland fire as an additional tool.

Fuels Treatments

Generally, the focus for hazardous fuels treatments is within the wildland-urban interface and within vegetation management projects to reduce fuel loading. Per the Forest Plan, the WUI is defined as the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland fire or vegetative fuel. The NRLMD defines WUI as the area adjacent to an at-risk community as identified in the Community Wildlife Protection Plan (CWPP). In the absence of a CWPP plan, the definition within the Healthy Forest Restoration Act (HFRA) applies. In this case, the WUI is an area 0.5 miles from the boundary of an at-risk community, or within 1.5 miles of the boundary of an at-risk community if the terrain is steep, or if there is a nearby road or ridgetop that could be incorporated into a fuel break, the land is in condition class three, or the area contains an emergency exit route needed for safe evacuations (condensed from HFRA § 101). This analysis utilizes WUI boundaries as defined by CWPP plans although "WUI areas" generally refer to places where human development meets or intermingles with undeveloped wildland or fuels. Although the BDNF participates in CWPP partnerships, WUI boundaries are identified and updated by counties with CWPPs and are not approved by the Forest Service (refer to assumption 7).

573,071 acres (39 percent) of lynx habitat on the BDNF falls within the WUI boundary. Of this habitat, a majority is within the "other" structural stage (18 percent) followed by mature, multi-storied (9 percent) (Table 9). Some lynx habitat within the WUI is outside of the BDNF; however, the Forest does not normally implement WUI projects outside of the Forest boundary, thus only the potentially affected acres under Forest administration (excluding inholdings) are included as part of the analysis (but see *Cumulative Effects*).

Table 9. Area and percentages of lynx habitat structural stages within the wildland-urban interface boundary on the Beaverhead-Deerlodge National Forest.

Structural Stage	Lynx habitat in WUI under BDNF management (acres)	Lynx habitat in WUI under BDNF management (percent)
Early Stand Initiation	49,439	3
Stand Initiation	20,049	1
Stem Exclusion	105,974	7
Mature; Multi-Storied	135,384	9
Other	262,225	18
Total	**573,071**	**39**
Remaining lynx habitat under BDNF management	**908,759**	**61**
Total lynx habitat under BDNF management	**1,481,830**	**100**

Since 2009, only 567 acres of lynx habitat were treated as parts of hazardous fuels projects (excluding projects with multiple objectives, such as aspen and conifer removal) under the previous habitat model. Of these, 49 acres of stand initiation and 317 acres of mature, multi-storied lynx habitat were included as part of the WUI exception acres for VEG S5 and VEG S6, respectively. The tracked exception acres consist of less than one percent of the lynx habitat on the Forest under the previous lynx habitat model.

Due to likely increases in regional fuels targets, the BDNF estimates increasing annual hazardous fuels treatments to 8,000 through 10,000 acres, which equates to a range of 120,000 to 150,000 acres of hazardous fuels treated by 2036 (B. Anderson, pers. comm., 13 October 2020). It is estimated 60 percent of treatments focus in WUI areas (ibid), thus a maximum of 35,100 acres of lynx habitat (39 percent of

90,000 acres in the WUI) could be affected. This represents 6 percent of lynx habitat in WUI under the updated model.

Wildland Fire

The BDNF Plan allows for modified containment strategies (e.g., monitor, confine, and point or zone protection) to manage unplanned ignitions for resource benefits. Some considerations used for deciding to use a modified containment strategy include: fire fighter safety, values at risk (includes wildlife habitat and silvicultural concerns), functional and objective concerns, cost, seasonal severity or timing, current and projected fire weather forecasts, natural and artificial barriers to fire spread, fire history information, and the overall projected fire size, growth intervals, and spread potential.

On the BDNF, fire regimes are variable. Both frequent stand-replacing or mixed severity fires (0-100 plus years) and infrequent stand replacement (over 200 years) fires occur. Since 1980, stand-regenerating wildfires burned a total of 151,886 acres on the BDNF. This includes fire severities defined as high, moderate, or unknown intensities within known fire perimeters. Other intensity categories were excluded, as stand-regenerating fire contributes to restarting successional stages that could affect lynx habitat. Of this total, 126,271 acres fall within lynx habitat (Table 10). The amount of stand regenerating wildfire is generally increasing over time (Table 10).

Table 10. Acres burned from stand regenerating fire (moderate, high, or unknown intensity) from 1980 to the present on the Beaverhead-Deerlodge National Forest.

Decade	Area within lynx habitat (acres)	Area outside of lynx habitat (acres)	Total (acres)
1980s	7,304	3,651	10,955
1990s	593	216	809
2000s	68,044	8,856	76,900
2010s	50,329	12,893	63,222
Total	**126,271**	**25,616**	**151,886**

Lands

Lands Special Uses

This category includes access and maintenance activities associated with utility infrastructure on the BDNF as well as commercial and non-commercial lands uses. Lands special uses provide for delivery of reliable power, water, and communication services to communities, support other federal, state, and local agency operations, and help sustain local economies. These activities reoccur annually on the BDNF and feature permanent improvements such as telecommunication lines, gas pipelines, water lines and impoundments, fiber optics, and communication sites.

Appendix G (Table G- 1) includes currently authorized lands uses on the BDNF and associated operation and maintenance activities. The majority of authorized uses require ongoing year-round motorized access, which is authorized though special use permits, rights of way, and easements. In some cases, this access occurs off designated forest system routes (e.g., within or adjacent to existing rights-of-way).

It is not possible to quantify the maximum or range of lynx habitat affected by existing lands uses such as utility lines, easements, or right-of-way as sufficient data does not exist for the extent of the Forest. However, it is reasonable to assume that activities to maintain and access areas under lands permits will

continue, especially as the state of Montana continues to grow in population and demand for these services increases.

Land Conveyance, Acquisition, and Exchange

Although infrequent, land sales, purchases, donations, and exchanges occur between the Beaverhead-Deerlodge National Forest and private individuals or organizations. Since 2009, an average of one or two conveyances, acquisitions, or exchanges occurred per year, although five occurred in 2017. The BDNF acquired approximately 2,073 acres and disposed of approximately 28 acres since 2009.

Range Management

Livestock Grazing

The Forest currently manages approximately 240 allotments, including some that are not currently active. Livestock grazing generally occurs through the middle of June through September. Each allotment contains varied structural stages and amount of lynx habitat, with 56 percent of the overall lynx habitat within LAUs occurring within grazing allotments under the new model (Table 11).

Table 11. Area and percentages of lynx habitat structural stages within grazing allotments.

Structural Stage	Lynx habitat within grazing allotments (acres)	Lynx habitat within grazing allotments (percent)
Early Stand Initiation	115,249	7
Stand Initiation	27,657	2
Stem Exclusion	191,172	12
Mature; Multi-Storied	199,927	12
Other	381,193	23
Total	**915,197**	**56**
Lynx habitat outside of grazing allotments	**710,608**	**44**
Total grazing allotment area	**3,209,705**	**100**

Range Infrastructure Maintenance

As part of livestock management, range permittees maintain existing structures to properly manage permitted cattle, sheep, horses, and domestic bison. Examples of structures include water developments (e.g., spring developments, troughs, and buried pipelines), fences, shipping corrals, buildings for designated cow camps, and ponds. Activities may include off road travel with motorized equipment (analyzed in *Other Management Activities and Issues*), tree removal (via chainsaw) for fallen trees on structures or pose substantial threats to a structure, sediment excavation from water sources, repair of broken pipe, and trough leveling. Existing range structures are generally replaced every 30 to 40 years due to deterioration from age (J. Bowey, pers. comm., 9 December 2020). The number of utilized and functioning structures changes annually due to livestock location and number, accessibility, and environmental or human-caused degradation of infrastructure. Effects from installation of new infrastructure are analyzed at the project-level and are not considered in this analysis.

Noxious Weed Control

The Forest Plan recognizes the need for noxious weed control and associated activities, such as off-road motorized travel to treat infestations (Vegetation Noxious Weed Goal and Recreation Standard 3). In 2002, the Forest signed the decision for the Beaverhead-Deerlodge National Forest Noxious Weed

Control Program that contained actions related to noxious weed control, including aerial and ground application of chemical herbicides, mechanical treatments (hand pulling), biological control methods, surveys for new infestations, and post-treatment monitoring. Annual direct control methods are permitted on 15,000-16,000 acres (including up to 9,000 acres with aerial application and up to 7,000 acres in ground treatments) (USDA BDNF, 2002). Generally, between 1,000-2,000 acres of annual treatments are considered beneficial for wildlife as improvements to forage, biodiversity, or habitat restoration.

Recreation and Travel Management

Recreation is managed by site-specific decisions around opportunity types, facilities, and access, and is generally categorized by season (summer versus winter; Table 12, Table 13), development level (developed versus non-developed, also known as dispersed), and access type (motorized versus non-motorized). In general, the BDNF defines summer as May 16 through December 1 and winter as December 2 through May 15. Fall hunting activities are incorporated in the summer season. Approximately 45 percent National Forest System lands on the BDNF fall within non-motorized allocations in summer and 40 percent in winter. Motorized allocations represent approximately 55 and 60 percent of the BDNF in summer and winter, respectively. Although the Forest only completed site-specific travel management (36 CFR 212 Subpart B) on the Madison Ranger District, the BDNF restricts summer motorized travel to open routes as displayed in the Forest Plan interim roads and trails layer in accordance with Forest Plan Recreation and Travel Management Standard 3. The Forest's Over Snow Vehicle Use Map (OSVUM), completed pursuant to 36 CFR 212 Subpart C, specifies the areas and routes where winter motorized travel is allowed.

Table 12. Available activities in summer recreation allocations as identified in the Forest Plan.

	Activities Available (yes, no, or partial)					
Use Type	**Designated Wilderness**	**Recommended Wilderness**	**Non-motorized**	**Wilderness Study Area**	**Backcountry**	**Road-Based**
Motorized watercraft	No	No	No	No	No	Yes
Developed camping	No	No	No	No	No	Yes
Scenic driving	No	No	No	No	Partial	Yes
Four-wheeling (full-sized, on roads)	No	No	No	No	Yes	Yes
ATV and motorcycle riding on trails	No	No	No	No	Yes	Yes
Mountain Biking	No	No	Yes	Yes	Yes	Yes
Stock use, hiking	Yes	Yes	Yes	Yes	Yes	Yes
Dispersed camping	Yes	Yes	Yes	Yes	Yes	Yes
Hunting and Fishing	Yes	Yes	Yes	Yes	Yes	Yes
Non-motorized watercraft	Yes	Yes	Yes	Yes	Yes	Yes

Table 13. Available activities in winter recreation allocations as identified in the Forest Plan.

	Activities Available (yes, no, or partial)				
Use Type	**Designated Wilderness**	**Recommended Wilderness**	**Non-motorized**	**Wilderness Study Area**	**Motorized Recreation**
Winter sport resorts	No	No	No	No	Partial
Scenic Driving	No	No	No	No	Partial

	Activities Available (yes, no, or partial)				
Use Type	**Designated Wilderness**	**Recommended Wilderness**	**Non-motorized**	**Wilderness Study Area**	**Motorized Recreation**
Four-wheeling (full-sized, on roads)	No	No	No	No	Partial
ATV and motorcycle riding on trails	No	No	No	Partial	Yes
Snowmobiles	No	No	No	Yes	Yes
Cross country skiing, ski touring, skiing, snowshoeing, winter hiking	Yes	Yes	Yes	Yes	Yes
Dog sledding	Yes	Yes	Yes	Yes	Yes
Trapping, hunting, and fishing	Yes	Yes	Yes	Yes	Yes

The BDNF is also categorized into motorized and non-motorized allocations, which describe access types within areas. Motorized allocations consist of 44 percent of lynx habitat in the summer and 58 percent in winter (Table 14). The "other" structural stage has the greatest amount of lynx habitat within both non-motorized and motorized allocations in summer (19 percent and 20 percent, respectively) and winter (14 percent and 20 percent, respectively), with the exception of winter motorized recreation which intersects with up to 14 percent of mature, multi-storied lynx habitat (Table 14).

Table 14. Area and percentages of lynx habitat structural stages within summer and winter allocations for non-motorized and motorized recreation use types.

Structural Stage	Total non-motorized (acres/percent)	Total motorized (acres/percent)	Total Outside of Forest Administration (acres/percent)	Grand Total (acres/percent)
Summer Allocation				
Early Stand Initiation	115,488/7	72,438/4	15,890/1	203,815/13
Stand Initiation	6,167/<1	29,857/2	911/<1	36,935/2
Stem Exclusion	114,767/7	139,550/9	12,539/1	266,856/16
Mature; Multi-Storied	219,241/13	163,541/10	38,090/2	420,873/26
Other	303,570/19	317,252/20	76,503/5	697,325/43
Total	**759,234/47**	**722,638/44**	**143,933/9**	**1,625,804/100**
Winter Allocation				
Early Stand Initiation	76,206/5	111,720/7	15,889/1	203,815/13
Stand Initiation	8,314/1	27,710/2	911/<1	36,935/2
Stem Exclusion	57,870/4	196,447/12	12,539/1	266,856/16
Mature; Multi-Storied	159,350/10	223,432/14	38,091/2	420,873/26
Other	233,707/14	387,115/24	76,503/5	697,325/43
Total	**535,447/33**	**946,425/58**	**143,933/9**	**1,625,804/100**

The Forest Service estimates visitor use by conducting national visitor use monitoring (NVUM) every five years. The last completed NVUM on the BDNF occurred in 2015. Because of improved reliability in the data beginning in 2010, this analysis considers only 2010 and 2015 NVUM data. Due to large confidence intervals in NVUM data, determining a trend using this data can be challenging; however,

visitation estimates show an increase of about 16 percent from 2010 to 2015 (Table 15) (USDA 2010; 2015).

Table 15. Visitation on the Beaverhead-Deerlodge National Forest based on NVUM survey results.

NVUM Survey Year	Estimated Visits[a]	90% confidence level (percent)[b]	Number of completed survey interviews
2010	692,000	±26.9	659
2015	751,000	±19.0	468

[a]A visit is the entry of one person onto the National Forest to participate in recreation activities for an unspecified amount of time.
[b]This value defines the upper and lower bounds of the visitation estimate at the 90 percent confidence level. For example, if the visitation estimate is 100 ± 5 percent, the number of visits ranges between 95 and 105.

Growth in outdoor recreation participation is also documented in other recreation research. Nationally, participation in outdoor recreation is project to increase by 12 to 30 percent (2008 thru 2030) in a number of activities that occur on the BDNF (White et al. 2016). Non-resident elk hunting in Montana Fish, Wildlife, and parks (FWP) Region 3, which overlaps much of the BDNF, increased 53 percent from 2008 to 2018 (MFWP 2019). Non-resident visitation to Montana increased by 16 percent between 2007 and 2017 (Grau 2018). Montana outfitter-guide client days also increased by 46 percent from 2005 to 2017, with 32 percent of all land-based guided activities occurring on NFS lands (Nickerson et al. 2007; Sage et al. 2018). Following the possible trend documented in the NVUM data and general growth in outdoor recreation participation, it is reasonable to anticipate use on the BDNF could increase 10 to 20 percent over the next 15 years (N. Meier, pers. comm., 4 December 2020).

Wilderness and Recommended Wilderness

The BDNF manages two Wilderness areas. The Lee Metcalf Wilderness is divided into four separate units in the Madison Range on the east side of the BDNF. The Anaconda Pintler Wilderness is in the Pintler Range on the west side of the BDNF. There are several areas of recommended Wilderness dispersed throughout the Forest that range in size from approximately 1,900 to 89,000 acres. Lynx habitat in Wilderness and recommended Wilderness consist of 16 percent (241,716 acres) of the available lynx habitat on the BDNF (Table 16).

Table 16. Lynx habitat within Wilderness and recommended Wilderness on the Beaverhead-Deerlodge National Forest.

Structural Stage	Lynx habitat within Wilderness (acres/percent)	Lynx habitat within recommended Wilderness (acres/percent)	Total lynx habitat (acres)
Early Stand Initiation	18,338/42	25,031/58	43,370/18
Stand Initiation	978/25	2,857/74	3,861/2
Stem Exclusion	9,994/48	10,639/52	20,682/8
Mature; Multi-Storied	45,694/56	36,549/44	82,209/34
Other	46,520/51	45,105/49	91,673/38
Total	**121,524/50**	**120,092/50**	**241,667/100**

Developed Recreation

For purposes of this analysis, developed recreation includes facilities and improvements managed by the Forest Service. This includes campgrounds, day use areas, marinas, rental cabins, roads and trails, and trailheads with facilities. Developed sites are used by the public during both summer and winter, although

the bulk of Forest Service recreation infrastructure sees its heaviest use during the summer season. Appendix G (Table G- 2) contains a list of developed recreation sites by type and the activities associated with their use, maintenance, and operation.

There are approximately 250 developed recreation sites on the BDNF, including two downhill (alpine) ski areas (refer to *Recreation Special Uses*). Of the developed sites, approximately 159 are within LAUs. There is an average of 2 sites per LAU with CFF-08 containing the maximum of 20 sites. There are approximately 6,454 and 1,561 miles of motorized and non-motorized routes on the BDNF, respectively, including approximately 958 and 1,276 miles of motorized and non-motorized National Forest System trails.

In 2009, the Forest signed a decision memo authorizing the removal of hazardous trees within 2.5 horizontal tree lengths (generally no more than 200 feet) from high risk areas within developed recreation sites. High risk areas include places where people regularly congregate and where constructed features occur within the administrative boundary of the site. Individual or groups of trees are selected for removal when threats to human health and safety or infrastructure are evaluated and present. Skid trails or landing areas may be necessary to facilitate removal of felled hazardous tree material.

There are multiple over-the-snow (OSV) facilities on the BDNF. Outside of two downhill ski areas and one Nordic (cross-country) ski area that operate under a special use permit (refer to *Recreation Special Uses*), the Forest, in cooperation with partners and volunteers, manages several Nordic ski areas including Chief Joseph, Echo Lake, Elkhorn, Moulton, Birch Creek, and Thompson Park. One additional ski area, Homestake, is permitted under special uses (although included in the *Developed Recreation* analysis due to similar effects). These areas consist of designated (marked but not groomed) and groomed system trails, warming huts, outhouses, and parking areas. Thompson Park's system of winter trails also includes opportunities for fat tire bike users on some of its groomed routes. Although use in Nordic areas is considered non-motorized, grooming is accomplished via motorized means (snowcats, groomers pulled by snowmobiles, etc.). Approximately 350 miles on the BDNF are groomed, authorized for grooming, or designated for Nordic, fat tire bike, or multi-use (e.g. snowmobiles, snowshoes, skiing, etc.). Over these seven Nordic ski areas, it is expected each could expand groomed or designated routes up to ten miles in lynx habitat. Thus, a total expansion of up to 70 additional miles in lynx habitat could occur over the life of the plan. Groomed snowmobile trails are not expected to expand over the life of the plan. Downhill ski areas may request changes to existing ski runs and infrastructure within the life of the plan, including snowmaking, vegetation management, and installation of facilities such as minor buildings or lifts.

Dispersed Recreation

Non-developed or dispersed recreation captures a variety of other activities that occur outside of developed sites, such as dispersed camping, boating (both motorized and non-motorized), horseback riding and pack stock use, hiking and backpacking, climbing, rock hounding, crystal mining, prospecting, geocaching, winter touring (snowshoeing, cross-country skiing, backcountry skiing, or dog sledding), hunting and fishing, drone use, photography, summer and winter off-highway vehicle use, driving for pleasure, and similar activities. Sometimes a combination of developed recreation (camping at a developed site) is paired with non-developed recreation activities (pack stock use) and vice versa (camping at a dispersed site but using system trails for a day hike).

While no infrastructure is associated with dispersed recreation, dispersed campsite inventories initiated in 2012 on the BDNF catalogued over 1,500 campsites, with the largest number on the Madison Ranger District and the smallest number on the Dillon Ranger District. This inventory has potentially increased over time. Because these are not considered developed sites, and, given the unregulated nature of

dispersed campsites, the Forest does not regularly update inventory or data. Information on capacity, frequency of use, and user groups associated with each site is not available. Beyond dispersed camping, it is not possible to quantify dispersed recreation, although it is reasonable to assume forest use will likely increase for these activities over the next 15 years.

Recreation Special Uses

Special uses include both commercial and non-commercial recreation opportunities such as outfitting and guiding (e.g., guided hunts, guided climbing, educational tours, wilderness skill courses), non-commercial group use (e.g., family reunions, off-highway vehicle club gatherings), competitive events (one-time and reoccurring), organization camps, recreation residences, and downhill and Nordic ski areas.

The BDNF currently authorizes 14 different types of recreation special uses. A variety of permit types authorizes diverse activities in Appendix G (Table G- 3) and range in term from a few days up to 40 years. Some authorizations provide for reissuance upon expiration (e.g., organization camps, recreation residences, outfitting and guiding, resorts, and winter resorts) while others require a new application from the proponent upon expiration (e.g., recreation events, temporary outfitting and guiding, non-commercial group use).

The BDNF is considering authorizing new commercial outfitting and guiding activities, expanded use areas, and anticipates expansion of the special uses program over the life of the Plan. Although effects from specific actions for new authorizations are not included in this analysis, effects from anticipated increase in recreation special uses is disclosed.

Permits issued for winter resorts (i.e., downhill ski areas) provide for reissuance upon expiration and are authorized for up to 40-year terms. Two downhill ski areas, Maverick Mountain and Discovery Ski Area, established in the 1960s and 1970s respectively, operate on the BDNF. Discovery Ski Area operates on approximately 2,200 acres with over 80 percent on national forest system lands near the town of Philipsburg, Montana. Its operating season runs from late November to early April, depending on snow conditions. Discovery contains eight lifts, twenty miles of cross-country trails, and supports a capacity of 2,150 daily visitors. During the 2018-2019 season (used as a proxy for current data as 2020 was a shortened season due to COVID-19 restrictions), an average of 616 people visited Discovery with a peak day of 1,975 skiers. Maverick Mountain, located on the south end of the Pioneer Mountains, operates on 525 acres on national forest system lands. Maverick manages one ski lift, supports a daily capacity of 333 visitors, and shares a similar operating season with Discovery Ski Area. During the 2018-2019 season (used as a proxy for current data as 2020 was a shortened season), an average of 151 people visited Maverick with a peak day of 329 skiers.

Up until recently, these ski areas focused their efforts and infrastructure on winter recreation opportunities. With the passage of the Ski Area Recreational Opportunity Enhancement Act of 2011, however, the Secretary of Agriculture may now permit other seasonal or year-round recreational activities in addition to skiing and other snow sports under ski area permits. The Act specifically identified what those non-snow sport activities could include, such as: zip lines, mountain bike terrain parks and trails, frisbee golf courses, and ropes courses. Discovery Ski Area currently has some summer operations, but those activities are not conducted on National Forest System lands. Both ski areas expressed interest in future summer operations on NFS lands.

The opportunity to expand operations to include summer uses will likely result in updates to existing ski area master development plans (MDPs). The Forest Service considers MDPs as long-range planning documents and project-level environmental analysis would be completed prior to implementation. It is

likely these two ski areas could see an eventual increase in infrastructure and development as well as change in scope of activities within their permit areas as MDPs are updated. Adding to these summer-use driven changes in operation, the increasing effects of climate change on snowpack will likely result in downhill ski areas seeking to increase their snowmaking capabilities.

In addition to these downhill ski areas, Homestake Lodge represents the only permitted Nordic ski area on the BDNF. The Lodge is located on a private inholding but operates a system of groomed Nordic ski trails on adjacent NFS lands. Its permit authorizes night skiing, snow making, and recreation events and includes an operating season of November through April, depending on snow conditions. Analysis of effects from Homestake are included as part of *Developed and Dispersed Recreation*.

Over-the-Snow Use

Winter motorized travel is permitted on 58 percent (949,425 acres) of lynx habitat (Table 14) on the BDNF. A variety of motorized activities can occur within winter recreation allocations, including snowmobiles, ATV and motorcycle riding, four-wheeling, and scenic driving (Table 13), among others, although these activities may be limited to specific areas (e.g., outside of designated and recommended wilderness) and restricted by season of use.

Similarly, winter non-motorized activities can occur within 33 percent (535,447 acres) of lynx habitat on the BDNF (Table 14). This use includes cross country skiing, ski touring, winter hiking, dog sledding, and trapping, hunting, and fishing, among others. In general, non-motorized activities are permitted in all winter recreation allocations on the Forest.

In addition to recreation over-snow use, over-snow travel is permitted as part of lands and recreation special uses for infrastructure and administrative maintenance (Appendix G; refer to *Other Management Activities and Issues: Project-related Connected Actions*).

Travel Management

The 2009 Revised Forest Plan interim roads and trails inventory (page 53 of the Forest Plan), eliminated the ambiguity of on-the-ground visual interpretation of routes and documented actual existing travel routes. The Record of Decision signed on January 14, 2009 by the Regional Forester set forth direction in the form of management allocations and standards, including the prohibition of motorized vehicles in summer and winter non-motorized allocations (except for permitted and administrative use), and restricted motorized vehicles to the open routes identified on the interim inventory. This map was later amended by a second decision made by the Forest Supervisor on February 12, 2010, which enacted Forest Plan travel management direction by closing all the motorized routes in areas with non-motorized allocations, including National Forest System roads and trails and unauthorized (non-system) motorized routes. Until site-specific management decisions occur, the interim inventory in the Forest Plan, as amended, serves as the interim route (road and trail) inventory for the Forest.

The Plan also established motorized route management objectives at two scales to reduce the miles of routes open to motorized use to maintain and improve wildlife habitat. The Plan sets objectives by landscape (between May 15 and December 1) and Montana Fish, Wildlife, and Parks 2006 hunting units (between October 15 and December 1). These objectives are referred to as open motorized road and trail density (OMRTD) goals and objectives. Site-specific travel planning would move conditions towards goals and objectives. Although the BDNF completed winter travel designations as part of the 2009 Revised Forest Plan, only the Madison Ranger District updated site-specific travel management for wheeled motorized vehicles since the 2009 Forest Plan revision (signed in 2011).

The BDNF identifies 6,454 miles of motorized routes and 958 miles of motorized trails that are open for motorized use during all or part of the year, excluding over-the-snow vehicles. New permanent road construction is rare, although temporary roads may be utilized for project implementation. The Forest strives to decommission unnecessary motorized routes for natural resource management. Since 2009, the BDNF has not constructed any new permanent roads. However, 0.7 miles and 27.45 miles of system roads and non-system (unauthorized) routes, respectively, have been decommissioned in the last 11 years.

Road maintenance and repair activities consist of grading, blading, ditch cleaning, culvert cleaning or replacement, graveling, among others. These occur throughout the summer as weather permits and are prioritized by Forest need, so the location or maintenance activities varies by year.

Road-related activities that could affect lynx and lynx habitat, such as temporary road construction and brushing, are analyzed within the *Other Management Activities and Issues: Project-related Connected Actions* section.

Minerals, Oil, and Gas

Activities associated with exploration, extraction, and reclamation of minerals, oil, and gas include the use of explosives, heavy-equipment, pumping water, drilling, vegetation management, and creating or repair of roads. Effects from temporary road creation or repair are analyzed in *Other Management Activities and Issues*.

Minerals

Most Federal lands are open to locatable mineral mining under the Mining Law of 1872, as amended. These minerals are valuable deposits subject to exploration and development under this law. More than half of BDNF lands are considered favorable for one or more polymetallic locatable or precious mineral deposits although demand is tied to economics and international markets. Most current mining activities on the BDNF consist of short-term (one year or less) mineral, energy, or geophysical investigations and their incidental support activities typically occurring on small claims or exploratory drilling. These mining and associated activities are submitted to the Forest under a mining Plan of Operations or Notice of Intent with the exception of some small-scale mining exploration activities (locatable minerals, e.g. gold panning, metal detecting, rock hounding, etc.). These activities occur but are not possible to quantify due to the lack of permitting requirements under the law.

There are currently 379 active mines within LAUs on the BDNF, with a range between 0 and 32 occurring within LAUs. Forty-two (54 percent) of LAUs contain one mine or less (Table 17). Due to a lack of footprint data, it not possible to determine how many acres of active mines intersect with lynx habitat, although it is assumed most of them are small (less than ten acres). The extent of effects to lynx habitat are also unknown because the current activities around each mine is not well documented (e.g. vegetation removal, road repair, etc.). It is likely some of these mines fall outside of lynx habitat and thus are not likely to influence existing conditions.

Table 17. Distribution of active mines across LAUs on the Beaverhead-Deerlodge National Forest.

Number of mines	Number of LAUs with mines
1 or fewer	42
2 to 5	12
6 to 10	11
11 to 15	5

Number of mines	Number of LAUs with mines
15 to 20	4
20 or greater	4
Total	**78**

The BDNF does not have any active large-scale mines, although there are four existing footprints under the Comprehensive Environmental Response, Compensation, and Liability Act (CERLCA; also known as superfund). Mines under remediation include Beal Mountain and Basin Creek, both on the Butte Ranger District. The two legacy superfund sites where cleanup is ongoing include Black Pine Mine on the Pintler Ranger District and Elkhorn Mine on the Dillon Ranger District. There are other legacy mine sites that could become CERLCA cleanup sites in the future.

The BDNF has not approved any large-scale mines since 2009 although small-scale exploration has occurred. Mining operations may require cross-country travel by vehicles and equipment, construction of less than one mile of low standard road, or use and minor repair of existing roads. Footprints for these projects varies from a few square feet to hundreds of acres, depending on the mining project scale. Small minerals exploration projects are short-term, with exploration and reclamation typically occurring within the same year. Large scale operations may occur over a long duration and reclamation requirements may also vary depending on site-specific analysis. Generally, mining operations do not occur in winter but can occur depending on the project and outcome of project-specific analysis. Large-scale mining may require year-round use and potentially snowplowing.

The Forest Service also permits removal of saleable or common variety minerals, including sand, gravel, stone, and clay, including decorative rock or landscaping stones. Due to changes in demand, the yearly number of permits and volumes for saleable material is challenging to predict. However, the Forest is the primary user of borrow pit material for construction and maintenance of forest roads and facilities (USDA BDNF 2009). This material occurs in varying locations in differing amounts on-Forest.

Oil and Gas

Oil and gas exploration consist of drilling one or more holes through directional drilling on a single or multiple pad configuration. Because semi-trucks transport drill rigs to perspective sites, road reconstruction and road building may accompany oil and gas proposals. The BDNF requires obliteration of pad sites after exploration, use, or leasing is completed (Minerals, Oil, and Gas Standard 3). Currently, there are no ongoing oil and gas projects on the BDNF.

In general, the potential for occurrence of oil and gas on the BDNF is considered low or very low, although some areas have a moderate potential (USDA BDNF, 2009). Areas of interest for oil and gas leasing include a portion of the Lima-Tendoy Mountains and the Big Hole Valley. In 1995, a Reasonably Foreseeable Development (RFD) scenario predicted there would be low-level of drilling on the BDNF and assumed there could be up to ten wildcat and four development wells drilled over a fifteen-year period (USDA BDNF 2009; reviewed in 2012 and still deemed sufficient). The majority of the wells would be dry holes (lasting only one year) unless the wells were productive. The RFD predicted foreseeable wells would require pads averaging 6.7 acres per well and changes to roads, although sites would be reclaimed after drilling.

Other Management Activities and Issues

Project-related Connected Actions

Other activities that could affect lynx or habitat may occur as part of forest management actions. Actions include but are not limited to temporary road construction and reclamation, vegetation brushing, off-road travel (including access via helicopter), and maintenance of administrative sites and infrastructure outside of special uses (e.g., signs, buildings).

Low-standard temporary roads are usually constructed for timber harvest and are typically reclaimed after harvest activities. Temporary roads are approximately ten feet wide and vary in length, but generally do not exceed 1 mile. Since 2009, 26.5 miles have been constructed and another 21.4 miles of temporary roads are part of existing decisions but are not yet built. This trend of proposing, building, and decommissioning temporary roads will likely continue.

Vegetation brushing along roadsides is part of timber management, road maintenance, and special uses projects. Brushing can occur with mechanized or hand-tools, depending on the extent of the need for travel or human safety.

Off-road motorized travel can occur as part of a variety of activities, such as range infrastructure maintenance, special forest products, noxious weed removal, thinning treatments, winter surveys, and others. This activity is not generally permitted by public users, with the exception of permit holders, hired contractors, or researchers, but is associated with specific project objectives that are subject to analysis.

Linkage Areas and Habitat Connectivity

As part of the conservation agreement (USDA & USDI 2005), agencies agreed to identify linkage areas, or places that connect blocks of lynx habitat that are separated by areas of non-habitat, such as basins, valleys, agricultural lands, or where habitat naturally narrows (Claar et al. 2003). Connectivity provided by these linkage areas can be degraded or removed by infrastructure, such as high-use highways or other developments (ibid). Improving landscape connectivity to facilitate wildlife movement is part of the BDNF Plan (Wildlife Connectivity Goal).

The Northern Rockies Lynx Planning Area map identifies potential linkage areas within and among the Northern Rockies planning area, including linkage areas on the Beaverhead-Deerlodge National Forest. The BDNF contains approximately 22 linkage areas within or partially within the Forest boundary (Figure 2). Lynx use of linkage areas is unknown, but it is assumed lynx may be dispersing into the BDNF as verified detections are increasing and lynx are residing within the Forest boundary (Gatlin, 2020). Interstates 15 and 90, and Montana State Highways 1, 2, 38, 43, 278, and 287 are major public travel corridors that separate portions of the Forest, which may represent potential fragmentation at a broad scale. In addition, some mountain ranges on the BDNF such the Pioneers, Lima-Tendoys, and Tobacco Roots are naturally separated by wide valleys, which could represent a barrier to lynx movement.

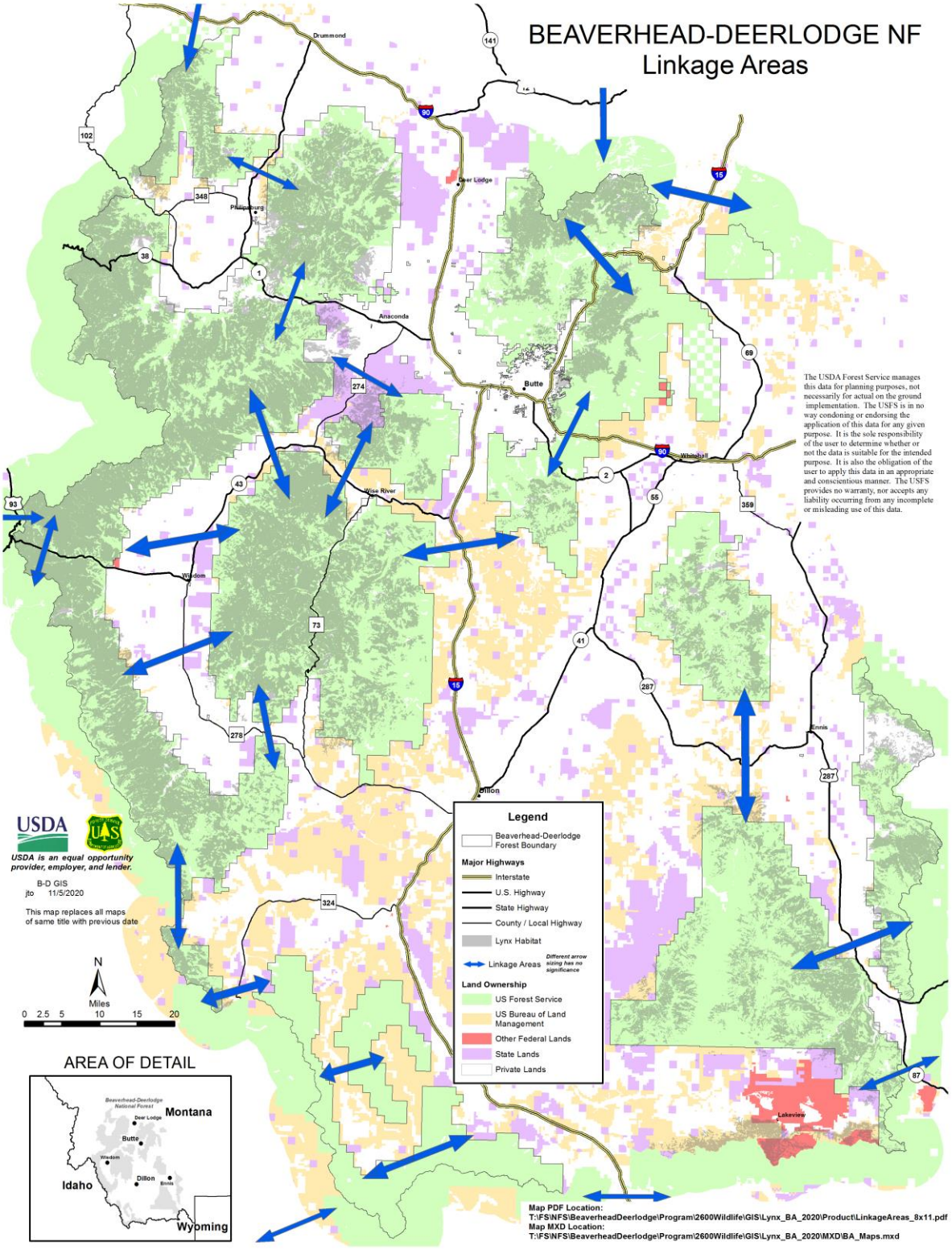

Figure 2. Linkage areas on the Beaverhead-Deerlodge National Forest as identified in the NRLMD.

Environmental Consequences

The Forest Plan is a programmatic decision and does not authorize any direct, site-specific management in the planning area. Therefore, the effects to lynx and its habitat that may result from implementing the programmatic plan can only be discussed in broad, general terms. Direct effects that would result from implementation of vegetation management activities cannot be predicted until those projects are planned and specific locations and habitats where activities would occur are known. Specific effects to lynx and lynx habitat would then be analyzed and discussed at the project level during the project section 7 consultation process.

Each section of this analysis contains descriptions of activities and discloses effects of the BDNF's Forest Plan on Canada lynx and its habitat as directed by the NRLMD. Appendix H contains a crosswalk for NRLMD standards and guidelines and supporting Forest Plan goals, objectives, and standards. The in-text analysis does not contain lists of all supporting Forest Plan direction for every NRLMD standard and guideline, although effects from using both the Plan and the NRLMD are disclosed.

Two unknown variables are consistent among all analyses in this assessment: 1) the BDNF cannot predict exact locations of future projects that may use exceptions or wildland-urban interface exemptions to Vegetation Standards 5 and 6 and; 2) the BDNF cannot predict locations where lynx may disperse or establish a home range. Thus, it is possible activities identified in the Forest Plan could reduce lynx or hare habitat until stands mature or interfere with lynx behavior or life history needs.

Vegetation Management

Disturbances that alter or remove horizontal cover or convert forest to structural stages that do not provide habitat for snowshoe hare during the winter have the potential to impact Canada lynx. These disturbances include vegetation management, which can be considered as both a stressor and driver of Canada lynx habitat. The use of both the Forest Plan and the NRLMD provides guidance to manage vegetation to mimic of approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.

Timber Management

Elements in the Forest Plan generally promote the management of disturbance processes to maintain a mosaic of tree species, age classes, and habitat types across the landscape that contribute to wildlife cover and forage. They also include maintaining old growth, snags, existing large downed wood, and maintaining secure areas and connectivity (Appendix H). Specifically, standards in the Forest Plan contains language that limits the following:

- *Even-aged harvest:* may occur only upon a finding that it is the appropriate and optimum method for the timber type and consistent with the protection of other resources and it shall not occur unless the stand has reached the culmination of mean annual increment unless there are other resource purposes for treatment (Timber Management Standards 1 and 3);
- *Opening size*: 40 acres is the maximum size created by one regeneration harvest operation (Timber Management Standard 2);
- *Restocking*: when trees are cut to meet timber production objectives, the cuttings shall be made in such a way as to assure that the technology and knowledge exists to adequately restock the lands (Timber Management Standard 5);

- *Old growth stands*: mechanical vegetation treatments and prescribed fire in old growth stands do not reduce the age and number of large trees and basal area (Vegetation Standard 1); and
- *Location*: commercial timber harvest is prohibited in recommended Wilderness (Recreation and Travel Management Standard 11).

Other standards in the Forest Plan require considerations for lynx and prey species within timber units, such as the following wildlife standards:

- *Snag retention*: mechanical treatments will retain snags greater than 20 inches diameter at breast height (DBH) (except hazard trees), maintain specific numbers of average snag per acre for snags greater than 15 inches DBH in treatment units, or retain live trees in the same size class to count as snags in areas that are deficient (Wildlife Habitat Standard 3);
- *Live tree retention*: limits the number of live trees greater than 10 inches DBH per acre in order to provide for future snags in regeneration harvest units (Wildlife Habitat Standard 4); and
- *Provide large woody debris habitat:* maintains existing downed wood in regeneration harvest units in lodgepole and Douglas-fir cover types (Wildlife Habitat Standard 12).

The Plan also contains vegetation objectives for specific tree species management. Specific to lynx, this includes:

- *Douglas-fir*: increase the number of acres in the 0 to 5-inch DBH class on approximately 20,000 acres (Vegetation: Forested Vegetation Objective Douglas-fir Type); and
- *Lodgepole Pine*: increase the number of acres in the 0 to 5-inch DBH class by approximately 74,000 acres (Vegetation: Forested Vegetation Objective Lodgepole Pine Type).

Currently, 65 percent (1,053,594 acres) of lynx habitat within the forest boundary is eligible for timber harvest, with 14 percent (224,836 acres) considered suitable for timber production and 51 percent (828,758 acres) not suitable, but harvest is permitted for other objectives (Table 7; Figure 3). In areas where harvest is permitted (both suitable for production and where harvest is not suitable, but allowed for other activities), most lynx habitat is considered non-foraging (early stand initiation, stem exclusion, and "other" structural stages; 74 percent; 775,749 acres) (Table 18). Stands undisturbed from timber activities consist of 32 percent (146,969 acres) foraging (stand initiation and mature, multi-storied structural stages) and 68 percent (313,009 acres) non-foraging habitat, with additional habitat existing outside of the forest boundary that could also provide for lynx life history needs (Table 18).

Table 18. The amount of lynx foraging and non-foraging habitat affected by different timber suitability categories.

Timber Suitability	Foraging habitat (acres/percent)	Non-foraging habitat area (acres/percent)	Total (acres/percent)
Within BDNF boundary			
Harvest permitted (suitable for production and allowed for other objectives)	277,846/26	775,749/74	1,053,595/100
No harvest permitted (not suitable)	146,969/32	313,009/68	459,978/100
Total	**424,815/28**	**1,088,758/72**	**1,513,573/100**
Outside external BDNF boundary			
Not treatable	32,994/30	79,240/70	112,234/100
Grand Total	**457,809/28**	**1,167,998/72**	**1,625,807/100**

Over the next 15 years, the BDNF will likely treat stands considered suitable for production and those that are unsuitable, although harvest is permitted, equally with an emphasis on suitable timber (meaning slightly more suitable timber may be harvested than unsuitable). Due to the increased pace and scale of timber harvest, the BDNF could commercially treat a total of 60,000 acres by 2036. This would represent approximately 6 percent of the lynx habitat within areas where harvest is permitted and 4 percent of the total lynx habitat within the BDNF boundary. This assumes all harvest would occur within lynx habitat and represents the maximum area that could be affected, although it is unlikely harvest would affect lynx habitat to this extent.

The Plan also contains two objectives to increase acres within 0 to 5-inch DBH class specific to Douglas-fir and lodgepole pine stands (Vegetation: Forested Vegetation Objective Douglas-fir Type and Lodgepole pine Type). Timber activities could be used to meet these objectives. Natural events, such as the Mountain Pine Beetle epidemic that originated near Butte (occurred around 2000) and Douglas-fir beetle outbreaks, may also contribute to meeting this objective in the Plan. Beetle outbreaks result in infection and death among mature trees, which proliferates seeds and saplings in the understory due to an increase in sunlight (A. Brennick, pers. comm., 23 October 2020). Thus, these natural events could promote growth of trees within the 0 to 5-inch DBH size class to meet the Plan objectives (ibid). Timber actions could also treat Douglas-fir, lodgepole pine, or mixed-conifer (consisting of three or more tree species mixtures of lodgepole pine, Douglas-fir, Engelmann spruce, subalpine fir, and others) stands to increase the number of areas within the specified size class. Of areas where timber harvest is suitable for production of allowed for other objectives, these stands contribute to approximately 26 and 63 percent of foraging and non-foraging habitat, respectively (Table 19). It is unlikely all of the lynx habitat within these cover types would be affected to meet this objective as natural events (as described above) also contribute to meeting the objectives and stands outside of lynx habitat with these cover types could also be treated. However, if treatment occurs within lynx habitat, these actions could temporarily reduce habitat for lynx and hares until stands mature to provide for life history needs. However, lynx or hares could disperse to lands unavailable for harvest both within and outside of the BDNF that contain these specific cover types.

Table 19. Cover type contributing to lynx habitat (foraging and non-foraging) within areas where timber harvest is suitable for production or allowed for other objectives.

		Cover Type (acres/percent)			
Lynx habitat type	**Total[a]**	**Lodgepole**	**Douglas-fir**	**Mixed Conifer**	**Other Cover Types**
Foraging	277,846/26	12,954/1	1,431/<1	258,705/25	4,755/<1
Non-foraging	775,749/74	258,313/24	76,058/7	335,717/32	105,660/10
Total	**1,053,595/100**	**271,268/26**	**77,490/7**	**594,422/56**	**110,415/10**

[a]Totals from suitability categories across all cover types are also displayed in Table 8. This table is a simplified version of Table 8 to highlight lynx habitat within areas where timber harvest could be used to meet Forest Plan objectives within Lodgepole Pine and Douglas-fir cover types (per objectives Vegetation: Forested Vegetation Objective Douglas-fir Type and Lodgepole pine Type).

Certain types of vegetation management can also promote development of Canada lynx habitat by returning a stand or area to an earlier successional stage that may eventually provide habitat for hares (such as dense, young regenerating forest), or by creating openings within existing forest canopies that promote development of multiple canopy layers. Maintaining a habitat mosaic of different successional stages within the forest types likely to be used by lynx is a key strategy for maintaining a range of suitable lynx habitats over time. Timber treatments, especially in stem exclusion stands, would likely provide increased snowshoe hare habitat than if the stands were left untreated (in support of Guideline VEG G1). In the long-term, these treatments would likely increase foraging opportunities for lynx by creating

additional hare habitat in stagnant stands and providing a mosaic of successional stages that would benefit lynx (Squires et al. 2010, Holbrook, 2017a, Holbrook et al. 2019).

On the BDNF, an average vegetation management project is approximately 80,000 acres, of which regeneration or intermediate harvest could be proposed up to 10,000 acres treated over several years. Up to 10 to 15 percent of an analysis area could be treated (A. Brennick, pers. comm, 9 November 2020) not all of which may contain lynx habitat. After completion, project areas are rarely re-treated during the life of the Forest Plan and would be eligible for pre-commercial thinning in approximately thirty years. When complete, these large vegetation projects contain a mosaic of treated and untreated areas that could support the life history needs of lynx or prey species (including alternative prey). A variety of connected spatial arrangements, compositions, and recovery times following vegetation treatments is important to support lynx use (Holbrook et al. 2017a), reproduction (Kosterman et al. 2018), and the growth of lynx habitat over time.

The NRLMD provides direction for vegetation management projects that could modify snowshoe hare or lynx habitat. In general, the NRLMD requires vegetation management activities to maintain habitat components necessary for lynx conservation, such as creating mosaics of high horizontal cover (VEG O1, VEG O2, VEG O4, VEG S5, VEG S6), maintaining denning habitat (VEG G11), limit timber regeneration within LAUs (VEG S1, VEG S2), and recruit or provide habitat for lynx and prey species (VEG O2, VEG G1, VEG G5).

Of the areas available for harvest on the BDNF, those consisting of foraging habitat for snowshoe hares and lynx are not generally eligible for precommercial thinning projects or other vegetation management treatment under Standards VEG S5 and VEG S6, except for specified exceptions and exemptions. Existing lynx habitat on the BDNF consists of 2 and 26 percent of stand initiation and mature, multi-storied structural stages, respectively (Table 5). The BDNF does not generally propose projects in mature, multi-storied stands. However, treatments may occur in some mature stands, such as mature lodgepole pine. Treatment of these stands is unlikely to affect lynx because these stands generally do not provide enough habitat to support hares. They are typically categorized as stem exclusion with some very small, scattered pockets of hare habitat created by canopy gaps.

Forest vegetation treatments could occur in foraging habitat under exception acre categories in VEG S5 and S6. In stand initiation stands, precommercial thinning activities could occur on a maximum of 6,200 acres that meet specific exception criteria (see VEG S5; Appendix D). Similarly, in mature, multi-storied stands, vegetation management projects could affect up to 390 acres within the exception categories (see VEG S6; Appendix D). Removal or alteration of habitat using these exception categories would represent a potential adverse effect to lynx because a temporary loss of lynx foraging or snowshoe hare habitat could occur until enough time passes for these stands to grow to meet the structural requirements for the species. More specifically, precommercial thinning in stand initiation or mature, multi-storied stands could remove or alter dense, horizontal cover that could provide habitat for both hares and lynx. If all exception acres are utilized over the life of the plan, a total of 6,590 acres (2 percent) of the available foraging habitat within harvestable timber stands could be removed. This represents 2 percent of all available foraging habitat and less than 1 percent of all lynx habitat on lands administered by the BDNF. However, in some cases, removal of foraging habitat may not represent an adverse effect to lynx or hares. The magnitude of effects would depend on other factors that would be analyzed at the project level, such as the amount of habitat removed in comparison to the remaining condition of habitat in the LAU, the location of removal, and the extent of remaining habitat within the LAU or adjacent areas.

Stands within the stem exclusion (17 percent of lynx habitat under BDNF management) or “other” (42 percent of lynx habitat under BDNF management) (Table 5) structural stages do not generally provide

foraging habitat for snowshoe hare or lynx and are thus eligible for treatment. A majority of timber treatments on the BDNF are focused within stands at the stem exclusion stage and timber harvest converts this stage to early stand initiation. The early stand initiation structural stage currently accounts for 13 percent of lynx habitat under BDNF management. Additional timber harvest would increase this amount, but natural forest succession would decrease it over time. Lynx may decrease use in treated stands that result in early stand initiation or sparse forest until the stands provide enough habitat to support a prey base (Squires et al. 2013, Holbrook et al. 2017a, Holbrook et al. 2018). Treatments in stem exclusion creates favorable conditions for lynx and hares 10 or more years after treatment by increasing tree growing space, nutrient availability, and sunlight, and allowing smaller trees to establish more quickly while supporting increased growth in residual trees due to less competition.

Timber harvest, especially salvage, can reduce the amount of down wood and snags which is important to lynx denning habitat. However, Wildlife Habitat Standards 3, 4, and 12 are designed to retain snags, downed wood, and provide for live tree retention for future snags. Due to multiple beetle infestations on the BDNF, it is not likely that denning habitat is limited as large, standing contiguous stands of beetle-killed trees are present across the landscape. These stands would provide a jackstraw-type structure of downed trees and snags once the trees fall which would provide both denning habitat for lynx and cover for snowshoe hares. At the landscape scale, this accumulation of downed debris is beneficial for lynx as denning habitat, which supports guideline VEG G11. At the project level, wildlife standards would support the retention of this element of lynx habitat during timber treatments in conjunction with NRLMD guideline VEG G11.

Salvage and snag removal are also utilized within beetle-impacted areas to address fire potential fire severity and remove timber before it is no longer marketable. Lynx in the Southern Rockies selected higher levels of beetle-killed trees at the landscape and home range scales and selected home ranges with abundant live spruce-fir trees within beetle-impacted landscapes (Squires et al. 2020). This was likely due to increased sunlight promoting the development of dense understories (Squires et al. 2020) and references therein). Due to decreasing mill value and increasing fire severity in beetle-killed stands over time, there is a management balance between growing habitat for lynx and social and economic concerns within these stands. On the BDNF, some stands affected by beetle kill may be treated for salvage which would reduce areas with horizontal cover for snowshoe hares and may alter lynx behavior and use of these stands. Salvage harvest would be assessed to determine whether the understory provides hare or lynx habitat, and if so, would be subject to site-specific consultation prior to treatment.

Timber harvest can result in habitat fragmentation when occurring over large expanses (Interagency Lynx Biology Team 2013). Timber Standard 2 prevents habitat fragmentation by limiting openings created by regeneration harvest to 40 acres in size (in support of Objective ALL 01 and Standard ALL S1). However, the Forest Supervisor or Regional Forester can waive this requirement on a project-specific basis. This has occurred on the BDNF and will likely occur for future harvest projects, generally in areas of beetle-killed trees with little or no live canopy. This could result in some site-specific fragmented habitat that lynx or hares may avoid, although fragmentation across the entirety of the BDNF is low based on the distribution of habitat on the BDNF (Appendix C; Figure B-4), as well as management designations for Wilderness and recommended Wilderness where commercial harvest is not permitted (refer to *Recreation and Travel Management: Wilderness and Recommended Wilderness*). Standard ALL S1 in the NRLMD requires that vegetation management projects must maintain habitat connectivity in a LAU, thus projects considering an exception to timber Standard 2 must ensure that fragmentation within a LAU boundary is not increased due to timber activities. Adhering to Standard ALL S1 and timber Standard 2 is beneficial to lynx and prey species as connectivity is maintained to encourage lynx and prey dispersal although localized fragmentation is possible.

The NRLMD provides guidance for the distribution of timber treatments to limit fragmentation. Under VEG S1, if the early stand initiation stage (not yet winter snowshoe hare habitat) exceeds 30 percent of an LAU, no additional habitat may be regenerated by vegetation management projects unless it: 1) meets criteria applicable to the wildland-urban interface or 2) a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages. Under the 2020 lynx habitat update, 9 of 78 LAUs exceed 30 percent of habitat within the stand initiation structural stage (Appendix F). Thus no additional habitat can be regenerated by management projects within those LAUs (BH-09, BH-10, BH-11, URC-02, URC-04, URC-05, URC-06, URC-08, URC-09) unless the exception criteria applies or stands mature and the percent of stands in early stand initiation decreases. This restriction limits the amount of early seral structural stage within LAUs caused by regeneration activities that could further reduce the amount of available habitat for lynx or hares.

Under NRLMD Standard VEG S2, no more than 15 percent of lynx habitat on NFS lands can be regenerated by timber management projects within a LAU in a ten-year period, unless it meets criteria applicable to the wildland-urban interface (refer to *Fire Management: Fuels Treatments* analysis). No LAUs have met this threshold on the BDNF (Appendix F). This standard helps maintain a mosaic of habitat over time and also supports VEG O2 by limiting the rate of regeneration harvest in each LAU, which would benefit lynx by providing prey distribution resources across the landscape.

NRLMD guidelines would be considered during site-specific design. Guideline G1 encourages development of projects that are designed to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Guideline VEG G5 provides habitat for alternative prey species, particularly red squirrel, in each LAU. Guideline VEG G11 describes how denning habitat should be retained and distributed in each lynx analysis unit. These guidelines benefit lynx by encouraging management that creates or maintains lynx habitat components over the long-term.

At a landscape scale, the use of direction in both the Forest Plan and the NRLMD on the Beaverhead-Deerlodge National Forest would positively contribute to the conservation of lynx by providing a framework for which to design and implement timber management projects to maintain or grow forested stands or features that provide current or future habitat for the species and limit habitat removal. Standards in the Forest Plan would likely maintain habitat (such as retaining important habitat features such as large trees and woody debris) or support the growth of lynx habitat over time (such as providing for future snags and restocking).

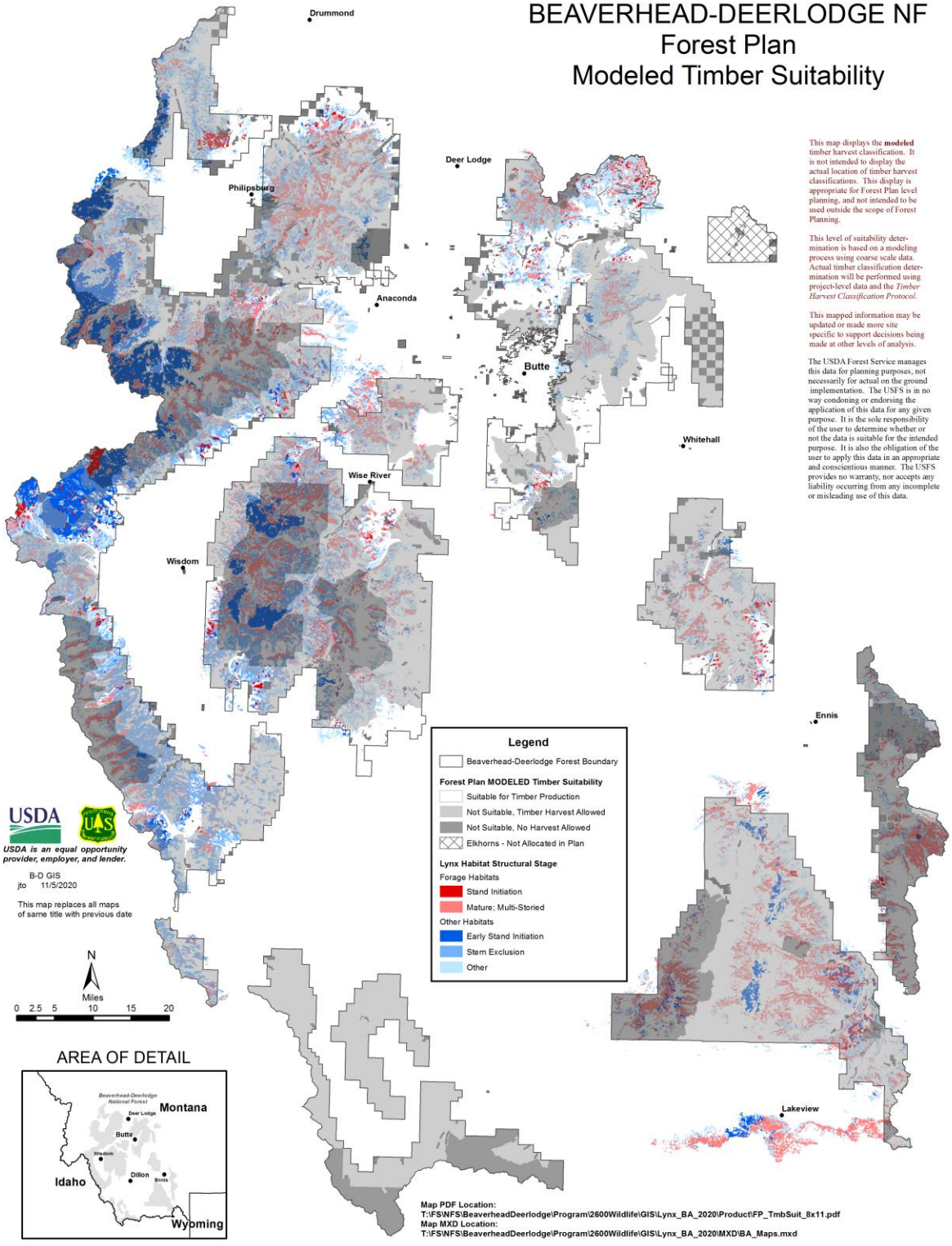

Figure 3. Timber suitability and lynx habitat on the Beaverhead-Deerlodge National Forest.

Aspen Restoration

The Forest Plan also contains a vegetation objective for aspen restoration on 67,000 acres (Vegetation: Forested Vegetation Objective Aspen Component). Like effects from timber harvest, treatments to restore aspen stands may cause a short-term adverse effect but a long-term benefit to lynx habitat. Since the goal of these restoration projects involves both establishing a healthy aspen overstory and promoting an understory of aspen seedlings, saplings, and shrubs, the removal of conifers could reduce available foraging habitat until understories grow to provide enough horizontal cover for lynx and hares. Effects of prescribed fire in these stands is disclosed within *Fire Management: Fuels Treatments*.

Adverse effects to lynx habitat from aspen restoration is possible because some snowshoe hare in the stand initiation structural stage (using exceptions under VEG S5) may be removed during treatments. Not all stands available for treatment consist of lynx habitat, and, depending on the conditions within the aspen stand, exception acres (VEG S5 #4; Appendix D) could be used to meet this objective as long as Standard VEG S1 is met within the LAU. Because aspen lacks its own cover type category in VMAP 18, it is not possible to project the percentage of aspen that contribute to lynx habitat compared to total acres of aspen on the BDNF. However, the use of exception acres in this category does not necessarily equate to an adverse effect to lynx as project location, condition of stands within the LAU, or size of the treatment may not result in an adverse determination. The magnitude and extent of this potential effect would be documented within the project-level analysis.

Treatment of mature aspen stands would be subject to provisions in VEG S6 and the removal of conifers from these stands may be appropriate provided the treatment does not reduce existing snowshoe hare habitat. In stands where conifers are prevalent but horizontal cover criteria is not met, the removal of conifers would benefit hares and lynx as the conifer-dominated aspen stands would not likely provide existing habitat conditions to support lynx or prey species. After treatment, the understory would likely develop over time to provide habitat conditions that could support the life history requirements for lynx. Treatment within mature, multi-storied stands that meet horizontal cover requirements for hares will not occur and would thus meet direction in the NRLMD.

Projects harvesting conifers from aspen stands would be subject to considering the same NRLMD standards and guidelines as identified in the *Timber Harvest* section, which would benefit lynx and prey species over the long-term. These guidelines would support maintaining or improving lynx and prey species habitat within aspen stands.

Conifer Encroachment Removal

Another vegetation objective in the Forest Plan that could affect lynx is the removal of encroaching conifers from riparian areas, shrublands, and grasslands on 74,000 acres (Vegetation Objective: grassland/shrubland/riparian). The goal of these treatments is to increase acres of grasslands and shrublands by removing conifers followed by prescribed fire (analyzed in *Fire Management: Fuels Treatments*). Most of this work occurs within shrub-steppe habitat, which is generally outside of preferred lynx habitat. However, shrub-steppe could provide habitat for alternative prey species and cover for lynx that may disperse through island mountain ranges (USDA 2007a), although lynx may also avoid these lower-elevation mountain shrublands (Interagency Lynx Biology Team 2013).

Conifer removal treatments may affect snowshoe hare and lynx habitat through the loss of individual trees are discountable and insignificant because suitable lynx and prey habitat is relatively infrequent within shrub-steppe areas. However, some projects may remove conifers from riparian areas which may contain habitat for lynx or hares. Projects within stands that may contain habitat for lynx or hares would need to meet vegetation standards in the NRLMD, which would mitigate effects to foraging habitat. Over time,

conifer encroachment removal projects would likely improve the quality of habitat for alternative prey species for lynx across the landscape by increasing tree vigor in existing riparian stands or improving the habitat within shrub-steppe systems (in support of Guideline VEG G5).

Special Forest Products

Effects from non-commercial harvest, including firewood, post and poles, Christmas trees, and others, is likely to be discountable and insignificant to lynx over the landscape. The removal of single or small groups of Christmas trees dispersed across the BDNF is unlikely to affect lynx habitat at any measurable scale. In addition, areas that require approval for personal use post and pole and firewood harvest would be subject to guidance in the NRLMD and generally occur in dead and dying (stem exclusion) stands. Foraging habitat is not typically removed during post-and-pole removal. Areas approved for public harvest would not contain habitat consisting of dense, horizontal cover that could support lynx and hares.

Fire Management

Fuels Treatments

The Forest Plan does not identify specific numbers of acres for fuel treatments, but the intention of the fuels section in the Plan is to build resiliency within vegetated stands and protect values at risk. Existing conditions of surface fuels, ladder fuels, and canopy spacing are considered when designing fuels treatments. Depending on the project location and intention, these treatments can occur both within and outside of WUI areas. Project location and the historic range of variability (which may change based on vegetated stand type, slope, and other factors), dictates how existing fuel is manipulated to achieve desired fire behavior and effects. This includes removal via cutting or harvest, piling, snag removal, variable density thinning, masticating, and planned ignitions, among others in areas with undesirable potential fire behavior. Intermediate treatments are most common in WUI areas to manage fire behavior. Permanent fuel breaks or regeneration harvests are not the norm for fuels management activities.

In recognition of monetary and societal costs associated with fires in the wildland-urban interface, fuels treatment projects in these areas are exempted from compliance with VEG S1, VEG S2, VEG S5, and VEG S6 under specific conditions designed to protect Highly Valued Resources or Assets at risk (which includes habitat for threatened and endangered species) (Scott et al. 2013). In general, WUI fuels treatments occur where structures and other human development meet or intermingle with undeveloped wildlands or areas with increased vegetative fuel, which may or may not be considered lynx habitat. The NRLMD and the 2007 biological opinion limits WUI exemptions to the standards to no more than 6 percent cumulatively of lynx habitat on an individual national forest. Six percent of the lynx habitat on the forest equates to 88,910 acres (Appendix D), which is 16 percent of the available lynx habitat within the WUI boundary as administered by the BDNF (573,071 acres) (Table 9). Of lynx habitat within WUI, foraging and non-foraging habitat currently comprises 27 (155,433 acres) and 73 percent (417,638 acres), respectively. If all exemption acres are utilized, 57 percent of the available foraging habitat (in both stand initiation and mature, multi-storied stands) could be altered or removed from the WUI area. This represents 21 percent of all available foraging habitat on the BDNF.

The Forest expects to increase fuels treatments up to 10,000 acres per year and it is possible 35,100 acres of lynx habitat could be treated as part of the wildland-urban interface by 2036. This represents 40 percent of the exemption allowance in VEG S5 and VEG S6; however, it is unlikely the entirety of treatment would focus within stand initiation or mature, multi-storied habitats as the distribution of lynx habitat on the BDNF is not wholly concentrated within the wildland-urban interface (Figure 4). Fuels treatments in the WUI are expected to have some adverse effects on lynx and snowshoe hares, because treatments

lower tree density which results in less area of dense horizontal cover. However, the extent and distribution of these projects would likely limit the magnitude of impacts on lynx, as 61 percent of lynx habitat administered by the BDNF is outside of the WUI boundary and 4 LAUs are completely outside of the wildland-urban interface (BH-03, GR-09, LT-02, URC-04). Standard VEG S1 also states "Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). In addition, fuel treatment projects may not result in more than three adjacent LAUs exceeding the standard", which also contributes to limiting lynx habitat fragmentation at a landscape scale. Currently, there are two places on the BDNF where more than three adjacent LAUs exceed this standard. These groupings of these areas are: 1) BH-09, BH-10, BH-11; and 2) URC-04, URC-5, URC-06, URC-08, URC-09. Thus, fuels treatments to further reduce fuels within WUI could not occur within these LAUs until habitat in the stand initiation stage no longer exceeds thirty percent.

Planned ignitions (prescribed fire) is another method used to reduce hazardous fuels, remove vegetation after timber harvest or mechanical treatments, or improve wildlife habitat. The trend on the BDNF is expected to increase in areas emphasizing WUI and in areas outside of historical conditions (USDA BDNF 2009). This technique is not generally used within stands sensitive to fire, such as spruce-fir, that lynx and hares may utilize due to increased amounts of dense horizontal cover (Interagency Lynx Biology Team 2013). However, in aspen stands, areas with conifer encroachment, areas with timber harvest, or areas outside of historical conditions, planned ignitions are used to improve general wildlife habitat, ecosystem function, and reduce fuel loading. Fire behavior is typically managed to burn at low to moderate levels, which may remove some areas of high tree density resulting in localized areas with less horizontal cover. However, prescribed fire may also promote additional foraging habitat as post-burn areas re-establish with early successional vegetation, which would benefit hares. Some large, woody debris contributing to denning habitat may also be consumed during prescribed fire activities. Overall, effects from planned ignitions as a method to reduce hazardous fuels vary as a function of time, from adverse and short-term (potentially removing existing foraging habitat for lynx and hares) to beneficial over the long-term (improving health of forest stands, improving general ecosystem function, and promoting early successional growth). It is unlikely prescribed fire would negatively affect available denning habitat for lynx due to the preponderance of woody material across the landscape (refer to *Vegetation Management: Timber Harvest*). Projects utilizing planned ignitions as a method are considered vegetation management (as defined in the NRLMD glossary) and would adhere to the vegetation management standards and guidelines in the NRLMD. Subsequent impacts to lynx and lynx habitat would be disclosed at the project level.

NRLMD guidelines would be considered during the design of fuels management projects. Guideline VEG G4 limits the creation of permanent travel routes that increase snow compaction during prescribed fire activities and stresses avoidance of permanent construction firebreaks on ridges or saddles. Guideline VEG G10 advises that fuel treatment projects within the wildland-urban interface should consider vegetation standards S1, S2, S5, and S6. Incorporation of these guidelines into project designs would continue to limit the concentration of negative impacts to Canada lynx, prey species, or lynx habitat for fuels treatments.

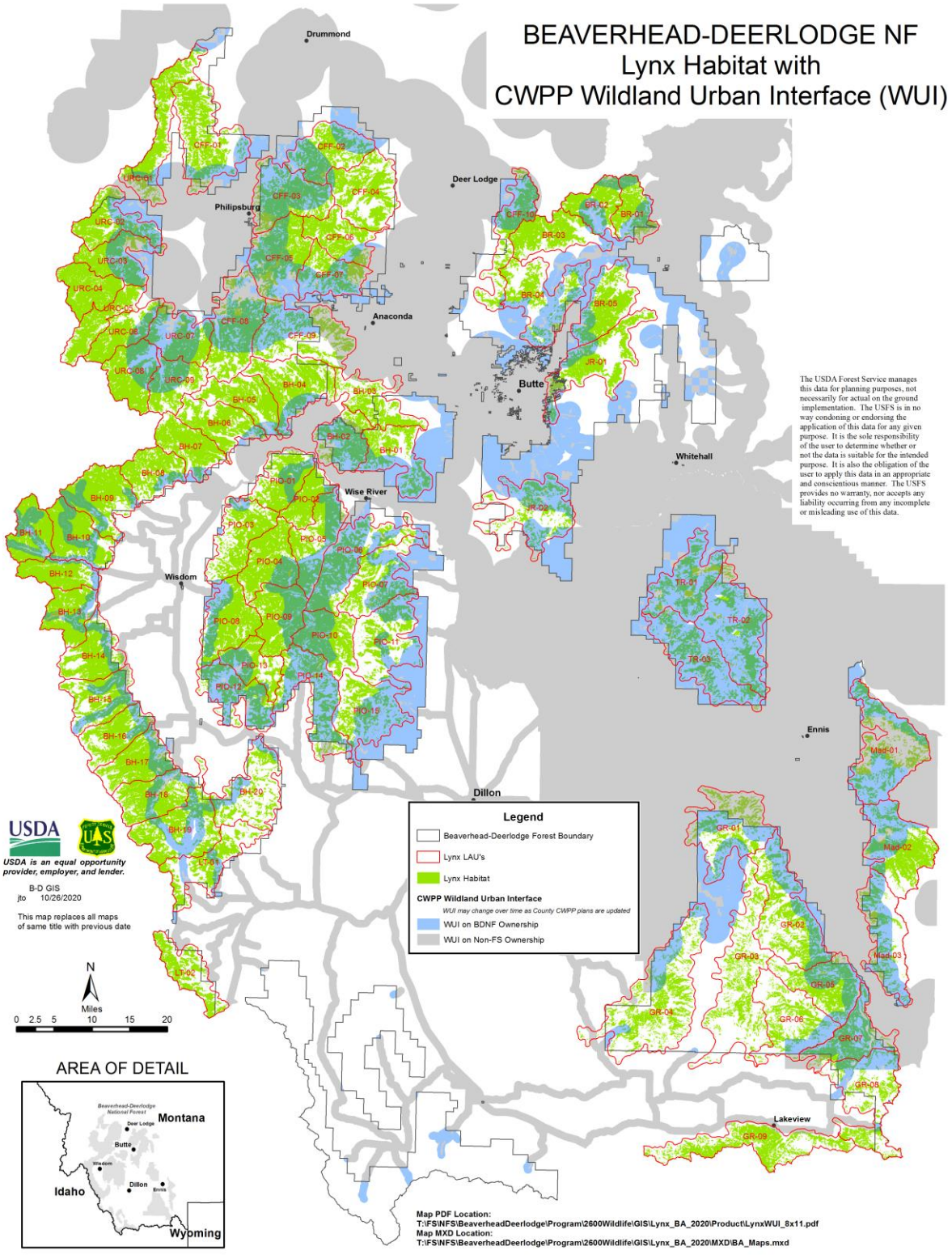

Figure 4. Lynx habitat within the wildland-urban interface on the Beaverhead-Deerlodge National Forest.

Wildland Fire

One standard in the Forest Plan allows for the use of unplanned ignitions to benefit resources:

- *Wildland fire use*: wildland fire is an available tool for all unplanned ignitions (Fire Management Standard 2).

On the BDNF, both frequent stand-replacing and mixed-severity fires shaped the landscape over time. Since the 1980s, 126,271 acres of lynx habitat (per the updated model) have been affected by wildland fires (Table 10) with the amount of regeneration wildfire increasing over time.

Wildfire maintains a mosaic of forest successional stages by altering the structure and composition of vegetation that provides habitat for lynx and hares (Interagency Lynx Biology Team 2013). Fires can remove canopy or vegetation completely or partially, depending on severity, and by reverting succession so that young regenerating forests occur within some stands. Lynx may also use newly-burned areas, but use depends on the presence of unburned vegetation, areas where fire skips, and enough cover for travel (Vanbianchi et al. 2017). Depending on vegetation type and fuel moisture, large wildfires (greater than 10,000 hectares in size) may create heterogeneous vegetation conditions, which can support larger densities of hares post-fire (Hutchen and Hodges 2019).

However, the magnitude of effects from wildfire on lynx or lynx habitat is not possible to quantify as the size, pattern, location, duration, weather, drought conditions, and vegetation types all determine the degree of severity for a given fire. The use of prescribed fire and/or other vegetation management actions may also reduce wildfire severity by altering the available fuels and lessening fire behavior. Like vegetation management actions, wildland fire can alter, remove, or degrade lynx habitat in a way that reduces or eliminates available snowshoe hare habitat and horizontal cover or burn downed woody debris that could provide denning habitat for lynx. Some openings or fragmentation may occur depending on the fire severity or location, which could affect lynx by reducing available habitat for foraging and dispersal. However, wildfires would likely create additional foraging habitat, especially within lodgepole pine stand cover types 10 to 20 years post-fire (Hutchen and Hodges 2019) as post-burn areas re-establish with early successional vegetation. Objectives, standards, and guidelines in the NRLMD do not apply to wildfire suppression or to wildland fire use (USDA 2007a). Although some adverse effects are possible, wildland fire is likely to maintain a mosaic of forest successional stages and habitat features that could support both hares and lynx over time and across the landscape.

Lands

Lands Special Uses

The BDNF authorizes a variety of lands special uses and associated activities (Appendix G) permitted by the Forest Plan, which contains two standards for utilities:

- *Energy transmission and wireless telecommunication facilities*: facilities shall be located only in designated utility corridors or at designated communication sites shown on the Utility Corridor and Communication Site Map (Lands Standards 1 and 2).

Within lands special use permits, a variety of activities are permitted that could affect lynx or lynx habitat. Effects from lands special uses involve the use of motorized off-road access in both summer and winter (analyzed in *Recreation and Travel Management: Over-the-Snow Use* and *Travel Management* and *Other Management Activities and Issues: Project-Related Connected Actions*), vegetation removal and burning, and snow removal. Vegetation removal along utility corridors may have short- or long-term impacts to

lynx habitats, depending on the location, habitat type, clearing standards, and frequency of removal (Interagency Lynx Biology Team 2013). Corridors that are extensively cleared of vegetation and maintained in a low structural stage condition likely equate to permanent habitat loss and may further widen right-of-ways when associated with highways and railroads (ibid). Vegetation removal from powerlines, right-of-ways, easements, and communications infrastructure could permanently remove some lynx habitat on the BDNF. Although these effects are potentially adverse to lynx habitat, it is not possible to quantify the magnitude as the location, magnitude, and frequency of vegetation removal is unknown and associated georeferenced data may be lacking for some permits (e.g., oil and gas pipelines). In addition, existing right-of-ways would likely expand in the future to meet current Federal and State requirements and support larger systems (e.g., voltage upgrades). Although the magnitude of this expansion and subsequent effects to lynx and lynx habitat are unknown at this time, this is a foreseeable action that could contribute to additional permanent habitat loss on the BDNF over the life of the plan.

Outside of the special uses mentioned above, other permitted uses that remove vegetation or snow (e.g., cultivation, service buildings, warehouse storage, communication users, etc.) would likely result in discountable and insignificant effects to lynx and lynx habitat. These activities are spread widely across the forest, occur in localized areas (e.g., parking lot) or narrow line (e.g., irrigation ditch, ingress or egress roads, etc.), and may or may not occur annually. Due to the limited nature of this vegetation and snow removal and unknown (but localized) location of these activities, effects to lynx and hares is not quantifiable. However, these activities would not occur at a large enough scale that would prevent lynx or hares from using available habitat.

Although some permanent adverse effects to lynx habitat are possible from these activities, guidance in the NRLMD and the Forest Plan may limit other negative effects to lynx and lynx habitat. The NRLMD limits winter access for non-recreation special uses to designated routes or over-the-snow routes (HU G12) and supports reducing impacts on lynx and lynx habitat for human activities, such as special uses and placement of utility transmission corridors (HU O5). The intent of this guidance is to reduce snow compaction and disturbance to lynx, hares, or habitat by designating areas. The use of both the Forest Plan and NRLMD guidance may reduce some effects to lynx as new construction and placement of structures would occur within known areas per the Forest Plan and access to special use areas is limited to designated routes (Figure 5), with the exception of lands uses that mandate unfettered access (e.g., utility lines). If proposals are submitted that consider activities outside of those listed in Appendix G or is an expansion of a special use permit that could impact lynx, analysis and subsequent consultation, if needed, would occur at the project level.

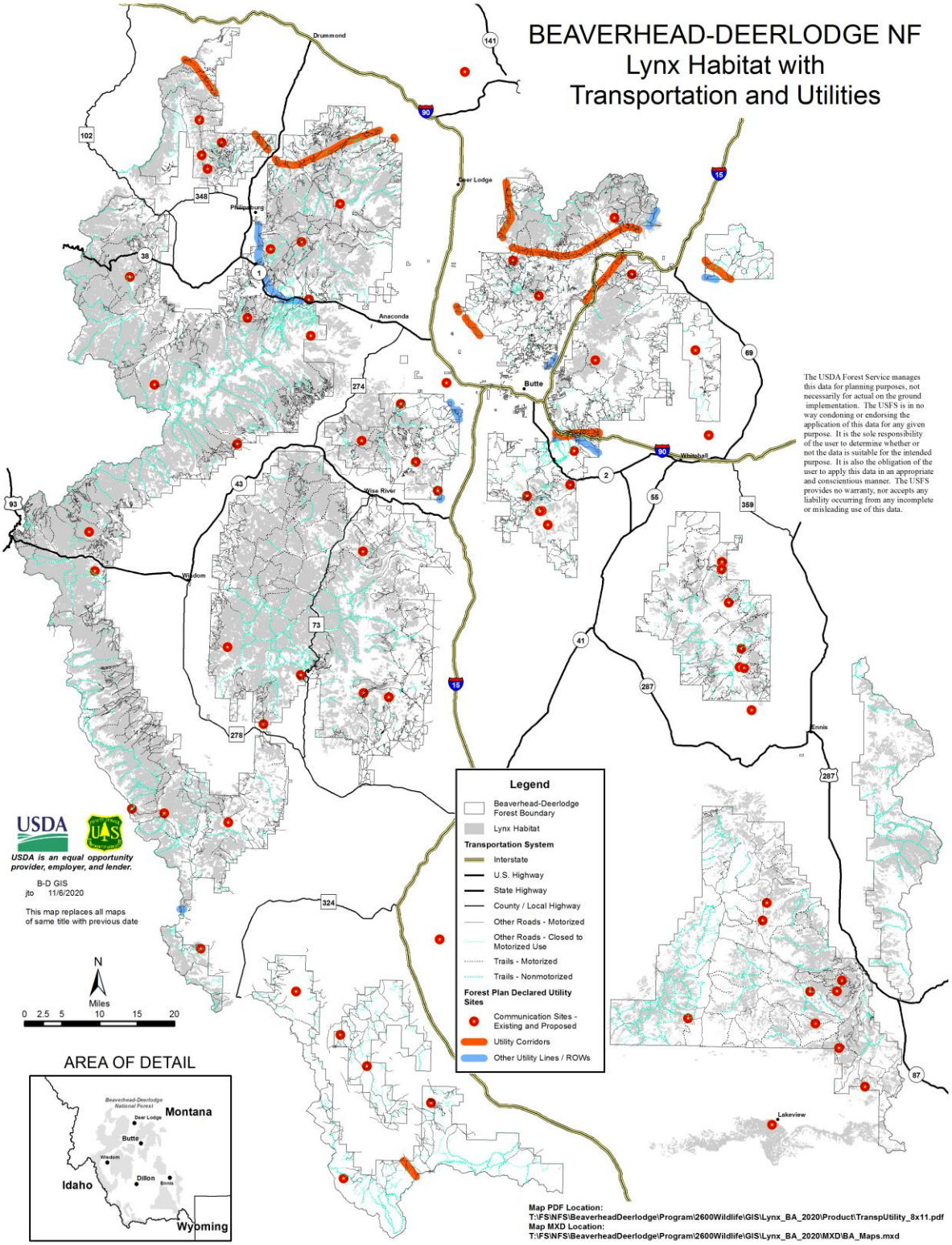

Figure 5. Canada lynx habitat overlap with transportation and utility corridors as identified in the Forest Plan.

Land Conveyance, Acquisition, and Exchange

The Forest Plan does not contain any standards or guidelines in relation to land sales or acquisitions, but ownership adjustments are pursued as opportunities arise to improve National Forest management through purchase, exchange, or other authority (Lands Land Adjustments Goal; in support of LINK O1). Direction in the NRLMD suggests National Forest System lands should be retained in public ownership (LINK G1). It is likely future land acquisitions on the BDNF will continue as opportunities arise, although some land conveyances and sales are possible. Acquisitions that contain modeled lynx habitat would benefit lynx as direction in the NRLMD would apply to any proposed projects within the new acquisition. These acquisitions would likely support habitat connectivity (in support of ALL S1), especially if acquired lands were near linkage areas or contained lynx habitat. Although rarer, land sales or exchanges from public to private or other ownership could potentially reduce lynx habitat managed under the NRLMD. Land sales or exchanges that affect lynx habitat are addressed by guideline LINK G1 and so would go through site-specific consultation.

In some instances, lands acquired by the BDNF include existing easements and rights-of-way that must be honored in perpetuity by the Forest Service. For example, if a parcel that includes a utility line and subsequent easement for operation and maintenance of the line, the utility company owns unfettered access to the easement. This access is not subject to Federal regulation as it is a form of property ownership and designation of winter access routes does not apply (per Guideline HU G12). However, winter access could cause snow compaction although these localized effects are discountable and insignificant (refer to analysis in *Recreation and Travel Management: Developed and Dispersed Recreation, Over-the-Snow Use,* and *Other Management Activities and Issues: Project-related Connected Actions*) as they likely occur infrequently and are well-dispersed over the landscape.

At the landscape scale, land conveyances, acquisitions, and exchanges result in beneficial or insignificant and discountable effects to lynx or lynx habitat. A majority of parcels subject to ownership changes are acquisitions by the BDNF which would be subject to direction in the NRLMD and would benefit lynx and lynx habitat. Infrequent sales or exchanges to private or other ownership that could happen within the next fifteen years are usually insignificant and discountable as these exchanges are typically small (generally less than ten acres) and would be subject to consideration of LINK G1 so any potential loss of lynx habitat would be analyzed prior to exchange. The purpose of LINK G1 is to maintain or improve connectivity and limit fragmentation, which would be achieved by additional land acquisitions by the BDNF.

Range Management

Livestock Grazing

Both the NRLMD and the Forest Plan contain guidance and criteria for grazing to protect existing resources. Standards specific to livestock grazing that apply to lynx in the Forest Plan include:

- *Allowable use levels*: prevents reduction of existing water quality or physical or biological functions of riparian-wetland areas, manages forage utilization, streambank disturbance, and stubble heights (Livestock Standard 1);
- *Resource protection*: specific criteria for special areas, such as wet meadows, will be identified and grazing will be limited at certain times of the years or under certain conditions, as necessary (Livestock Standard 3); and

- *Modification of grazing practices*: practices that prevent attainment of desired stream function, or are likely to adversely affect threatened or endangered species, or adversely impact sensitive species, are modified to attain desired stream function or population objectives (Aquatic Resources Standard 14).

The NRLMD includes one objective and four guidelines concerning livestock grazing in lynx habitat. The purpose of this guidance is to reduce effects on lynx habitat from grazing while concurrently permitting livestock. Grazing operations occurring in occupied habitat must comply with standards and guidelines in the NRLMD that direct managers to limit impacts to regenerating trees and shrubs and to aspen stands (GRAZ G1 and GRAZ G2) and maintain certain habitat components used by lynx, in the stages or quantities that would have occurred under historic disturbance regimes (GRAZ G3 and GRAZ G4). Overall, grazing should be made compatible with improving or maintaining lynx habitat (GRAZ 01).

On the BDNF, 56 percent (915,197 acres) of lynx habitat is within grazing allotments. Within grazing allotments, most lynx habitat is non-foraging, although foraging habitat contributes to 25 percent (227,584 acres) (Table 11). The overlap of lynx habitat and livestock grazing is likely limited because livestock typically do not graze in heavily wooded areas. However, if grazing is poorly managed, competition between prey species and livestock may occur in localized areas, such as riparian willows and aspen stands that are utilized by both snowshoe hare and livestock (Interagency Lynx Biology Team 2013). In addition, overgrazing by livestock could reduce forest regeneration in newly created openings resulting from timber harvest, prescribed or wildland fire, or within shrub-steppe habitats (ibid). Riparian standards in the Forest Plan (Aquatic Resources Standard 14) also minimize potential effects from overgrazing by modifying grazing practices that could adversely impact sensitive species and their habitats.

Although some site-specific negative impacts to habitat for prey species could occur, the overall effect of grazing on lynx foraging habitat is discountable and insignificant. The combination of Forest Plan and NRLMD standards and guidelines applied to grazing allotments would limit long-term impacts to hares and lynx habitat across the landscape.

Range Infrastructure Maintenance

Maintaining existing range infrastructure includes activities such as understory shrub and tree removal (generally less than quarter acre or individual tree removal) around at-risk structures, including fences, corrals, water developments, and others. These activities may or may not occur in lynx habitat, although some available habitat may be altered or reduced. Although it is reasonable to assume this activity occurs broadly across the landscape with an annual frequency (on different structures), it is not possible to quantify the number of potentially affected acres of lynx habitat. Stands would still provide lynx habitat despite individual tree removal. This activity is discountable and insignificant to lynx because unaffected vegetation is likely available for forage and cover in areas adjacent to range infrastructure and activities occur Forest-wide and with varying frequency.

Noxious Weeds

In general, non-native invasive weeds are thought to have few or low impacts on lynx or lynx habitat (Interagency Lynx Biology Team 2013). The Forest Plan permits authorized motorized wheeled cross-country travel for some activities, including noxious weed control (Recreation and Travel Management Standard 3) and both ground and aerial application of selective herbicides (USDA BDNF 2002). Outside of localized and short-term disturbance from application activities (both on-ground and aerial), effects to lynx and snowshoe hare habitat from noxious weed treatments are discountable and insignificant.

Recreation and Travel Management

Effects from recreation are incompletely understood and depend on the type and context of activity, although primary impacts to lynx and lynx habitat are from habitat alteration at recreation sites, displacement of lynx due to summer and winter motorized activity, human presence, and access, and the potential for incidental trapping or illegal shooting of lynx resulting from access to preferred habitats via allowable motorized use of development (analyzed in *Travel Management*) (Interagency Lynx Biology Team 2013). This analysis discloses these impacts within the context of allowable activities in the Forest Plan. Effects from developed and dispersed recreation, with the exception of winter dispersed recreation (analyzed in *Over-the-Snow Use*) are combined due to similarities among these categories.

Wilderness and Recommended Wilderness

The Forest Plan limits activities permitted in Wilderness and recommended Wilderness:

- *Minerals, oil, and gas*: leasing is legally unavailable in Wilderness and recommended Wilderness areas (Minerals, Oil, and Gas Standard 1);
- *Road construction*: permanent road construction is not allowed in summer non-motorized allocations or in areas evaluated for wilderness potential (Recreation and Travel Management Standard 2) or in recommended Wilderness (Recreation and Travel Management Standard 12);
- *Motorized vehicle use*: managed recommended Wilderness for primitive or semi-primitive non-motorized settings and protect Wilderness character (Recreation and Travel Management, Standard 10) and wheeled or motorized vehicles designed for the primary purpose of transporting people, except for wheel chairs, are prohibited in recommended wilderness except for permitted or administrative uses (Recreation and Travel Management, Standard 13); and
- *Timber harvest*: commercial timber harvest is prohibited in recommended Wilderness (Recreation and Travel Management Standard 11).

The NRLMD does not contain standards or guidelines regarding lynx or hare habitat in Wilderness or recommended Wilderness; however, Plan direction is beneficial to lynx and lynx habitat. Sixteen percent of lynx habitat on the BDNF is part of Wilderness or recommended Wilderness where activities are limited. In addition, 36 percent (86,070 acres) within these areas is considered lynx foraging habitat (Table 16). Management of these areas would provide lynx large expanses of habitat free from development where natural processes would be the primary drivers of vegetation condition. In the absence of disturbance, some vegetation stands within Wilderness and recommended Wilderness may stagnate (refer to analysis in *Vegetation Management*); however, the lack of mineral, oil, and gas leasing, road construction, motorized vehicle use, and timber harvest within these areas reduces the risk of Canada lynx habitat loss, disturbance, or displacement. Wilderness and recommended Wilderness are distributed across the BDNF and could provide refugia with limited disturbances for dispersing or resident lynx (Figure 6).

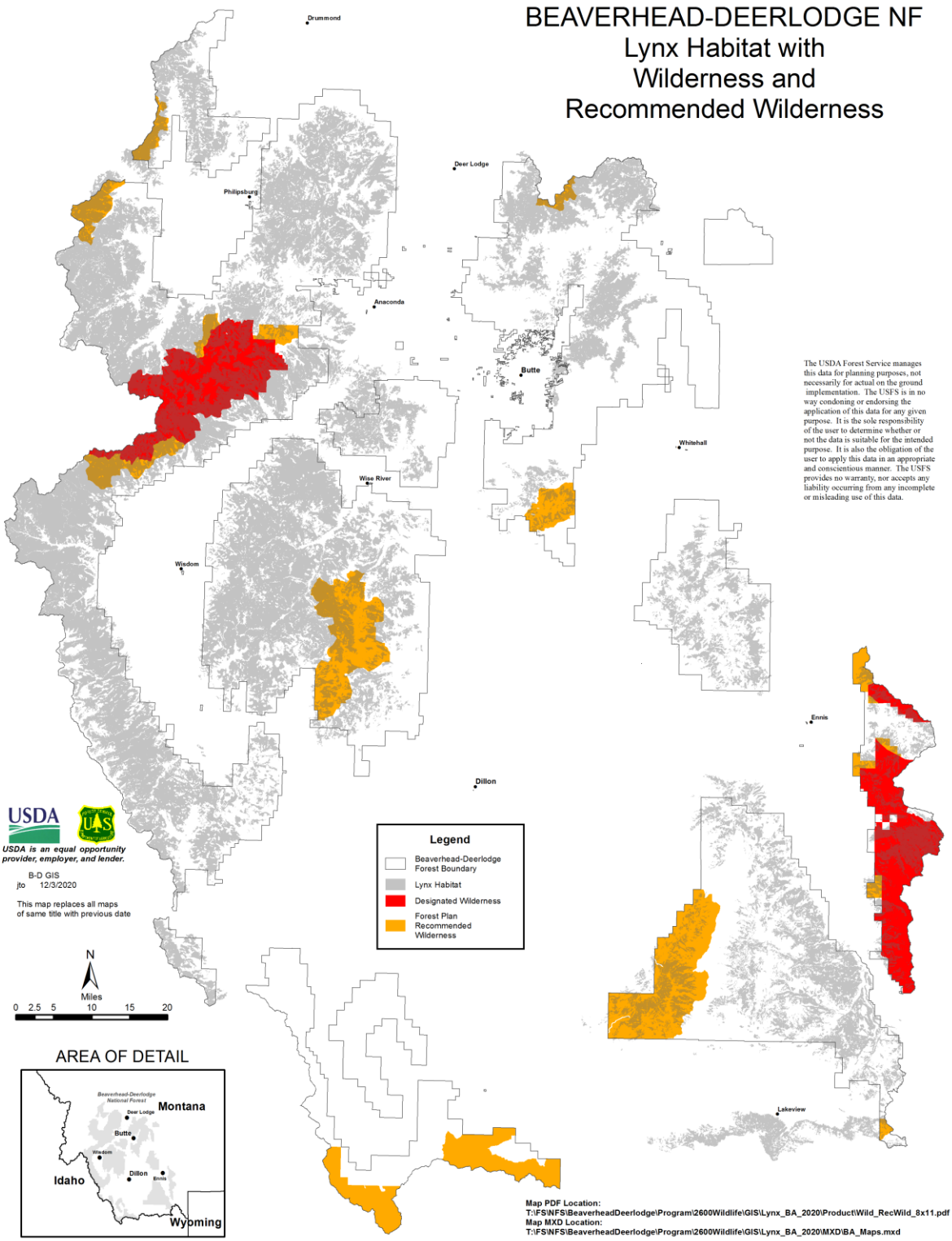

Figure 6. Canada lynx habitat within Wilderness and recommended Wilderness on the Beaverhead-Deerlodge National Forest.

Developed and Dispersed Recreation

The Forest Plan provides guidance regarding developed and dispersed recreation to provide for visitor experiences, limit motorized vehicle use, and set seasonal restrictions:

- *Recreation opportunity*: manage summer non-motorized allocations for either a primitive or semi-primitive non-motorized setting from May 16 thru December 1 (Recreation and Travel Management Standard 7), manage winter non-motorized allocations for a primitive or semi-primitive non-motorized setting from December 2 thru May 15 (Recreation and Travel Management Standard 8), manage summer backcountry allocations for a semi-primitive motorized setting from May 16 thru December 1 (Recreation and Travel Management Standard 9), and manage recommended Wilderness for primitive or semi-primitive non-motorized settings and protect Wilderness character (Recreation and Travel Management Standard 10);
- *Motorized vehicle use:* motorized vehicles are not allowed in summer or winter non-motorized allocations except for permitted or administrative use (Recreation and Travel Management Standard 2) and restrict year-round, wheeled motorized travel to designated routes or areas (Recreation and Travel Management Standard 3); and
- *Non-motorized seasonal restrictions*: manage winter allocations for primitive or semi-primitive setting December 2 thru May 15 (Recreation and Travel Management Standard 8) and manage recommended Wilderness for primitive or semi-primitive non-motorized settings and protect Wilderness character (Recreation and Travel Management Standard 10).

Effects to lynx or lynx habitat from hazard tree removal, vegetation removal, or blasting (as part of activities listed in Appendix G (Table G- 2) to maintain recreation facilities or infrastructure could alter or reduce horizontal cover and render lynx or hare habitat temporarily unsuitable in some areas where lynx habitat and developed sites overlap until vegetation re-establishes. Incidental vegetation removal would not likely affect lynx or hares as this removal is likely localized and well-dispersed across the Forest. However, it is possible some lynx or hare habitat could be removed under exceptions in VEG S5(#1) and VEG S6(#1). These exceptions permit 500 acres of foraging habitat removal within 200 feet of administrative sites for the purposes of maintaining defensible space (also analyzed in *Vegetation Management: Timber Harvest*). This represents less than one percent of the available lynx foraging habitat across the BDNF. However, use of this exception may not equate to adverse effects to lynx as other environmental factors, such as project location and size, surrounding habitat, and condition of habitat within a LAU could offset some effects.

Public use of summer recreation facilities or dispersed summer recreation would have a discountable and insignificant effect on lynx. Developed and dispersed summer recreation facilities are well distributed and limited across the BDNF and restrictions for motorized access allocations limit vehicular travel (refer to *Travel Management*). Depending on the proximity of developed or dispersed recreation sites to lynx habitat, lynx may or may not alter behavior or habitat selection to avoid human activity as lynx tolerance of human disturbance varies (Interagency Lynx Biology Team 2013). On lands managed by the BDNF, 47 percent and 44 percent of lynx habitat falls within non-motorized and motorized summer allocations (Table 14; Figure 7), so lynx disrupted by human activity could disperse to unaffected areas. It is unlikely that human use of existing developed or dispersed facilities would create a level of disturbance that would preclude a resident or dispersing lynx from completely avoiding the BDNF as lynx habitat exists outside of developed and dispersed recreation sites and human activity is generally temporary.

Developed winter recreation (dispersed is addressed in *Over-the-Snow Use*) can contribute to additional areas of snow compaction. Areas of consistent snow compaction is defined as “areas of land or water that

are generally covered with snow and gets enough human use that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after (within 48 hours) snowfall" (USDA 2007b). The Forest, in cooperation with partners and volunteers, manages several winter Nordic ski areas. Public use of these trails is non-motorized although snow is compacted via motorized means (snowcats, groomers pulled by snowmobiles, etc.). Frequent winter visitor use near snowmobile or cross-country ski routes, in nearby openings, parks, and meadows, near ski huts, plowed roads, or winter parking areas, and other accessible places, can cause additional areas of consistent snow compaction (USDA 2007b), which is thought to facilitate interspecific competition (mainly coyotes) for prey. Some studies suggest there is not significant foraging competition in winter between lynx and coyotes (Kolbe et al. 2007, Dowd and Gese 2012), although coyotes may select compacted snow for travel routes (Interagency Lynx Biology Team 2013). The Fish and Wildlife Service's final rule concluded that snow compaction that facilitates competition to a level that negatively affects lynx was a not threat due to a lack of evidence (USDI 2003).

Due to a lack of complete data, it is not possible to quantify the number of potential miles within Nordic ski areas that intersect with lynx habitat although up to 350 miles within Nordic ski areas are groomed, authorized for grooming, or designated for winter use, and could potentially promote interspecies competition. However, effects from snow compaction from existing Nordic ski areas and associated frequent winter visitor use areas are insignificant and discountable because of the lack of scientific evidence supporting interspecific competition at a level that could interfere with lynx survival, the Nordic ski areas are dispersed across the Forest so any effects are distributed across the landscape, and the BDNF contains abundant lynx habitat free from snow compacting activities.

It is reasonable to assume that both summer and winter developed recreation sites will expand or increase due to anticipated increases in visitor use over the life of the plan. The NRLMD provides guidance regarding the development and expansion of developed recreation areas. If these types of recreation projects are proposed, lynx movement and the effectiveness of present habitat should be maintained (HU G3) and designated over-the-snow routes or play areas should not expand beyond baseline areas of consistent snow compaction, unless the designation serves to consolidate use and improve lynx habitat (HU G11). These guidelines, in addition to motorized and non-motorized and seasonal allocations outlined the Forest Plan, would likely mitigate potential effects to lynx by maintaining connectivity and lynx habitat and restricting human disturbance across all lynx habitat by providing for specific recreation opportunities and limiting motorized access. Projects considering new or expanded developed recreation sites would adhere to the standards and guidelines for human use as outlined in the NRLMD and impacts would be analyzed for site-specific effects to lynx and lynx habitat.

More specifically, the Forest may expand or increase of some designated routes in existing Nordic ski areas (Chief Joseph, Echo Lake Elkhorn, Moulton, Birch Creek, Thompson Park, and Homestake) as human use increases. Currently, the BDNF has approximately 350 miles of groomed, authorized for grooming, or designated routes for Nordic, fat tire bike, or multi-use (e.g. snowmobiles, snowshoes, skiing, etc.). Since georeferenced data for these areas is not complete, this represents the current maximum number of miles that may intersect with lynx habitat, although it is not likely all affect habitat. It is possible an additional 70 miles of groomed or designated routes in lynx habitat could be added over the life of the plan. If these routes average ten feet wide, a maximum of 85 acres could be affected. Effects from an additional seventy miles of routes in lynx habitat include: habitat loss from brushing or clearing of trails, additional snow compaction, and disturbance from human activity. During the planning process, the following guidance in the Plan and the NRLMD must be considered: 1) for over-snow vehicle activities, the winter allocation status (motorized versus non-motorized; Figure 8) and whether the proposed use is allowed within the allocation (Recreation and Travel Management Standard 2 and 7-10);

2) whether or not the expansion falls within lynx habitat; and 3) whether or not the expansion occurs outside of designated over-the-snow routes, within areas of consistent snow compaction, and if it serves to consolidate use and improve lynx habitat (HU G11). Any expansions would be subject to project-level analysis and consultation, if necessary, to disclose potential effects to lynx or lynx habitat.

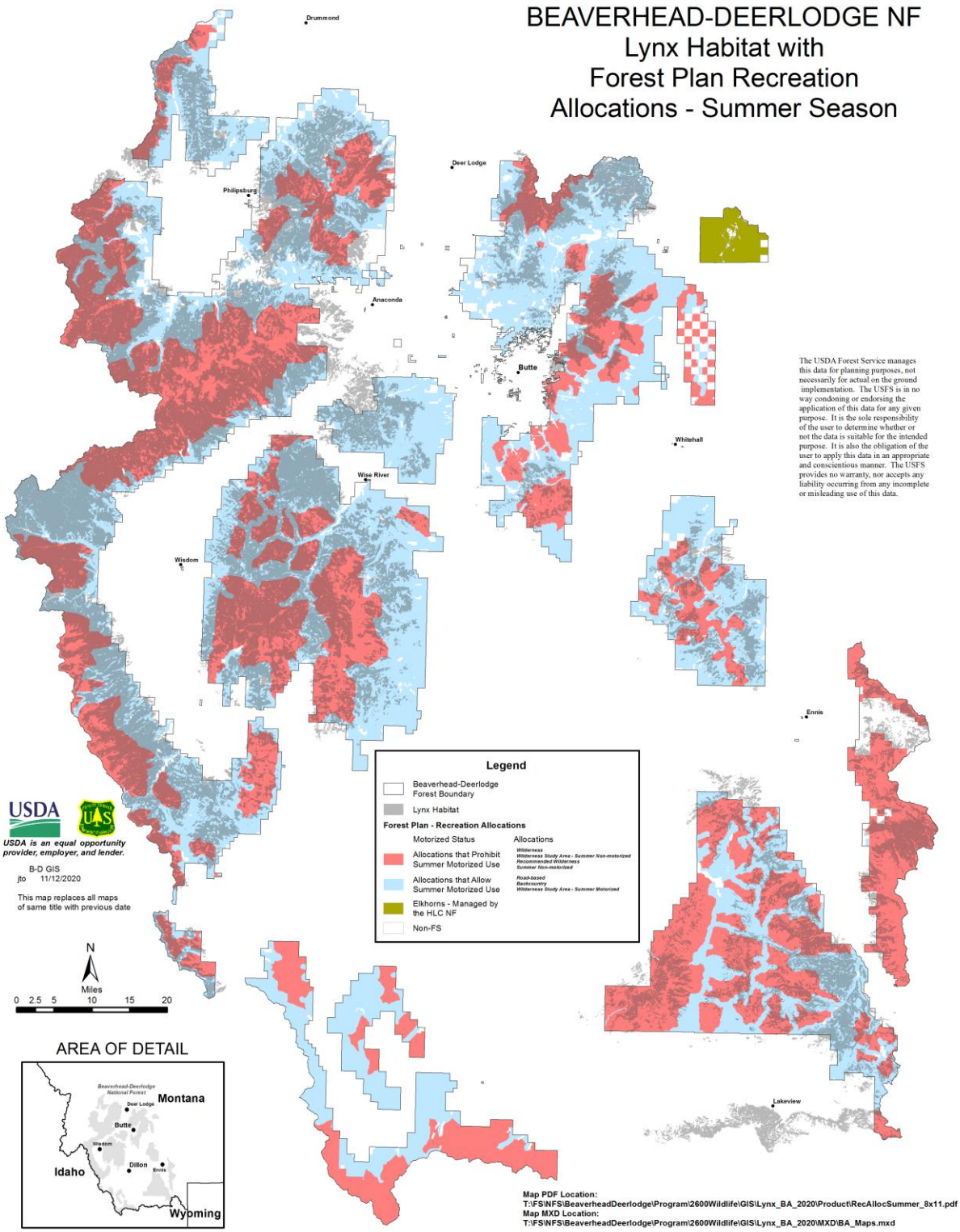

Figure 7. Summer motorized allocations and overlap with lynx habitat on the Beaverhead- Deerlodge National Forest.

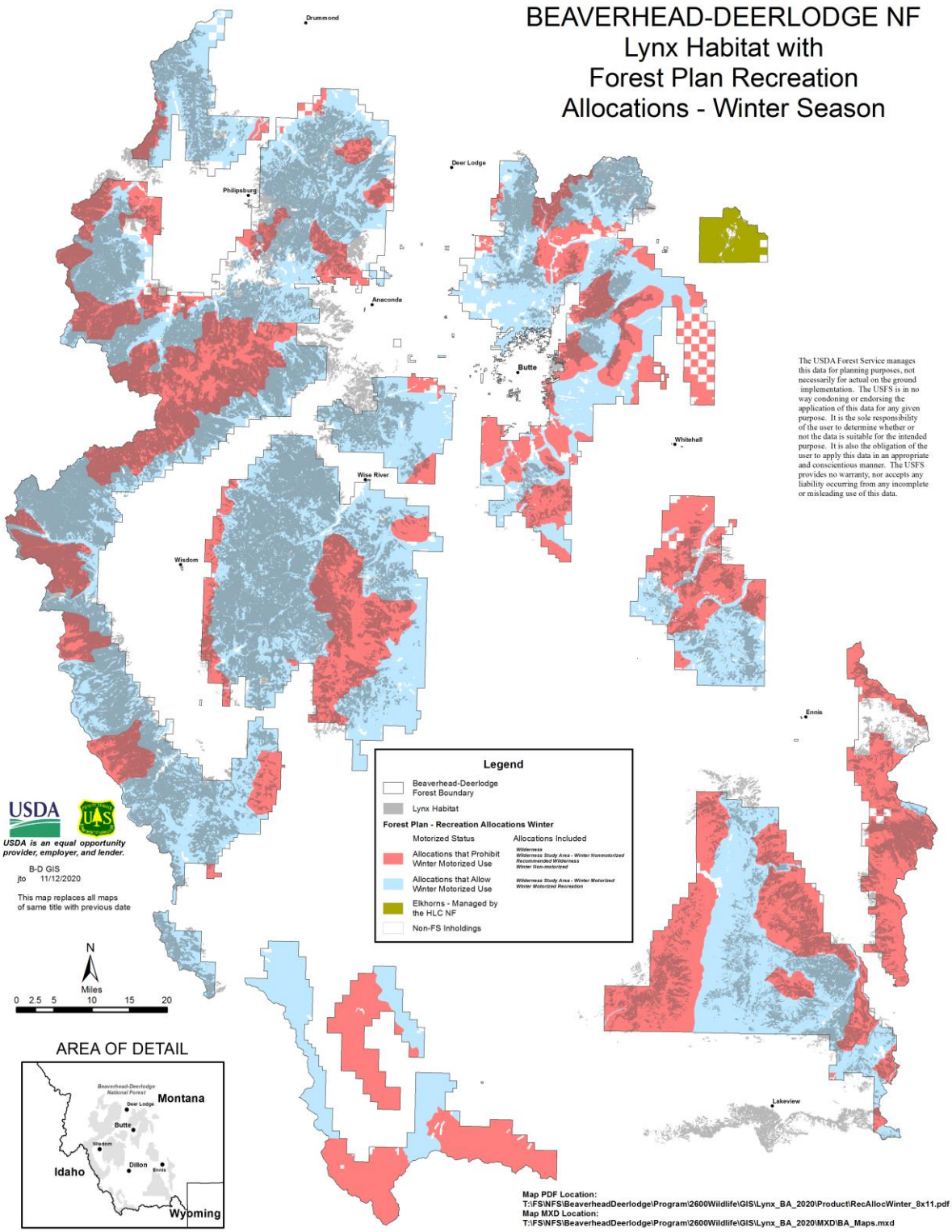

Figure 8. Winter motorized allocations and overlap with lynx habitat on the Beaverhead-Deerlodge National Forest.

Recreation Special Uses

Special uses standards in the Forest Plan provide guidance for new outfitter and guide permits and new recreation resorts or residence tracts:

- *New outfitter and guide permits or permit increases*: new or increases in permits will be only made based on need, administrative capability, and a suitable mix of guided and non-guided public capacity determined by a forestwide capacity study which may vary by type of activity and/or season of use; heli-skiing operations will not be permitted (Recreation and Travel Management Standard 5); and
- *New recreation resorts or residence tracts*: new recreation resorts or residence tracts will not be permitted, nor will permits be issued for unoccupied tracts or lots (Recreation and Travel Management Standard 6).

Effects from lynx special uses activities include habitat alteration from maintenance and operation activities, potential changes in lynx behavior caused by human presence, and the potential for incidental injury or mortality from using dogs during outfitting and guiding.

Habitat alteration from maintenance and operation activities permitted under recreation special uses (Appendix G; Table G- 3) include vegetation removal, snow removal, blasting, and snow compaction or grooming (analyzed in *Developed and Dispersed Recreation* and *Over-the-Snow Use*) in localized areas. As previously disclosed, habitat alteration caused by these activities could reduce horizontal cover and render lynx or hare habitat temporarily unsuitable in some areas where lynx habitat and special use permitted sites overlap until vegetation re-establishes. Incidental vegetation or snow removal for special use activities should not affect lynx or hares at any measurable scale as this occurs at small, localized locations that are dispersed across the BDNF and isolated from one another. Similarly, snow compaction caused by motorized-over-snow vehicles, winter ski tours, or other activities are also insignificant and discountable because isolated tracks would not cause areas of "consistent snow compaction" as defined by the NRLMD (refer to *Developed and Dispersed Recreation* and *Over-the-Snow* analyses).

Continuing operations within permitted ski areas (Discovery Ski Area and Maverick Mountain) would result in discountable and insignificant effects to lynx. Olson et al. (2018) studied lynx responses to non-motorized winter recreation at varying intensities. This study compared high intensity recreation areas (Vail Pass, Colorado, with 35,000 recreationists per year including snowmobilers, skiers, and snowshoers and a large ski resort covering 2,500 acres with 23 lifts) to a smaller, low-to-moderate intensity recreation area (smaller ski resort with 2,000 acres with 18 lifts). Lynx decreased movement rates in areas with intense back-country skiing and snowmobiling and adjusted temporal patterns by increasing night activity in areas with high-intensity recreation, although lynx still used these areas (Olson et al. 2018). Because these ski areas on the BDNF are small in comparison to the Olson et al. study and have been on the landscape for over forty years, it is more likely lynx would alter behavior to become more active at night compared to completely avoiding these areas. Based on Olson et al., it is likely lynx would continue to reside or disperse through these areas.

The expansion of ski uses on the BDNF is also probable due to the Ski Area Recreational Opportunity Enhancement Act. However, new operations outside of the existing permitted activities, including summer operations, would require analysis and adherence to standards and guidelines in the NRLMD. This guidance includes: maintaining habitat connectivity in an LAU and/or linkage area (ALL S1), creating provisions to make inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat is maintained (HU G1), provide for lynx foraging habitat consistent with the ski area's operational needs (HU G2), development and operations should be planned that provide for lynx movement and

maintain habitat effectiveness (HU G3), and consider access road and lift termini location to maintain and provide lynx security habitat, if needed (HU G10). The use of the NRLMD for ski area use and infrastructure expansion would mitigate potentially adverse effects to lynx habitat by maintaining habitat features important to lynx and hares.

It is reasonable to assume that new commercial outfitting and guiding activities, expanded use areas, and a general expansion of the special uses program will occur within the life of the Forest Plan. It is not possible to quantify the magnitude of effects on lynx from increased human participation in recreation special uses (e.g., single-day recreation events, persistence at organization camps or recreation residences, etc.), especially since permits can vary from a single day to forty years. Effects to lynx can range from no effect (e.g., no intersection between people and lynx) to potentially adverse (e.g., behavioral changes or disturbance from a home range due to increased human presence). In addition, outfitters and guides that utilize dogs while hunting for legal game could displace, injure, or cause mortality to individual lynx (analyzed in *Cumulative Effects: Hunting and Trapping*). Lynx avoidance of areas due to increased human presence is impossible to predict, although resident or dispersing lynx could potentially relocate to adjacent, undisturbed habitat as human presence and participation in specific recreation special uses is often temporary, except for long-term permits.

Competitive events, both one-time and reoccurring, would result in insignificant and discountable effects to lynx. Effects from this special use are from increased human use of a particular area, which generally occurs over a very short period of time (one day or less). Due to the temporal nature of these events, lynx behavior could be altered although lynx could disperse from the area until human use returns to baseline conditions.

The use of guidance in both the NRLMD and the Forest Plan would mitigate effects to lynx habitat for recreation special uses by maintaining lynx habitat and connectivity (in support of HU O2 and ALL S1). The Forest Plan prevents the creation of new recreation resorts or residence tracts (Recreation and Travel Management Standard 6) so new, large developments that could remove substantial lynx habitat will not occur on the BDNF within the foreseeable future. Guidance in the NRLMD would maintain lynx and winter snowshoe hare habitat, lynx foraging habitat, and security in expanding ski areas (HU G1, HU G2, and HU G10) and maintain habitat effectiveness to provide for lynx and lynx movement (HU G3).

Over-the-Snow Use

Increasing visitor use over the next fifteen years would likely include increased numbers of winter recreationists engaging in over-snow activities within allocations. Effects to lynx and lynx habitat from over-snow activities include potential consistent snow compaction and behavioral changes in response to recreationists. The NRLMD contains direction for areas with designated over-the-snow routes or play areas (refer to *Developed and Dispersed Recreation*), but not dispersed over-snow recreation use. Dispersed over-snow recreation does not affect lynx habitat because tracks caused by snowshoes, dogsleds, skies, snowmobiles, or other cross-country mechanisms do not meet the definition of “areas of consistent snow compaction” as defined in the NRLMD.

The Plan limits areas accessible to winter motorized vehicle use and contains seasonal restrictions to maintain recreation settings:

- *Motorized vehicle use:* motorized vehicles are not allowed in summer or winter non-motorized allocations except for permitted or administrative use (Recreation and Travel Management Standard 2) and restrict year-round, wheeled motorized travel to designated routes or areas (Recreation and Travel Management Standard 3); and

- *Non-motorized seasonal restrictions*: manage winter allocations for primitive or semi-primitive setting December 2 thru May 15 (Recreation and Travel Management Standard 8) and manage recommended Wilderness for primitive or semi-primitive non-motorized settings and protect Wilderness character (Recreation and Travel Management Standard 10).

Additional consistent snow compaction from winter recreation activities in concentrated areas is thought to facilitate interspecific competition for prey (refer to analysis in *Developed and Dispersed Recreation*). Not all lynx habitat is available to winter snow-compacting activities (Table 14; Figure 8), because the Forest Plan limits motorized use to specific allocations with seasonal restrictions and recreationists are generally limited to areas with favorable terrain and vegetation. Single or small use of dispersed areas by recreation activities (e.g., skiing, snowmobiling, etc.) does not meet the definition of consistent snow compaction and would thus not affect lynx habitat or promote interspecific competition for prey.

Individual lynx may alter behavior based on winter recreationists. Lynx utilized areas with low overlap with snowmobile recreation, moderate overlap with backcountry skiing, and shared landscapes at fine scales with non-motorized users, but avoided areas with high levels of use by motorized recreationists (Squires et al. 2019). Lynx decreased movement rates or adjusted temporal patterns in areas with high-intensity developed recreation areas but may tolerate recreation in low to moderate intensities (refer to *Recreation Special Uses* analysis) (Olson et al. 2018).

Future management actions, such as vegetation projects, road improvements, road decommissioning, or snow packing may alter the spatial relationships between winter over-snow use and lynx, as some areas may become more accessible (e.g., through vegetation removal projects or road improvements) or may further segregate winter recreationists and lynx (e.g., road decommissioning) (Squires et al. 2019). This could further alter individual lynx behavior depending on the spatial arrangement of BDNF projects and the presence of resident or dispersed lynx.

Although over-the-snow activities may alter behavior of some individual lynx, lynx would continue to reside and disperse on the BDNF. Winter motorized and non-motorized travel are limited to 58 percent and 33 percent of lynx habitat on the BDNF, respectively. However, it is unlikely all of lynx habitat that intersects with areas permitted for winter travel would be affected as recreationists are generally limited by terrain and snow conditions and undisturbed habitat would be available to resident or dispersing lynx.

Travel Management

The Forest Plan provides standards to restrict travel on the BDNF:

- *Motorized vehicle use*: motorized vehicles are not allowed in summer or winter non-motorized allocations except for permitted or administrative use (Recreation and Travel Management Standard 2), restrict year-round, wheeled motorized travel to designated routes or areas (Recreation and Travel Management Standard 3), and wheeled or motorized vehicles designed for the primary purpose of transporting people, except for wheel chairs, are prohibited in recommended Wilderness except for permitted and administrative uses (Recreation and Travel Management Standard 13);
- *Extreme sport courses*: extreme sport courses such as motocross trails, technical mountain bike courses, and motor vehicle challenge course will not be constructed (Recreation and Travel Management, Standard 4);
- *Non-motorized seasonal restrictions*: manage non-motorized seasonal restrictions for primitive or semi-primitive setting from May 16 thru December 1 (Recreation and Travel Management Standard 7), manage winter allocations for primitive or semi-primitive setting December 2 thru May 15 (Recreation and Travel Management Standard 8), and manage recommended Wilderness for

primitive or semi-primitive non-motorized settings and protect Wilderness character (Recreation and Travel Management Standard 10);

- *Motorized seasonal restrictions*: manage summer backcountry allocations for a semi-primitive motorized setting from May 16 thru December 1 (Recreation and Travel Management Standard 9);
- *Open motorized road and trail density*: hunting units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage from October 15 – December 1 (Wildlife Habitat Standard 1) and landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Wildlife Habitat Standard 2); and
- *Permanent road construction*: permanent road construction is not allowed in summer non-motorized allocations or in areas evaluated for wilderness potential (Recreation and Travel Management Standard 1) or in recommended Wilderness (Recreation and Travel Management Standard 12).

On lands administered by the BDNF, 44 percent (722,638 acres) and 58 percent (946,425 acres) of lynx habitat are within summer and winter motorized allocations, respectively (Table 14). Some areas of winter and summer allocations overlap one another. Although available lynx habitat exists outside of these allocations, the presence of a motorized transportation system may impact lynx and lynx habitat by: 1) direct habitat loss from the road prism; 2) potential for collisions between vehicles and lynx; 3) reductions in potential available denning habitat if accessible roads, denning habitat, and breeding lynx occur in close spatial proximity; 4) providing human access to preferred lynx habitat where incidental non-target trapping may occur during legal trapping activities (analyzed in *Travel Management*); and 5) snow compaction from winter motorized recreation (analyzed in *Recreation and Travel Management: Developed and Dispersed Recreation* and *Over-the-Snow Use*). Routine road maintenance activities, such as grading, blading, ditch cleaning, culvert cleaning or replacement, graveling, or blasting on existing roads to clear landslides or debris, would not impact lynx or lynx habitat at a measurable scale.

Permanent road construction is rare, as evidenced by the lack of new permanent road construction on the BDNF since 2009. If a road were constructed, the amount of lynx habitat potentially reduced by clearing a road prism is extremely small relative to overall habitat availability across the BDNF, although localized effects of some permanent habitat removal are possible. It is unlikely permanent road establishment and subsequent vegetation removal would negatively influence resident or dispersing individuals as lynx generally do not avoid forest service gravel roads (Squires et al. 2010). In addition, the NRLMD provides guidance regarding permanent road placement to prevent habitat fragmentation (ALL S1, HU G7). This guideline, in conjunction with guidance in the Forest Plan and VEG G4, would limit the areas where permanent roads could be constructed based on existing road density and lynx habitat. Previous research suggested that lynx denned further from roads (Squires et al. 2008), although other research demonstrated that this avoidance was a function of road location and landscape; fewer roads were located within denning habitat and more were concentrated in areas that lynx avoid, such as forest edges and managed stands (Squires et al. 2010). Thus, effects to lynx and lynx habitat from road construction is discountable and insignificant, due to the rarity of construction, the limited habitat removal relative to available habitat for lynx and hares, and the limitations of permanent road locations in both the Plan and the NRLMD to prevent habitat fragmentation and minimize roads on the landscape.

Although lynx presence may increase on the BDNF, effects to lynx and lynx habitat from vehicle collisions or road upgrades on the BDNF is discountable. Vehicle collisions with lynx are possible and have occurred in the state of Montana on highways (USDI 2017a), but the probability of this occurring is extremely low (Interagency Lynx Biology Team 2013). Although visitor use is expected to increase on the

BDNF, many of the forest roads utilized by public users are low-speed gravel roads, so the likelihood of collision is lower than high-speed paved roads. In addition, guideline HU G6 must be considered when unpaved roads are upgraded to maintenance levels 4 or 5, which could increase traffic speeds and volumes and promote increased human activity or development. Lynx may also benefit energetically from travel on roads during long-distance movement (Moen et al. 2010).

Motorized vehicle use may indirectly influence incidental trapping or pursuit by dogs or people by facilitating access to lynx habitat. This could increase the vulnerability of lynx to incidental or accidental capture, shooting, or pursuit. Reductions in access, especially motorized, would be beneficial to lynx and lynx habitat from this perspective. Implementation of the Forest Plan with specific limits on motorized use (including winter allocations) would be beneficial by reducing the risk of injury or mortality to individual lynx.

Minerals, Oil, and Gas

Three standards in the Forest Plan contribute to project design of minerals, oil, and gas activities that reduce effects to lynx:

- *Stipulations to protect resource values for mineral and energy developments*: lease options may limit term periods, timing of exploration/operations, as well as surface use and occupancy and identifies areas legally unavailable for leasing, including but not limited to Wilderness and recommended wilderness areas. (Minerals, Oil, and Gas Standard 1);
- *Road obliteration*: new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system (Minerals, Oil, and Gas Standard 2); and
- *Drill pads*: drill pads will be obliterated (Minerals, Oil, and Gas Standard 3).

The NRLMD contains direction for human-use activities related to minerals, oil, and gas development. These developments should consider the location of human activities (HU O5), encourage remote monitoring to reduce snow compaction (HU G4; analyzed in *Recreation and Travel Management: Over-the-Snow Use*), restore lynx habitat after mineral developments are closed (HU G5), and avoid effects on lynx when roads are built or upgraded (HU G6, HU G7) by restricting public motorized use (HU G9) and winter access (HU G12).

Effects from minerals or energy developments may vary depending on size, type, and location of activities. Activities associated with mineral, oil, and gas exploration and drilling can change or eliminate native vegetation and contribute to habitat fragmentation if wells or mines exist or are built in high densities or if roads, powerlines, pipelines, or other infrastructure is developed (Interagency Lynx Biology Team 2013). However, this development does not always occur within lynx habitat and the BDNF does not generally permit winter exploration. Thus, the magnitude of effects can range from no effect to potentially adverse, as specific proposals for minerals or energy development vary widely in nature, scope, location, and proposed activities.

Although it is not possible to quantify the magnitude of effects from existing small-scale mines on the BDNF, mines are generally well-dispersed throughout the Forest with just over half of LAUs only containing one active mine or less (Table 17). Effects from existing mines are insignificant and discountable because the distribution of mines across the Forest coupled with the likely small size of these mines (less than ten acres) would not contribute to fragmentation or remove enough vegetation across the

landscape to significantly affect lynx or habitat. However, disturbance to lynx from mining activities is possible when mining is occurring. If behavior is disrupted from human presence or activity, lynx could relocate to adjacent, undisturbed habitat. In addition, mining activities do not generally occur in winter, which would limit some potential disturbance effects to resident or dispersing lynx.

Effects to lynx from existing footprints of large-scale miles on the BDNF are insignificant and discountable, as cleanup and reclamation is ongoing. Over time, reclamation of these sites is likely beneficial to lynx and hares as vegetation may re-establish within the footprint although reclamation activities could alter the behavior of lynx or hares due to human presence while activities are occurring. Future remediation of other legacy mine sites would also have a similar short-term impact but long-term benefit to both lynx and hares.

On the BDNF, no large-scale mines have been approved since 2009. More than half of BDNF lands are considered favorable for one or more locatable or precious mineral deposits and the potential of oil and gas occurrence is considered low or very low, with a few areas with moderate potential (USDA BDNF, 2009). Using the Reasonable Foreseeable Development scenario, up to ten wildcat and four development wells could be drilled over a fifteen-year period, with the likelihood existing only one year (unless productive) and with a pad size of 6.7 acres. Due to this low estimate, habitat fragmentation caused by mineral or energy development is unlikely on the BDNF. In addition, leasing for mineral or energy development is not available widely across the Forest as some areas of lynx habitat are outside of leasing decisions (Figure 9). Incoming proposals for minerals or energy exploration or development would adhere to the standards and guidelines for vegetation and for lynx habitat, and impacts would be analyzed for specific proposals when they occur. Although some short-term negative impacts may occur, such as vegetation removal, the guidance in the Forest Plan and NRLMD would likely mitigate long-term adverse effects to lynx or lynx habitat by obliterating closed oil pads and restoring habitat, limiting areas available for minerals or energy development, and reducing motorized access.

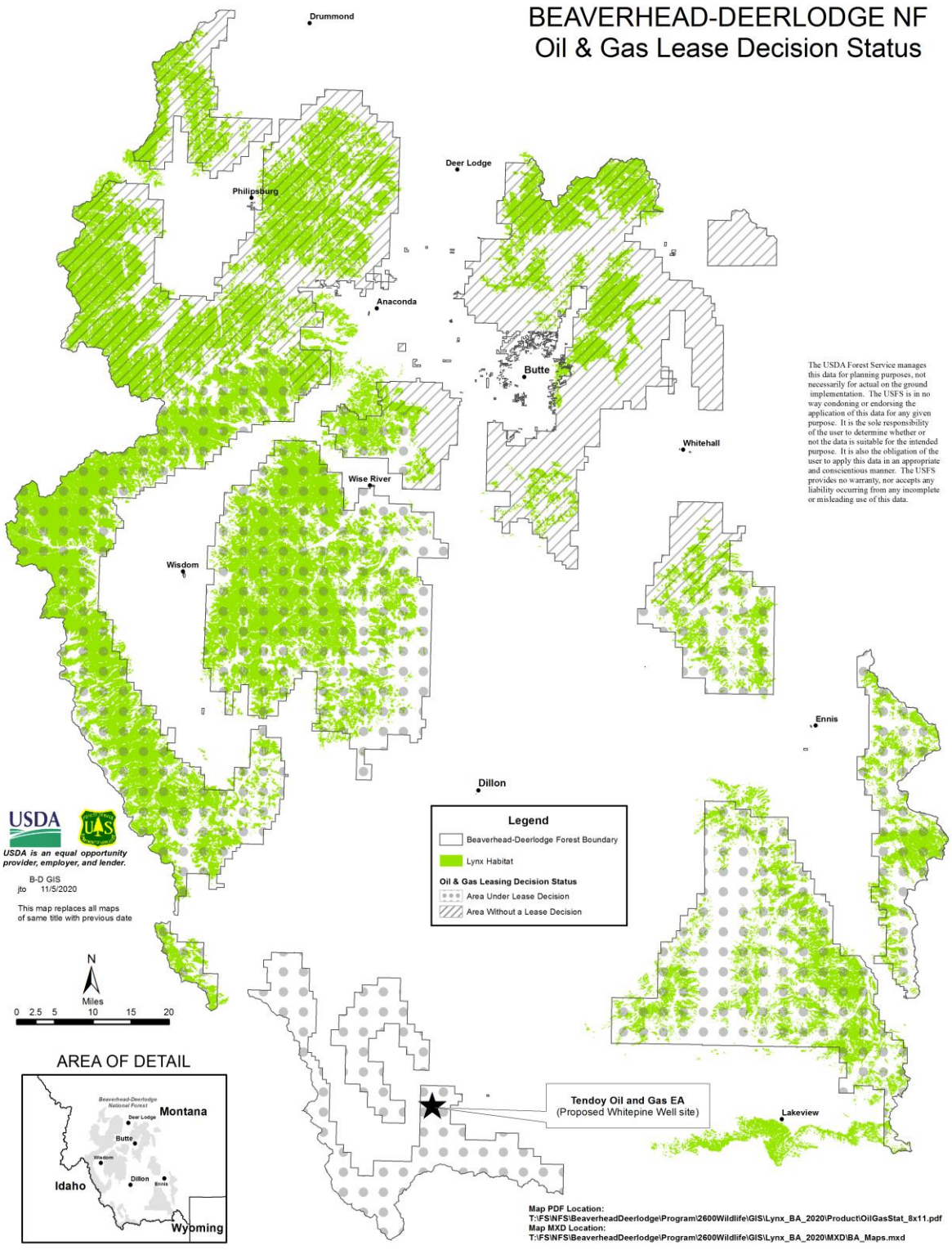

Figure 9. Canada lynx habitat overlap with oil and gas leasing decision status on the Beaverhead-Deerlodge National Forest.

Other Management Activities and Issues

Project-related Connected Actions

Many project-related connected actions, such as temporary road construction, vegetation brushing, sight line clearing for survey marking, off-road travel, and infrastructure or administrative maintenance (e.g., radio repeaters, signs, and buildings) may have a short-term localized impact on lynx and lynx habitat.

Activities that remove vegetation (e.g., temporary road construction, brushing, sight-line clearing, infrastructure maintenance) could alter or reduce or horizontal cover and render lynx or hare habitat temporarily unsuitable in localized areas. The NRLMD acknowledges vegetation clearing along roadsides, but states brushing should be done to the minimum level necessary to provide for safety (HU G8) to limit effects to lynx and hares. The amount of vegetation removal that would occur during these project-related connected actions is extremely small relative to the overall habitat availability for lynx. In addition, this activity would occur in extremely localized areas (along roadsides and around infrastructure) that are well-distributed across the forest, so effects from vegetation removal from project-related connected actions are discountable and insignificant.

In addition to vegetation removal from temporary road construction, provisions in the NRLMD limit public use and suggest reclamation or decommission of temporary roads after use is over (HU G9). By definition, temporary roads on NFS lands are reclaimed when use is over. Applying this direction would further limit long-term effects from roads to lynx and lynx habitat as road construction would be considered during project planning and decommission of temporary roads should occur at when the road is no longer needed. Although lynx may either tolerate or avoid areas with increased human use (Interagency Lynx Biology Team 2013), some short-term negative effects to lynx and hares (e.g., displacement) are possible as avoidance may increase during temporary road construction and future access. Impacts on lynx and lynx habitat from maintaining or building specific routes will be analyzed during project planning.

Off-road motorized travel permitted as part of another action (such as travel to a water development, ATV use during a timber sale or fire, snowmobile access to infrastructure or during winter surveys, helicopter access, or other such related activities) would have a discountable and insignificant effect on lynx or lynx habitat. Although some incidental lynx or hare habitat may be removed or broken by vehicles driving alongside or within areas with dense horizontal cover, the effect is extremely short-term and localized. In winter, snow may be compacted from motorized vehicles accessing structures permitted via lands or recreation special uses. Like localized vegetation effects, effects from snow compaction would be extremely localized and would result in discountable and insignificant to lynx and lynx habitat (refer to *Recreation and Travel Management: Developed and Dispersed Recreation* and *Over-the-Snow Use* for further analysis of snow compaction). In addition, the NRLMD provides guidance to limit winter access for non-recreation special uses; winter access should be limited to designated routes or designated over-the-snow routes (HU G12), which would further consolidate snow compaction for winter special use access. The use of helicopters would not affect vegetation used by hares or lynx. Some lynx or hares may be displaced or avoid areas while off-road travel or helicopter use occurs, but this displacement is short-term and unlikely to continue after motorized use subsides.

It is not possible to quantify effects from project-connected actions at the landscape scale, but effects to lynx and lynx habitat from the actions listed above are discountable and insignificant. These activities would not occur at a scale that would render major portions of habitat unsuitable and would only occur for short durations. It is possible lynx and hares may avoid these areas until vegetation recovers or during times of additional human use, but long-term adverse effects are unlikely.

Linkage Areas and Habitat Connectivity

A variety of activities on NFS lands may affect habitat connectivity, particularly in linkage areas within or between LAUs. Key activities include infrastructure development, changes in lynx habitat due to fire or vegetation management (analyzed in *Fire Management* and *Vegetation Management*, respectively), and high levels of human activity associated with exploration or development of minerals, oil, and gas. These activities may result in a reduction of the total area of suitable habitat, increased isolation of habitat patches, and impaired ability of lynx to move effectively between habitat patches. Disturbances such as regeneration harvest and stand-replacing fire can create areas unfavorable to snowshoe hare or lynx until those areas regrow to a structural stage that provides suitable habitat. Those areas may be used less by lynx than other structural stages, due to lack of both cover and prey, but succession may alter forest conditions into structural stages that provide better foraging or travel habitat for lynx over time.

Outside of vegetation and fire management, the NRLMD provides guidance to limit fragmentation caused by the development or expansion of ski areas or recreation sites (ALL S1, HU G1, HU G2, HU G3, HU G10, HU G11), road building (ALL S1, ALL G1, HU G6, HU G7, HU G9, LINK S1), land exchanges (LINK G1), grazing (LINK G2), and mineral or energy development sites (ALL S1, HU G5, HU G12). Application of the standards and guidelines in the NRLMD and guidance in the Forest Plan in occupied habitat would benefit lynx and lynx habitat by minimizing fragmentation related to forest activities and would promote maintenance or restoration of linkages at a variety of scales.

The Forest Plan has a variety of goals, objectives, and standards that support habitat connectivity for lynx across the landscape (Appendix H). Standards in various sections that apply to maintaining linkage and connectivity are as follows:

- *Riparian Conservation Area*: any activity in RCAs shall be designed to enhance, restore, or maintain the physical and biological characteristics of the RCA (Aquatic Resources Standard 1);
- *Facilities for energy or communications*: energy transmission facilities shall be located only in designated utility corridors shown on the Utility Corridor and Communication Site map, energy gathering or distribution facilities may be located outside of designated corridors (Lands Standard 1) and wireless telecommunication facilities shall be located in designated communication sites and utility corridors shown on the Utility Corridor and Communication Site map, exceptions may be made for non-ground disturbing temporary facilities that are in place for less than one year (Lands Standard 2);
- *Even-aged harvest:* may occur only upon a finding that it is the appropriate and optimum method for the timber type and consistent with the protection of other resources and it shall not occur unless the stand has reached the culmination of mean annual increment unless there are other resource purposes for treatment (Timber Management Standards 1 and 3);
- *Opening size*: 40 acres is the maximum size created by one regeneration harvest operation (Timber Management Standard 2);
- *Restocking*: when trees are cut to meet timber production objectives, the cuttings shall be made in such a way as to assure that the technology and knowledge exists to adequately restock the lands (Timber Standard 5);
- *Old growth stands*: mechanical vegetation treatments and prescribed fire in old growth stands do not reduce the age and number of large trees and basal area (Vegetation Standard 1);
- *Stipulations to protect resource values for minerals and energy developments*: lease options may limit term periods, timing of exploration/operations, as well as surface use and occupancy and

identifies areas legally unavailable for leasing, including but not limited to Wilderness and recommended wilderness areas. (Minerals, Oil, and Gas Standard 1);

- *Road obliteration*: any new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system (Minerals, Oil, and Gas Standard 2);
- *Drill pads*: drill pads will be obliterated (Minerals, Oil, and Gas Standard 3);
- *Motorized vehicle road use and travel*: motorized vehicles are not allowed in summer or winter non-motorized allocations except for permitted or administrative use (Recreation and Travel Management Standard 2), restrict year-round, wheeled motorized travel to designated routes, areas, or on roads or routes identified on the interim roads and trails inventory (Recreation and Travel Management, Standard 3), seasonal restrictions for primitive, semi-primitive, and backcountry settings (Recreation and Travel Management, Standards 7-9);
- *Non-motorized use*: seasonal restrictions for primitive, semi-primitive, and backcountry settings (Recreation and Travel Management, Standards 7-9) and manage Wilderness or recommended Wilderness areas for non-motorized settings and limit road construction (Recreation and Travel Management Standards 10-13);
- *Areas that exceed open motorized road and trail densities*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands (Wildlife Habitat Standard 1) and landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands) (Wildlife Habitat Standard 2); and
- *Permanent road construction*: permanent road construction is not allowed in summer non-motorized allocations or in areas evaluated for wilderness potential (Recreation and Travel Management Standard 1) or in recommended Wilderness (Recreation and Travel Management Standard 12).

At a small scale, land exchange may represent a permanent loss of lynx habitat if land is exchanged from the BDNF to a private entity (refer to *Lands: Land Conveyance, Acquisition, and Exchange* analysis). However, guideline LINK G1 advises that NFS lands should be retained in public ownership, and if this guideline is not met for a specific land exchange, documentation of rationale and consultation, if necessary, is required.

The proposed action does not directly authorize any activity that would result in a permanent loss or conversion of lynx or snowshoe hare habitat at a scale that approximates the large landscape used by lynx. Although some activities authorized in the Plan could contribute to minor amounts of fragmentation, any short- or long-term effects caused by these activities would be subject to site-specific analysis and ESA section 7 consultation. These effects would be limited in time and space.

Cumulative Effects

Under the ESA, future state, tribal, private, or local activities not involving federal actions that are reasonably certain to occur within the action area are subject for consideration for cumulative effects. For this analysis, the cumulative effects boundary consists of all 2020 modeled lynx habitat both within and outside of the BDNF. Federal lands other than those administered by the Forest are not included as part of the analysis because those areas are subject to their own section 7 consultation requirements. Federal lands, including the Forest Service, Bureau of Land Management, National Park Service, and Fish and

Wildlife Service, contribute to approximately 95 percent of lynx habitat (Table 20). Thus, actions occurring on nonfederal lands likely result in minimal impacts as only five percent of available lynx habitat within or adjacent to the BDNF could be affected (lands within State and Private management).

Table 20. Amount of lynx habitat by ownership as modeled in 2020.

Land Owner	Lynx habitat (acres)	Lynx habitat (percent)
U.S. Forest Service[a]	1,481,832	91
U.S. Bureau of Land Management[a]	38,640	2
U.S. National Park Service[a]	118	<1
U.S. Fish and Wildlife Service[a]	1,789	<1
Other federal land[a]	12,801	<1
State of Montana	23,939	<1
Private	66,686	4
Total	**1,625,805**	**100**

[a]Contributes towards the calculation of lynx habitat on federal lands that are subject to section 7 requirements for projects occurring within these lands.

A majority of lynx habitat outside of federal ownership is within the "other" structural stage (59 percent) followed by mature, multi-storied habitats (19 percent) (Table 21). On these lands, foraging and non-foraging habitat contribute to of 20 percent (18,085 acres) and 80 percent (72,540 acres) of habitat, respectively.

Table 21. Area and percentages of structural stages within lynx habitat under nonfederal ownership within or adjacent to the Beaverhead-Deerlodge National Forest.

	Land Ownership		
Structural Stage	**Within BDNF administrative boundary (acres/percent)**	**Outside BDNF administrative boundary (acres/percent)**	**Total (acres/percent)**
Early Stand Initiation	8,832/10	975/1	9,807/11
Stand Initiation	733/1	57/<1	790/1
Stem Exclusion	3,043/3	5,802/6	8,844/10
Mature; Multi-storied	7,781/9	9,513/11	17,294/19
Other	24,582/27	29,306/32	53,888/59
Total	**44,971/50**	**45,653/50**	**90,625/100**

Nonfederal lands consist of only five percent of available habitat adjacent to the BDNF. However, because these lands are located between large blocks of federal lands providing lynx habitat, their management may affect connectivity and linkage habitat (see Figure 2). A majority of nonfederal lands (49 percent) is within private ownership inside the BDNF boundary (Table 21). As identified in this assessment, a variety of activities such as vegetation management, fire management, or development of minerals, oil, and gas could occur on nonfederal lands and may reduce available habitat for lynx. Depending on the size and location of the activities, habitat fragmentation or reduced connectivity between linkage areas may occur.

Vegetation and fire management activities on nonfederal lands within modeled lynx habitat have the potential to be cumulatively adverse to lynx when considered alongside management activities with similar effects occurring on adjacent NFS lands. While the quality of habitat is not known, resident or

dispersing lynx may utilize some of these areas. Current estimates show that foraging habitat contributes to twenty percent of lynx habitat on state and private land (Table 21), thus it is possible activities could reduce year-round habitat for both lynx and hares on nonfederal lands if horizontal cover is removed. If quality lynx habitat is contiguous and management activities occur in close spatial and temporal proximity, vegetation and fire management on nonfederal lands could add to the effects of project-level actions on NFS lands either positively (maintaining connectivity) or negatively (temporarily reducing hare and lynx foraging habitat or cover). The BDNF sometimes utilizes prescribed fire on private lands adjacent to BDNF lands to meet specific project objectives and it is likely this action will continue for the life of the plan.

Development on private lands (roads, buildings, utility corridors, etc.) may cause a localized adverse effect to lynx due to permanent loss of snowshoe hare and lynx habitat. These developments may also impact connectivity in lynx habitat, although movement impacts are likely local due to the dispersed nature of private inholdings. Not all lands would undergo development and those that contribute to habitat loss or degradation in quality would constitute a very small portion of available lynx habitat within the cumulative effect boundary. Private lands are generally small and scattered; 49 percent are within the BDNF administrative boundary, and therefore some potential negative effects would be moderated by federal land management actions (i.e., the BDNF would follow standards and guidelines in the NRLMD to mitigate potential effects to lynx and lynx habitat).

Recreation activities occurring on nonfederal lands is likely to increase, so some additional land users may spill over onto NFS lands adjacent to private or state lands. Increases in human disturbance occurring within lynx habitat on NFS lands could cause portions of NFS lands with less human influence to become more important to lynx.

Hunting and Trapping

Incidental trapping or harvest of lynx may occur on nonfederal lands if lynx continue to expand and disperse across suitable habitat within and adjacent to the BDNF, although Montana Fish, Wildlife, and Parks implemented programs to reduce this risk. The state of Montana prohibits hunting and trapping of lynx; however, legal hunting and trapping of other species occurs in the state and lynx could be unintentionally injured or killed. Incidental trapping or snaring of lynx is possible in areas where regulated trapping for other species, such as coyote, fox, fisher, marten, bobcat, and wolf, overlaps with lynx habitat. Trapped lynx can be released, but there is potential for accidental injury or mortality (Kolbe et al. 2003). Dogs used for bobcat and lion hunting may also accidentally tree a lynx, and Montana Fish, Wildlife, and Parks recommends retrieving trained hounds and leaving the site immediately if this happens. Poaching may also occur.

Although behavioral disruption (from dog or human pursuit), injury, or mortality to individual lynx are possible from hunting and trapping activities, Montana Fish, Wildlife, and Parks provides educational opportunities and best management practices for hunters pursuing legal game (Golden et al. 2003, Association of Fish & Wildlife Agencies n.d.), and recommends proper identification prior to shooting. Voluntary trapper safety hunter safety and education programs are offered in the state of Montana although the engagement of hunters and trappers with these programs is unknown. The perceived reduced effects to lynx from educational outreach are assumed to occur, although impossible to quantify.

Climate Change

Possible effects to lynx from climate change are anticipated to occur by 2050 and are disclosed in the LCAS (Interagency Lynx Biology Team 2013). These include potential shifts in lynx distribution in

relation to elevation and latitude, changes in hare population cycles, reductions in the amount of lynx habitat due to changes in snow suitability and persistence, changes in the frequency and severity of disturbances (such as wildfires and insects) that impact habitat, and changes in demographic rates, such as survival and reproduction. With a warming climate in the Northern Rockies, fire seasons may be extended with a higher severity with larger burn areas, which may temporarily reduce availability of lynx and snowshoe hare habitat (Interagency Lynx Biology Team 2013). In addition, the locations of tree species that are key components of snowshoe hare habitat, including Engelmann spruce and subalpine fir, may shift in elevation in response to a changing climate.

Overall, climate change could have the potential to alter the amount and distribution of lynx habitat on the BDNF. The potential reduction in deep fluffy snow, differences in fire severity and beetle outbreaks, and alterations in locations of suitable habitat, may reduce the amount of habitat available to lynx and prey species. At the local level, changes in snow condition could further alter the predator-prey relationship between lynx and hares (Squires et al. 2010) which may negatively impact lynx survival and distribution on the BDNF.

Environmental Consequences Summary

The proposed programmatic action identifies allowable uses on NFS lands and describes the spatial context over which they could be planned or occur. Allowable uses such as vegetation, fire, and recreation management consist of actions that could have adverse impacts to lynx by removing, altering, or diminishing habitat. The proposed action does not determine the amount, location, type, or scope of future actions, but establishes the framework that future actions must consider. The magnitude of effects on lynx and lynx habitat would be established at the time of project planning, which will determine the actual presence, amount, and temporal context of potential effects. Appropriate analysis and consultation will occur as specific projects are planned.

Dense horizontal cover, persistent snow, and snowshoe hare densities all contribute to driving lynx populations, behavior, and distribution across the landscape. Forest actions that set back vegetation succession to an early stand initiation structural stage (e.g., vegetation and fire management) may be used by snowshoe hares during the summer but is snow-covered and unavailable to hares during the winter. Eventually these stands regenerate into a stand initiation structural stage, providing high stem densities and horizontal structure above the snowpack in winter, which then becomes high quality snowshoe hare habitat (Squires et al. 2010, Kosterman 2014, Holbrook et al. 2017a). Older forested stands also provide high quality habitat when they consist of multi-story mature or late successional forests with high horizontal cover for both lynx and hares (ibid). This variety of structural stages provide the landscape mosaic of habitat conditions needed for snowshoe hare persistence and lynx foraging habitat.

Effects to lynx and lynx habitat from actions permitted by the Forest Plan within the sideboards of the NRLMD are complex and varied and range from no effect (no intersection between lynx, lynx habitat, and actions) to potentially adverse effects (alteration or removal of lynx habitat under exception and exemption categories) (Table 22).

Table 22. Summary of general potential effects to lynx and lynx habitat across forest plan categories.

Forest Plan Category	General Potential Effects	Lynx Habitat Affected (acres/percent)
Vegetation Management	• Potential disturbance to lynx or hares • Reduction or alteration of horizontal stand structure or downed, woody debris	• 1,053,594/65 eligible for timber harvest - 224,836/14 suitable for production

Forest Plan Category	General Potential Effects	Lynx Habitat Affected (acres/percent)
	• Creation of foraging habitat over time • Contribute to mosaic of structural stands across the landscape • Exceptions in VEG S5 and VEG S6 that could reduce habitat until it grows to support hares or lynx	- 828,758/51 unsuitable but permitted • Commercial treatments could affect up to acres 60,000/4 by 2036 • Up to 6,590/2 foraging habitat removed for VEG S5 and S6 exceptions
Fire Management	• Potential disturbance to lynx or hares • Reduction or alteration of horizontal stand structure or downed, woody debris • Creation of foraging habitat over time • Contribute to mosaic of structural stands across the landscape • Exemptions in VEG S5 and VEG S6 for habitat alteration or removal in WUI areas	• 573,071/39 within WUI • Fuels treatments could affect up to 35,100/6 by 2036 • 88,910/6 acres of foraging habitat altered or removed under VEG S5 and S6 exemptions for WUI • If all exemption acres are utilized, up to 21 percent of available foraging habitat on the BDNF could be altered or removed
Lands	• Potential disturbance to lynx or hares from special use activities • Localized vegetation removal, potential reduction in horizontal stand structure from special use activities • Potential for future expansion and permanent vegetation removal to support larger systems over the life of the Plan • Acquire additional NFS lands where the NRLMD would apply, if in lynx habitat, equating to a long-term benefit	• Not available
Range Management	• Potential competition between livestock and hares in localized areas if grazing is not managed well in riparian, willow, and aspen habitats • Potential reduction of habitat in newly created openings if overgrazed • Localized vegetation removal, potential reduction in horizontal stand structure from infrastructure maintenance	• 915,197/56 within grazing allotments
Recreation and Travel Management	• Potential disturbance to lynx and hares or potential mortality or injury from using dogs for outfitting and guiding • Snow compaction • Vegetation alteration or removal around recreation sites that could utilize VEG S5 and S6 for defensible space[a] • Future expansion of Nordic ski areas • Facilitation of additional access into lynx habitat, increasing vulnerability of lynx and hares to disturbance or potential injury or mortality from hunting and trapping other legal game	• Non-motorized summer: 759,234/47 • Motorized summer: 722,638/44 • Non-motorized winter: 535,447/33 • Motorized winter: 946,425/58 • 500/<1 acres of foraging habitat altered or removed for creating defensible space around administrative sites under VEG S5 and VEG S6 exceptions[a] • Up to 70 miles of designated routes for Nordic ski area expansion, which equates to 85 acres.
Minerals, Oil, and Gas	• Potential disturbance to lynx and hares • Snow compaction for winter access • Localized vegetation removal that could reduce horizontal cover	• Unknown

Forest Plan Category	General Potential Effects	Lynx Habitat Affected (acres/percent)
Other Issues	• Potential disturbance to lynx and hares from activities not listed above • Localized vegetation removal, potential reduction in horizontal stand structure • Possible fragmentation from various activities • Cumulative impacts to habitat connectivity and linkage areas on lands intermingled with BDNF lynx habitat	• Unknown

[a]This area is accounted for in vegetation management under the total exceptions in VEG S5 and VEG S6, although the potential for habitat removal is also analyzed in the *Recreation and Travel Management* section.

Determination of Effects

Determination

Implementation of the proposed action *may affect and is likely to adversely affect* Canada lynx on the Beaverhead-Deerlodge National Forest.

Rationale

This biological assessment analyzes the potential impacts to Canada lynx of implementing the framework within the Beaverhead-Deerlodge 2009 Revised Forest Plan in conjunction with the Northern Rockies Lynx Management Direction. Impacts to lynx and their habitat have been considered in the context of the modeled lynx habitat on the Forest, vegetation conditions, anticipated amount and distribution of forest activities (e.g., timber projects, recreation expansion), and guidance within the Forest Plan and the Northern Rockies Lynx Management Direction. Since all areas of modeled lynx habitat are considered occupied, lynx are presumed to be present, including both resident or dispersing.

Vegetation management on the BDNF could cause a range of effects from beneficial to adverse to lynx and lynx habitat. Beneficial effects include the creation of foraging habitat over time and contributions to a mosaic of structural stands across the landscape. However, these actions could potentially disturb lynx or hares during project implementation. Adverse effects include the reduction or alteration of snowshoe hare habitat that may occur until the stands grow into suitable habitat over time (through the use of exceptions to VEG S5 and S6). However, the use of exceptions may or may not be adverse. The magnitude and extent of these effects would be analyzed at the project level.

Like vegetation management, fire management could also benefit or negatively affect lynx and lynx habitat. The use of fire would contribute to increasing foraging habitat over time and would contribute to a mosaic of structural stands across the landscape. However, horizontal cover and downed, woody debris could be temporarily removed or altered until enough time passes for stands to grow back into lynx or hare habitat. Large wildland fires could also fragment lynx habitat, depending on fire intensity and location.

More specifically, the proposed action includes objectives to treat some foraging lynx habitat using pre-commercial thinning to achieve resource benefits, reduce fuel loading in WUI areas, or create defensible space around administrative sites using exceptions and exemptions to NRLMD vegetation standards. These treatments could potentially result in adverse effects by altering or removing showshoe hare or lynx habitat. Removal of vegetation or horizontal cover could render habitat temporarily unsuitable for

foraging until stands grow over time to support hares. It is possible the use of exceptions or exemptions may not result in adverse effects, although the extent and magnitude would be disclosed at the project level. Adverse effects to lynx could also be cumulative from timber harvest, fuels treatments, or other habitat alterations occurring on adjacent nonfederal lands.

Lands and land special uses could also have a range of effects from insignificant and discountable to potentially adverse. Actions that permit localized vegetation removal, snow removal, or snow compaction activities as part of special uses would have a discountable and insignificant to lynx and lynx habitat because these actions are spread widely across the Forest, occur in localized areas, and may or may not occur annually. Vegetation removal along utility corridors could have potential long-term impacts to lynx habitat, depending on the location, habitat type, clearing standards, and frequency of removal, especially if corridors for right-of-ways, powerlines, easements, or other infrastructure are widened in the future to accommodate larger systems. Land acquisitions would likely result in beneficial effects to lynx as direction in the NRLMD would apply to those areas, however; some exchanges or disposal may transfer land (and potentially lynx habitat) out of BDNF management.

Range management and related actions (infrastructure maintenance and noxious weeds) would have insignificant and discountable effects to lynx and lynx habitat. Some extremely localized vegetation effects are possible if competition between livestock and hares for forage occurs or overgrazing reduces forest regeneration; however, these effects are limited and application of direction in the Forest Plan and the NRLMD would limit long-term impacts to habitat across the landscape.

Recreation and Travel management also has a range of effects to lynx and lynx habitat. Overall, a majority of the effects from applying both Forest Plan and NRLMD direction are beneficial (e.g., Wilderness and recommended Wilderness) or insignificant and discountable (e.g., hazard tree removal, blasting, public use, snow compaction, continued operations with permitted downhill ski areas, existing travel management). However, lynx behavior may change based on recreation intensity or spatial arrangement between land use and lynx or travel management may increase the risk of accidental trapping or shooting by facilitating access into lynx habitat. Some foraging habitat could be removed or altered to create defensible space around administrative sites, which could result in an adverse effect to lynx or lynx habitat. Future expansions of Nordic ski areas outside of areas of consistent snow compaction and expansion of ski area uses outside of existing permitted activities would require analysis and adherence to the standards and guidelines in the NRLMD to limit potential effects to lynx and lynx habitat. Recreational activities occurring on nonfederal lands may also increase, so portions of lynx habitat on the BDNF with less human influence may become more important to lynx over time.

Other actions connected to activities permitted in the Forest Plan could also occur within the framework of the NRLMD and generally result in insignificant and discountable effects. Some of these actions include temporary road construction, vegetation brushing, sight-line clearing, or off-road travel. Some vegetation removal (using precommercial thinning) to create defensible space for infrastructure or administrative maintenance could also occur under project-related connected actions. Creation and removal of vegetation to create defensible space around administrative sites could render lynx habitat permanently unsuitable as vegetation would be maintained to better control fuel loading and associated fire behavior (as previously mentioned).

The magnitude of effects from mineral and energy developments also ranges from no effect to potentially adverse, depending on location, duration, and proposed activities. Effects from existing mines are insignificant and discountable because they are generally well-dispersed and are of small size. Future developments may remove habitat although direction in the NRLMD and Forest Plan would likely mitigate long-term adverse effects to lynx or lynx habitat.

At a landscape scale, the use of direction in both the Forest Plan and the NRLMD on the Beaverhead-Deerlodge National Forest would positively contribute to the conservation of lynx by providing a framework to design and implement projects that would limit permanent effects to lynx and lynx habitat. Mosaics of habitat would likely be available to resident or dispersing lynx and areas considered for projects would be subject to maintaining site-specific habitat components that could support the species over the life of the Plan.

Glossary

Area of consistent snow compaction: an area of land or water that during winter is generally covered with snow and gets enough human use that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after (within 48 hours) snowfall. These can be areas or linear routes, and are generally found in or near snowmobile or cross-country ski routes, in adjacent openings, parks and meadows, near ski huts or plowed roads, or in winter parking areas. In the FEIS for the NRLMD, areas of consistent snow compaction were determined based on acreages or miles used during the period 1998 to 2000 (USDA 2007b).

Commercial (tree harvest): tree thinning where the cut trees are sold (U.S. Department of Agriculture 2007b).

Designated over-the-snow routes: routes managed under permit or agreement or by the agency, where use is encouraged, either by on-the-ground marking or by publication in brochures, recreation opportunity guides or maps (other than travel maps), or in electronic media produced or approved by the agency. The routes identified in outfitter and guide permits are designated by definition; groomed routes are also designated by definition. In the FEIS for the NRLMD, the determination of baseline snow compaction was based on the miles of designated over-the-snow routes authorized, promoted, or encouraged during the period 1998 to 2000 (USDA 2007b).

Foraging habitat (lynx): habitat that supports lynx primary prey (snowshoe hare) and alternate prey, (e.g., red squirrels) year-round. The highest quality snowshoe hare habitat contains a high density of young trees or shrubs that are tall enough to protrude above the snow in winter. Red squirrel densities tend to be highest in mature cone-bearing forests with substantial quantities of coarse woody debris (USDA 2007b). This analysis groups stand initiation and mature, multi-storied structural stages into “foraging habitat” when discussing effects to lynx or lynx habitat.

Highly Valued Resource or Asset: a naturally occurring (resource) or a a man-made thing of use or value to its owner (asset; e.g., building, communication tower, road) that may be damaged by wildfire, resulting in a change in value or loss (Scott et al. 2013).

Non-foraging habitat (lynx): habitat that may or may not support lynx prey, depending on the season and generally lacks year-round foraging opportunities. This analysis groups early stand initiation, stem exclusion, and other structural stages into “non-foraging” habitat when discussing effects to lynx or lynx habitat.

Precommercial thinning: the mechanical removal of trees to reduce stocking and concentrate growth on the remaining trees, and not resulting in immediate financial return (USDA 2007b).

Primitive: an area characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other area users is minimal. The area is managed to

be essentially free from evidence of man-induced restrictions and controls. Motorized use within the area is not permitted (USDA BDNF 2009).

Regeneration harvest: cutting trees and creating an entirely new age class; an even-age harvest (USDA 2007b).

Semi-primitive non-motorized: areas characterized by a predominately natural or natural-appearing environment of moderate-to-large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is not permitted, including airplanes, helicopters, etc. (USDA BDNF 2009).

Semi-primitive motorized: areas characterized by a predominately natural or natural-appearing environment of moderate-to-large size. Concentration of users is low, but there is often evidence of other area users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is permitted (USDA BDNF 2009).

Timber production: the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use (USDA BDNF 2009).

Wildland-Urban Interface (WUI): the line, area, or zone where structures and human development meet or intermingle with undeveloped wildland or vegetative fuel (USDA 2009). The NRLMD definition utilizes buffers around at-risk communities and the Healthy Forest Restoration Act as the basis for analysis (USDA 2007b), which defines WUI as an area 0.5 miles from the boundary of an at-risk community, or within 1.5 miles of the boundary of an at-risk community if the terrain is steep, or if there is a nearby road or ridgetop that could be incorporated into a fuel break, the land is in condition class three, or the area contains an emergency exit route needed for safe evacuations (condensed from HFRA § 101). This analysis uses WUI areas as identified by counties with CWPP (refer to assumption 7) although the term "WUI area" is used to describe those lands where structures and human development meet or intermingle with undeveloped wildland or vegetative fuel.

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Appendix A: A Review of Canada Lynx Occupation Status on the Beaverhead-Deerlodge National Forest, Western Lynx Biology Team.

A Review of Canada Lynx Occupation Status on the Beaverhead-Deerlodge National Forest

Western Lynx Biology Team

September 15, 2020

Review Objective

From 2017 to the present, biologists have documented several lynx observations on the Beaverhead - Deerlodge National Forest (BDNF). As a result, the Forest Supervisor on the BDNF has requested that the Western Lynx Biology Team (WLBT) review and assess recent observation records to determine if the Forest meets occupation definition criteria described in the Northern Rockies Lynx Management Direction Record of Decision (USDA, 2007).

Issue Summary

Occupation designations for Canada lynx habitat on National Forests in the western United States are described in the 2006 amended Lynx Conservation Agreement (LCA) between the US Fish and Wildlife Service (FWS) and the US Forest Service (Attachment 1). The 2006 amended LCA established provisions for defining "occupied" mapped lynx habitats (Attachment 1 - Appendix 1) and determined which National Forests, or portions thereof, were considered "occupied". Based on the provisions identified, the 2006 amended LCA determined the BDNF (in its entirety) was an "unoccupied" Forest (Attachment 1 – Table 1 in Appendix 1).

The Northern Rockies Lynx Management Direction (NRLMD) provides direction for managing mapped lynx habitat in R1 of the Forest Service on "occupied" Forests, as defined in the 2006 amended LCA. Because the BDNF is currently designated as an "unoccupied" Forest, Standards and Guidelines in the NRLMD do not currently apply on the BDNF; however, the Forest has since 2007 considered direction in the NRLMD when designing management actions. The NRLMD (on page 1 in the Record of Decision) specifies that if, and when, NFS lands become "occupied" based on criteria and evidence described in the 2006 amended LCA, the direction shall then be applied to those forests. Thus, the WLBT will utilize the same criteria and evidence definitions provided in the amended 2006 LCA to determine if the BDNF (or portions thereof) currently meets the occupation definition for which the NRLMD was meant to apply.

Occupation Definition Criteria

The criteria in the 2006 amended LCA for defining "occupied" Forests are as follows:

1) *There are at least 2 "verified lynx observations or records" since 1999 on the National Forest, unless they are verified to be "transient" individuals; OR*
2) *There is "evidence of reproduction" on the National Forest.*

*"*Verified lynx observations or records" were described further as follows:

a) *Those that scientifically document a lynx by identifying physical remains, live-captured animals or DNA samples.*

b) They may come from the National Lynx Survey, mortality records, photographs, research, or surveys.
c) They must be associated with generally reliable sources.

In October of 2019, the WLBT developed a white paper to further clarify occupation criteria in the 2006 amended LCA (Attachment 3) to provide a framework for formulating "occupancy status" recommendations when new observations are reported in currently unoccupied habitats (Attachment 3). The WLBT also identified a process for considering what observation records suggest in terms of lynx presence. The 2019 WLBT paper included the following clarifying definitions:

1) Verified lynx observations or records
As is indicated in the 2006 amended LCA definition, scientifically documented records from physical remains, live-captured animals or DNA analyses are considered verified observations. Verified records may also include evidence from mortality records, research, surveys or photographs, but must be associated with generally reliable sources. Records that meet the scientific criteria described should be considered verified observations, unless the record indicates a *transient* individual as described below. Observations that are not verified to be of *transient* individuals should be considered evidence of residential occupation. Individual verified records could potentially be from the same individual lynx, unless DNA evidence or other diagnostic characteristics (e.g., photos that clearly show different physical characteristics) indicates otherwise.

2) Transient individual
A lynx is verified to be a *transient* individual when the observations indicate: a) dispersal movements through an area (i.e., as indicated by a scattered pattern of locations across the landscape); or b) a single individual exhibiting sustained use of a particular area (i.e., verified observation points of a single individual are clustered in space and time) for only one winter **or** one summer season. Observations of individuals that exhibit sustained use of a particular area for two or more consecutive winter periods, or one consecutive summer and winter period are indicative of a home range and residential occupation. In other words, a lynx observation or record **should not** be classified as *transient* where locations exhibited sustained use of a particular area (i.e., observation points are clustered in space and time) indicative of a home range over: 1) two consecutive winter periods; **or** 2) one winter period followed by one consecutive summer period; **or** 3) one summer period followed by one consecutive winter period.

3) Evidence of reproduction
Reproduction is indicated when verified observations include the presence of kittens, which could be shown through photos, DNA evidence, and/or track observations that indicate a family group. Evidence of reproduction obtained from an "unoccupied" Forest would warrant a change in status to "occupied."

Historical Lynx Observations on the BDNF
McKelvey and others (in Ruggiero et al. 2000) reconstructed the history and distribution of lynx in the contiguous United States from the 1800s to 1999. Attachment 2 spatially displays the approximate location of 109 records on the BDNF that McKelvey and others (Ibid) considered "reliable", but unverifiable; 31 of these records are from the Montana Fish Wildlife and Parks fur trapping data base (1951 – 1982). The Montana Natural Heritage Program (MNHP) also maintains lynx observation records, and recorded 28 fur trapping records on the BDNF from 1977 to 1988 (Attachment 4). Although these records appear to come from credible sources, they are not verified from DNA. Nor is it known if the lynx records recorded in either database indicate use by residential or transient individuals.

Recent Surveys and Lynx Observations on the BDNF
Biologists on the BDNF prepared a comprehensive briefing paper (Attachment 5) summarizing survey efforts and lynx observations from 1999 through the end of 2019. As is described in their briefing paper

and summarized in Table 1 of the brief, the Forest has conducted several surveys within different mountain ranges on the Forest using various survey methods. Formal surveys conducted during the 1999 to 2017 time period recorded the potential for lynx occurrence on the Forest within the Flint, Anaconda and Pioneer mountain ranges during winter snow track surveys conducted in 1999, 2000, 2001; tracks thought to be from lynx were observed and recorded by Forest Service (FS) and Montana Fish, Wildlife and Parks (MFWP) biologists during these surveys, but no DNA was collected for validation.

In December of 2017, a remote camera station established by a private party [who is also a summer MFWP seasonal employee] captured photos of lynx near Twin Lakes in the Anaconda Mountain Range west of Anaconda, MT. Subsequently, a total of at least 76 photos, verified by FS and MFWP biologists to be of lynx, were captured at the initial camera detection station near Twin Lakes (Attachment 2), and at one additional camera detection station about four miles away that was installed for one winter season (2018/19) near 100 Acres Meadow. Lynx photos were collected at both camera stations during three winter time periods (2017/18, 2018/19, and 2019/20). Several snow samples collected from tracks near these camera detection stations during all three winter time periods provided additional validation of the presence of lynx through eDNA testing at the National Genomics Lab in Missoula, MT. Environmental DNA tests (eDNA) can detect and confirm species, but such tests are incapable of detecting the sex of the species and/or individuals.

Several hair, urine and scat samples were also collected at, or in the immediate vicinity of, the same camera detection stations discussed above in the Anaconda Mountain Range during the 2017/18, 2018/19, and 2019/20 winter time periods. Of the 20 hair, urine and scat samples collected that amplified (e.g., contained sufficient DNA to determine lynx species), 18 contained sufficient DNA quality to also determine lynx sex and/or individual. All 18 samples were collected during the 2018/2019 winter time period, and were determined to have come from one individual male lynx that was previously known to have occupied a home range on the Helena - Lewis and Clark NF near Lincoln, MT in 2012 (Golding, pers. comm., June 2020).

In May of 2019, an additional photo of a lynx was detected on a remote camera station installed by MFWP researchers near Big Hole Pass in the Beaverhead Range west of Dillon, MT. The Big Hole Pass camera set is about 57 air miles south of the remote camera stations in the Anaconda Range described previously. FS and MFWP biologists assessed the photo from the Big Hole Pass camera and verified that the individual photographed was a lynx, but no DNA was collected that could have validated the sex or individual in the photograph. No additional photos of lynx at this camera station have been reported since March of 2019. Because the March 2019 lynx photo detection was reported to FS biologists in July of 2019 after snow had melted, immediate follow up snow track surveys in the vicinity of the camera station were not possible. However, follow-up track surveys were conducted by biologists on the BDNF during the following winter period (February of 2020) within areas surrounding the Big Hole Pass camera station; one snow track sample and one scat sample were collected in the Big Hole Mountain Range west of the Big Hole Pass camera station during this survey, and both samples were delivered to the National Genomics Lab for analysis. In July of 2020, the lab determined that the snow track sample was positive for lynx via eDNA analysis, but the scat sample has yet to be analyzed (Golding, pers. comm., July 2020). During the winter months of January, February and March of 2020, biologists on the BDNF also completed snow track surveys to detect lynx and other carnivores within the Boulder, Highland, Tobacco Root, Anaconda, Beaverhead, and Pioneer Mountain Ranges. Twelve snow track samples were collected during these surveys, and eDNA analysis results were positive for lynx for five of those samples; all five were collected in the Anaconda Range in the near vicinity of the of the same Twin Lakes camera station described previously (Ibid).

Lynx Observation Assessment

The criteria in the 2006 amended LCA for defining "occupied" Forests were previously described in the Occupation Definition Criteria section, and include: 1) at least 2 verified lynx observations or records since 1999 on a National Forest, unless they are verified to be "transient" individuals; or 2) there is evidence of reproduction on the National Forest.

Evidence of Reproduction

A relatively large number of verified lynx detections, from photos and DNA evidence, validate the presence of lynx on the BDNF from 2017 to the present; but none of the detections provide evidence of reproduction as indicated by the presence of kittens, or photo or track observations that indicate a family group.

Verified Observations – Anaconda Range

All but two of the verified detections discussed in the previous section occurred at, or in the near vicinity of two remote camera detection stations located about 4 miles apart in the Anaconda Range (Twin Lakes and 100 Acre Meadow cameras). All verified detections at these sites were recorded during three consecutive winter time periods (2017/2018, 2018/2019, and 2019/2020). Eighteen of the detections, verified by DNA evidence, indicated one male individual, and all eighteen detections occurred during the second winter time-period (2018/2019). DNA evidence could not validate that the same male individual was also present during the first winter period (2017/2018) or third winter period (2019/2020); nor is it known if he was present in this same area during any of the summer time periods. The WLBT developed criteria for assessing transient versus residential use (Attachment 3); the team concluded that clustered detections of an individual lynx during two consecutive winter time periods (or one winter period followed by one consecutive summer period) are indicative of a home range and residential occupation, and should not indicate use by a transient individual. Use by the male lynx individual in the Anaconda

Range was only verified over one winter time period, and thus, by definition, residential use could not be validated. However, the majority of all verified detections (photos, eDNA, and DNA) were clustered in time and space during all three winter periods, are indicative of a lynx home range, and suggest residential use.

The total number of lynx individuals indicated by detections in the Anaconda Range since 2017 is unknown. But, because of the large number of detections that could not be identified to sex or individual, and because lynx are known to share home ranges or portions of home ranges, detections in the Anaconda Range could represent multiple lynx individuals.

Verified Observations – Big Hole Range

Verified detections in the Big Hole Range include one photo detection at the Big Hole Pass camera station during May of 2019 and one detection from a snow track verified via eDNA analysis in February of 2020. These detection locations are about 17 miles apart and occurred within a nine-month time period, but there is insufficient evidence to determine whether or not these detections indicate one or two different individuals. Nor is there sufficient evidence to assess whether these detections in the Big Hole Range represent transient or residential individuals. Of interesting note is that the eDNA snow track detection in the Big Hole Range was collected on February 19th of 2020, and an eDNA snow track detection was also collected in the Anaconda Range on February 11th of 2020. These detection locations are about 60 air miles apart, and although lynx dispersal movements of this distance and during this short time period are certainly possible, lynx tend to remain within home ranges during deep snow winter months and such dispersal movements are not likely (Squires, pers. comm., July 2020). Thus, these two detections could very likely indicate the presence of two different lynx individuals on the BDNF during February of 2020.

Areas of Potential Use and Occupation on the Forest

As was discussed previously in the Issue Summary section, the 2006 amended LCA (Attachment 1 – Table 1 in Appendix 1) and the WLBT white paper (Attachment 3) includes guidance for assessing the range of occupation within Forests that meet the "occupied" definition. When lynx detections indicate that Forests meet the "occupied" criteria, additional assessments are appropriate to evaluate potential use in all mountain ranges on the Forest. For example, when Forests were initially designated as "occupied" in the 2006 amended LCA, small, isolated or significantly disjunct mountain ranges on the Lewis and Clark NF, Gallatin NF and Helena NF were removed from "occupied" status. The island mountain ranges removed on all three Forests were significantly distant from recently recorded (since 1999) lynx observation locations on each Forest, and were separated by densely populated community centers (Bozeman, Helena, and Great Falls). Portions of the BDNF east of Interstate 90 and Interstate 15 do include island mountain ranges surrounded by private, non-forested farm/ranch landscapes. However, the Gravelly Range and Madison Range on the east side share borders with "occupied" designated habitats on the Targhee NF and Gallatin NF respectively; and, the Boulder River landscape north of Butte shares borders with designated "occupied" habitats on the Helena NF. None of the island mountain ranges on the BDNF, including those on the west side, are considered significantly disjunct from each other, or from "occupied" ranges on adjacent Forests. Thus, barriers to lynx dispersal movements between mountain ranges on the Forest (and dispersal movements to and from adjoining Forests) were considered to be fairly limited in scope and scale; lynx are known to cross interstate highways, but dispersal movements would likely be limited within the densely populated community center surrounding the city of Butte.

The WLBT considered historic observation record locations on the BDNF. As was previously discussed in the Historical Lynx Observations section, McKelvey and others (in Ruggiero et al., 1999) identified approximately 109 historical lynx records on the BDNF (Attachment 2), 31 of which were from the MFWP fur trapping data base (1951 – 1982). The MNHP also maintains lynx observation records and recorded 28 fur trapping records on the BDNF from 1977 to 1988 (Attachment 4). Although these records appear to come from credible sources, they are not verified from DNA. Nor is it known if the lynx observations recorded in either database indicate use by residential or transient individuals. Although the majority of historical observations were recorded within western portions of the BDNF, observations were also recorded within east-side mountain ranges.

The WLBT also considered lynx habitat quality and location on the BDNF, and its capability to support lynx use and occupation. Attachment 2 spatially displays mapped lynx habitat on the BDNF; the map was recently updated by biologists and other staff on the BDNF using improved vegetation data sets and mapping criteria provided by the Lynx Biology Team (Ruediger et al. 2000) and the NRLMD (USDA Forest Service 2007, Appendix B). The Lynx Biology Team defined lynx habitat as boreal forests dominated by deep "fluffy" snow and spruce-fir habitat types capable of dense horizontal cover that provide habitat for snowshoe hares. As is shown on Attachment 2, all mountain ranges on the BDNF (except for the Tendoy and eastern portion of the Beaverhead mountain ranges south of Hwy. 324 and south of Interstate 15 in the southwestern portion of the Forest) include mapped habitat capable of supporting lynx; capable habitats may support long and/or short term residential use if and when forest structural conditions provide high horizontal cover suitable for supporting high densities of snowshoe hares.

Conclusions

After a comprehensive review of all the recent (2017 to present) lynx observation records provided by the BDNF and National Genomics Lab, the WLBT concludes that recent lynx detections on the BDNF meet the provisions for an "occupied" Forest as defined in the 2006 Amended Conservation Agreement.

Because it is unknown how many lynx individuals may be indicated by the verified detections reported and recorded since 2017, or their whereabouts currently, the WLBT recommends that all mapped lynx habitat on the Forest (as depicted in Attachment 2) should, by definition, be considered "occupied". The

rational for this recommendation includes the following: 1) none of the island mountain ranges on the BDNF were considered significantly disjunct from each other, or from "occupied" habitats on immediately adjacent Forests; 2) all mountain ranges on the BDNF (except for the Tendoy and eastern portion of the Beaverhead mountain ranges south of Hwy. 324 and south of Interstate 15) include lynx habitat capable of supporting lynx, and may support long and/or short term residential use if and when forest structural conditions provide high horizontal cover suitable for supporting high densities of snowshoe hares; and, 3) credible (but unverified) historical records from the Forest indicate some type of use by lynx within all mountain ranges that support capable habitat.
Since the most recent detections of lynx on the BDNF during the winter of 2017/2018, the Forest has completed several lynx surveys across the Forest in multiple mountain ranges during 2018, 2019, and early 2020. Such efforts are commendable and are consistent with WLBT recommendations summarized in Attachment 3 to collect as much biologically based information associated with recent reported observations as possible. Future follow up winter surveys could provide more information on how and where lynx are utilizing habitats across the Forest, and provide additional DNA evidence that could help validate how many different lynx individuals may currently exist on the BDNF.

Prepared by: Western Lynx Biology Team
Authored by: Gary Hanvey, R1 Team Rep

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USDA Forest Service. 2007. Northern Rockies Lynx Management Direction (NRLMD). USDA Forest Service. Missoula, MT.

Attachments

Attachment 1 – 2006 Amended Lynx Conservation Agreement
Attachment 2 - Map of Lynx Habitat & Observation Records on BDNF
Attachment 3 – WLBT "Occupied" Clarification Document
Attachment 4 – Map of Lynx Records in MNHP Database
Attachment 5 – BDNF Survey Summary Brief (Gatlin et al., Jan 14, 2020)

Attachment 1

USFS Agreement #00-MU-11015600-013

CANADA LYNX
CONSERVATION AGREEMENT

U.S. FOREST SERVICE
AND
U.S. FISH AND WILDLIFE SERVICE

Lynx Conservation Agreement-- USDA Forest Service & USDI Fish and Wildlife Service

I. INTRODUCTION

On July 8, 1998, the U.S. Fish and Wildlife Service published a proposed rule to list the Canada lynx in the coterminous United States as a threatened species under the Endangered Species Act of 1973, as amended (ESA) (Federal Register, Volume 63, No. 130). The normal 12 month rule-making process was extended for an additional six months to allow for consideration of new scientific information and additional public comments on the proposed rule. The final rule, listing the lynx as threatened, was published in the Federal Register, Volume 65, No. 58 and reaffirmed 68 FR 40076. A more complete history and description of the listing process for Canada lynx can be found at the US Fish and Wildlife Service Canada Lynx News website-- www.r6.fws.gov/endspp/lynx.

In March of 1998, an interagency lynx coordination effort was initiated in response to the emerging awareness of the uncertain status of lynx populations and habitat in the conterminous United States and the onset of the listing process. The U.S. Fish and Wildlife Service (FWS), USDA Forest Service (FS), Bureau of Land Management (BLM), and the National Park Service (NPS) have participated in this effort. Three products important to the conservation of lynx on federally managed lands have been produced through this effort: (1) "The Scientific Basis for Lynx Conservation" (Ruggiero et. al. 2000), hereafter referred to as the "Science Report"; the Lynx Conservation Assessment and Strategy (LCAS); and this Lynx Conservation Agreement (CA). Several States within the range of the lynx have contributed to this effort through interactions with participants and review of draft products.

The Science Report, prepared by an international team of experts in lynx biology and ecology, is a compendium and interpretation of current scientific knowledge about the Canada lynx, its primary prey and habitat relationships. This document serves as an important scientific reference for the various lynx activities of the cooperating Federal Agencies.

The LCAS builds upon this scientific base and identifies the risks to the species that may occur as a result of federal land management. It recommends conservation measures that could be taken to remove or minimize the identified risks. It was developed to provide a consistent and effective approach to conservation of Canada lynx on federal lands in the conterminous United States.

II. OBJECTIVE AND INTENT

This Agreement is an interim measure to promote the conservation of the Canada lynx on federal lands managed by the signatories. The signatories agree to take measures to reduce or eliminate adverse effects or risks to the species and its occupied habitat pending amendments to Forest Plans. This agreement is based upon new information about the Canada lynx contained in the Lynx Science Report and the LCAS. The LCAS is appended to this Agreement. Specifically, the signatories agree and intend:

- To coordinate assessment, analyses, planning, and management efforts between the two agency signatories and with other appropriate entities (e.g. Bureau of Land Management, National Park Service, State and Tribal agencies) to assure a consistent approach to conserving lynx;

- To use the Science Report, other relevant science, and LCAS, together with locally specific information as appropriate, as the basis for implementing this agreement.;

- To use the Science Report, other relevant science, and LCAS, together with locally specific information as appropriate, as the basis for streamlining section 7 consultation between the FS and FWS.

Lynx Conservation Agreement-- USDA Forest Service & USDI Fish and Wildlife Service

III. PARTIES TO THE CONSERVATION AGREEMENT

USDA Forest Service (FS), including Regions 1, 2, 4, 6 and 9.
USDI Fish and Wildlife Service (FWS), including Regions 1, 3, 5 and 6.

Additional parties (e.g. National Park Service, Bureau of Land Management, State agencies, and/or Tribal entities) may join in this lynx conservation effort through amendment to this Conservation Agreement or development of separate agreements.

IV. AUTHORITY FOR CONSERVATION AGREEMENTS

This Conservation Agreement is within existing authorities of the signatories.

The authority for the U.S. Fish and Wildlife Service to enter into this voluntary Conservation Agreement derives from the Endangered Species Act of 1973, as amended; the Fish and Wildlife Act of 1956, as amended; and the Fish and Wildlife Coordination Act of 1934, as amended.

The primary purpose of the ESA (section 2 (b)) is to provide a means whereby ecosystems upon which endangered and threatened species depend may be conserved. Further under section 7, federal agencies "...Shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species...." Each federal agency "... shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded or carried out by such agency... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary... to be critical...."

Under the National Forest Management Act, the Forest Service prepares Land and Resource Management Plans (Forest Plans) for each National Forest. Forest Plans provide broad management guidance applicable to subsequently approved project actions. Forest Plans may be amended at any time, and revised when conditions have changed or at least every fifteen years.

While Forest Plans provide guidance for project actions, they do not compel the FS to propose or undertake a particular action. Moreover, this Conservation Agreement does not propose actions and is not inconsistent with the Forest Plans nor does this agreement establish management criteria for National Forests or restrict the agencie's ability to undertake additional conservation measures.

Objectives under the Forest Service Manual 2670.2 include: "Manage National Forest System habitats and activities for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the Endangered Species Act are no longer necessary.

V. LYNX STATUS, DISTRIBUTION AND RISK FACTORS

In the final rule published by the Fish and Wildlife Service, the contiguous United States distinct population segment of Canada lynx was listed as threatened in the forested portions of Colorado, Idaho, Maine, Michigan, Minnesota, Montana, New Hampshire, New York, Oregon, Utah, Vermont, Washington, and Wisconsin. Lynx are not known to currently occur in New Hampshire, Vermont, New York, and Oregon. In the Lynx Science Report, McKelvey et. al. (1999) reported finding records of lynx occurrence in 24 states. Lynx occur primarily in boreal, sub-boreal, and western montane forests in North America that support their primary prey, snowshoe hares.

Lynx are classified as endangered by four states (Vermont, New Hampshire, Michigan, and Colorado), threatened by Washington, sensitive by Utah, extirpated by Massachusetts, presumed extirpated by Pennsylvania, a species of special concern in Maine, a protected species in Wisconsin, and as small game or furbearer with no harvest allowed in New York, Minnesota, Wyoming, Idaho, and Montana.

The Lynx Conservation Assessment and Strategy identifies 17 lynx risk factors in 4 different categories-- factors affecting lynx productivity, lynx mortality, lynx movements, and other large-scale risk factors. Risk factors identified activities or existing conditions that could adversely affect either individual or groups of lynx.

Factors identified include timber management; wildland fire management; recreation; forest/backcountry roads and trails; livestock grazing; other human developments; trapping; predator control; incidental or illegal shooting; competition and predation as influenced by human activities; highways (vehicular collisions); highway, railroad and utility corridors; land ownership patterns; ski areas and large resorts; fragmentation and degradation of lynx refugia; lynx movement and dispersal across shrub-steppe habitats; and habitat degradation by non-native invasive plant species.

The Science Report, the LCAS and the FWS's listing process documents (proposed and final rule) are sources of more complete descriptions of the risk factors,status and distribution of this species.

VI. CONSERVATION MEASURES THAT WILL BE CARRIED OUT

PART 1 - IDENTIFYING SPECIFIC AREAS SUBJECT TO THIS AGREEMENT

The FS identified and mapped lynx habitat and lynx analysis units within the NFS administrative units listed in the LCAS, in coordination with the FWS and using the habitat descriptions from the LCAS. Linkage areas and shrub-steppe habitats adjacent to lynx habitat in western States also were identified and mapped.

As new criteria for mapping become available the lynx habitat maps may be refined. Site specific application of mapping criteria may also lead to changes in what is mapped as lynx habitat. As a result, the areas subject to this agreement may change. Such refinements will be fully coordinated between the signatories. Lynx habitat, as used later in this document, refers to the results of these mapping efforts.

It is U.S. Fish and Wildlife Service policy to authorize incidental take and issue appropriate terms and conditions for projects only when there is reasonable certainty that take will occur if the action proceeds as proposed. Therefore, the parties agree that measures to minimize incidental take of lynx under this agreement will apply only to proposed actions in occupied lynx habitat.

In order to implement this agreement, the FWS and FS will jointly identify 'occupied lynx habitat' as a subset of mapped lynx habitat. The identification of occupied lynx habitat will include consideration, as appropriate, of the Science Report, the LCAS, FWS's final listing decision documents, any information used to designate critical habitat, and new scientific information regarding the ecology and distribution of lynx, and population data Current and future agreements between federal and state agencies regarding the sharing and use of population data will be utilized.

This conservation agreement applies until forest plans have been amended or revised to provide guidance necessary to conserve lynx and applies only to NFS lands mapped as occupied lynx habitat.

PART 2 - PROGRAMMATIC PLANNING

The FS agrees that Forest Plans within states where lynx are listed should include guidance to conserve lynx for those portions of administrative units identified as occupied lynx habitat. During the period covered by this agreement, any necessary changes in these plans will be made through amendments and/or revisions in accordance with the National Forest Management Act (NFMA) including appropriate public participation and disclosure. The following are key principles to guide the programmatic planning process during the interim period:

- Where appropriate, the process will consider multiple scales of analysis as described in the LCAS.

- The process of amending or revising a Forest Plan will include consideration of the Science Report, the LCAS, FWS's final listing decision documents, scientific information regarding the ecology and distribution of lynx in the plan area, and population data, including current or future agreements between federal and state agencies regarding the sharing and use of population data.

- The NFS administrative units with occupied lynx habitat have plans of varying ages and are in various stages of being amended or revised. Consequently, the specific strategy for updating lynx management guidance can also vary, including revisions, broad scale analysis and amendments of groups of Forest plans, and amendment of an individual Forest plan. The process will maximize use of ongoing efforts.

The FS agrees to coordinate with the FWS on approaches to the programmatic planning process for lynx, to assure a comprehensive approach to conserving lynx on National Forests.

The FS and FWS agree to coordinate the planning efforts described here with any concurrent planning by the National Park Service or Bureau of Land Management and other appropriate entities for adjacent occupied lynx habitat.

PART 3 - PROJECT PLANNING AND IMPLEMENTATION

The Agencies agree that the LCAS includes a set of recommendations that are based on the best currently available scientific information about lynx, risks to the species and/or individuals posed by management activities, current habitat conditions, and measures that are likely needed to conserve the species and minimize adverse effects. The agencies agree that the implementation of this agreement will be informed by, but does not require, new information on the Lynx gathered and/or analyzed prior to the approval of projects or activities. The Agencies agree to the following actions and considerations associated with project planning and implementation.

Exceptions to the provisions in this section will be made where such projects or authorizations are required by law or are necessary to protect or reduce risk to human health or safety. If habitat needs of other threatened or endangered species conflict with the habitat needs for lynx, the FS and the FWS shall identify and pursue necessary alternative courses of action during consultation. All exceptions considered will be coordinated with the FWS and disclosed during the documentation of the semi-annual review sessions discussed below in Part 4 C.

A. Proposed actions

The FS agrees to review and consider the recommendations in the LCAS prior to making any new decision to undertake actions in occupied lynx habitat. A proposed or new action is one for which a federal agency has no documented agency decision (does not yet have a decision notice, record of decision, or decision memo).

For actions on NFS lands in occupied lynx habitat which are proposed by and/or involve third parties, such as pipeline corridors, access requests, issuance of new authorizations upon expiration of existing authorizations or permits, etc. the agencies agree to review and consider the new information on the lynx included in the LCAS, the Science Report, and appropriate local information during the agencies' analysis and decision-making processes.

For actions on NFS lands in occupied lynx habitat which are proposed by the FS and do not involve third parties, the Forest Service will prepare an evaluation of the action using relevant information, including the LCAS the Science Report, and appropriate local information to determine whether the activity may affect the lynx. If the evaluation indicates an activity is likely to adversely affect the lynx, the agency will revise the project considering recommendations in the LCAS, as appropriate, so that the activity is not likely to adversely affect lynx.

When performing effects analysis for any fuels treatment project, which may affect Lynx or their habitat, the direction outlined in the FWS and NOAA Fisheries December 10, 2002 joint memorandum entitled, "Evaluating the Net Benefit of Hazardous Fuels Treatment Projects" shall be followed. The direction in this joint memorandum is based upon the latest ecological methodologies and approaches to consultation under Section 7 of the ESA.

More specifically it states that, "... when conducting an effects analysis under the Act, the Services determine the current condition of the listed species and its habitat within the action area (i.e., the environmental baseline) and across its range, project the species' condition anticipated after implementation of the proposed project, and then compare this condition against the condition anticipated if the project is not implemented. In the analysis, the conditions and effects that will result if no action is taken act as the control against which to measure the effects of the proposed project. This difference is the effect of the proposed action. Without comparing the proposed project to a no project alternative, it is impossible to make conclusions regarding the net effects of the treatments (Krebs, C. J. 1999. Ecological Methodology, Second edition. Addison Wesley Longman Inc. Menlo Park, CA. Pages 341 - 347).

The FS and FWS will also look for opportunities to undertake proactive management actions to benefit lynx, based on the LCAS, to the extent they are consistent with current land and resource management plans.

Nothing in this Conservation Agreement is intended to alter existing laws and regulations. For example, Section 325 of the 2004 Department of Interior Appropriations Act (P.L. 108-108) directs the Forest Service to review certain expiring grazing permits and that the terms and conditions of those permits shall remain in effect until the agency completes processing of the permits in accordance with applicable laws.

B. Determination of Effect

Effects analysis and determinations for lynx and occupied lynx habitat will be documented in a Biological Assessment(s) or Biological Evaluation as part of ESA consultation with FWS. The LCAS and other relevant information will be used and referenced in all determinations of effect for lynx. The LCAS will be used as described in the section entitled "Approach to Development of

conservation Measures," as provided for in current and future LCAS updates, and informed by new information.

The LCAS provides the initial framework for the preferred and advisable courses of action for conservation of lynx. Effects determinations will include consideration of local conditions and activities by local biologists using the LCAS and other relevant information sources.

Administrative units in each lynx geographic area (as defined in the LCAS) should consider as appropriate, working together to supplement the guidance in this section with more specific tools, such as project screens, that could help insure consistency and accuracy in determination of effects.

PART 4 - MONITORING AND REPORTING

The FS and FWS agree to the following actions subject to the availability of funding.

A. Research

Current lynx research will be continued and new lynx research programs developed that emphasize the needs discussed in the LCAS section entitled "Inventory, Monitoring, and Research Needs" and in the Science Report, Chapter 17;

B. Inventory and Monitoring

1. The National Lynx Survey effort initiated in 1999 has been completed.

2. The FS and FWS will cooperate and involve other agencies and interested states and tribes in the inventory and monitoring of lynx distribution and lynx habitat as further described in the LCAS.

3. As recommended in the LCAS, appropriate actions, including research, administrative studies, or monitoring, will be taken to verify the effectiveness of the lynx conservation measures.

C. Conservation Agreement Implementation Monitoring and Assistance

The agencies agree to a joint, semi-annual review of the progress in implementing this CA. This review could lead to the modification and exceptions discussed in part VII below.

The agencies agree to use the Interagency Lynx Steering Committee and the interagency Lynx Biology Team that developed the LCAS to the extent necessary to ensure the consistent application of this Conservation Agreement and the LCAS, and to help resolve detailed questions that surface as implementation proceeds.

VII. AMENDMENTS, EXCEPTIONS AND DURATION OF AGREEMENT

Exceptions or amendments to this agreement may be jointly agreed to by the signatories on a case-by-case basis, where such deviations would better provide for protection and conservation of the lynx, where conflicts must be resolved between the needs of lynx and other listed species, or when new, relevant scientific information becomes available or when required by applicable laws or regulations. Such exceptions or amendments shall be agreed to by modification. All modifications within the scope of this agreement shall be made by issuance of a modification executed by all parties prior to any changes being performed.

Additional parties (e.g. National Park Service, Bureau of Land Management, State agencies and Tribal entities) may join in this lynx conservation effort through amendment to this Conservation Agreement or development of separate agreements.

Any of the parties to this agreement may terminate the agreement in whole or in part. This agreement shall be considered fully executed when it has been signed by all signatories. The agreement shall remain in effect until December 31, 2010 or until all National Forests with occupied mapped lynx habitat have amended or revised their forest plans to provide guidance to conserve lynx.

VIII. QUALIFICATIONS AND CONTACTS

This agreement in no way restricts any of the signatories from participating in similar activities with other public or private agencies, organizations, and individuals.

This agreement is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the parties to this agreement will be handled in accordance with applicable laws, regulations, and procedures including those for Government procurement and printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the parties and shall be independently authorized by appropriate statutory authority. This agreement does not provide such authority. Specifically, this agreement does not establish authority for noncompetitive award to the cooperator of any contract or other agreement. Any contract or agreement for training or other services must fully comply with all applicable requirements for competition.

This agreement does not create any private rights of action.

The principal contacts for this agreement are:

Deputy Regional Forester
USDA Forest Service, Region 1
PO Box 7669
Missoula, MT 59807

Assistant Regional Director – Ecological Services
U.S. Fish and Wildlife Service
134 Union Boulevard, Suite 645
Lakewood, CO 80228

IX. SIGNATURES

ABIGAIL KIMBELL
Regional Forester, Northern Region
USDA Forest Service

10/20/06
DATE

MITCH KING
Regional Director, Mountain-Prairie Region,
USDI Fish and Wildlife Service

10-13-06
DATE

Lynx Conservation Agreement-- USDA Forest Service & USDI Fish and Wildlife Service

Appendix 1. Amendment to the Canada Lynx Conservation Agreement To Define Occupied Mapped Lynx Habitat.

Background: The Canada Lynx Conservation Agreement between the U.S. Fish and Wildlife Service (FWS) and U.S. Forest Service (FS) was revised in May 2005. A component of the Agreement was "... the FWS and FS will jointly identify 'occupied lynx habitat' as a subset of mapped lynx habitat." Pursuant to Section VII Amendments, Exceptions, and Duration of Agreement, we therefore amend the Canada Lynx Conservation Agreement with the following definition of Occupied Mapped Lynx Habitat.

Definition: Occupied mapped lynx habitat

The FWS and FS jointly developed this definition of occupied mapped lynx habitat. Information in the FWS Lynx Recovery Outline was considered during development of the "occupied habitat" definition for mapped lynx habitat on national forests in the northern and southern Rocky Mountains and the Cascade Range (Forest Service Regions 1, 2, 4, and 6).

All mapped lynx habitat on an entire national forest is considered "occupied" by lynx when:

1- There are at least 2 verified lynx observations or records since 1999 on the national forest unless they are verified to be transient individuals; or

2- There is evidence of lynx reproduction on the national forest.

Forests that meet these occupied criteria were then examined to evaluate whether portions of the forest had isolated regions, disjunct mountain ranges, or peripheral areas that did not meet the "occupied" criteria stated above. Portions of some forests were removed from occupied status. Examples of this are small isolated mountain ranges on the Lewis and Clark NF and southern peripheral portions of the Okanogan-Wenatchee NF. The eastern portion Okanogan-Wenatchee NF would be retained as potential linkage between the two populations, and due to proximity to Canada and likely recolonization by lynx (see Table 1).

For the purposes of this definition, once an area is considered "occupied" it remains occupied. Lynx are wide ranging and their distribution expands and contracts in the northern United States when populations in Canada expand and contract. Areas that had been historically used by lynx (pre-1999) but are currently unoccupied, are not considered "occupied" based on the definition above. At some point in the future when lynx populations increase during years of high snowshoe hare densities, these areas may be used by lynx. While the Conservation Agreement applies primarily to occupied lynx habitat, the LCAS may provide useful information for Forest Service managers to consider when making decisions regarding unoccupied mapped lynx habitat until a final Lynx Recovery Plan is adopted.

Definitions

Verified Observation or Record: Verified lynx observations or records are those that scientifically document a lynx by identifying physical remains, live-captured animals, or DNA samples. Verified records may come from the National Lynx Survey, mortality records, photographs, research, or surveys. Verified records must be associated with generally reliable sources, such as formal research and survey efforts carried out by agencies, tribal governments, or universities with appropriate quality control (L.F. Ruggiero et al. 1999, Ecology and Conservation of Lynx in the United States, 480 pp).

9

Lynx Conservation Agreement-- USDA Forest Service & USDI Fish and Wildlife Service

LCAS: The Lynx Conservation Assessment and Strategy, August, 2000.

Mapped Lynx Habitat: Mapped lynx habitat consists primarily of mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare. The vegetation types and elevations that provide lynx habitat vary somewhat across the U.S. The specific descriptions are listed on pages 4 and 5 of the Glossary in the LCAS, by geographic area (i.e. Northeastern U.S., Great Lakes states and Western U.S.).

Lynx Conservation Agreement-- USDA Forest Service & USDI Fish and Wildlife Service

Table 1: National Forests With Occupied or Unoccupied Mapped Lynx Habitat Based Upon Verified Records From 1999 to October , 2006.

CASCADE MOUNTAINS GEOGRAPHIC AREA

Administrative Unit	Occupied	Basis
Mt. Baker-Snoqualmie NF	Yes	Research. The southern end of the forest is currently unoccupied
Okanogan-Wenatchee NF	Yes	National Lynx Survey, Research. The southern Extent of the forest is currently unoccupied

NORTHERN ROCKY MOUNTAINS GEOGRAPHIC AREA

Administrative Unit	Occupied	Basis
Malheur NF	No	National Lynx Survey
Wallowa-Whitman NF	No	National Lynx Survey
Umatilla NF	No	National Lynx Survey
Bighorn NF	No	National Lynx Survey
Ashley NF	No	National Lynx Survey
Salmon-Challis NF	No	National Lynx Survey
Nez Perce NF	No	Unsurveyed
Bitterroot NF	No	National Lynx Survey
Beaverhead-Deerlodge NF	No	National Lynx Survey
Colville NF	Yes**	No National Lynx Survey. Occupied status based on one FWS refuge record
Idaho Panhandle NFs	Yes	Research locations on Kaniksu NF; National Lynx Survey protocol for 1-year unsuccessful on St. Joe NF
Clearwater NF	Yes	Camera and DNA records
Lolo NF	Yes	National Lynx Survey, Research on Seeley Lake RD
Kootenai NF	Yes	Research
Flathead NF	Yes	Research
Lewis and Clark NF	Yes	Research; the disjunct mountain ranges are currently unoccupied.
Helena NF	Yes	Mortality on MacDonald Pass and lynx research on the Lincoln RD. Disjunct mountain ranges currently unoccupied
Gallatin NF	Yes	National Lynx Survey and DNA
Custer NF	Yes**	Considered the Beartooth RD occupied since there are verified observations on both sides of the RD and we have not surveyed this RD
Targhee NF	Yes	National Lynx Survey and use by research animals
Bridger-Teton NF	Yes	Research and DNA records

Lynx Conservation Agreement-- USDA Forest Service & USDI Fish and Wildlife Service

Administrative Unit	Occupied	Basis
Shoshone NF	Yes**	National Lynx Survey- One documentation by DNA and followup snowmobile protocol unsuccessful, but motorized survey area has limited access. Large areas unsurveyed. There are recent records in the eastern portion of Yellowstone NP, adjacent to the NF

**Available data do not fully meet the occupied habitat criteria, but based upon the strength of existing evidence and limited survey effort, the presence of resident lynx is highly probable.

SOUTHERN ROCKY MOUNTAINS GEOGRAPHIC AREA

Administrative Unit	Occupied	Basis
Arapaho-Roosevelt NF	Yes	Research
San Juan NF	Yes	Research
Rio Grande NF	Yes	Research
Grand Mesa, Uncompahgre and Gunnison NFs	Yes	Research
Pike-San Isabel NF	Yes	Research
Medicine Bow-Routt NF	Yes	Research
White River NF	Yes	Research

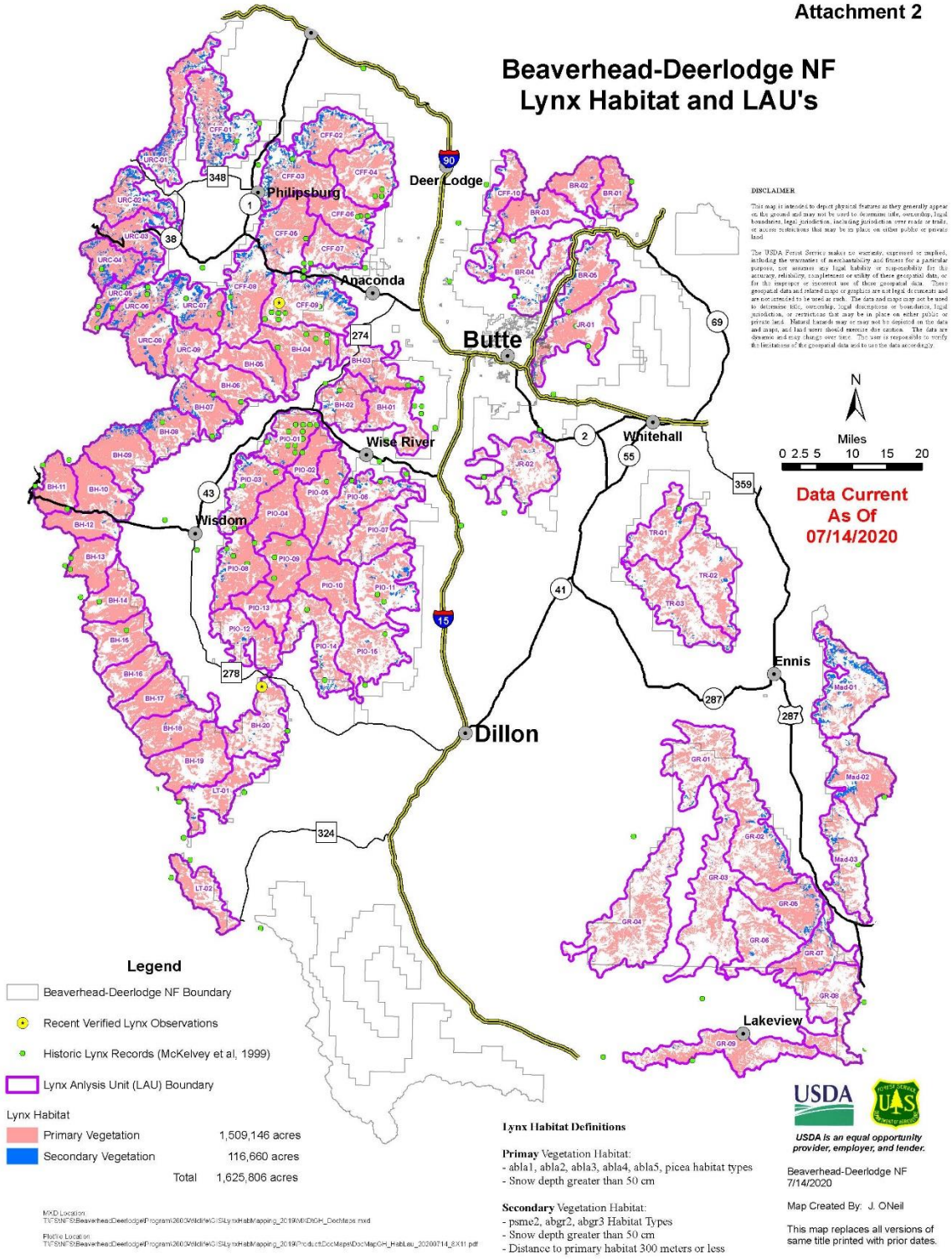
Lynx Conservation Agreement-- USDA Forest Service & USDI Fish and Wildlife Service

Table 2. Amended or Revised Forest Plans

Section IV, Part 1 states that "This conservation agreement applies until forest plans have been amended or revised to provide guidance necessary to conserve lynx and applies only to NFS lands mapped as occupied lynx habitat". The following forest plans have been revised with lynx guidance and are no longer subject to the Canada Lynx Conservation Agreement:

White River NF
Medicine Bow NF
Bighorn NF
Boise NF
Payette NF
Sawtooth NF
Wasatch-Cache NF
Uinta NF
Chippewa NF
Superior NF
Hiawatha NF
Ottawa NF
White Mountain NF

Attachment 2



Attachment 3

Determining Lynx Occupation Status on National Forests as Defined in the Amended Lynx Conservation Agreement

The criteria for classifying lynx observations on National Forests designated as "unoccupied" were defined in the Lynx Conservation Agreement (LCA) between the US Fish and Wildlife Service (FWS) and the US Forest Service (amended 2006). The objective of this paper is to clarify the definition and application of those criteria. Any Forest, or portions thereof, that were previously designated as "occupied" by lynx are not subject to these criteria.

BACKGROUND

The objective and intent of the 2000 Lynx Conservation Agreement between the Forest Service and FWS was to promote conservation of the Canada lynx and its habitat on federal lands and identify actions the signatories agreed to implement to reduce or eliminate adverse effects to the species until land use plans could be amended with appropriate regulatory direction. The 2000 agreement expired in 2004, and in 2006 was amended and extended for an additional five years to 2010. The 2006 LCA amendment also established provisions for defining "occupied" mapped lynx habitats (Appendix 1) and which National Forests, in their entirety or in specific mountain ranges, were considered "occupied" or "unoccupied" based on these definitions (Appendix, 1, Table 1).

The criteria in the 2006 LCA for defining "occupied" habitats are as follows:

3) *There are at least 2 "verified lynx observations or records" since 1999 on the National Forest, unless they are verified to be "transient" individuals; OR*
4) *There is "evidence of reproduction" on the National Forest.*

*"*Verified lynx observations or records" were described further as follows:

a) Those that scientifically document a lynx by identifying physical remains, live-captured animals or DNA samples.
b) They may come from the National Lynx Survey, mortality records, photographs, research, or surveys.
c) They must be associated with generally reliable sources.

Although the Northern Rockies Lynx Management Direction (NRLMD 2007) largely superseded the LCA on 18 Forests in the Northern Rockies, the Regional Foresters' 2007 Record of Decision (ROD) deferred to the amended LCA for defining which National Forests (or portions thereof) were identified as occupied by Canada lynx, and to which the NRLMD decision and management direction applied. Per the NRLMD ROD, if and when "unoccupied" NFS lands become "occupied" based upon criteria and evidence defined in the LCA as described above, the direction shall then apply to mapped lynx habitats on those forests (NRLMD ROD, page 1).

CRITERIA FOR DETERMINING OCCUPANCY

To assist in the application of this process, the Western Lynx Biology Team (WLBT) has developed the following criteria to further clarify the "occupation status" terms described in the LCA and NRLMD.

1) <u>Verified lynx observations or records</u>

As is indicated in the LCA definition, scientifically documented records from physical remains, live-captured animals or DNA analyses are considered verified observations. Verified records may also include evidence from mortality records, research, surveys or photographs, but must be associated with generally reliable sources. Records that meet the scientific criteria described should be considered a verified observation **unless** the record is determined to be a *transient* individual as described below. Individual verified records could potentially be from the same individual lynx unless DNA evidence indicates otherwise.

2) Transient individual

A lynx is verified to be a transient individual when the observations indicate: a) dispersal movements through an area (i.e., as indicated by a scattered pattern of locations across the landscape); or b) a single individual exhibiting sustained use of a particular area (i.e., verified observation points of a single individual are clustered in space and time) for only one winter **or** one summer season. Observations of individuals that exhibit sustained use of a particular area for two or more consecutive winter periods, or one consecutive summer and winter period are indicative of a home range and residential occupation. In other words, a lynx observation or record **should not** be classified as *transient* where locations exhibited sustained use of a particular area (i.e., observation points are clustered in space and time) indicative of a home range over: 1) two consecutive winter periods; **or** 2) one winter period followed by one consecutive summer period; **or** 3) one summer period followed by one consecutive winter period.

3) Evidence of reproduction

Reproduction is indicated when verified observations include the presence of kittens, which could be shown through photos, DNA evidence, and/or track observations that indicate a family group. Evidence of reproduction obtained from an "unoccupied" Forest would warrant a change in status to "occupied."

PROCESS FOR ASSESSING AND RECOMMENDING "OCCUPIED" STATUS

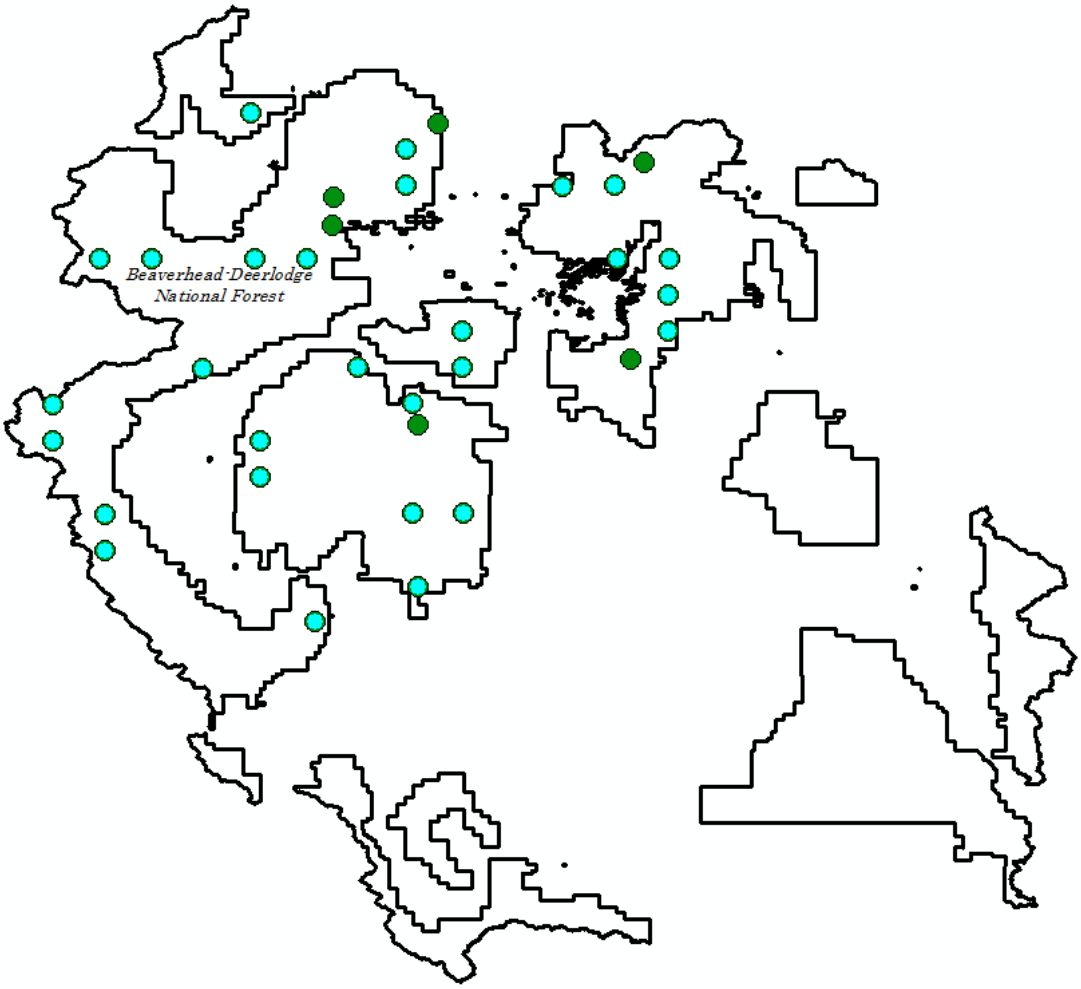
The determination of whether or not a currently "unoccupied" National Forest should be considered "occupied" will utilize occupation status definitions developed by the FWS and Forest Service as described in the LCA. An interagency team (i.e., the WLBT) will review the relevant information and make a recommendation to the interagency Western Lynx Steering Team. Toward this end, the WLBT will utilize the definitions summarized above as a framework for formulating "occupied status" recommendations when new observations are reported in currently unoccupied habitats. In addition, the WLBT will consider what the new observation(s) suggest in terms of lynx presence, and the likelihood that the area where the observation was reported could support persistent or short-term occupation. As such, it may be appropriate to conduct a habitat assessment, especially when new observations are being evaluated on National Forests that include disjunct mountain ranges not considered capable of residential occupation.

When new lynx observations are reported on National Forests designated as "unoccupied," the Forest unit where the observation was reported will conduct an analysis that may include additional investigations to obtain supplemental information. Additional investigations may include collection of DNA evidence to validate the reported observation(s) as lynx, and/or help determine lynx sex or individual. Additional track surveys and/or remote camera sets are also appropriate to help inform transient vs residential use. This additional information will be provided to the WLBT to assist in their review and subsequent recommendation of whether that National Forest should be considered "occupied" or remain in "unoccupied" status.

The Lynx Recovery Outline (FWS 2005) categorized geographic areas within the range of lynx as "core," "secondary," or "peripheral" based on the historical and most recent evidence of lynx population persistence, lynx habitat, and lynx occurrence. The WLBT may also consider these habitat characterizations when making occupancy recommendations.

Attachment 4

Lynx Records on Beaverhead – Deerlodge NF from MNHP Database
As of 11/26/2019



Blue color = Fur Trapping Records (1977 – 1988)
Green color = Observation Records (1997-2018)
(no records between 1990-1997)

Attachment 5

USDA Forest Service
National Forest System
Briefing Paper

Date: January 14, 2020

Beaverhead-Deerlodge National Forest Canada Lynx Survey and Detection Summary

Prepared by: Michael Gatlin, Inventory and Monitoring Coordinator, Beaverhead-Deerlodge National Forest, Supervisor's Office, email: Michael.gatlin@usda.gov

This briefing summarizes the Beaverhead – Deerlodge National Forest's (BDNF) efforts to detect Canada lynx (*Lynx canadensis*; lynx) within or near the BDNF administrate boundary.

Methods

Data for this briefing were compiled from all known survey reports and other documents pertaining to lynx that have been located for the BDNF. Due to the lack of information regarding survey effort within several reports, assumptions were made to provide the most thorough and accurate accounting of total effort to detect lynx. Specifically, inference was drawn using the minimum effort prescribed by a particular survey method. For example, the National Lynx Detection Protocol (NLDP) states that each survey transect should have at least five hair-snare stations deployed for no less than 14 days. Using this information we were able to conservatively calculate total effort for surveys that only noted the number of transects (but did not disclose the number of stations or the number of days deployed). For instance, a NLDP survey with seven transects would have a minimum effort of 490 trap-days (7 transects (t) with 5 hair-snare stations (s), deployed for 14 days (d); ((7t*5s)*14d) = 490). Reports that did not disclose any quantifiable survey information were used to denote whether or not a lynx was detected. Furthermore, lynx detections were considered verified or unverified based on the following criteria. A verified lynx sighting are those that were confirmed through DNA analysis or photographic evidence inspected by lynx experts. If a lynx was noted to have been detected but DNA and photographic confirmation were not disclosed we considered those sightings to be unverified. Although these data are accurate to the best of our knowledge the specific values should be considered an approximation. Copies of the reports used in this briefing are available upon request.

Lynx and Mesocarnivore Surveys

Focused efforts to detect lynx on the BDNF began in 1999 using the National Lynx Detection Protocol (NLDP; McKelvey et al. 1999), methods outlined in Halfpenny et al. (1995) and Squires et al. (2007), or modifications thereof.

The Pioneer, Anaconda and Flint Creek Mountains were surveyed for lynx during 1999, 2000, and 2001. Approximately 77 NLDP hair-snare survey stations were established across the Pioneer (52 stations), Anaconda (13 stations), and Flint Creek (12 stations) Mountains that were

monitored over three summers. Hair-snare data collected during this effort failed to detect lynx through DNA analysis.

Additional efforts to detect lynx in these mountains took place during the winters of 1999, 2000, 2001, 2002, and 2003. Broad-scale winter-track surveys were conducted by BDNF staff along eight snowmobile routes within a 100 mi^2 area near Georgetown Lake, Montana during 1999 and 2000. The Georgetown Lake corridor connects the Anaconda and Flint Creek Mountain ranges. Survey routes included Twin Lakes, Storm Lakes, Dry Creek Rd., Peterson Meadow, East Fork, Fred Burr, Warm Springs, and Foster Creek. Additional surveys occurred along the Pioneer Mountains Scenic Byway between Wise River and Polaris, Montana during the same period. During the 1999 and 2000 survey effort, approximately 800 miles of survey routes were completed in total. Lynx were detected during the winters of 1999 and 2000 by the observation of eight- and six sets of tracks, respectively. Lynx tracks were detected along the Fred Burr, Twin Lakes, Dry Creek, East Fork, and Pioneer Scenic Byway routes in 1999. Three of the detections in 2000 were along the Pioneer Scenic Byway while others occurred along the East Fork, Dry Creek, and Twin Lakes routes. These lynx detections were unverified.

A greater effort to detect lynx in the Pioneer, Anaconda, and Flint Creek Mountains was implemented during the winters of 2001, 2002, and 2003 with the assistance of the US Forest Service Rocky Mountain Research Station (RMRS). Methods employed during these surveys included intensive and extensive protocols developed during this study (Squires et al. 2004). Intensive surveys collected environmental information (i.e., habitat type, snow condition, and weather conditions) for each survey route. Extensive surveys focused solely on detecting animal tracks in the snow and did not collect environmental data. Over the course of three winters survey crews conducted 1,335 and 7,865 miles of intensive and extensive surveys, respectively. A single set of unverified lynx tracks were detected near the Anaconda Mountains in February 2001. No additional lynx were detected during the remainder of the study period.

Furthermore, lynx surveys were conducted in the Tobacco Root Mountains during 2001, 2002, and 2006. Hair-snare stations following the NLDP were established in subalpine fir, lodge pole pine, and Douglas fir habitat types during winter 2001. Hair-snare data failed to detect lynx. Snow-track surveys were also conducted in these mountains during the winters of 2001 and 2002. No lynx tracks or sign were detected during the 2001 winter surveys; however, an undetermined single series of tracks was found in January of 2002 within the subalpine fur habitat near McKelvey Lake. Though these tracks may have been lynx, species identification was not conclusive because samples of scat or hair were not found for DNA analysis. The level of effort (i.e., number of transects or stations surveyed) for the 2001-2002 Tobacco Root Mountain surveys is not known. Additional snow-track surveys were conducted during the winter of 2006. Intensive surveys occurred along seven snowmobile routes (Dry Boulder Creek, S. Boulder Creek, S. Willow Creek, N. Meadow Creek, S. Meadow Creek, Mill Creek, and Indian Creek) within the Tobacco Root Mountains. The 2006 survey effort details are not known; however, no lynx were detected.

Efforts to detect lynx in the Flint Creek, Pioneer, and Boulder Mountains continued in the summer 2009 following the NLDP with modification. A sampling transect was established within each mountain range and those transects consisted of five or six hair-snare stations each. Stations along the Pioneer Mountain (Odell Creek), Flint Creek Mountain (Coal Creek), and Boulder Mountain (Basin Creek) transects were sampled for 216, 210, and 216 hair-snare-trap-days, respectively. In addition to hair-snare stations nine camera-traps were placed along those transects. Transects along Odell Creek, Coal Creek, and Basin Creek had two, three, and four

cameras, respectively, deployed for a total of 321 camera-trap-days. These efforts failed to detect lynx.

Hair-snare and camera-trap stations were established in the Anaconda and, to a lesser extent, Boulder Mountains in 2012, 2013, and 2014. BDNF biologists established 26, 25, and 28 transects (2012, 2013, 2014, respectively) with 5 hair-snare stations per transect following the NLDP within the Anaconda Mountains. Two additional NLDP stations were established in the Boulder Mountains in 2012. Moreover, between two and five camera-traps were deployed near the hair-snare stations during the study. Sampling effort for hair-snare stations over three years totaled 5,740 trap-days (2,100, 1,750, and 1,890 days in 2012, 2013, and 2014 respectively). The sampling effort of camera-traps is not known. No lynx were detected during these efforts.

The RMRS recently initiated a large-scale multispecies mesocarnivore monitoring effort in US Forest Service regions 1 and 4. The premise of this study is to better understand the status of small to medium sized carnivores, including lynx, on national forests. Monitoring methodology follows recommendations in Golding et al. (2018). RMRS staff started a three year monitoring effort for mesocarnivores on the BDNF in 2017. A pilot study to detect fisher in winter 2017 established 12 stations across two sites in the John Long and Flint Creek Mountains and did not detect lynx. Full-scale multispecies monitoring began in the winter of 2018 with 11 sites established in the Pioneer Mountains. No lynx were detected in the Pioneer Mountains; however, incidental data (pictures and scat) collected in the Anaconda Mountains (near Twin Lakes) was verified to be lynx through DNA and eDNA analysis. Surveys conducted during the summer of 2018 and winter of 2019 focused on the Twin Lakes area and followed NLDP and snow-tracking methods. Summer 2018 surveys established 45 hair-snare stations that were deployed for 28 days and did not detect lynx. Thirteen bait-stations were established in the winter of 2019. Those stations were maintained and monitored from the beginning of February until the end of March. Additionally, 170 miles of snow-track surveys were conducted in addition to tracking efforts during station rebaiting trips. The presence of lynx were verified through DNA analyses of hair, scat, and urine samples and eDNA analyses of snow-track samples collected at two of the thirteen bait-stations and/or along multiple snow-track routes near those two stations. Hair, scat and urine samples collected during the 2019 winter survey were further analyzed in an attempt to extract nuclear DNA that can identify species sex and/or individual; those samples that successfully amplified indicated a single individual male lynx. However, because analyses of eDNA are not capable of individual or sex identification, and because some hair, scat, and urine samples collected did not yield nuclear DNA, it is not known if all samples collected during the 2019 survey indicate one or multiple. Summer NLDP surveys continued in 2019 within the Boulder Mountains. Twenty hair-snare stations along 4 transects were established and monitored but failed to detect lynx.

Passive Lynx Detections

Passive observations of animals generally occurs through examination of the historic record, physical observation, or stationary camera traps (i.e., game cameras) not associated with a survey effort. The database of record for these observations in the State of Montana Natural Heritage Program (MNHP) database. The MNHP contains multiple records that documents potentially 77 lynx on the BDNF from the years 1977 to 2000. Those data were collected from fur-bearer harvest reports and their accuracy is unverified and lack specific location information (McKelvey et al. 1999). Interestingly, a lynx reintroduction study in Colorado documented that six GPS-

collared individuals traveled from Colorado and passed through the BDNF between 2004 and 2007. However, those individuals did not remain on the BDNF while the GPS-collars were collecting data and it is not known whether or not they returned to the BDNF.

Since 2016 to present, four lynx observations on or near the BDNF were reported. In 2016, a single lynx observation was reported between the Madison and Gravely Mountain Ranges along the Madison River near Ennis, MT; and, in 2018, another single lynx observation was reported southeast of Thunderbolt Mountain within the Boulder Mountain Range. Although these observations seem to be credible, neither were verified by photographic or DNA evidence. In December of 2017, a remote camera station captured photos of a single lynx individual near Twin Lakes in the Anaconda Mountain Range, and in May of 2019, another remote camera station captured a photo of a single lynx individual south of "Bighole Pass" between the Beaverhead and Pioneer Mountain Ranges; both remote camera stations are associated with unrelated research projects by Montana Fish, Wildlife and Parks Biologists. The individuals photographed by both cameras were reviewed by Forest Service and RMRS lynx biologists, and verified to be lynx. Additionally, lynx were seen near Thompson Park just south of Butte, MT on two separate occasions. A single lynx was observed in the Thompson Park area in June of 2019 and a pair of lynx were observed in the same area again in August. The Thompson Park observations have not been verified but are considered to be reliable by Montana Fish, Wildlife, and Parks.

Summary

Formal surveys for lynx on the Beaverhead-Deerlodge National Forest began in 1999 and are ongoing. To date, this equates to a total estimated effort of 20,511 trap days which is derived from 1,294 stations (bait stations, camera traps, and NLPD scent stations) in addition to approximately 10,113 miles of snow track surveys (Table 1). Lynx have been detected nine times during these surveys in three different mountain ranges (Anaconda, Flint Creek, and Pioneer) with a majority of the detections within the Anaconda Range. Six occurred within the Anaconda, two in Pioneer, and one in Flint Creek.

Passive detections of this species on the Beaverhead-Deerlodge have occurred since 1977 with the most recent observation in 2019. A total of 77 lynx observations are recorded in the database of record; however, this excludes the most recent observations in the Big Hole and Thompson Park areas. Some of these observations occurred within the same mountain ranges where lynx have been verified through active survey methods. However, passive observations outside of the aforementioned ranges include detections within or nearby the Madison and Gravely Mountain Ranges, the Boulder Mountain Range, and the Beaverhead Mountain Range.

Table 1. Summary of Canada lynx detection surveys on the Beaverhead-Deerlodge National Forest from 1999 to 2019. If lynx detections denoted with ([a]) specifies that those detections were not verified and ([b]) indicates that the observations were verified through DNA or photographic analysis.

Year	Mountain Range	Season	Method	Effort	Duration	Total Effort	Effort Type	Lynx Detected?
1999	Anaconda	Summer	NLDP	65	14	910	Days	No
		Winter	Snow-Track	63	4	252	Miles	Yes[a]

Year	Mountain Range	Season	Method	Effort	Duration	Total Effort	Effort Type	Lynx Detected?
	Flint Creek	Summer	NLDP	60	14	840	Days	No
		Winter	Snow-Track	10	4	40	Miles	Yes[a]
	Pioneer	Summer	NLDP	260	14	3640	Days	No
		Winter	Snow-Track	20	4	80	Miles	Yes[a]
2000	Anaconda	Summer	NLDP	65	14	910	Days	No
		Winter	Snow-Track	63	4	252	Miles	Yes[a]
	Flint Creek	Summer	NLDP	60	14	840	Days	No
		Winter	Snow-Track	10	4	40	Miles	No
	Pioneer	Summer	NLDP	265	14	3710	Days	No
		Winter	Snow-Track	20	4	80	Miles	Yes[a]
2001	Anaconda	Winter	Snow-Track	1162	-	1162	Miles	Yes[a]
	Flint Creek	Winter	Snow-Track	1162	-	1162	Miles	No
	Pioneer	Winter	Snow-Track	1595	-	1595	Miles	No
	Tobacco Root	Winter	NLDP	-	-	-	-	No
	Tobacco Root	Winter	Snow-Track	-	-	-	-	No
2002	Anaconda	Winter	Snow-Track	880	-	880	Miles	No
	Flint Creek	Winter	Snow-Track	880	-	880	Miles	No
	Pioneer	Winter	Snow-Track	880	-	880	Miles	No
	Tobacco Root	Winter	NLDP	-	-	-	-	No
	Tobacco Root	Winter	Snow-Track	-	-	-	-	No
2003	Anaconda	Winter	Snow-Track	880	-	880	Miles	No
	Flint Creek	Winter	Snow-Track	880	-	880	Miles	No
	Pioneer	Winter	Snow-Track	880	-	880	Miles	No
2006	Tobacco Root	Winter	Snow-Track	7	-	7	Transects	No
2009	Boulder	Summer	NLDP	6	36	216	Days	No
		Summer	Camera	4	36	144	Days	No
	Flint Creek	Summer	NLDP	7	35	245	Days	No
		Summer	Camera	3	35	105	Days	No
	Pioneer	Summer	NLDP	8	36	288	Days	No
		Summer	Camera	2	36	72	Days	No
2012	Anaconda	Summer	NLDP	130	14	1820	Days	No
	Boulder	Summer	NLDP	10	28	280	Days	No
2013	Anaconda	Summer	NLDP	125	14	1750	Days	No
2014	Anaconda	Summer	NLDP	135	14	1890	Days	No
2017	Flint Creek	Winter	Fisher	6	-	6	-	No
	John Long	Winter	Fisher	6	-	6	-	No
2018	Anaconda	Summer	NLDP	45	28	1260	Days	No
		Winter	Incidental	-	-	-	-	Yes[b]
	Pioneer	Winter	Bait-station	11	53	583	Days	No
2019	Anaconda	Winter	Bait-station	13	56	728	Days	Yes[b]

Year	Mountain Range	Season	Method	Effort	Duration	Total Effort	Effort Type	Lynx Detected?
	Anaconda	Winter	Snow-track	170	-	170	Miles	Yes[b]
	Boulder	Summer	NLDP	20	14	280	Days	No

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McKelvey, K.S., J.J. Claar, G.W. McDaniel, G. Hanvey. 1999. National lynx detection protocol. Washington, DC: U.S. Department of Agriculture, Forest Service 12 p.

McKelvey, K.S., K.B. Aubry, Y.K. Ortega. 1999. History and distribution of lynx in the contiguous United States. In Ruggiero, Leonard F., Aubry, K.B., S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires (Eds.), Ecology and conservation of lynx in the United States (pp. 207-264). Gen. Tech. Rep. RMRS-GTR-30WWW. Fort Collins, CO: Washington, DC: U.S. Department of Agriculture, Forest Service 480 p.

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Appendix B: Summary of Canada lynx survey effort and detections on the Beaverhead Deerlodge National Forest.

USDA Forest Service
National Forest System
Briefing Paper

Updated: November 6, 2020

Beaverhead-Deerlodge National Forest Canada Lynx Survey and Detection Summary

Prepared by: Michael Gatlin, Inventory and Monitoring Coordinator, Beaverhead-Deerlodge National Forest, Supervisor's Office, email: Michael.gatlin@usda.gov

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Methods

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A greater effort to detect lynx in the Pioneer, Anaconda, and Flint Creek Mountains was implemented during the winters of 2001, 2002, and 2003 with the assistance of the US Forest Service Rocky Mountain Research Station (RMRS). Methods employed during these surveys included intensive and extensive protocols developed during this study (Squires et al. 2004). Intensive surveys collected environmental information (i.e., habitat type, snow condition, and weather conditions) for each survey route. Extensive surveys focused solely on detecting animal tracks in the snow and did not collect environmental data. Over the course of three winters survey crews conducted 1,335 and 7,865 miles of intensive and extensive surveys, respectively. A single set of unverified lynx tracks were detected near the Anaconda Mountains in February 2001. No additional lynx were detected during the remainder of the study period.

Furthermore, lynx surveys were conducted in the Tobacco Root Mountains during 2001, 2002, and 2006. Hair-snare stations following the NLDP were established in subalpine fir, lodge pole pine, and Douglas fir habitat types during winter 2001. Hair-snare data failed to detect lynx. Snow-track surveys were also conducted in these mountains during the winters of 2001 and 2002. No lynx tracks or sign were detected during the 2001 winter surveys; however, an undetermined single series of tracks was found in January of 2002 within the subalpine fur habitat near McKelvey Lake. Though these tracks may have been lynx, species identification was not conclusive because samples of scat or hair were not found for DNA analysis. The level of effort (i.e., number of transects or stations surveyed) for the 2001-2002 Tobacco Root Mountain surveys is not known. Additional snow-track surveys were conducted during the winter of 2006. Intensive surveys occurred along seven snowmobile routes (Dry Boulder Creek, S. Boulder Creek, S. Willow Creek, N. Meadow Creek, S. Meadow Creek, Mill Creek, and Indian Creek) within the Tobacco Root Mountains. The 2006 survey effort details are not known; however, no lynx were detected.

Efforts to detect lynx in the Flint Creek, Pioneer, and Boulder Mountains continued in the summer 2009 following the NLDP with modification. A sampling transect was established within each mountain range and those transects consisted of five or six hair-snare stations each. Stations along the Pioneer Mountain (Odell Creek), Flint Creek Mountain (Coal Creek), and Boulder Mountain (Basin Creek) transects were sampled for 216, 210, and 216 hair-snare-trap-days, respectively. In addition to hair-snare stations nine camera-traps were placed along those transects. Transects along Odell Creek, Coal Creek, and Basin Creek had two, three, and four cameras, respectively, deployed for a total of 321 camera-trap-days. These efforts failed to detect lynx.

Hair-snare and camera-trap stations were established in the Anaconda and, to a lesser extent, Boulder Mountains in 2012, 2013, and 2014. BDNF biologists established 26, 25, and 28 transects (2012, 2013, 2014, respectively) with 5 hair-snare stations per transect following the NLDP within the Anaconda Mountains. Two additional NLDP stations were established in the Boulder Mountains in 2012. Moreover, between two and five camera-traps were deployed near the hair-snare stations during the study. Sampling effort for hair-snare stations over three years totaled 5,740 trap-days (2,100, 1,750, and 1,890 days in 2012, 2013, and 2014 respectively). The sampling effort of camera-traps is not known. No lynx were detected during these efforts.

The RMRS recently initiated a large-scale multispecies mesocarnivore monitoring effort in US Forest Service regions 1 and 4. The premise of this study is to better understand the status of small to medium sized carnivores, including lynx, on national forests. Monitoring methodology follows recommendations in Golding et al. (2018). RMRS staff started a three year monitoring effort for mesocarnivores on the BDNF in 2017. A pilot study to detect fisher in winter 2017 established 12 stations across two sites in the John Long and Flint Creek Mountains and did not detect lynx. Full-scale multispecies monitoring began in the winter of 2018 with 11 sites established in the Pioneer Mountains. No lynx were detected in the Pioneer Mountains; however, incidental data (pictures and scat) collected in the Anaconda Mountains (near Twin Lakes) was verified to be lynx through DNA and eDNA analysis. Surveys conducted during the summer of 2018 and winter of 2019 focused on the Twin Lakes area and followed NLDP and snow-tracking methods. Summer 2018 surveys established 45 hair-snare stations that were deployed for 28 days and did not detect lynx. Thirteen bait-stations were established in the winter of 2019. Those stations were maintained and monitored from the beginning of February until the end of March. Additionally, 170 miles of snow-track surveys were conducted in addition to tracking efforts during station rebaiting trips. The presence of lynx was verified through DNA analyses of hair, scat, and urine samples and eDNA analyses of snow-track samples collected at two of the thirteen bait-stations and/or along multiple snow-track routes near those two stations. Hair, scat and urine samples collected during the 2019 winter survey were further analyzed in an attempt to extract nuclear DNA that can identify species sex and/or individual; those samples that successfully amplified indicated a single individual male lynx. However, because analyses of eDNA are not capable of individual or sex identification, and because some hair, scat, and urine samples collected did not yield nuclear DNA, it is not known if all samples collected during the 2019 survey indicate one or multiple. Summer NLDP surveys continued in 2019 within the Boulder Mountains. Twenty hair-snare stations along 4 transects were established and monitored but failed to detect lynx.

Additional, extensive, snow-track surveys for lynx were conducted within the Boulder, Highland, Tobacco Root, Anaconda, Pioneer, and Beaverhead ranges during the winter of 2020. Sites were selected based on recent lynx observations (Boulder, Highland, and Anaconda) in addition to connectivity to verified lynx detections or historical observations (Tobacco Root, Pioneer, and Beaverhead). Crews surveyed 743 miles with snowmobiles or skis over 33 days between January and March 2020. Lynx were detected (tracks) at Storm Lake in the Anaconda range on 2/11/2020 and confirmed by eDNA. This site has been known to be occupied by an individual male for the past several years. Urine was collected for analysis, but testing was unable to confirm if this was the same individual from previous years. Furthermore, eDNA samples were collected from tracks that could not be verified to be lynx but had similar characteristics across the BDNF. In total, thirteen samples (snow tracks and scat) were collected from sites in the Highland, Boulder, Pioneer, and Beaverhead ranges. Lynx was detected in the Beaverhead range on 2/19/2020 and verified to be a previously undetected female through DNA analysis of scat.

Passive Lynx Detections

Passive observations of animals generally occurs through examination of the historic record, physical observation, or stationary camera traps (i.e., game cameras) not associated with a survey effort. The database of record for these observations in the State of Montana Natural Heritage Program (MNHP)

database. The MNHP contains multiple records that documents potentially 77 lynx on the BDNF from the years 1977 to 2000. Those data were collected from fur-bearer harvest reports and their accuracy is unverified and lack specific location information (McKelvey et al. 1999). Interestingly, a lynx reintroduction study in Colorado documented that six GPS-collared individuals traveled from Colorado and passed through the BDNF between 2004 and 2007. However, those individuals did not remain on the BDNF while the GPS-collars were collecting data and it is not known whether or not they returned to the BDNF.

Since 2016 to present, four lynx observations on or near the BDNF were reported. In 2016, a single lynx observation was reported between the Madison and Gravely Mountain Ranges along the Madison River near Ennis, MT; and, in 2018, another single lynx observation was reported southeast of Thunderbolt Mountain within the Boulder Mountain Range. Although these observations seem to be credible, neither were verified by photographic or DNA evidence. In December of 2017, a remote camera station captured photos of a single lynx individual near Twin Lakes in the Anaconda Mountain Range, and in May of 2019, another remote camera station captured a photo of a single lynx individual south of "Bighole Pass" between the Beaverhead and Pioneer Mountain Ranges; both remote camera stations are associated with unrelated research projects by Montana Fish, Wildlife and Parks Biologists. The individuals photographed by both cameras were reviewed by Forest Service and RMRS lynx biologists, and verified to be lynx. Additionally, lynx were seen near Thompson Park just south of Butte, MT on two separate occasions. A single lynx was observed in the Thompson Park area in June of 2019 and a pair of lynx were observed in the same area again in August. The Thompson Park observations have not been verified but are considered to be reliable by Montana Fish, Wildlife, and Parks.

In March 2020, two bait stations were deployed aid in detection of lynx as snow conditions deteriorated going into spring. One station was placed in the Bryant Creek drainage based on its habitat quality and historic observations. The other was placed centrally in the Beaverhead range, at Rock Island Lakes, based on its quality habitat and connectivity to verified lynx detections. These stations were deployed for 21 trap-days each and failed to detect lynx.

Summary

Formal surveys for lynx on the Beaverhead-Deerlodge National Forest began in 1999 and are ongoing. To date, this equates to a total estimated effort of 20,553 trap days which is derived from 1,296 stations (bait stations, camera traps, and NLPD scent stations) in addition to approximately 10,856 miles of snow track surveys (Table 1). Lynx have been detected ten times during these surveys in three different mountain ranges (Anaconda, Beaverhead, Flint Creek, and Pioneer) with most of the detections occurring within the Anaconda Range. Six occurred within the Anaconda, two in Pioneer, one in Flint Creek, and most recently one in the Beaverhead range.

Passive detections of this species on the Beaverhead-Deerlodge have occurred since 1977 with the most recent observation in 2020. A total of 77 lynx observations are recorded in the database of record; however, this excludes the most recent observations. Some of these observations occurred within the same mountain ranges where lynx have been verified through active survey methods. However, passive observations outside of the aforementioned ranges include detections within or nearby the Madison and Gravely Mountain Ranges, the Boulder Mountain Range.

Table 1. Summary of Canada lynx detection surveys on the Beaverhead-Deerlodge National Forest from 1999 to 2020. If lynx detections denoted with ([a]) specifies that those detections were not verified and ([b]) indicates that the observations were verified through DNA or photographic analysis.

Year	Mountain Range	Season	Method	Effort	Duration	Total Effort	Effort Type	Lynx Detected?
1999	Anaconda	Summer	NLDP	65	14	910	Days	No

Year	Mountain Range	Season	Method	Effort	Duration	Total Effort	Effort Type	Lynx Detected?
	Anaconda	Winter	Snow-Track	63	4	252	Miles	Yes[a]
	Flint Creek	Summer	NLDP	60	14	840	Days	No
	Flint Creek	Winter	Snow-Track	10	4	40	Miles	Yes[a]
	Pioneer	Summer	NLDP	260	14	3640	Days	No
	Pioneer	Winter	Snow-Track	20	4	80	Miles	Yes[a]
2000	Anaconda	Summer	NLDP	65	14	910	Days	No
	Anaconda	Winter	Snow-Track	63	4	252	Miles	Yes[a]
	Flint Creek	Summer	NLDP	60	14	840	Days	No
	Flint Creek	Winter	Snow-Track	10	4	40	Miles	No
	Pioneer	Summer	NLDP	265	14	3710	Days	No
	Pioneer	Winter	Snow-Track	20	4	80	Miles	Yes[a]
2001	Anaconda	Winter	Snow-Track	1162	-	1162	Miles	Yes[a]
	Flint Creek	Winter	Snow-Track	1162	-	1162	Miles	No
	Pioneer	Winter	Snow-Track	1595	-	1595	Miles	No
	Tobacco Root	Winter	NLDP	-	-	-	-	No
	Tobacco Root	Winter	Snow-Track	-	-	-	-	No
2002	Anaconda	Winter	Snow-Track	880	-	880	Miles	No
	Flint Creek	Winter	Snow-Track	880	-	880	Miles	No
	Pioneer	Winter	Snow-Track	880	-	880	Miles	No
	Tobacco Root	Winter	NLDP	-	-	-	-	No
	Tobacco Root	Winter	Snow-Track	-	-	-	-	No
2003	Anaconda	Winter	Snow-Track	880	-	880	Miles	No
	Flint Creek	Winter	Snow-Track	880	-	880	Miles	No
	Pioneer	Winter	Snow-Track	880	-	880	Miles	No
2006	Tobacco Root	Winter	Snow-Track	7	-	7	Transects	No
2009	Boulder	Summer	NLDP	6	36	216	Days	No
	Boulder	Summer	Camera	4	36	144	Days	No
	Flint Creek	Summer	NLDP	7	35	245	Days	No
	Flint Creek	Summer	Camera	3	35	105	Days	No
	Pioneer	Summer	NLDP	8	36	288	Days	No
	Pioneer	Summer	Camera	2	36	72	Days	No
2012	Anaconda	Summer	NLDP	130	14	1820	Days	No
	Boulder	Summer	NLDP	10	28	280	Days	No
2013	Anaconda	Summer	NLDP	125	14	1750	Days	No
2014	Anaconda	Summer	NLDP	135	14	1890	Days	No
2017	Flint Creek	Winter	Fisher	6	-	6	-	No
	John Long	Winter	Fisher	6	-	6	-	No
2018	Anaconda	Summer	NLDP	45	28	1260	Days	No
	Anaconda	Winter	Incidental	-	-	-	-	Yes[b]
	Pioneer	Winter	Bait-station	11	53	583	Days	No

Year	Mountain Range	Season	Method	Effort	Duration	Total Effort	Effort Type	Lynx Detected?
2019	Anaconda	Winter	Bait-station	13	56	728	Days	Yes[b]
	Anaconda	Winter	Snow-track	170	-	170	Miles	Yes[b]
	Boulder	Summer	NLDP	20	14	280	Days	No
2020	Anaconda	Winter	Snow-track	100	-	100	Miles	Yes[b]
	Beaverhead	Winter	Snow-track	207	-	207	Miles	Yes[b]
	Beaverhead	Winter	Bait-station	1	21	21	Days	No
	Boulder	Winter	Snow-track	154	-	154	Miles	No
	Highland	Winter	Snow-track	12	-	12	Miles	No
	Pioneer	Winter	Snow-track	221	-	221	Miles	No
	Pioneer	Winter	Bait-station	1	21	21	Days	No
	Tobacco Root	Winter	Snow-track	49	-	49	Miles	No

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Appendix C: Updated Lynx Habitat Mapping Process Paper.

USDA
Forest Service

Northern Region
Forest Service

Project Record
Process Paper Review

Gary Hanvey
R1 Canada Lynx
Biologist

October 06, 2020

Regional Office Review

Canada Lynx Habitat Mapping on the Beaverhead-Deerlodge National Forest – 2020 Update

Overview

Guidance for updating lynx habitat maps on Forests within the Northern Region of the Forest Service is outlined in a 2016 Regional Forester's memo (Marten, 2016)[1]. As is summarized in the memo, provisions for updating lynx habitat maps are found in the Northern Rockies Lynx Management Direction (NRLMD) Final Environmental Impact Statement (FEIS)[2], NRLMD Biological Opinion (BO)[3], and the Canada Lynx Conservation and Strategy 3rd Edition[4]. All three documents emphasized and encouraged mapping updates when refined vegetation databases and improved Geographical Information System (GIS) mapping techniques become available.

In close coordination with Northern Region Renewable Resource staff in the Regional Office, the Beaverhead-Deerlodge National Forest (BDNF) initiated the process of updating mapped lynx habitat on the Forest in 2020. 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[5] prepared by BDNF Forest Biologist Jennifer Gatlin and other staff on the Forest.

This review will assess the Forest's mapping process and results to determine consistency with mapping direction outlined in Regional Forester's 2016 memo, and compliance with NRLMD Standard LAU S1 relative to changes in Lynx Analysis Unit (LAU) boundaries.

[1]Marten, L. M. 2016. Clarification of Lynx Habitat Mapping in R1. Unpublished memo. USDA Forest Service. Northern Region. 26 Fort Missoula Road, Missoula, MT 59804. September 6, 2016. 2pp.

[2] USDA Forest Service. 2007. Northern Rockies Lynx Management Direction (NLRMD) FEIS Volume 1, Biological Assessment, and ROD. Missoula, MT: USDA Forest Service, Northern Region 1. 1000 pp.

[3] USDI Fish and Wildlife Service. 2007. Biological opinion on the effects of the Northern Rocky Mountains Lynx Amendment on the Distinct Population Segment (DPS) of Canada lynx (lynx) in the contiguous United States. Helena, MT. 85 pp.

[4] Interagency Lynx Biology Team. 2013. *Canada lynx conservation assessment and strategy*. 3rd edition. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication R1-13-19, Missoula, MT. 128 pp.

[5]Gatlin, J., and others. 2020. Habitat Mapping Documentation for Canada Lynx (*Lynx* canadensis) on the Beaverhead-Deerlodge National Forest - 2020 Update. Unpublished paper. USDA Forest Service, Dillon, MT. 34 pp.

Mapping Update - Process Summary

The Lynx Conservation Agreement[6] provided initial direction for managing Canada lynx habitats on National Forest System (NFS) lands and emphasized the use of habitat mapping direction provided in the 2000 Lynx Conservation Assessment and Strategy (LCAS)[7]. Although the LCAS recommended specific habitat types most preferred by lynx for mapping lynx habitat on National Forests in Montana, **habitat type** data sets where not available on the BDNF when the Forest initially mapped habitat in 2000; thus, biologists and silviculturists on the Forest utilized SILC-3 cover type and aspect combinations as a proxy for mapping lynx habitat, which resulted in a very conservative approach that included many acres of non-boreal forest habitat types that do not support lynx. The BDNF's 2020 mapping update utilized the same habitat mapping direction provided in the 2000 LCAS for mapping lynx habitat on the forest, but incorporated improved vegetation data sets and refined Geographic Information System (GIS) mapping tools to more accurately identify and spatially delineate the boreal forest habitat types (subalpine fir, Engelmann spruce, and other mesic habitat types) that are capable of supporting lynx on the BDNF.

Mapping guidelines in the 2000 LCAS also provide a process for delineation of Lynx Analysis Units (LAUs) that approximate the size of a female lynx annual home range (25-50 square miles) and incorporate at least 10 square miles of primary vegetation that includes subalpine fir and/or Engelmann spruce forest habitat types; LAU delineation allows for a consistent means of analyzing the effects of management actions at the project level, and a means for analyzing compliance with standards and guidelines in the NRLMD. As is described in the BDNF's process paper (page 3), in 2000 the Forest initiated a four-step LAU development process by delineating all 6th code HUCs as individual LAUs regardless of location, size or the amount of lynx habitat within each. The 2nd, 3rd and 4th steps included removing HUCs that did not contain lynx habitat, and combining or rearranging HUC boundaries to meet LCAS criteria for LAU size (25 – 50 square miles) and minimum amounts of lynx habitat within each (>10 square miles of primary vegetation). However, additional refinement beyond the first step was never completed in 2000 per LCAS mapping direction, resulting in many LAUs that don't meet mapping criteria provided in the LCAS, don't allow for accurate management action effects analyses at the project scale, and don't allow for accurate assessments of compliance with standards and guidelines in the NRLMD. As is described in the BDNF's updated habitat documentation process paper (Gatlin, J., and others. 2020), the Forest re-delineated LAUs by incorporating the refined lynx habitats described previously, and the LCAS LAU delineation criteria described above.

Conclusion

This 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 LCAS (Ruediger et al., 2000). In addition, refined LAU delineatons are consistent with criteria provided in the 2000 LCAS (Ibid), 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.

[6] USDA Forest Service & USDI Fish and Wildlife Service. 2000. Canada lynx conservation agreement. 12 pp.

[7] Ruediger, Bill, Jim Claar, Steve Gniadek, Bryon Holt, Lyle Lewis, Steve Mighton, Bob Naney, Gary Patton, Tony Rinaldi, Joel Trick, Anne Vandehey, Fred Wahl, Nancy Warren, Dick Wenger, and Al Williamson. 2000. Canada lynx conservation assessment and strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp.

USDA United States Department of Agriculture

Habitat Mapping Documentation for Canada Lynx (*Lynx canadensis*) on the Beaverhead-Deerlodge National Forest – 2020 Update

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Contents

List of Tables

List of Figures

Key Abbreviations

BARC: Burned Area Reflectance Classification

BDNF: Beaverhead-Deerlodge National Forest

ESI: early stand initiation

FEIS: Final Environmental Impact Statement

LAU: lynx analysis unit

LCAS: Lynx Conservation Assessment and Strategy

MMS: mature; multi-storied

MTBS: Monitoring Trends in Burn Severity

NRLMD: Northern Rockies Lynx Management Direction

PVT: potential vegetation types

SE: stem exclusion

SI: stand initiation

SNODAS: Snow Data Assimilation System

VMap: Northern Region Existing Vegetation Mapping program

Introduction

This document describes the process used to update geospatial layers and lynx analysis units (LAUs) for Canada lynx on the Beaverhead-Deerlodge National Forest[8] ("Forest" or BDNF). This process follows mapping guidelines in the LCAS (Reudiger et al. 2000), the NRLMD (USDA Forest Service 2007), the Regional Forester's Memo (Marten 2016), and meets LAU Standard 1 outlined in the Record of Decision for the NRLMD (USDA Forest Service 2007) using improved vegetation datasets, habitat information, and remote sensing tools. In addition, Eastside Forests in Montana worked with the Regional Office to develop a consistent way to model and create a map product that supports both broad-scale and project-level analyses for lynx (USDA Forest Service 2016). This guidance developed rule sets that utilized available data to best identify and predict lynx habitat and vegetation structural stages.

The following direction guided this process:

- Information and direction contained in the original Canada Lynx Conversation Assessment and Strategy (LCAS; Reudiger et al. 2000);
- Northern Rockies Lynx Management Direction (NRLMD; USDA Forest Service 2007);
- Potential vegetation type (PVT) classification for the Northern Region (USDA Forest Service 2004);
- Guidance and direction provided in the 2016 Regional Forester's memo for clarification of lynx habitat mapping (Marten 2016); and
- Region 1 Vegetation Mapping Program (VMap) classification for the Beaverhead-Deerlodge National Forest (Ahl et al. 2018).

In 2019, the Forest began to update the previous habitat maps using this guidance and produced a geospatial map layer of lynx habitat and lynx analysis units for the BDNF. The resulting map products (Appendix B) identify updated "mapped lynx habitat", including LAUs and vegetation structural stages.

Previous Lynx Habitat Mapping

In 2001, the Beaverhead-Deerlodge National Forest estimated lynx habitat and delineated associated LAUs using the best available vegetation datasets at the time.

Data Sources and Assumptions

At that time, the BDNF did not have a consistent habitat mapping method but determined the best data source combined two existing geospatial products: remotely-sensed satellite imagery (SILC-3) and aspect from 30-meter digital elevation models (DEMs). Satellite imagery land classification, version 3 (SILC-3) delineates existing vegetation attributes (cover type) across the entire landscape, and, when combined with aspect from the DEMs, created a surrogate for habitat types that represented potentially suitable habitat for Canada lynx. Using this guidance, the Forest

[8] The Helena-Lewis and Clark National Forest jointly administers the Elkhorn portion with the BDNF. The Helena-Lewis and Clark identified and mapped lynx habitat and associated LAUs within the Elkhorn Mountain Range in a separate process paper (USDA Forest Service 2020). This document does not address the Elkhorn landscape.

used attributes from existing vegetation datasets, namely subalpine fir, spruce, and cool-moist Douglas-fir habitat types, to identify lynx habitat.

Lynx Habitat

Rationale

The Canada lynx was listed as threatened in March of 2000. As a result, the Forest Service agreed to identify and map lynx habitat and lynx analysis units within the National Forest System per the Lynx Conservation Agreement (USDA Forest Service & USDI Fish and Wildlife Service 2000) between the U.S. Forest Service and the U.S. Fish and Wildlife Service. The LCAS (Reudiger et al. 2000) served as the basis for describing habitat for mapping activities.

Process

Biologists and silviculturists determined the cover type and aspect combinations (Table 1) that likely incorporated desirable snowshoe hare habitat based on existing seral vegetation stage and moisture. Subject matter experts expected this method overestimated lynx habitat acres due to the lack of data specific to the habitat types most preferred by lynx. However, this conservative approach was accepted as the best available means of mapping lynx habitat on the Forest at the time. This process resulted in 2,711,422 acres of lynx habitat on the Beaverhead-Deerlodge National Forest.

Table 1. Cover type and aspect combinations used to map lynx habitat in 2001.

SILC-3 Cover Type	Aspect
4101 aspen	all
4102 broadleaf forest	all
4201 Engelmann spruce	all
4203 lodgepole pine	all
4208 subalpine fir	all
4212 Douglas-fir	northeast, north, northwest, flat
4219 alpine forest	all
4220 mixed subalpine forest	all
4221 mixed mesic forest	all
4223 Douglas-fir/lodgepole pine	northeast, north, northwest, flat
4224 burned timber stands	all
4225 Douglas-fir/grand fir	all
4229 western larch/Douglas-fir	northeast, north, northwest, flat
4301 mixed forest	all
6101 needleleaf-dominated riparian	all
6102 broadleaf-dominated riparian	all
6103 needleleaf/broadleaf riparian	all
6104 mixed riparian	all
6202 shrub riparian	all
6203 mixed non-forest riparian	all

Lynx Analysis Units

Rationale

Identifying lynx analysis units were another requirement of the Conservation Agreement (USDA Forest Service & USDI Fish and Wildlife Service 2000). Lynx analysis units provide a scale to begin the analysis of potential direct and indirect effects of projects or activities on individual lynx (Ruediger et al. 2000). In general, LAUs should approximate the size of a female lynx annual home range (25-50 square miles or 15,000-30,000 acres) and each LAU should incorporate a minimum of 10 square miles of primary vegetation that includes alpine forest or Engelmann spruce forest habitat types (Ruediger et al. 2000; USDA Forest Service 2007). Hydrologic Unit Codes (HUCs)[9] serve as the starting point to delineate LAUs (Ruediger et al. 2000).

Process

The Forest developed the following steps to identify LAUs:

1. Start with the entire boundary of all 6th code HUCs[10] within the southwest Montana extent that contains the Beaverhead-Deerlodge National Forest.
2. Remove HUCs that do not contain lynx habitat.
3. Trim portions of HUCs that do not contain or are not adjacent to lynx habitat.
4. Split and combine remaining HUCs into appropriately sized polygons to meet the contiguous habitat criteria, as described by Ruediger et al. (2000).

After identifying 2.7 million acres of lynx habitat, the BDNF began the initial LAU mapping process using 6th code HUCs as the starting point. However, additional refinement beyond the first step was not completed per direction during that time.

This resulted in 509 LAUs that contained a range of 0 – 24,101 acres of lynx habitat per LAU. 118 LAUs had 0 acres of mapped lynx habitat and 208 LAUs contained less than 6,000 acres, which does not meet the minimum life history requirements of a female lynx or the LCAS mapping recommendation for incorporating at least 6,400 acres of primary vegetation per LAU.

Consequently, the currently mapped LAU boundaries do not accurately represent the appropriate scale to analyze potential direct and indirect effects of projects or activities on individual lynx as intended and required by the NRLMD. As such, the Forest determined the LAU process should be completed to support more accurate project and activity effects analysis.

Updated Lynx Habitat Mapping

Methods outlined in this section incorporate the best available scientific information concerning lynx populations, distribution, habitat use, and prey species to generate an updated habitat model,

[9] Hydroloic Unit Codes (HUCs) describe the contributing drainage area of a stream from large scale "regions" down to small scale "subwatersheds".
[10] 6th code HUCs are at the subwatershed level, which subdivides a watershed into respective drainage parts.

associated LAUs, and structural stage classification. This update incorporates new information and delineates appropriately sized LAUs.

Data Sources and Assumptions

Data and associated assumptions used to generate the updated lynx habitat model, structural stages, and LAUs are described below:

VMap, Version 18

VMap, a spatial database derived from remote-sensing landscapes, classifies existing vegetation and contains attributes including life form, dominance type, tree canopy cover class, and tree size class based on the Region 1 existing vegetation classification system. The base imagery is 10-meter resolution, but pixels are aggregated into smoothed polygons based on similarity of vegetation within a given area. Size of polygons range from 2 to 10 acres with no minimum or maximum size limitations. This allows for an accurate spatial depiction of vegetation pattern across the landscape. An accuracy assessment supports each attribute which provides a quantified estimate of the error associated with each mapped class. Due to its accuracy, VMap-18 polygons were used as the base mapping units and starting point to identify lynx habitat.

Potential Vegetation Types (PVT)

Potential vegetation types (PVT) consist of broad habitat type groups. PVT describes the type of habitat that may be present on the landscape based on an aggregation of plant communities of similar biophysical characteristics and similar function and response to disturbances. For example, areas with cool and wet characteristics may be assigned to the “abla1” (subalpine fir) habitat type. PVT was assigned to the base VMAP polygons using FSVeg data where available, and Jones PVT where FSVeg was unavailable.

FSVeg

FSVeg is a vegetation database composed of vegetation condition data on National Forest System lands. Data sources that contribute to this database include on-the-ground site visits (e.g. common stand exams), aerial photo interpretation, and extrapolation of vegetation information from neighboring stands. Information on habitat type (Pfister et al. 1997), where available, was the only attribute from FSVeg used in this analysis. FSVeg is assumed to be the most accurate dataset for determining habitat type because data are obtained from actual field visits and data extrapolation is completed by local, field-going personnel. However, border-to-border FSVeg data does not exist on the BDNF and only occurs where suitable timber exists on the landscape. Areas that do not have FSVeg data include wilderness and roadless areas, private lands, and newly acquired National Forest System lands.

Jones PVT

Jones PVT (2004) covers all of Region 1 as a contiguous, 90-meter raster of unknown accuracy. It uses point locations of known habitat types, and anecdotal reviews suggest it provides good estimations at broad scales but contains errors at finer scales and site-specific locations.

Regeneration Disturbance

Disturbance layers used in this process include regeneration timber management activities, high and moderate severity wildfire, and other disturbance processes such as insects and disease and

windthrow. The Forest used disturbance layers to filter potential erroneous habitat type assignments and to classify structural stages. Specific data included the following:

Timber management disturbance
Regeneration activities, queried from the Forest Activity Tracking System (FACTS) database, generally utilizes timber stands which average 40 acres in size. Structural stages within the 40-acre plots may differ because a management activity may affect only a portion of the stand, which causes an over-representation of actual disturbance. For example, "patch clearcut" may only occur within a single stand within the 40-acre polygon, although the regeneration treatment applies to the entire acreage.

Wildfire disturbance
Fire severity data from both the Burned Area Reflectance Classification (BARC) and Monitoring Trends in Burn Severity (MTBS) was used in this process. The BARC database, the primary source for fire severity, contains a satellite-derived data set of post-fire vegetation condition ranked from low severity to high. MTBS, the secondary source for fire severity data, consists of a 30-meter remote-sensing derived raster produced using Landsat TM imagery and is available for fires greater than 1000 acres, post-1984. This product is produced without field validation or an accuracy assessment. When fire severity data is lacking, external fire perimeters are used to indicate disturbance and are assigned an "unknown" severity.

Other disturbances
The updated mapping effort also considered other regeneration disturbances where mapped or otherwise identified. These include timber harvest on non-Forest Service owned lands, insect-cause mortality at severities sufficient to reset stands to regeneration (primarily mountain pine bark beetle and Douglas-fir bark beetle), and any other identified source, such as wind, flood, or other damage.

Snow Data Assimilation System (SNOWDAS)

The NOAA National Weather Serve's National Operational Hydrologic Remote Sensing Center Snow Data Assimilation System contributes to this dataset and consists of snowpack properties, such as depth and snow water equivalent. SNODAS was developed to provide the best possible estimates of snow cover and associated parameters to support hydrologic modeling and analysis.

Biophysical Attributes

Measures of elevation, aspect, and slope are included in VMap data. Results of studies conducted on lynx habitat use during winter in northwest Montana (Squires et al. 2010) provided empirical data for establishing snow depths that provide a competitive advantage over other meso-carnivores during winter, and development of corresponding lower elevational thresholds for mapping lynx habitat (refer to the mapping process descriptions). Due to the diverse landscape on the BDNF, the elevation where snow depth met the minimum requirement varied by location. Aspect was used for structural stage classification to further inform the lynx habitat model.

Lynx Habitat

Rationale

The process described in this document for updating lynx habitat is consistent with Appendix B in the NRLMD (USDA Forest Service 2007), the NRLMD Biological Opinion (USDI Fish and Wildlife Service 2007), the LCAS (Ruediger et al. 2000), and the memo on Clarification on Lynx Habitat Mapping in Region 1 (Marten 2016). Mapping updates such as this were anticipated in the final environmental impact statement, record of decision, and biological opinion for the NRLMD as indicated in the following statements:

- Lynx habitat maps (and lynx analysis units) would be refined and updated as new information and improved GIS mapping techniques become available (USDI Fish and Wildlife Service 2007); and
- Map vegetation that could contribute to lynx habitat, as described for each geographic area in the Lynx Conservation Assessment and Strategy, using the finest-scale vegetation information that is available (USDA Forest Service 2007).

This update used geospatial data that could contribute to lynx habitat (as described for each geographic area in the 2000 LCAS) using the finest-scale vegetation information available (USDA Forest Service 2016) to map primary and secondary vegetation. Primary vegetation is composed of subalpine fir habitat types dominated by cover types of spruce/fir, Douglas-fir, and seral lodgepole pine that support foraging, denning, and young-rearing (USDA Forest Service 2016). Secondary vegetation consists of other cool, moist habitat types (e.g., Douglas-fir, grand fir) that may contribute to lynx habitat where intermingled and immediately adjacent to primary vegetation (USDA Forest Service 2016). Note that a habitat type is an aggregation of plant communities of similar biophysical characteristics and similar function and response to disturbances whereas a cover type is the vegetation composition of an area, as described by the dominant plant species.

In addition to existing vegetation data, a snow-depth filter improved the model. Habitats with deep, fluffy snow give lynx a competitive advantage over animals that do not have large feet adapted for over-snow travel, such as bobcats, mountain lions, and coyotes (Ruggiero et al. 1999).

Process

VMap-18 vegetation polygons were used as the base mapping units for identifying lynx habitat. The polygons are attributed with existing vegetation information (such as cover type, size class, and canopy cover) and biophysical setting data (aspect and elevation) that are used in the modeling process to classify lynx habitat. When additional attributes from other data sources are utilized, such as habitat type and disturbance data, a zonal majority spatial update process assigns these additional attributes to the existing VMap-18 polygons. This process maintains the VMap-18 polygons as the base mapping units.

The stepwise process for determining lynx habitat on the landscape is outlined below:

1. Starting with VMap-18 data, polygons labeled with an existing cover type of “urban” or “water” were re-classified into non-habitat and were removed from further analysis.

2. The remaining polygons were assigned a Potential Vegetation Type (PVT). PVT was assigned via a crosswalk (Milburn et al. 2015) based on FSVeg habitat types defined in *Forest Habitat types of Montana* (Pfister et al. 1977). Where FSVeg data was not available, PVT was assigned using SILC3 PVT (Jones 2004).
3. VMap polygons assigned subalpine fir and Engelmann spruce potential vegetation types (abla1, abla2, abla3, abla4, abla5, and picea) were classified as *preliminary primary vegetation* habitat.
4. All VMap polygons assigned moist Douglas-fir and Grand fir potential vegetation types (psme2, abgr2, abgr3) were classified as *preliminary secondary vegetation* habitat.
5. All remaining VMap polygons were classified as non-habitat and were removed from further analysis.
6. *Preliminary* habitat polygons (consisting of both primary and secondary vegetation as identified in steps 3 and 4, respectively) were checked for PVT classification errors. The assigned PVT may be an error where a VMAP polygon labeled with a non-tree cover type (i.e., shrub, grass, or non-vegetated) was assigned a forested PVT type. This combination of a forested PVT assigned to a polygon with a non-tree cover type occurs for one of two reasons:
    a. a disturbance on the landscape "reset" the cover type to an earlier regeneration phase; or
    b. the polygon was assigned an inaccurate potential vegetation type from the Jones' PVT data source.

    Polygons with non-tree cover type attributes were compared to known regeneration disturbance layers (timber management, wildfire, and other disturbances). Non-tree polygons that overlapped with a disturbance were retained as preliminary habitat. Non-tree polygons that did not overlap with disturbances were deemed to be erroneously assigned a forested habitat type and were thus classified as non-habitat and removed from further analysis.
7. A snow-depth elevation filter (Klein-Baer et al. 2019) further refined the preliminary habitat. Areas with deep, fluffy snow provide a competitive advantage for lynx during winter. Telemetry studies in northwest Montana indicated that lynx selected habitats with a minimum snow depth of 50 centimeters (Squires et al. 2010). For each 5th code (HUC10) watershed on the BDNF, average snow depths (obtained from SNOWDAS) greater than 50 centimeters from December to May 2009-2019 were used to determine the lower threshold elevation for habitat. BDNF personnel with site-specific knowledge of winter conditions on the landscape reviewed the modeled threshold elevations for each HUC10 watershed. In watersheds where the modeled threshold elevation was not consistent with local observation of snow depth (Table 2), site visits determined the corrected threshold elevation value. Preliminary habitat polygons falling below the validated 50-centimeter snow depth threshold elevation within each HUC10 watershed were reclassified as non-habitat and removed from further analysis.

Table 2. Watersheds where habitat polygons were changed to reflect ground-verified snow elevations.

Landscape	Area Description	Watershed Name	Watershed HUC
Bighole	Fishtrap/La Marche/Seymour	North Fork Bighole River	100200405
		Christiansen Creek–Bighole River	1002000406

Landscape	Area Description	Watershed Name	Watershed HUC
		Deep Creek	1002000407
		Fishtrap Creek-Bighole River	1002000408
Jefferson River	Highlands	Big Pipestone Creek	1002000502
		Middle Jefferson River	1002000505
		Upper Jefferson River	1002000501
Gravellys	West Fork Madison	Lake Creek	1002000705
		West Fork Madison	1002000706

8. A 300 meter proximity filter was applied to refine secondary vegetation. If any part of a preliminary secondary vegetation polygon was within 300 meters of a primary vegetation polygon, the entire secondary vegetation polygon was retained as secondary vegetation that contributes to lynx habitat. Retaining the entire polygon where any portion was within 300 meters of primary vegetation resulted in retaining secondary vegetation polygons, extending from 0 to approximately 600 meters away from primary vegetation polygons (Figure 1). 600 meters is consistent with research for snowshoe hares using secondary vegetation proximal to primary vegetation habitat (Lewis et al. 2011). Secondary vegetation polygons located (in their entirety) more than 300 meters from primary vegetation polygons were reclassified as non-habitat and removed from further analysis.

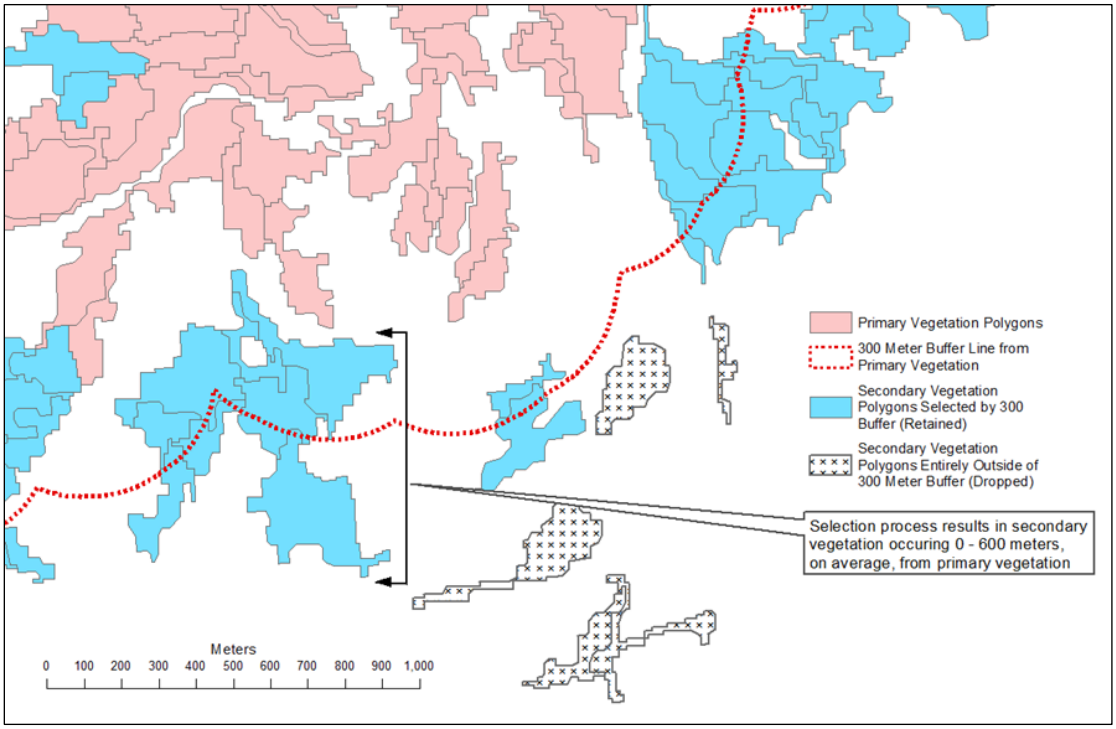

Figure 1. Example of refining secondary vegetation polygons within a 300 meter buffer from primary vegetation polygons.

9. All remaining habitat was carried forward into the lynx analysis unit delineation process.

Lynx Analysis Units

Rationale

The NRLMD includes a standard that directs the appropriate process for changing lynx analysis unit boundaries because delineated lynx habitat was likely to change over time as a result of lynx habitat mapping updates that incorporated improved vegetation data sets. This standard (LAU S1) states: "Changes in LAU boundaries shall be based on site-specific habitat information and after review by the Forest Service Regional Office" (Standard 1, USDA Forest Service 2007). For this reason, LAUs previously delineated in 2000 were not utilized as part of this process because: 1) the vegetation data sources are outdated; 2) the LAUs were based on 6th code HUCs that are relatively small and incapable of incorporating enough lynx habitat to support a female lynx home range; and 3) the LAUs incorporated entire watersheds that included lower elevations that encompassed vegetation types that do not provide habitat for lynx.

The LCAS (Reudiger et al. 2000) and the NRLMD (USDA Forest Service 2007) outlined criteria and related information when identifying LAUs and mapping lynx habitat. This process considered the following criteria and variables:

- Follow watershed boundaries, where appropriate;
- LAUs could encompass both potential lynx habitat (e.g., denning and foraging capable habitat) and non-lynx habitat (e.g., unsuitable areas such as lakes, low elevation ponderosa pine forest, and alpine tundra);
- The size of LAUs should generally be 25-50 mi² (15,000 to 25,000 acres) in size and likely larger in less contiguous or poor-quality habitat;
- Areas with small amounts of lynx habitat incapable of supporting a lynx home range (less than 6,400 acres) may be incorporated into neighboring LAUs or discarded or as lynx habitat if further than a day's travel distance for a lynx (3-6 miles) from the nearest neighboring LAU; and
- The distribution of habitat across the LAU should consider daily movement distances of resident females (typically up to 3-6 miles).

Process

The following method was used to update LAU delineations:

1. Initial LAU polygons were created by buffering lynx habitat by ¼ mile. This distance was used to optimize boundary smoothing while minimizing the inclusion of non-habitat areas.
2. The Forest then excluded areas that overlapped with existing LAUs on adjacent National Forest system lands. This resulted in a coincident boundary between the BDNF and other forest LAUs.
3. The resulting polygons were divided into LAUs using 6th code watershed boundary lines (HUC-12) to attain habitat acreage as close as possible to the suggested optimum range of 15,000-25,000 acres. Some LAUs fell outside of this range due to natural barriers, isolation, or other reasons; however, these LAUs were retained if minimum standards for lynx life history needs and spatial arrangement criteria were met. Per the LCAS, modeling should consider daily movement distances of resident females (3-6 miles) and should contain 6,400

acres of primary vegetation to support lynx (Reudiger et al. 2000). Areas with insignificant amounts of lynx habitat may be discarded (Ibid).

4. Polygons that did not meet minimum life history lynx standards or spatial arrangement criteria were re-classified as non-habitat and removed from further analysis. This included fragmented habitat consisting of areas further than 6 miles from other habitat and less than 6,400 acres of primary vegetation. Areas where habitat polygons did not meet delineation definitions (as described above) included: Bull Mountains (on-forest), southern Lima Tendoys (on-forest), Ruby Mountains (off-forest), and Rock Creek valley bottom (off-forest).
5. The resulting lynx habitat within delineated LAUs was calculated as:
   - Primary vegetation habitat: 1,509,146 acres
   - Secondary vegetation habitat: 116,660 acres
   - Total lynx habitat: 1,625,806 acres
6. LAUs were assigned an alpha-numeric label in the form of "AA-NN", where "AA" is the forest plan landscape abbreviation code and "NN" is a sequential number, resulting in 78 individual LAUs containing lynx habitat ranging from 12,603 to 29,880 acres, with an average of 20,844 acres per LAU.

Structural Stage Classification

Rationale

Per the standards and guidelines in the NRLMD (USDA Forest Service 2007), the Forest classified lynx habitat (as identified in the *Lynx Habitat* section of this document) into five structural stages (Table 3). Although not part of the LCAS habitat mapping requirement, the Forest completed the exercise to assist with analysis at the project level.

Table 3. Lynx habitat structural stages per the Northern Rockies Lynx Management Direction (USDA Forest Service 2007).

Structural Stage	Definition	Model Parameters
Early stand initiation (ESI)	Stage that develops after a stand-replacing disturbance, such as fire, a regeneration harvest, or blowdown. A new single-story layer of shrubs and trees establish and develop. Trees are not tall enough to protrude above snow and stands are unsuitable for snowshoe hares in winter.	• Non-disturbed habitat stands that met ESI criteria based on the VMap crosswalk (Appendix A). • Disturbed habitat stands where: ○ Regeneration disturbance occurred in the last 20 years on NE, N, NW, and level aspects; or ○ Regeneration disturbance occurred in the last 30 years on E, SE, S, SW, W aspects.

Structural Stage	Definition	Model Parameters
Stand initiation (SI)	Stage that develops after a stand-replacing disturbance, such as fire, a regeneration harvest, or blowdown. A new single-story layer of shrubs and trees establish and develop. The trees are tall enough to protrude above snow and provide habitat for snowshoe hares in winter.	• Non-disturbed habitat stands that met SI criteria based on the VMap crosswalk (Appendix A). • Habitat stands where regeneration disturbance occurred: ○ within the last 21 to 40 years on NE, N, NW, and level aspects; or ○ within the last 31 to 40 years on E, SE, S, SW, W aspects.
Stem exclusion (SE)	This is a closed canopy stage. Trees initially grow fast and occupy all the growing space. Tall trees shade the forest floor so understory plants (including trees) grow more slowly.	• Non-disturbed habitat stands that met SE criteria based on the VMap crosswalk (Appendix A). • Habitat stands where regeneration disturbance occurred: ○ within in the last 41 to 80 years and VMap attributes are absent (i.e., “transitional forest”); or ○ within the last 41 to 80 years and VMAP attributes are present.
Mature; Multi-storied (MMS)	Many age classes and vegetation layers exist, including large, old trees and decaying trees.	• Non-disturbed habitat stands that met MMS criteria based on the VMap crosswalk (Appendix A). • Habitat stands where regeneration disturbance occurred: ○ more than 80 years ago and VMAP attributes are absent (i.e., “transitional forest”); or ○ more than 80 years ago and VMAP attributes are present.
Other (OT)	Any stand that does not fall into one of the above categories.	• Remaining stands of lynx habitat outside of the structural stages listed above.

Process

The Forest used the following method to assign structural stages to habitat:

1. Lynx habitat polygons without disturbances were assigned an initial classification based on VMap attributes. To complete this step, BDNF specialists created a “VMap to Structural Stage Crosswalk” (Appendix A). This crosswalk started with the Region 1 Eastside Forest Canada Lynx Habitat Mapping Model (USDA Forest Service 2016) which defined the default structural stage in polygons without disturbance. Specialists reviewed the crosswalk and polygons that did not fit the default regional model were modified based on local knowledge (BDNF modified structure).
2. Polygons that overlapped with disturbances were then reclassified based on the type and age of the disturbance. For this step, “disturbance” was defined by:
   - FACTS database past activities with the following codes: 2400, 3350, 4101, 4102, 4110, 4111, 4113, 4115, 4116, 4117, 4121, 4122, 4123, 4131, 4132, 4133, 4134, 4141, 4142, 4143, 4145, 4146, 4147, 4148, 4151, 4152, 4162, 4175, 4176, 4177, 4183, 4192, 4193, 4194, 4196, 4231, 4240, 4242, 4270, 6104, 6130, or 6132;
   - Past fires with a high, moderate, or an unknown burn intensity (where intensity was unknown, the entire fire perimeter was considered disturbance);
   - Off-forest and non-Forest Service harvest activities, where known; or

- Other stand-replacing disturbances, where mapped, and age of disturbance is known or estimated.

3. Lynx habitat polygons were assigned a final structural stage using a decision tree (Figure 2). Note that there is a difference between *disturbance age* and *data age*, in that the age of disturbance will change every year. This process contains two assumptions: disturbance data are more accurate than VMap attribute values for disturbances less than forty years old and VMap values (not including "transitional forest") are more accurate than disturbance data for disturbance areas greater than forty years old. Thus, if the age of disturbance is less than forty years old, disturbance data was used to determine the structure. If the age of disturbance is more than forty years old, VMap was used in areas where VMap attributes are other than "transitional forest". If "transitional forest" is listed as an attribute, then disturbance data was used for a structural stage determination.

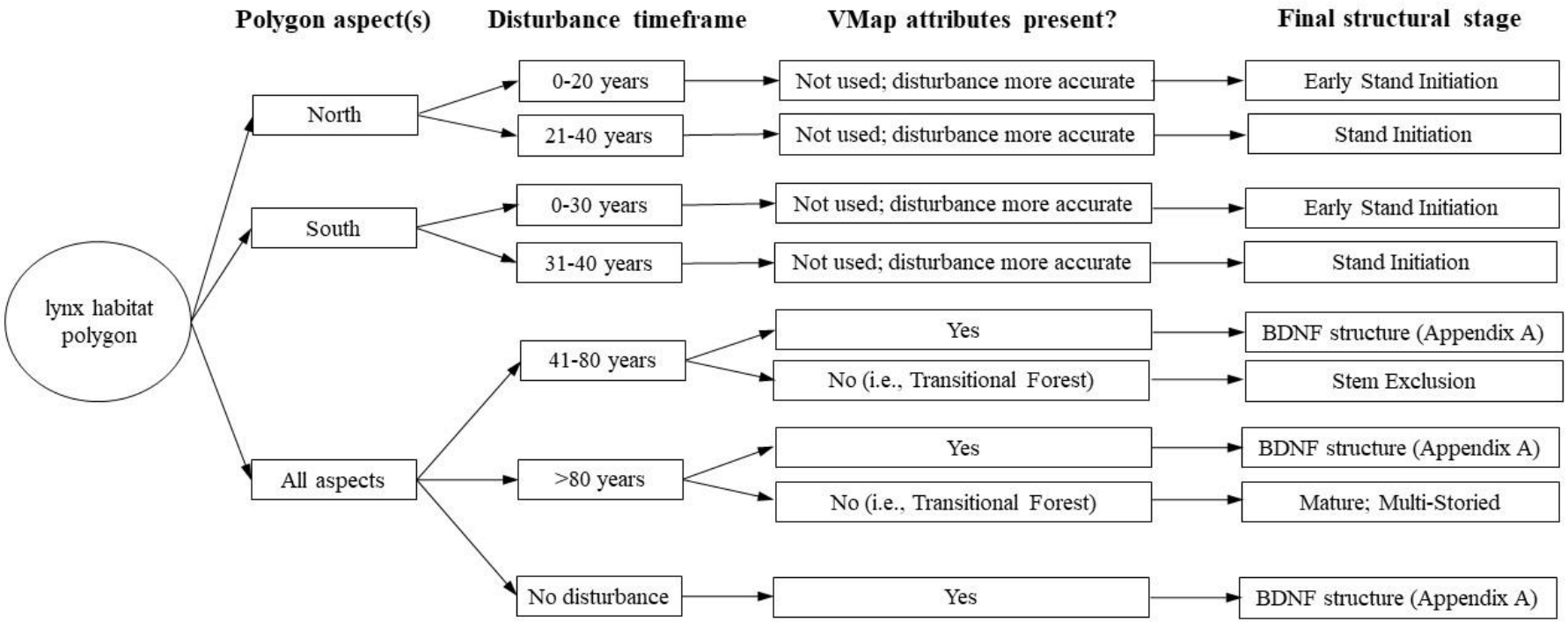

Figure 2. Process to assign a structural stage to lynx habitat polygons based on aspect, disturbance timeframe, and VMap attributes.

Habitat or Structural Stage Errors

In some cases, ground-verification reveals inaccurate habitat mapping or structural stage determinations. This generally occurs when field specialists verify the existing conditions within a project area prior to analysis. If mapped habitat or structural stage in the updated geospatial layer differs from existing on-the-ground conditions, updates will be made to the lynx habitat polygon or structural stage attributes to reflect the current conditions. Per guidance in the NRLMD, maps of lynx habitat would be reviewed and updated based on local information during site-specific project analysis (USDA Forest Service 2007).

Summary

The Beaverhead-Deerlodge National Forest updated lynx habitat, lynx analysis units, and assigned vegetation structural stages in 2020. This document describes the rationale, the methodology, and the data used to complete these updates. The current method utilizes the best available information to model and identify lynx habitat on the BDNF.

Current data indicates there is less mapped lynx habitat than previously estimated in 2000. In addition, fully delineating LAUs per mapping guidelines in the LCAS (Reudiger et al. 2000), the NRLMD (USDA Forest Service 2007), and the Regional Forester's Memo (Marten 2016) reduced the number and increased the size of LAUs. Table 4 reflects the changes from the previous mapping process in 2000 to the current mapping effort in 2020.

Table 4. Comparison of lynx habitat acres, number of lynx analysis units, and the range of habitat within lynx analysis units between mapping efforts.

Metric	2001 mapping effort	2020 mapping effort	Difference
Lynx habitat (acres)	2,711,422	1,625,806	-1,085,616
Lynx analysis units (number)	509	78	-431
Range of lynx habitat within LAUs (acres)	0-24,101	12,603 - 29,880	Minimum +12,603 Maximum +5,779

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Appendix A: VMap to Structural Stage Crosswalk.

Table A- 1. Crosswalk between VMap attributes and the resulting Forest modified structure based on local knowledge.

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	PIPO	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PIPO	5-9.9	10-24.9	all	Other
TREE	PIPO	10-14.9	10-24.9	all	Other
TREE	PIPO	10-14.9	25-39.9	all	Other
TREE	PIPO	10-14.9	40-59.9	all	Other
TREE	PIPO	15-19.9	25-39.9	all	Other
TREE	PIPO-IMIX	5-9.9	10-24.9	all	Other
TREE	PIPO-IMIX	5-9.9	25-39.9	all	Other
TREE	PIPO-IMIX	10-14.9	10-24.9	all	Other
TREE	PIPO-IMIX	10-14.9	25-39.9	all	Other
TREE	PIPO-IMIX	15-19.9	10-24.9	all	Other
TREE	PIPO-IMIX	15-19.9	25-39.9	all	Other
TREE	PSME	0-4.9	10-24.9	all	Early Stand Initiation
TREE	PSME	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PSME	0-4.9	40-59.9	all	Stand Initiation
TREE	PSME	0-4.9	≥ 60	all	Stand Initiation
TREE	PSME	5-9.9	10-24.9	all	Other
TREE	PSME	5-9.9	25-39.9	all	Other
TREE	PSME	5-9.9	40-59.9	all	Other
TREE	PSME	5-9.9	≥ 60	all	Stem Exclusion
TREE	PSME	10-14.9	10-24.9	all	Other
TREE	PSME	10-14.9	25-39.9	all	Other
TREE	PSME	10-14.9	40-59.9	all	Other

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	PSME	10-14.9	≥ 60	all	Other
TREE	PSME	15-19.9	10-24.9	all	Other
TREE	PSME	15-19.9	25-39.9	all	Other
TREE	PSME	15-19.9	40-59.9	all	Other
TREE	PSME	15-19.9	≥ 60	all	Other
TREE	PSME	≥ 20	10-24.9	all	Other
TREE	PSME	≥ 20	25-39.9	all	Other
TREE	PSME	≥ 20	40-59.9	all	Other
TREE	PSME	≥ 20	≥ 60	all	Other
TREE	PSME-IMIX	0-4.9	10-24.9	all	Early Stand Initiation
TREE	PSME-IMIX	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PSME-IMIX	0-4.9	40-59.9	all	Stand Initiation
TREE	PSME-IMIX	0-4.9	≥ 60	all	Stand Initiation
TREE	PSME-IMIX	5-9.9	10-24.9	all	Other
TREE	PSME-IMIX	5-9.9	25-39.9	all	Other
TREE	PSME-IMIX	5-9.9	40-59.9	all	Other
TREE	PSME-IMIX	5-9.9	≥ 60	all	Other
TREE	PSME-IMIX	10-14.9	10-24.9	all	Other
TREE	PSME-IMIX	10-14.9	25-39.9	all	Other
TREE	PSME-IMIX	10-14.9	40-59.9	all	Other
TREE	PSME-IMIX	10-14.9	≥ 60	all	Other
TREE	PSME-IMIX	15-19.9	10-24.9	all	Other
TREE	PSME-IMIX	15-19.9	25-39.9	all	Other
TREE	PSME-IMIX	15-19.9	40-59.9	all	Other
TREE	PSME-IMIX	15-19.9	≥ 60	all	Other
TREE	PSME-IMIX	≥ 20	10-24.9	all	Other

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	PSME-IMIX	≥ 20	25-39.9	all	Other
TREE	PSME-IMIX	≥ 20	40-59.9	all	Other
TREE	PSME-IMIX	≥ 20	≥ 60	all	Other
TREE	PSME-TMIX	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	PSME-TMIX	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	PSME-TMIX	15-19.9	25-39.9	all	Mature; Multi-Storied
TREE	PSME-TMIX	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	PSME-TMIX	15-19.9	≥ 60	all	Mature; Multi-Storied
TREE	PSME-TMIX	≥ 20	25-39.9	all	Mature; Multi-Storied
TREE	PSME-TMIX	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	ABGR	5-9.9	40-59.9	all	Other
TREE	PICO	0-4.9	10-24.9	all	Early Stand Initiation
TREE	PICO	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PICO	0-4.9	40-59.9	all	Stand Initiation
TREE	PICO	0-4.9	≥ 60	all	Stand Initiation
TREE	PICO	5-9.9	10-24.9	all	Other
TREE	PICO	5-9.9	25-39.9	all	Other
TREE	PICO	5-9.9	40-59.9	all	Other
TREE	PICO	5-9.9	≥ 60	all	Stem Exclusion
TREE	PICO	10-14.9	10-24.9	all	Other
TREE	PICO	10-14.9	25-39.9	all	Other
TREE	PICO	10-14.9	40-59.9	all	Stem Exclusion
TREE	PICO	10-14.9	≥ 60	all	Stem Exclusion
TREE	PICO	15-19.9	10-24.9	all	Other
TREE	PICO	15-19.9	25-39.9	all	Other
TREE	PICO	15-19.9	40-59.9	all	Stem Exclusion

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	PICO	15-19.9	≥ 60	all	Stem Exclusion
TREE	PICO	≥ 20	10-24.9	all	Other
TREE	PICO	≥ 20	25-39.9	all	Other
TREE	PICO	≥ 20	40-59.9	all	Stem Exclusion
TREE	PICO-IMIX	0-4.9	10-24.9	all	Early Stand Initiation
TREE	PICO-IMIX	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PICO-IMIX	0-4.9	40-59.9	all	Stand Initiation
TREE	PICO-IMIX	0-4.9	≥ 60	all	Stand Initiation
TREE	PICO-IMIX	5-9.9	10-24.9	all	Other
TREE	PICO-IMIX	5-9.9	25-39.9	all	Other
TREE	PICO-IMIX	5-9.9	40-59.9	all	Other
TREE	PICO-IMIX	5-9.9	≥ 60	all	Other
TREE	PICO-IMIX	10-14.9	10-24.9	all	Other
TREE	PICO-IMIX	10-14.9	25-39.9	all	Other
TREE	PICO-IMIX	10-14.9	40-59.9	NW thru NE	Mature; Multi-Storied
TREE	PICO-IMIX	10-14.9	40-59.9	E thru W	Other
TREE	PICO-IMIX	10-14.9	≥ 60	NW thru NE	Mature; Multi-Storied
TREE	PICO-IMIX	10-14.9	≥ 60	E thru W	Other
TREE	PICO-IMIX	15-19.9	10-24.9	all	Other
TREE	PICO-IMIX	15-19.9	25-39.9	all	Other
TREE	PICO-IMIX	15-19.9	40-59.9	NW thru NE	Mature; Multi-Storied
TREE	PICO-IMIX	15-19.9	40-59.9	E thru W	Other
TREE	PICO-IMIX	15-19.9	≥ 60	NW thru NE	Mature; Multi-Storied
TREE	PICO-IMIX	15-19.9	≥ 60	E thru W	Other
TREE	PICO-IMIX	≥ 20	10-24.9	all	Other
TREE	PICO-IMIX	≥ 20	25-39.9	all	Other

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	PICO-IMIX	≥ 20	40-59.9	NW thru NE	Mature; Multi-Storied
TREE	PICO-IMIX	≥ 20	40-59.9	E thru W	Other
TREE	PICO-IMIX	≥ 20	≥ 60	NW thru NE	Mature; Multi-Storied
TREE	PICO-IMIX	≥ 20	≥ 60	E thru W	Other
TREE	PICO-TMIX	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PICO-TMIX	0-4.9	40-59.9	all	Stand Initiation
TREE	PICO-TMIX	0-4.9	≥ 60	all	Stand Initiation
TREE	PICO-TMIX	5-9.9	10-24.9	all	Other
TREE	PICO-TMIX	5-9.9	25-39.9	all	Other
TREE	PICO-TMIX	5-9.9	40-59.9	all	Other
TREE	PICO-TMIX	5-9.9	≥ 60	all	Other
TREE	PICO-TMIX	10-14.9	10-24.9	all	Other
TREE	PICO-TMIX	10-14.9	25-39.9	all	Mature; Multi-Storied
TREE	PICO-TMIX	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	PICO-TMIX	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	PICO-TMIX	15-19.9	10-24.9	all	Other
TREE	PICO-TMIX	15-19.9	25-39.9	all	Mature; Multi-Storied
TREE	PICO-TMIX	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	PICO-TMIX	15-19.9	≥ 60	all	Mature; Multi-Storied
TREE	PICO-TMIX	≥ 20	25-39.9	all	Mature; Multi-Storied
TREE	PICO-TMIX	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	PICO-TMIX	≥ 20	≥ 60	all	Mature; Multi-Storied
TREE	ABLA	0-4.9	10-24.9	all	Early Stand Initiation
TREE	ABLA	0-4.9	25-39.9	all	Early Stand Initiation
TREE	ABLA	5-9.9	10-24.9	all	Other
TREE	ABLA	5-9.9	25-39.9	all	Other

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	ABLA	5-9.9	40-59.9	all	Other
TREE	ABLA	5-9.9	≥ 60	all	Other
TREE	ABLA	10-14.9	10-24.9	all	Other
TREE	ABLA	10-14.9	25-39.9	all	Other
TREE	ABLA	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	ABLA	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	ABLA	15-19.9	10-24.9	all	Other
TREE	ABLA	15-19.9	25-39.9	all	Other
TREE	ABLA	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	ABLA	≥ 20	25-39.9	all	Other
TREE	ABLA	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	ABLA-IMIX	0-4.9	10-24.9	all	Early Stand Initiation
TREE	ABLA-IMIX	0-4.9	40-59.9	all	Stand Initiation
TREE	ABLA-IMIX	5-9.9	10-24.9	all	Other
TREE	ABLA-IMIX	5-9.9	25-39.9	all	Other
TREE	ABLA-IMIX	5-9.9	40-59.9	all	Other
TREE	ABLA-IMIX	5-9.9	≥ 60	all	Other
TREE	ABLA-IMIX	10-14.9	10-24.9	all	Other
TREE	ABLA-IMIX	10-14.9	25-39.9	all	Other
TREE	ABLA-IMIX	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	ABLA-IMIX	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	ABLA-IMIX	15-19.9	10-24.9	all	Other
TREE	ABLA-IMIX	15-19.9	25-39.9	all	Other
TREE	ABLA-IMIX	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	ABLA-IMIX	15-19.9	≥ 60	all	Mature; Multi-Storied
TREE	ABLA-IMIX	≥ 20	25-39.9	all	Other

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	ABLA-IMIX	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	ABLA-TMIX	0-4.9	10-24.9	all	Early Stand Initiation
TREE	ABLA-TMIX	0-4.9	25-39.9	all	Early Stand Initiation
TREE	ABLA-TMIX	5-9.9	10-24.9	all	Other
TREE	ABLA-TMIX	5-9.9	25-39.9	all	Other
TREE	ABLA-TMIX	5-9.9	40-59.9	all	Other
TREE	ABLA-TMIX	5-9.9	≥ 60	all	Other
TREE	ABLA-TMIX	10-14.9	10-24.9	all	Other
TREE	ABLA-TMIX	10-14.9	25-39.9	all	Mature; Multi-Storied
TREE	ABLA-TMIX	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	ABLA-TMIX	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	ABLA-TMIX	15-19.9	10-24.9	all	Other
TREE	ABLA-TMIX	15-19.9	25-39.9	all	Mature; Multi-Storied
TREE	ABLA-TMIX	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	ABLA-TMIX	15-19.9	≥ 60	all	Mature; Multi-Storied
TREE	ABLA-TMIX	≥ 20	25-39.9	all	Mature; Multi-Storied
TREE	ABLA-TMIX	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	PIEN	0-4.9	10-24.9	all	Early Stand Initiation
TREE	PIEN	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PIEN	0-4.9	40-59.9	all	Stand Initiation
TREE	PIEN	0-4.9	≥ 60	all	Stand Initiation
TREE	PIEN	5-9.9	10-24.9	all	Other
TREE	PIEN	5-9.9	25-39.9	all	Other
TREE	PIEN	5-9.9	40-59.9	all	Other
TREE	PIEN	5-9.9	≥ 60	all	Other
TREE	PIEN	10-14.9	10-24.9	all	Other

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	PIEN	10-14.9	25-39.9	all	Other
TREE	PIEN	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	PIEN	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	PIEN	15-19.9	10-24.9	all	Other
TREE	PIEN	15-19.9	25-39.9	all	Other
TREE	PIEN	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	PIEN	15-19.9	≥ 60	all	Mature; Multi-Storied
TREE	PIEN	≥ 20	25-39.9	all	Other
TREE	PIEN	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	PIEN	≥ 20	≥ 60	all	Mature; Multi-Storied
TREE	PIEN-IMIX	5-9.9	10-24.9	all	Other
TREE	PIEN-IMIX	5-9.9	25-39.9	all	Other
TREE	PIEN-IMIX	5-9.9	40-59.9	all	Other
TREE	PIEN-IMIX	5-9.9	≥ 60	all	Other
TREE	PIEN-IMIX	10-14.9	10-24.9	all	Other
TREE	PIEN-IMIX	10-14.9	25-39.9	all	Other
TREE	PIEN-IMIX	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	PIEN-IMIX	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	PIEN-IMIX	15-19.9	25-39.9	all	Other
TREE	PIEN-IMIX	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	PIEN-IMIX	15-19.9	≥ 60	all	Mature; Multi-Storied
TREE	PIEN-IMIX	≥ 20	25-39.9	all	Other
TREE	PIEN-IMIX	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	PIEN-TMIX	0-4.9	10-24.9	all	Early Stand Initiation
TREE	PIEN-TMIX	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PIEN-TMIX	0-4.9	40-59.9	all	Stand Initiation

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	PIEN-TMIX	0-4.9	≥ 60	all	Stand Initiation
TREE	PIEN-TMIX	5-9.9	10-24.9	all	Other
TREE	PIEN-TMIX	5-9.9	25-39.9	all	Other
TREE	PIEN-TMIX	5-9.9	40-59.9	all	Other
TREE	PIEN-TMIX	5-9.9	≥ 60	all	Other
TREE	PIEN-TMIX	10-14.9	10-24.9	all	Other
TREE	PIEN-TMIX	10-14.9	25-39.9	all	Mature; Multi-Storied
TREE	PIEN-TMIX	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	PIEN-TMIX	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	PIEN-TMIX	15-19.9	10-24.9	all	Other
TREE	PIEN-TMIX	15-19.9	25-39.9	all	Mature; Multi-Storied
TREE	PIEN-TMIX	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	PIEN-TMIX	15-19.9	≥ 60	all	Mature; Multi-Storied
TREE	PIEN-TMIX	≥ 20	10-24.9	all	Other
TREE	PIEN-TMIX	≥ 20	25-39.9	all	Mature; Multi-Storied
TREE	PIEN-TMIX	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	PIEN-TMIX	≥ 20	≥ 60	all	Mature; Multi-Storied
TREE	PIAL	0-4.9	10-24.9	all	Early Stand Initiation
TREE	PIAL	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PIAL	0-4.9	40-59.9	all	Stand Initiation
TREE	PIAL	0-4.9	≥ 60	all	Stand Initiation
TREE	PIAL	5-9.9	10-24.9	all	Other
TREE	PIAL	5-9.9	25-39.9	all	Other
TREE	PIAL	5-9.9	40-59.9	all	Other
TREE	PIAL	5-9.9	≥ 60	all	Other
TREE	PIAL	10-14.9	10-24.9	all	Other

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	PIAL	10-14.9	25-39.9	all	Other
TREE	PIAL	10-14.9	40-59.9	all	Other
TREE	PIAL	10-14.9	≥ 60	all	Other
TREE	PIAL	15-19.9	10-24.9	all	Other
TREE	PIAL	15-19.9	25-39.9	all	Other
TREE	PIAL	15-19.9	40-59.9	all	Other
TREE	PIAL	15-19.9	≥ 60	all	Other
TREE	PIAL	≥ 20	10-24.9	all	Other
TREE	PIAL	≥ 20	25-39.9	all	Other
TREE	PIAL	≥ 20	40-59.9	all	Other
TREE	PIAL-IMIX	0-4.9	10-24.9	all	Early Stand Initiation
TREE	PIAL-IMIX	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PIAL-IMIX	0-4.9	40-59.9	all	Stand Initiation
TREE	PIAL-IMIX	0-4.9	≥ 60	all	Stand Initiation
TREE	PIAL-IMIX	5-9.9	10-24.9	all	Other
TREE	PIAL-IMIX	5-9.9	25-39.9	all	Other
TREE	PIAL-IMIX	5-9.9	40-59.9	all	Other
TREE	PIAL-IMIX	5-9.9	≥ 60	all	Other
TREE	PIAL-IMIX	10-14.9	10-24.9	all	Other
TREE	PIAL-IMIX	10-14.9	25-39.9	all	Other
TREE	PIAL-IMIX	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	PIAL-IMIX	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	PIAL-IMIX	15-19.9	10-24.9	all	Other
TREE	PIAL-IMIX	15-19.9	25-39.9	all	Other
TREE	PIAL-IMIX	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	PIAL-IMIX	15-19.9	≥ 60	all	Mature; Multi-Storied

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	PIAL-IMIX	≥ 20	10-24.9	all	Other
TREE	PIAL-IMIX	≥ 20	25-39.9	all	Other
TREE	PIAL-IMIX	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	PIAL-TMIX	5-9.9	10-24.9	all	Other
TREE	PIAL-TMIX	5-9.9	25-39.9	all	Other
TREE	PIAL-TMIX	5-9.9	40-59.9	all	Other
TREE	PIAL-TMIX	5-9.9	≥ 60	all	Other
TREE	PIAL-TMIX	10-14.9	10-24.9	all	Other
TREE	PIAL-TMIX	10-14.9	25-39.9	all	Mature; Multi-Storied
TREE	PIAL-TMIX	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	PIAL-TMIX	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	PIAL-TMIX	15-19.9	10-24.9	all	Other
TREE	PIAL-TMIX	15-19.9	25-39.9	all	Mature; Multi-Storied
TREE	PIAL-TMIX	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	PIAL-TMIX	15-19.9	≥ 60	all	Mature; Multi-Storied
TREE	PIAL-TMIX	≥ 20	10-24.9	all	Other
TREE	PIAL-TMIX	≥ 20	25-39.9	all	Mature; Multi-Storied
TREE	PIAL-TMIX	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	PIFL2	0-4.9	10-24.9	all	Early Stand Initiation
TREE	PIFL2	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PIFL2	5-9.9	10-24.9	all	Other
TREE	PIFL2	5-9.9	25-39.9	all	Other
TREE	PIFL2	5-9.9	40-59.9	all	Other
TREE	PIFL2	10-14.9	10-24.9	all	Other
TREE	PIFL2	10-14.9	25-39.9	all	Other
TREE	PIFL2	10-14.9	40-59.9	all	Other

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	PIFL2	15-19.9	10-24.9	all	Other
TREE	PIFL2	15-19.9	25-39.9	all	Other
TREE	PIFL2	15-19.9	40-59.9	all	Other
TREE	PIFL2	≥ 20	25-39.9	all	Other
TREE	PIFL2-IMIX	0-4.9	10-24.9	all	Early Stand Initiation
TREE	PIFL2-IMIX	0-4.9	25-39.9	all	Early Stand Initiation
TREE	PIFL2-IMIX	0-4.9	40-59.9	all	Early Stand Initiation
TREE	PIFL2-IMIX	5-9.9	10-24.9	all	Other
TREE	PIFL2-IMIX	5-9.9	25-39.9	all	Other
TREE	PIFL2-IMIX	5-9.9	40-59.9	all	Other
TREE	PIFL2-IMIX	5-9.9	≥ 60	all	Other
TREE	PIFL2-IMIX	10-14.9	10-24.9	all	Other
TREE	PIFL2-IMIX	10-14.9	25-39.9	all	Other
TREE	PIFL2-IMIX	10-14.9	40-59.9	all	Other
TREE	PIFL2-IMIX	10-14.9	≥ 60	all	Other
TREE	PIFL2-IMIX	15-19.9	10-24.9	all	Other
TREE	PIFL2-IMIX	15-19.9	25-39.9	all	Other
TREE	PIFL2-IMIX	15-19.9	40-59.9	all	Other
TREE	PIFL2-TMIX	5-9.9	10-24.9	all	Other
TREE	PIFL2-TMIX	10-14.9	10-24.9	all	Other
TREE	PIFL2-TMIX	10-14.9	40-59.9	all	Other
TREE	PIFL2-TMIX	15-19.9	25-39.9	all	Other
TREE	JUNIP	0-4.9	10-24.9	all	Early Stand Initiation
TREE	JUNIP	5-9.9	10-24.9	all	Other
TREE	JUNIP	10-14.9	10-24.9	all	Other
TREE	JUNIP	15-19.9	10-24.9	all	Other

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	IMIX	0-4.9	10-24.9	all	Early Stand Initiation
TREE	IMIX	0-4.9	25-39.9	all	Early Stand Initiation
TREE	IMIX	0-4.9	40-59.9	all	Stand Initiation
TREE	IMIX	0-4.9	≥ 60	all	Stand Initiation
TREE	IMIX	5-9.9	10-24.9	all	Other
TREE	IMIX	5-9.9	25-39.9	all	Other
TREE	IMIX	5-9.9	40-59.9	all	Other
TREE	IMIX	5-9.9	≥ 60	all	Other
TREE	IMIX	10-14.9	10-24.9	all	Other
TREE	IMIX	10-14.9	25-39.9	all	Other
TREE	IMIX	10-14.9	40-59.9	NW thru NE	Mature; Multi-Storied
TREE	IMIX	10-14.9	40-59.9	E thru W	Other
TREE	IMIX	10-14.9	≥ 60	NW thru NE	Mature; Multi-Storied
TREE	IMIX	10-14.9	≥ 60	E thru W	Other
TREE	IMIX	15-19.9	10-24.9	all	Other
TREE	IMIX	15-19.9	25-39.9	all	Other
TREE	IMIX	15-19.9	40-59.9	NW thru NE	Mature; Multi-Storied
TREE	IMIX	15-19.9	40-59.9	E thru W	Other
TREE	IMIX	15-19.9	≥ 60	NW thru NE	Mature; Multi-Storied
TREE	IMIX	15-19.9	≥ 60	E thru W	Other
TREE	IMIX	≥ 20	10-24.9	all	Other
TREE	IMIX	≥ 20	25-39.9	all	Other
TREE	IMIX	≥ 20	40-59.9	NW thru NE	Mature; Multi-Storied
TREE	IMIX	≥ 20	40-59.9	E thru W	Other
TREE	IMIX	≥ 20	≥ 60	NW thru NE	Mature; Multi-Storied
TREE	IMIX	≥ 20	≥ 60	E thru W	Other

Life form	VMap dominance group 6040 attribute	Tree size (diameter at breast height; inches)	Tree canopy cover (percent)	Aspect	BDNF modified structure
TREE	TMIX	0-4.9	10-24.9	all	Early Stand Initiation
TREE	TMIX	0-4.9	25-39.9	all	Early Stand Initiation
TREE	TMIX	0-4.9	40-59.9	all	Stand Initiation
TREE	TMIX	0-4.9	≥ 60	all	Stand Initiation
TREE	TMIX	5-9.9	10-24.9	all	Other
TREE	TMIX	5-9.9	25-39.9	all	Other
TREE	TMIX	5-9.9	40-59.9	all	Other
TREE	TMIX	5-9.9	≥ 60	all	Other
TREE	TMIX	10-14.9	10-24.9	all	Other
TREE	TMIX	10-14.9	25-39.9	all	Mature; Multi-Storied
TREE	TMIX	10-14.9	40-59.9	all	Mature; Multi-Storied
TREE	TMIX	10-14.9	≥ 60	all	Mature; Multi-Storied
TREE	TMIX	15-19.9	10-24.9	all	Other
TREE	TMIX	15-19.9	25-39.9	all	Mature; Multi-Storied
TREE	TMIX	15-19.9	40-59.9	all	Mature; Multi-Storied
TREE	TMIX	15-19.9	≥ 60	all	Mature; Multi-Storied
TREE	TMIX	≥ 20	10-24.9	all	Other
TREE	TMIX	≥ 20	25-39.9	all	Mature; Multi-Storied
TREE	TMIX	≥ 20	40-59.9	all	Mature; Multi-Storied
TREE	TMIX	≥ 20	≥ 60	all	Mature; Multi-Storied
TREE-DECID	POPUL	Not applicable	Not applicable	all	Other
TREE-DECID	POTR5	Not applicable	Not applicable	all	Other
SHRUB, HERB, OR SPVG (if no disturbance layer overlaps)	Not applicable	Not applicable	Not applicable	Not applicable	Early Stand Initiation
VMAP 'TRANSITIONAL FOREST' (if no disturbance layer overlaps)	Not applicable	Not applicable	Not applicable	Not applicable	Early Stand Initiation

Appendix B: Lynx habitat and lynx analysis unit maps on the Beaverhead-Deerlodge National Forest.

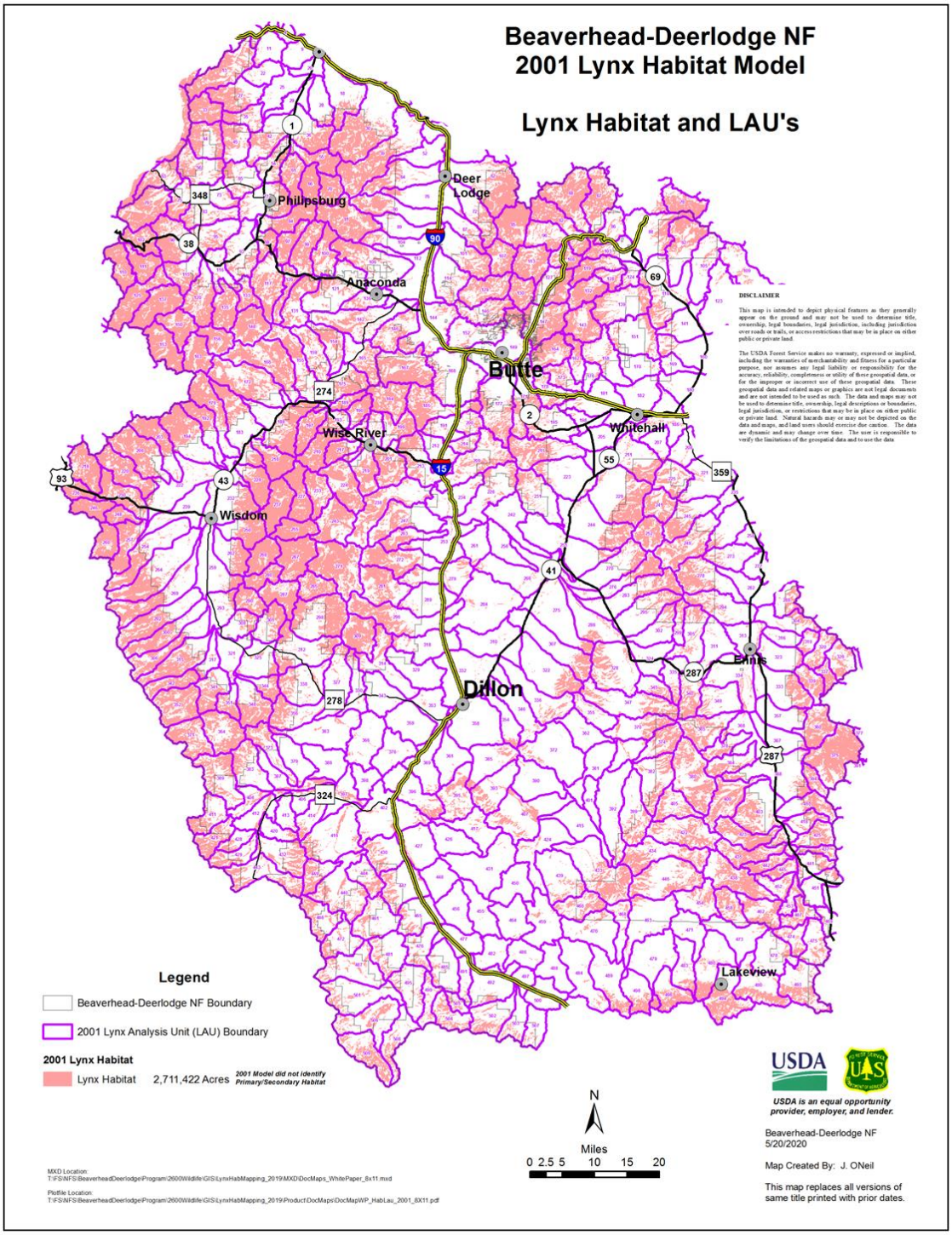

Figure B- 1. 2001 lynx habitat and lynx analysis units on the Beaverhead-Deerlodge National Forest.

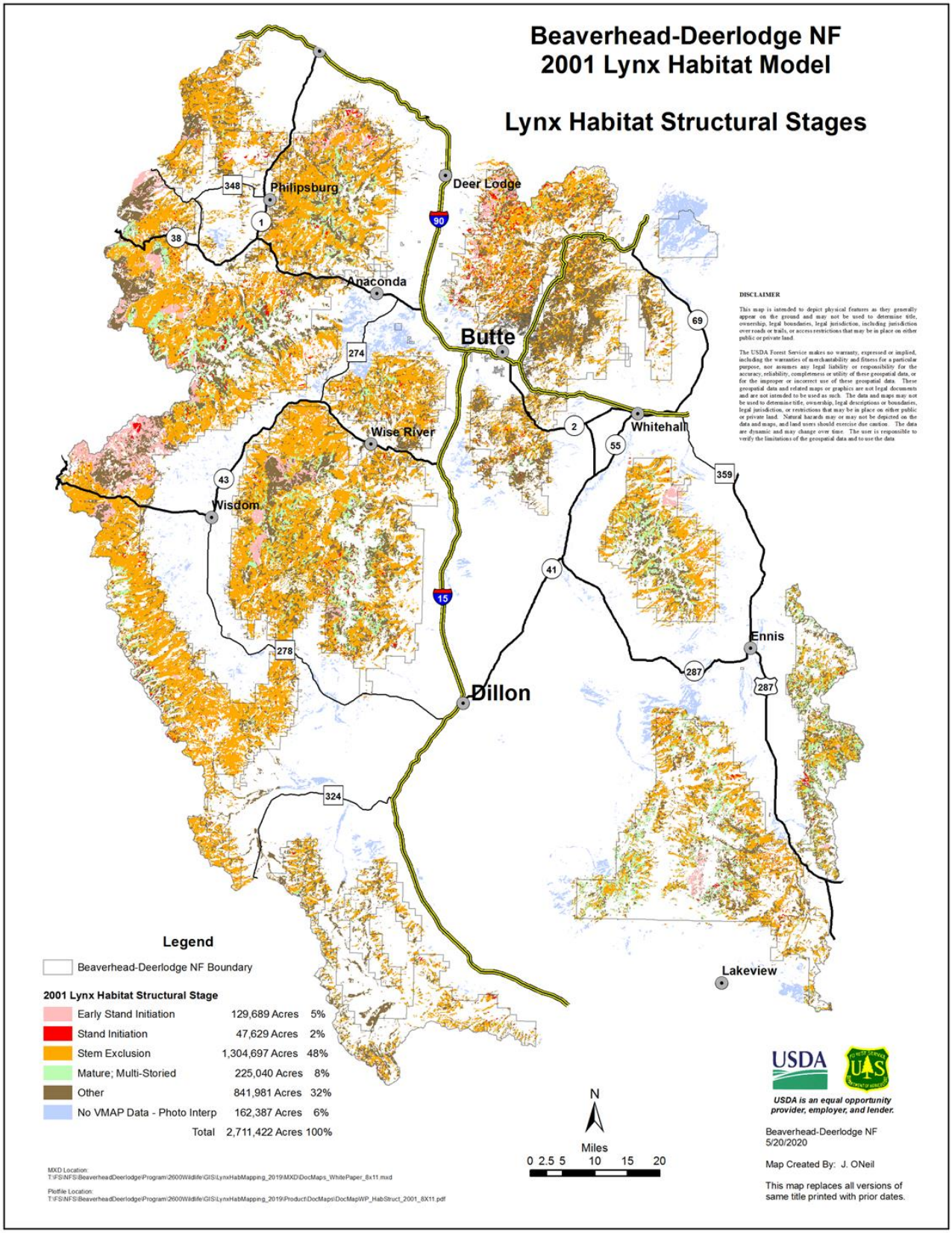

Figure B- 2. Vegetation structural stages within 2001 lynx habitat on the Beaverhead-Deerlodge National Forest.

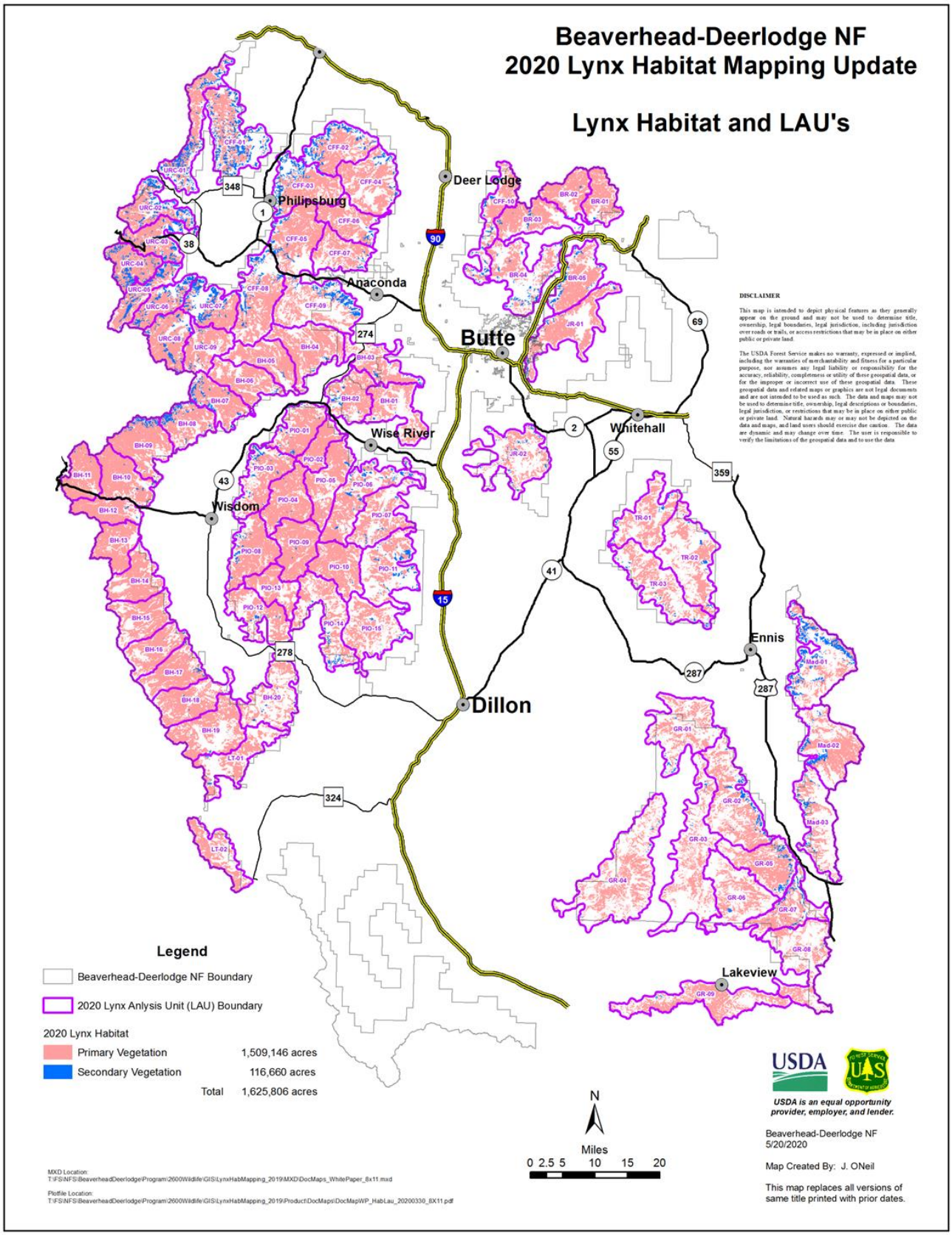

Figure B- 3. 2020 lynx habitat and lynx analysis units on the Beaverhead-Deerlodge National Forest.

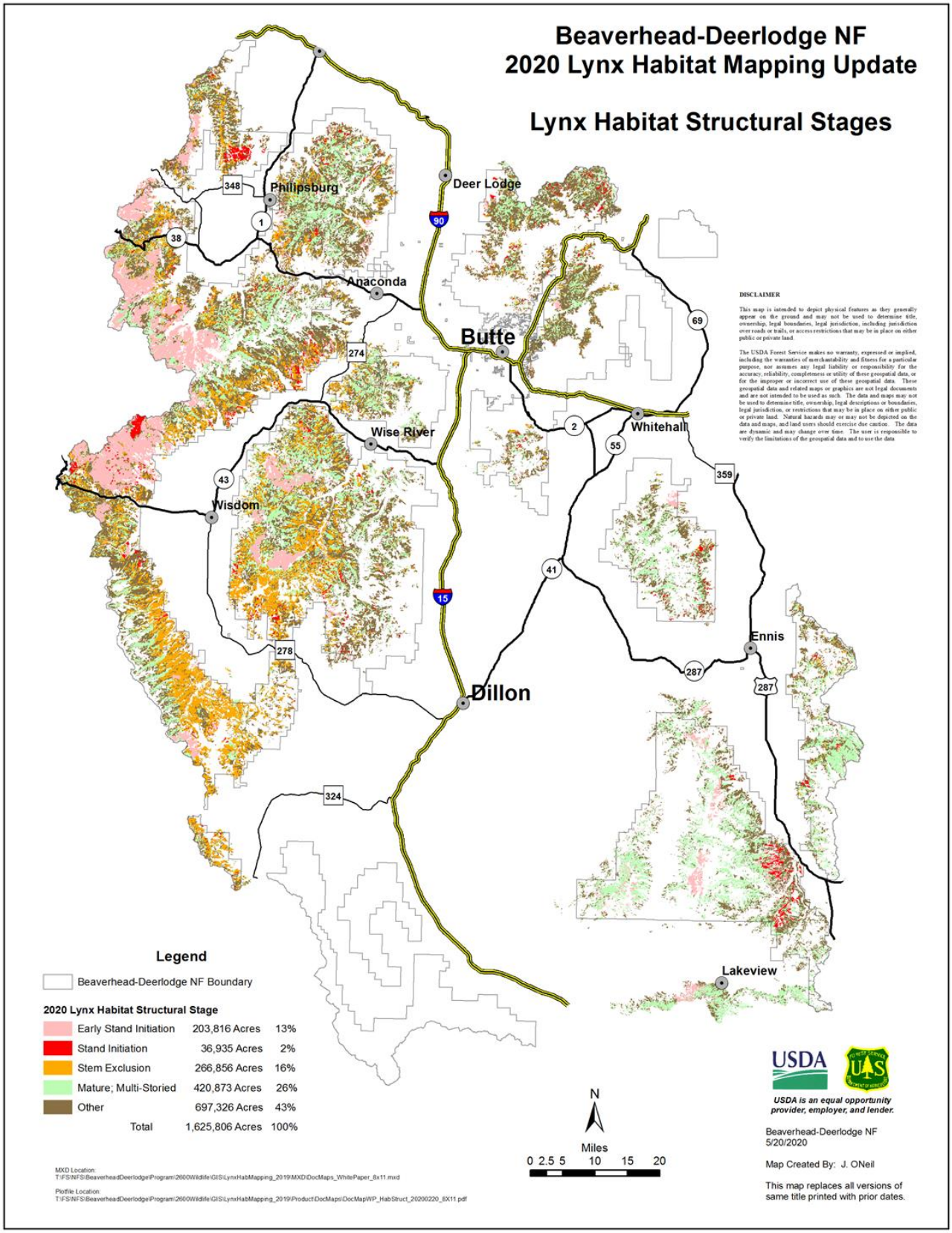

Figure B- 4. Vegetation structural stages within 2020 lynx habitat on the Beaverhead-Deerlodge National Forest.

Appendix D: Justification for exception and exemption acres.

Although not required, the Forest consolidated a list of projects since 2009 (the start of the revised Forest Plan) that used exception and exemption acres to meet the intent of the NRLMD. To date, the Forest has exceeded these exceptions for the research and aspen categories in VEG S5 and the research and salvage categories in VEG S6, which now apply due to the occupancy change (Table D- 1). Justifications are provided for those categories where exceptions or exemptions are requested.

It is important to note that tracking exceptions and exemptions are not considered "take" as the BDNF was not required to follow the NRLMD prior to the chance in occupancy. To meet the intent of the NRLMD, claimed exception and exemption acres were determined by identifying completed projects and those with signed decisions, but have not yet been implemented. With the change in occupancy, the BDNF will track exception and exemption acres for all future projects.

Exemption acres under VEG S5 and VEG S6 for WUI apply across the category, meaning a maximum of 88,910 acres, can apply to either VEG S5 or VEG S6 as long as the total number of acres is not exceeded.

Similarly, the total of 6,200 acres for VEG S5 and 290 acres for VEG S6 can apply to any of the subcategories within these standards, as long as the total amount is not exceeded. Subcategories are disclosed in Table D-1 to provide a clear justification for the requested change.

Table D- 1: Exception and exemption acres claimed under the previous lynx habitat model and requested acres using the 2020 updated habitat.

Exception/Exemption Category	Identified exception or exemption acres[a]	Claimed exception or excemption acres[b]	Balance between identified and claimed acres	Requested exception or exemption acres
VEG S5 (#1)– within 200 feet of administrative sites	0	0	0	250
VEG S5 (#2) – research or genetic test	40	303	-263	500
VEG S5 (#4)– aspen	220	243	-27	5,250
VEG S5 (#5)– western white pine	0	0	0	0
VEG S5 (#6)– whitebark pine	0	0	0	200
VEG S5 – WUI – 6% of mapped lynx habitat within an administrative boundary (SI)[c]	154,400	49	154,351	88,910
VEG S6 (#1) – within 200 feet of administrative sites[c]	0	0	0	250
VEG S6 (#2) – research	0	10	-10	40
VEG S6 (#3) – salvage	0	43	-43	100
VEG S6 - WUI – 6% of mapped lynx habitat within an administrative boundary (MMS)[d]	154,400	317	154,083	88,910

[a]Identified area acres as determined by guidance in the NRLMD (USDA 2007b) and outlined in the 2007 Biological Assessment (Bertram 2007).

[b]Claimed exception acres include all implemented projects and those with a signed decision BDNF projects from 2009-present. 2009 was used as a reasonable timeframe as the revised Forest Plan was completed and signed.

[c]Exemption acres for WUI were assigned by grouping VEG S5 and VEG S6 categories, thus repeated numbers indicate a total across a category, not a sum (154,400 acres is the total for both VEG S5 and VEG S6 WUI categories).

Assumptions

1. The frequency of treatment around administrative sites to create and maintain defensible space varies and development of new sites is likely within the life of the Forest Plan.
2. The Forest will likely receive increased timber and fuels targets within the next 15 years, indicated by direction from the Regional Office.
3. Numbers in this justification represent a likely scenario given increased timber and fuels targets for the Forest and the history of acres utilized within each category since 2009.

VEG S5 #1 and VEG S6 #1 – within 200 feet of administrative sites

Activities that would utilize these exception acres include creating defensible space around administrative sites, including but not limited to developed recreation facilities (campgrounds, day use areas, etc.), infrastructure (buildings, communication towers, etc.), and dwellings. The BDNF did not have any exception acres in this category in the original NRLMD analysis. However, vegetation removal around administrative sites to create defensible space is an important consideration for the societal and economic values on the BDNF. There are approximately 275 developed recreation sites on the BDNF, including those under a special use permit. If all of these sites required defensible space treatments, a total of 795 acres could be affected. This number does not include other infrastructure that may require defensible space treatments, such as communication towers or other buildings. It is extremely unlikely all administrative sites would require defensible space treatment and also intersect with lynx habitat, but it is possible that some lynx habitat could be affected within the next fifteen years. Sites may also vary with the frequency of treatment to maintain defensible space. Given the estimated number of developed recreation sites on the BDNF, other infrastructure, and the potential to add more administrative sites in the future that may require maintenance of defensible space (e.g., additional communication towers), 500 acres is a reasonable estimate for vegetation removal in stand initiation and mature, multi-storied structural stages for the purpose of creating and maintaining defensible space. This represents less than one percent of available foraging habitat for lynx on lands administered by the BDNF. 250 acres (for a total of 500 acres) is attributed to using either VEG S5 or VEG S6 to maintain administrative sites.

VEG S5 #2 – research or genetic test

In general, activities that utilize these exception acres include liberating individual tree species of interest in early seral stands to create ecological conditions to promote or enhance existing trees, which may remove snowshoe hare habitat. Three projects utilized a total of 303 acres in this category since 2009. Since only 3 projects occurred in the previous 11 years, it is reasonable to assume an additional 2-4 projects consisting of 4,000-5,000 total acres apiece could occur within the next 15 years due to the increased pace and scale of the timber program (A. Brennick, pers. comm., 6 October 2020). However, only a small portion of these projects is likely to require the use of this category and would only occur where absolutely necessary to meet project objectives. Since the Forest "exceeded" this category by 303 acres, a reasonable estimation is 500 acres given the increase emphasis on the timber program over the next 15 years. If the estimated number of acres are treated for research or genetic testing (8,000 - 20,000 acres, or 2-4 projects of 4,000-5,000 acres each), the percentage of these projects utilizing this exception category ranges from 2.5 to 6.25 percent of the project area. Under the updated lynx habitat model, 36,935 acres are currently in the stand initiation phase, although only 36,023 acres are under BDNF management. 500 acres under this exception equates to 1.4 percent of the available habitat within this structural stage across all modeled LAUs and lands under BDNF management.

VEG S5 #4 – aspen

Since 2009, the Forest has utilized a total of 243 acres of the aspen exception acres under Vegetation Standard 5 (#4). This exception applies to precommercial thinning treatments in young stands. This exceeds the 220 acres as identified by the NRLMD. At the current rate, the Forest utilized around 22 acres per year in the aspen exception. With the increased pace of aspen restoration, it is possible the Forest could utilize up to 350 acres per year over the next 15 years compared to the 22 acres per year treated over the last decade (B. Anderson, pers. comm., 13 October 2020). This increase represents a total of 5,250 acres in the Vegetation Standard 5 (#4) category. If the maximum acres of aspen are treated within the next 15 years (52,500 acres), exception acres represent approximately 8 percent of the Forest Plan aspen goal (67,000 acres). Because aspen lacks its own cover type category in VMAP 18, it is not possible to project the percentage of aspen that consist of exception acres compared to total acres of aspen on the BDNF. However, 36,935 acres are currently in the stand initiation phase across modeled LAUs, although only 36,023 acres are under BDNF ownership. 5,250 acres under this exception represents approximately 7 percent of the total acres in the stand initiation phase across LAUs and under BDNF management.

VEG S5 #6 – whitebark pine

Although the BDNF has not utilized this category in the past, future actions could treat snowshoe hare habitat for the purposes of improving or restoring whitebark pine. Currently, 2 percent (28,673 acres) of lynx habitat consists of whitebark pine (Table 6). Of this habitat, 10,438 acres are either suitable for timber production or harvest is allowed for other activities (Table 8). There are currently 124 acres of whitebark pine within the stand initiation structural stage where harvest could occur (ibid). Given estimates in increased timber and potential growth of other stands, a reasonable assumption for improving or restoring whitebark pine stands is 200 acres. This represents less than one percent of the available lynx habitat that consists of whitebark pine habitat on the BDNF.

VEG S6 #2 – research

Similar to the previous category, activities that utilize exception acres under VEG S6 (research) aim to liberate individual tree species of interest in mature, multi-story or late successional forests, which may reduce snowshoe hare habitat. Since 2009, a single 30-acre project used this exception, although only 10 acres (33 percent) consisted of habitat that met this category. Given similar estimations of likely increases in timber, a reasonable assumption for this category is 40 acres (A. Brennick, pers. comm., 6 October 2020). Within all LAUs, a total of 420,873 acres consists of mature, multi-storied habitat, although only 382,777 acres is under BDNF ownership. Forty acres in this exception represents less a percent of the available mature, multi-storied lynx habitat in both LAUs and lands under BDNF management.

VEG S6 #3 – salvage

Salvage activities include the removal of dead and dying timber. In general, treatments under salvage occurs in stands impacted by beetle kill, fires, or other environmental factors or events that cause a decrease in timber value. Stands must be harvested prior to losing all marketable value.

This exception allows for incidental removal (such as skid trail construction) of snowshoe hare habitat in mature, multi-story or late successional stands during a salvage treatment. Since 2009, a single 725-acre project utilized 43 acres under this exception, which equates to 6 percent of the project area. Given the number of existing stands affected by insects and disease and the possibility of increased fires, 100 acres in this category for the next 15 years is a reasonable estimation. Within all LAUs, a total of 420,873 acres consists of mature, multi-storied habitat, although only 382,777 acres is under BDNF management. One

hundred acres in this exception represents less than a percent of the available mature, multi-storied lynx habitat in both LAUs and lands under BDNF management.

VEG S5 and VEG S6 WUI - 6% of mapped lynx habitat within an administrative boundary

Both Vegetation Standards 5 and 6 have direction that applies to fuels treatment projects within the WUI that do not meet Vegetation Standards S1, S2, S5, and S6. These projects shall occur on no more than 6 percent (cumulatively) of lynx habitat on each Forest as a whole. In addition, fuels treatments may not result in more than three adjacent LAUs exceeding the standards. The NRLMD combines the exception acres in VEG S5 and VEG S6 and set the limit for the BDNF at 154,400 acres. Since 2009, the BDNF treated 49 acres of stand initiation and 317 acres of mature, multi-storied lynx habitat in the WUI. This equates to less than 1 percent of the available exemption acres for this category.

Lynx habitat under Forest management (excluding inholdings) was used as the basis for calculating the six percent ceiling. Under the updated habitat model, this limits WUI treatments to 88,910 acres of lynx habitat. This represents a 58 percent decrease of exemption acres for these categories.

Projects contributing to exception and exemption acres

Table D- 2 contains the list of projects from 2009 to present that contributed to the calculation of claimed exemption acres.

Table D- 2: Completed, ongoing, and signed projects that contributed to exception and exemption acre calculations under the previous lynx habitat model.

Project	Year	Exception/exemptions(s) Utilized	Acres
Completed projects			
Barker Lakes	2011	VEG S5 #2	75
Meadow Creek Fuels	2011	VEG S6 WUI	283
Crockett Lake	2014	VEG S6 #2	10
Roadside 8	2015	VEG S6 #3	43
Mussigbrod	2015	VEG S5 #2	200
Boulder Lowlands	2015	VEG 65 WUI	15
Aspen CE - Shineberger	2017	VEG S5 #4	3
Aspen CE – Mount Haggin	2018	VEG S5 #4	13
Ongoing projects			
Highlands Whitebark Pine Research	2013	VEG S5 #2	28
Trapper Creek	2014	VEG S5 #4	19
East Deerlodge Valley Landscape Restoration Management Project	2015	VEG S5 #4	38
Blacktail Headwaters	2015	VEG S5 #4 VEG S5 WUI VEG S6 WUI	112 49 19
Aspen CE- Birch, Willow, Lost	2017	VEG S5 #4	3
Aspen CE – Deadwood	2018	VEG S5 #4	9
Red Rocks Vegetation Management Project	2019	VEG S5 #4	65
Signed projects – not implemented			

Project	Year	Exception/exemptions(s) Utilized	Acres
Fleecer	2018	VEG S5 #4	49

Appendix E: Area of lynx habitat and percentages of structural stages within each LAU.

Table E- 1: Existing conditions of structural stages within each LAU, including lands outside of Forest administrative boundaries.

LAU name	Total lynx habitat (acres)	Early Stand Initiation (acres/percent)	Stand Initiation (acres/percent)	Stem Exclusion (acres/percent)	Mature; Multi-Storied (acres/percent)	Other (acres/percent)
BH-01	16,504	326/2	18/<1	963/6	5,696/35	9,503/58
BH-02	17,296	149/1	99/1	4,907/24	5,615/32	7,335/42
BH-03	14,851	58/<1	25/<1	2,270/15	5,628/38	6,870/46
BH-04	27,060	1,405/5	1,927/7	4,769/18	3,506/13	15,453/57
BH-05	20,515	569/3	370/2	3,843/19	4,539/22	11,193/55
BH-06	20,201	454/2	250/1	5,766/29	3,902/19	9,830/49
BH-07	21,230	2,124/10	603/3	6,094/29	4,202/20	8,208/39
BH-08	18,924	1,985/10	111/1	6,465/34	3,069/16	7,293/39
BH-09	29,880	21,580/72	3,093/10	1,802/6	799/3	2,607/9
BH-10	26,864	17,608/66	1,064/4	2,360/9	775/3	5,057/19
BH-11	22,295	7,394/33	1,205/6	4,471/20	2,904/13	6,276/28
BH-12	17,522	2,831/16	29/<1	4,269/24	2,993/17	7,401/42
BH-13	20,761	719/3	350/2	4,649/22	3,830/18	11,241/54
BH-14	21,251	289/1	564/3	4,884/23	3,766/18	11,748/55
BH-15	20,189	251/1	323/2	8,279/41	4,346/22	6,990/35
BH-16	18,314	175/1	51/<1	6,709/37	5,587/31	5,792/32
BH-17	22,391	1,076/5	21/<1	12,820/57	3,787/17	4,688/21
BH-18	23,163	313/1	50/<1	12,303/53	4,436/19	6,062/26
BH-19	27,536	4,526/16	511/2	14,279/52	3,349/12	4,871/18
BH-20	14,157	53/<1	58/<1	5,937/42	1,860/13	6,249/44
BR-01	15,663	247/2	1,252/8	337/2	3,246/21	10,582/68
BR-02	16,520	407/2	592/4	522/3	3,467/21	11,533/70
BR-03	20,494	404/2	198/1	891/4	5,983/29	13,018/64
BR-04	17,698	682/4	708/4	2,146/12	2,404/14	11,759/66
BR-5	21,170	780/4	306/1	1,378/7	5,004/24	13,702/65
CFF-01	29,029	501/2	3,535/12	6,026/21	1,686/6	17,282/60
CFF-02	22,962	975/4	900/4	1,515/7	7,852/34	11,721/51
CFF-03	26,772	763/3	193/1	3,549/13	8,646/32	13,620/51
CFF-04	24,439	482/2	394/2	2,201/9	6,363/26	14,999/61
CFF-05	28,792	1,425/5	503/2	4,483/16	8,730/30	13,650/47
CFF-06	18,325	819/4	38/<1	1,006/5	6,208/34	10,255/56
CFF-07	15,395	696/5	21/<1	636/4	3,333/22	10,709/70
CFF-08	28,378	689/2	491/2	3,191/11	11,015/39	12,994/46
CFF-09	22,061	360/2	233/1	1,713/8	6,071/28	13,684/62

LAU name	Total lynx habitat (acres)	Early Stand Initiation (acres/percent)	Stand Initiation (acres/percent)	Stem Exclusion (acres/percent)	Mature; Multi-Storied (acres/percent)	Other (acres/percent)
CFF-10	16,796	1,070/6	513/3	870/5	4,581/27	9,763/58
GR-01	17,106	2,266/13	74/<1	9/<1	6,586/39	8,171/48
GR-02	28,400	2,398/8	328/1	8/<1	12,864/45	12,802/45
GR-03	20,408	4,602/23	13/<1	0/0	10,948/54	4,845/24
GR-04	28,999	3,758/13	0/0	0/0	17,428/60	7,814/27
GR-05	23,676	3,407/14	3,165/13	64/<1	8,019/34	9,022/38
GR-06	14,606	127/1	0/0	0/0	9,299/64	5,179/35
GR-07	17,393	1,329/8	2,312/13	0/0	4,560/26	9,192/53
GR-08	16,467	287/2	15/<1	4/<1	7,495/46	8,666/53
GR-09	25,899	3,389/13	0/0	9/<1	14,222/55	8,278/32
JR-01	23,063	425/2	6/<1	1,134/5	4,711/20	16,788/73
JR-02	14,079	618/4	378/3	1,037/7	2,951/21	9,096/65
LT-01	15,317	17/<1	71/<1	8,869/58	1,295/8	5,065/33
LT-02	14,231	27/<1	337/2	7,079/50	1,869/13	4,918/35
MAD-01	21,741	655/3	272/1	1,359/6	6,220/29	13,236/61
MAD-02	25,599	439/2	130/1	491/2	15,888/62	8,650/34
MAD-03	12,603	238/2	410/3	334/3	6,601/52	5,020/40
PIO-01	20,597	815/4	592/3	4,585/22	6,615/32	7,990/39
PIO-02	14,088	167/1	235/2	3,052/22	5,839/41	4,795/34
PIO-03	21,615	4,787/22	0/0	4,948/23	6,686/31	5,194/24
PIO-04	58,556	4,731/17	0/0	4,687/16	10,838/38	8,300/29
PIO-05	23,248	1,164/5	147/1	4,975/21	5,576/24	11,386/49
PIO-06	24,913	326/1	645/3	4,272/17	8,604/35	11,066/44
PIO-07	17,629	237/1	37/<1	1,151/7	4,903/28	11,301/64
PIO-08	27,335	5,744/21	560/2	7,453/27	6,763/25	6,815/25
PIO-09	28,377	4,120/15	126/<1	9,601/34	6,689/24	7,841/28
PIO-10	24,366	275/1	758/3	5,636/23	6,998/29	10,699/44
PIO-11	17,068	361/2	87/1	831/5	4,169/24	11,621/68
PIO-12	17,092	284/2	1,058/6	9,762/57	458/3	5,530/32
PIO-13	15,645	994/6	53/<1	9,287/59	2,171/14	3,140/20
PIO-14	21,210	1,330/6	921/4	5,453/26	3,360/16	10,146/48
PIO-15	16,546	90/1	263/2	972/6	2,807/17	12,414/75
TR-01	17,395	1,949/11	11/<1	102/1	6,550/38	8,783/50
TR-02	19,255	908/5	1,122/6	390/2	5,787/30	11,049/57
TR-03	17,772	865/5	550/3	29/<1	7,439/42	8,889/50
URC-01	25,779	7,082/27	238/1	3,059/12	2,360/9	13,040/51
URC-02	20,380	10,061/49	30/<1	2,430/12	1,684/8	6,175/30
URC-03	21,042	2,587/12	352/2	5,279/25	3,379/16	9,445/45
URC-04	23,192	10,848/47	97/<1	2,174/9	3,553/15	6,521/28
URC-05	17,726	9,066/51	267/2	1,481/8	2,567/14	4,346/25

LAU name	Total lynx habitat (acres)	Early Stand Initiation (acres/percent)	Stand Initiation (acres/percent)	Stem Exclusion (acres/percent)	Mature; Multi-Storied (acres/percent)	Other (acres/percent)
URC-06	18,297	5,909/32	53/<1	2,515/14	3,768/21	6,051/33
URC-07	19,765	997/5	395/2	3,816/19	5,530/28	9,027/46
URC-08	24,656	17,852/72	186/1	683/3	3,286/13	2,650/11
URC-09	17,274	12,099/70	0/0	348/2	2,364/14	2,463/14

Appendix F: Lynx habitat within LAUs contributing to Vegetation Standards S1, S2, and intersections with the wildland-urban interface on lands administered by the Beaverhead-Deerlodge National Forest.

Table F- 1 displays lynx habitat within LAUs that contributes to NRLMD standards in lands administered by the Beaverhead-Deerlodge National Forest. The total lynx habitat within LAUs is displayed for comparison. It is possible for 100 percent of lands under BDNF administration to occur within the WUI on a specific LAU with other lands outside BDNF contributing to the remainder of the LAU area. Lands within the BDNF administration boundary were considered for vegetation and wildland-urban interface NRLMD standards because the forest plans and implements activities within this area.

Table F- 1: Existing conditions within LAUs contributing to NRLMD standards.

LAU name	Total lynx habitat including lands outside of BDNF administration (acres)	VEG S1: area within early stand initiation (acres/percent)	VEG S2: area of regeneration harvest within a ten-year period (acres/percent)	Area within WUI (acres/percent)
BH-01	16,504	326/2	0/0	7,634/47
BH-02	17,296	149/1	66/1	12,042/100
BH-03	14,851	58/<1	0/0	0/0
BH-04	27,060	1,405/5	23/<1	4,255/18
BH-05	20,515	569/3	3/<1	965/5
BH-06	20,201	454/2	9/<1	1,032/5
BH-07	21,230	2,124/10	14/<1	996/5
BH-08	18,924	1,985/10	4/<1	2,051/11
BH-09	29,880	21,580/72	291/1	8,310/28
BH-10	26,864	17,608/66	152/1	9,810/37
BH-11	22,295	7,394/33	0/0	9,660/43
BH-12	17,522	2,831/16	0/0	1,185/7
BH-13	20,761	719/3	42/<1	4,900/25
BH-14	21,251	289/1	21/<1	4,354/22
BH-15	20,189	251/1	0/0	8,647/44
BH-16	18,314	175/1	0/0	2,803/16
BH-17	22,391	1,076/5	0/0	5,335/25
BH-18	23,163	313/1	122/1	5,353/24
BH-19	27,536	4,526/16	39/<1	6,991/26
BH-20	14,157	53/<1	15/<1	2,310/17
BR-01	15,663	247/2	0/0	5,673/44
BR-02	16,520	407/2	0/0	5,747/37
BR-03	20,494	404/2	56/<1	316/2
BR-04	17,698	682/4	159/1	4,920/29
BR-5	21,170	780/4	0/0	4,668/22

LAU name	Total lynx habitat including lands outside of BDNF administration (acres)	VEG S1: area within early stand initiation (acres/percent)	VEG S2: area of regeneration harvest within a ten-year period (acres/percent)	Area within WUI (acres/percent)
CFF-01	29,029	501/2	0/0	3,745/14
CFF-02	22,962	975/4	215/1	14,003/65
CFF-03	26,772	763/3	0/0	20,173/88
CFF-04	24,439	482/2	0/0	1,132/5
CFF-05	28,792	1,425/5	121/<1	16,548/68
CFF-06	18,325	819/4	0/0	1,173/7
CFF-07	15,395	696/5	0/0	8,244/65
CFF-08	28,378	689/2	150/1	18,571/72
CFF-09	22,061	360/2	0/0	9,136/74
CFF-10	16,796	1,070/6	752/5	10,776/71
GR-01	17,106	2,266/13	0/0	6,255/61
GR-02	28,400	2,398/8	0/0	10,500/37
GR-03	20,408	4,602/23	0/0	174/1
GR-04	28,999	3,758/13	0/0	3,552/13
GR-05	23,676	3,407/14	27/<1	12,633/55
GR-06	14,606	127/1	0/0	2,051/14
GR-07	17,393	1,329/8	0/0	15,116/98
GR-08	16,467	287/2	0/0	3,944/36
GR-09	25,899	3,389/13	0/0	0/0
JR-01	23,063	425/2	0/0	4,170/20
JR-02	14,079	618/4	0/0	9,652/72
LT-01	15,317	17/<1	0/0	1,728/12
LT-02	14,231	27/<1	0/0	0/0
MAD-01	21,741	655/3	0/0	12,564/100
MAD-02	25,599	439/2	0/0	9,107/37
MAD-03	12,603	238/2	0/0	9,286/91
PIO-01	20,597	815/4	0/0	6,766/34
PIO-02	14,088	167/1	0/0	896/7
PIO-03	21,615	4,787/22	0/0	1,003/5
PIO-04	58,556	4,731/17	0/0	6,598/23
PIO-05	23,248	1,164/5	4/<1	13,145/58
PIO-06	24,913	326/1	12/<1	20,737/84
PIO-07	17,629	237/1	0/0	7,908/45
PIO-08	27,335	5,744/21	0/0	6,735/25
PIO-09	28,377	4,120/15	84/<1	12,747/45
PIO-10	24,366	275/1	32/<1	14,484/60
PIO-11	17,068	361/2	0/0	7,646/45
PIO-12	17,092	284/2	27/<1	14,323/93
PIO-13	15,645	994/6	0/0	6,392/41

LAU name	Total lynx habitat including lands outside of BDNF administration (acres)	VEG S1: area within early stand initiation (acres/percent)	VEG S2: area of regeneration harvest within a ten-year period (acres/percent)	Area within WUI (acres/percent)
PIO-14	21,210	1,330/6	92/<1	16,033/87
PIO-15	16,546	90/1	0/0	8,046/49
TR-01	17,395	1,949/11	0/0	14,804/100
TR-02	19,255	908/5	23/<1	17,315/97
TR-03	17,772	865/5	28/<1	16,825/100
URC-01	25,779	7,082/27	0/0	1,904/9
URC-02	20,380	10,061/49	0/0	6,494/37
URC-03	21,042	2,587/12	0/0	11,218/58
URC-04	23,192	10,848/47	0/0	19/<1
URC-05	17,726	9,066/51	0/0	114/1
URC-06	18,297	5,909/32	0/0	4,210/24
URC-07	19,765	997/5	3/<1	14,915/81
URC-08	24,656	17,852/72	0/0	8,555/35
URC-09	17,274	12,099/70	0/0	9,052/53

Appendix G: Lands and Recreation Uses and Associated Activities.

Lands Special Uses

Table G- 1 displays lands special uses activities and associated operation and maintenance activities. The use description reflects the actual special uses authorization as defined in FSH 2709.11, Chapter 10. The majority of these uses require ongoing year-round motorized access, which is authorized through special use permits, rights-of-way, and easements. In some cases, this access occurs off designated forest system routes (e.g., within or adjacent to rights of way).

Table G- 1: Types of lands special uses on the Beaverhead-Deerlodge National Forest.

Use	Associated Infrastructure	Operation and Maintenance Activities	Requires year-round access (yes/no)
Cultivation	Irrigation lines and ditches	• Use of heavy equipment, hand tools, and motorized or over-the-snow vehicle access • Debris removal	Yes
Sign	Business signs, directional signs, entrance signs, etc.	• Replacement of signposts and signs • Painting/staining • Vegetation removal	Yes
Service building	Volunteer fire department facilities	• Use of heavy equipment, hand and power tools, motorized or over-the-snow vehicle access • Operation and maintenance of buildings, septic system, and parking lot • Snow removal	Yes
Mailbox	Rural community post boxes	• Replacement of signposts and mailboxes • Painting/staining	Yes
Encroachment[a]	Homeowner yards, parking areas	• Motorized vehicle use and parking • Landscaping (e.g., gardening, lawn mowing, sprinkler systems) • Fence maintenance	Yes
Research/experimental	Unexploded ordnance destruction and removal, seismometers	• Surface removal of munitions and explosives • Use of heavy equipment and motorized vehicles for access • Vegetation removal • Munitions debris treatment and non-munitions waste stream treatment • Posting warning signs	Yes
Non-disturbing use (archaeological surveys)	None	• Archaeological surface surveys conducted by contractors and partners on foot	No

Use	Associated Infrastructure	Operation and Maintenance Activities	Requires year-round access (yes/no)
Temporary construction (removal)	Decommissioned water transmission system (pipeline, ditch, culvert, earthen dam)	• Use of heavy equipment, hand and power tools, and motorized vehicles for access • Trenching, digging, and backfilling	No
Warehouse/storage	MT DOT stockpile, storage	• Use of heavy equipment and motorized or over-the-snow vehicle access • Storage of winter road treatment materials (de-icing materials)	Yes
Commercial filming	None	• Accessing filming locations by motor vehicle, over-the-snow vehicle, on foot, horseback, or on skis • Staging trailers, film crews, camera lights, film equipment (cameras, booms, etc.) • Use of props	Yes
FERC	Hydroelectric Dam/Facilities	• Use of heavy equipment and motorized or over-the-snow vehicle access • Staging materials and supplies for repair and maintenance of infrastructure • Trenching, digging • Use of helicopters (pole placement or large infrastructure installation) • Vegetation removal	Yes
Oil and gas pipeline	Above ground and buried natural gas pipelines	• Use of heavy equipment and motorized or over-the-snow vehicle access • Staging materials and supplies • Trenching and digging • Vegetation removal	Yes
Powerline	Above ground and buried transmission and distribution lines, power poles, towers	• Use of heavy equipment and motorized or over-the-snow vehicle access • Staging materials and supplies • Trenching and digging • Use of helicopters (pole replacement) • Vegetation removal	Yes
Aircraft facilities	Airport runway, airway beacon	• Use of heavy equipment, hand and power tools, and motorized or over-the-snow vehicle access • Aircraft presence (on ground and overhead) • Snow removal	Yes
Federal Highways Administration (DOT Easement)	State or county highways (paved or gravel) and associated right-of-ways	• Use of heavy equipment, hand and power tools, and motorized or over-the-snow vehicle access • Snow removal • Staging materials and supplies • Road Resurfacing, blading, trenching, digging, clearing debris/rockfall/slides, culvert replacement, and sign maintenance	Yes

Use	Associated Infrastructure	Operation and Maintenance Activities	Requires year-round access (yes/no)
		• Vegetation removal	
FRTA, FLPMA easements and permits	Driveways, access roads to private inholdings, motorized and non-motorized trails, bridges, culverts, gates	• Use of heavy equipment, hand and power tools, and motorized or over-the-snow vehicle access • Snow removal • Road resurfacing, blading, clearing debris/rockfall/slides, and culvert replacement • Vegetation removal	Yes
Communication Users (broadcast and non-broadcast)	Amateur radio towers, microwave sites, private mobile radio towers, cellular and wireless internet towers and vaults, monitoring equipment, FAA navigation equipment (VORTAC)	• Use of hand and power tools and motorized or over-the-snow vehicle access • Replacement of communication site vaults • Use of helicopters • Fence maintenance	Yes
Telephone	Above ground and buried telephone lines and fiber optic cable, utility service boxes	• Use of heavy equipment, hand and power tools, and motorized or over-the-snow vehicle access • Staging materials and supplies for repair and maintenance of lines • Trenching, digging, boring, drilling • Use of helicopters (e.g., pole replacement) • Vegetation removal	Yes
Water transmission	Livestock irrigation ditches, irrigation pipelines, water transmission pipelines	• Use of heavy equipment, hand and power tools, and motorized or over-the-snow vehicle access • Vegetation removal	Yes
Water impoundment	Earthen or concrete dams, spillways, reservoirs, diversions, and weirs	• Use of heavy equipment, hand and power tools, and motorized or over-the-snow vehicle access • Trenching, digging • Vegetation removal	Yes
Water development	Wells, spring boxes	• Use of heavy equipment, hand and power tools, and motorized or over-the-snow vehicle access • Trenching, digging • Vegetation removal	Yes

[a] This category of uses originates through unauthorized occupancy of National Forest System lands. See FSM 5330 for policy on violations and FSM 5450 and 36 CFR 254.3 if the use involves a title claim or possible sale under the Small Tracts Act (96 Stat. 2535). Special use authorizations do not substitute for judicial resolution of the encroachment. The only valid reasons for issuing permits for encroachment are to: 1) provide a mechanism to authorize temporary use of the land in conjunction with the legal action on the encroachment; or 2) serve as a tool in tracking or managing encroachments.

Developed Recreation

Table G- 2 displays developed recreation by facility type and associated uses. The heaviest use occurs during summer.

Table G- 2: Developed recreation by facility type and associated uses on the Beaverhead-Deerlodge National Forest.

Developed Site Type	Associated Infrastructure	Operation and Maintenance Activities	Uses	Season of Heaviest Use
Campground	Access roads, tent and RV pads, picnic tables, fire rings, water hydrants, vault toilets, flush toilets, fencing, food lockers, kiosks, storage sheds, bridges, meat poles, fee collection infrastructure	• Use of heavy equipment and high levels of motor vehicle traffic • Painting/staining • Repaving, chip sealing, blading/grading • Food storage • Toilet pumping and water system maintenance • Fee collection • Vegetation removal (including hazard trees), piling and burning	Overnight accommodations	Summer
Day Use Area	Access roads, parking lots, picnic tables, group shelters, fire rings, water hydrants, vault toilets, flush toilets, kiosks, swimming docks, shoreline benches, fencing, fee collection infrastructure	• Use of heavy equipment and high levels of motor vehicle traffic • Painting/staining • Repaving, chip sealing, blading/grading • Food storage • Toilet pumping and water system maintenance • Fee collection • Snow removal • Vegetation removal (including hazard trees), piling and burning	Picnicking, scenery viewing, wildlife viewing, ice fishing, swimming	Summer and winter
Marina	Access roads, parking lots, picnic tables, fire rings, water hydrants, vault toilets, flush toilets, kiosks, fencing, fee collection infrastructure	• Use of heavy equipment and high levels of motor vehicle traffic • Painting/staining • Repaving, chip sealing, blading/grading • Food storage • Toilet pumping and water system maintenance • Fee collection • Vegetation removal (including hazard trees)	Boat launch, fishing	Summer
Rental cabin	Access roads, parking areas, cabins, sheds, outhouses, corrals, gates, water hydrants, meat poles	• Use of heavy equipment, motor vehicle traffic, and motorized over-the-snow access • Painting/staining	Overnight accommodations, stock use, skiing, snowmobiling	Summer and winter

Developed Site Type	Associated Infrastructure	Operation and Maintenance Activities	Uses	Season of Heaviest Use
		• Repaving, chip sealing, blading/grading • Food storage • Toilet pumping and water system maintenance • Fee collection • Vegetation removal (including hazard trees), piling and burning		
Roads and trails	Maintenance level 1-5 roads (native surface, gravel, paved), trail classes 1-5 (primitive, native surface, and paved), signs, rolling dips, water bars, culverts, rip-rap, puncheon, retaining wells, bridges, trestles, tunnels, cattleguards, gates	• Use of heavy equipment, power and hand tools, motorized or over-the-snow vehicle access • Resurfacing, blading/grading, repair/replacement/maintenance of bridges and culverts, blasting, rocking/tread work • Vegetation removal and brushing (including hazard trees), stump removal	Pleasure driving, OHV riding, pack stock use, hiking, mountain biking	Summer
Trailheads	Access roads, parking lots, vault and flush toilets, kiosks, fences, food lockers, pack stock loading ramp and hitching rails, corrals, parking stops/boulders	• Use of heavy equipment and high levels of motor vehicle traffic • Blading/grading and resurfacing • Pack stock and OHV staging • Vegetation removal (including hazard trees)	Parking, staging, camping	Summer
Groomed trails	Compacted surfaces, bridges, signs, snow stakes/markers	• Use of over-the-snow motorized vehicles, snowcat and snowmobile-towed groomers • Blasting • Vegetation removal and brushing (including hazard trees), stump removal	Nordic skiing, snowmobiling, tracked motor vehicles, fat tire and motorized snow biking, hiking, snowshoeing	Winter

Recreation Special Uses

Table G- 3 displays use types and associated activities permitted under recreation special uses on the BDNF. The use description reflects the actual special uses authorization as defined in FSH 2709.11, Chapter 10. Many activities require year-round access.

Table G- 3. Recreation special uses use types, infrastructure, and associated operation and maintenance activities.

Use	Associated Infrastructure	Operation and Maintenance Activities	Requires year-round access (yes/no)
Boat dock and wharf	Boat docks, outhouses, parking areas	• Use of heavy equipment, hand tools, and motorized vehicles • Storage of buoys/boat slips	No

Use	Associated Infrastructure	Operation and Maintenance Activities	Requires year-round access (yes/no)
		• Blading/grading • Toilet pumping • Snow removal	
Shelter	Warming huts, parking lots, outhouses, signs, fencing	• Use of heavy equipment and hand tools • Painting/staining • Blading/grading • Toilet pumping • Firewood cutting and storage • Snow removal	Yes
Organization camp	Main camp lodge, cabins, outbuildings, water systems, septic systems, parking lots, ball courts propane tanks, picnic tables, fire rings, fencing, driveways, signs, and other associated infrastructure	• Use of heavy equipment, hand tools, and high levels of motor vehicle traffic • Painting/staining, construction, and reconstruction • Repaving, chip sealing, blading/grading • Food storage • Toilet pumping and water system maintenance • Snow removal • Vegetation removal (including hazard trees)	No
Isolated cabin	Cabins	• Motorized vehicle, hand and power tool use • Snow removal • Vegetation removal (including hazard trees)	Yes
Recreation residence	Cabins, outbuildings, driveways, septic systems, water systems, propane tanks, landscaping, fencing, gates, docks, campfire rings/fire pits	• Use of heavy equipment, hand and power tools, and high levels of motor vehicle traffic • Painting/staining, construction, and reconstruction • Toilet pumping and water system maintenance • Snow removal • Vegetation removal (including hazard trees)	Yes
Privately-owned resort	Lodges, cabins, outbuildings, laundry facilities, propane tanks, fencing, RV pads, campsites, horse corrals, ball-courts, picnic tables, fire rings, dump station, hazmat storage (fuel), hot spring pools, parking lots, driveways, water system, septic system, signs	• Use of heavy equipment, hand and power tools, and high levels of motor vehicle traffic • Painting/staining, construction, and reconstruction • Repaving, chip sealing, blading/grading • Food storage • Toilet pumping and water system maintenance • Snow removal • Vegetation removal (including hazard trees)	Yes

Use	Associated Infrastructure	Operation and Maintenance Activities	Requires year-round access (yes/no)
Marina	Boat launch, dock, outhouse, outbuildings, parking lot	• Use of heavy equipment, hand and power tools, and high levels of motor vehicle traffic • Repaving, chip sealing, blading/grading • Toilet pumping and water system maintenance	No
Concession campground	Developed campsites, restroom facilities, septic systems, water systems, kiosks, parking barriers, fencing, site markers, signs, fee collection infrastructure	• Use of heavy equipment, hand and power tools, and high levels of motor vehicle traffic • Painting/staining, construction, and reconstruction • Repaving, chip sealing, blading/grading • Food storage • Toilet pumping and water system maintenance • Vegetation removal (including hazard trees)	No
Outfitting and Guiding	Season-long camps, seasonal placement of yurts	• Over-the-snow motorized vehicle use • Camping, backpacking, hiking, backcountry and Nordic skiing, trail running, mountain biking, canoeing • Fly-fishing, hunting (rifle, archery, with or without dogs) • Pack trips (llamas or horses), horseback riding, grazing • Commercial filming • High-altitude military-style maneuvers • Trail maintenance (rocking, tread work, clearing) • Food preparation and storage • Vegetation removal and brushing	Yes
Winter resort and ski trails	Ski lodges, outbuildings, ski lifts, ski runs, ski trails, communication towers/antennae, solar arrays, hazmat storage (fuel), warehouses, garages, maintenance yards, snowmaking equipment, water systems, septic systems, parking lots, signs	• Heavy equipment, motorized over-the-snow vehicle, and helicopter use • High levels of motor vehicle traffic • Repaving, chip sealing, blading/grading • Avalanche control (use of explosives) • Erosion control, slash pile creation and burring • Septic pumping and water system maintenance • Food storage • Snow grooming, snow removal, snow making • Vegetation removal (including hazard trees)	Yes
Ski slope or ski trail	Ski runs and trails, signs	• Motorized over-the-snow vehicle use • Erosion control • Snow grooming • Vegetation removal	Yes

Use	Associated Infrastructure	Operation and Maintenance Activities	Requires year-round access (yes/no)
Target range	Entrance gate, targets, practice range, picnic tables, fire ring, swing set, toilet, storage sheds	• Motorized vehicle and hand and power tool use • Painting/staining • Toilet pumping	No
Recreation event	Signs, checkpoints, check stations	• Motorized vehicle or over-the-snow vehicle use • Bicycle racing, trail running, swimming • Snow grooming	Yes
Non-commercial group use	None	• None	Yes

Appendix H: Crosswalk between Northern Rockies Lynx Management Direction and supporting goals, objectives, and standards in the Beaverhead-Deerlodge 2009 Revised Forest Plan.

Table H- 1 lists the Forest Plan direction that supports the NRLMD (Wildlife Habitat Standard 7). Standard 7 states "The Northern Rockies Lynx Management Direction (2007) will apply to the BDNF as described in the Northern Rockies Lynx Management Record of Decision."

Table H- 1: NRLMD direction and supporting guidance in the Forest Plan.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
All management practices and activities (ALL) – apply to all management projects in lynx habitat in lynx analysis units in occupied habitat and in linkage areas, subject to valid existing rights. They do not apply to wildfire suppression or to wildland fire use.	
Objective ALL O1: Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.	**Aquatic Resources** *Standard 1*: Riparian Conservation Area – any activity in RCAs shall be designed to enhance, restore, or maintain the physical and biological characteristics of the RCA. **Economics and Social Values** *Economy Contribution Goal*: Contribute to the social and economic well-being of local communities by promoting sustainable use of renewable natural resources. Provide timber for commercial harvest, forage for livestock grazing, exploration and development opportunities for mineral resources, and recreation settings consistent with other resource goals. **Fire Management** *Standard 2*: Wildland fire use is an available tool for all unplanned ignitions. **Infrastructure** *Transportation System Goal*: The minimum transportation system necessary is identified and managed. Roads and trails are identified in the transportation atlas maintained at the Forest Supervisor's Office. Roads and trails are constructed, managed, and maintained to meet land and resource objectives. **Lands** *Conservation Easement Goal:* Conservation easements are acquired where appropriate to protect important habitat or viewsheds. *Utility Corridors and Communication Sites Goal*: A network of designated utility corridors and communication sites is provided to minimize the proliferation of rights-of-way, facilities, and corridors across the landscape. Designation of a corridor does not constitute approval of any particular project.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Standard 1: Energy transmission facilities shall be located only in designated utility corridors shown on the Utility Corridor and Communication Site map. Energy gathering or distribution facilities may be located outside of designated corridors. *Standard 2*: Wireless telecommunication facilities shall be located in designated communication sites and utility corridors shown on the Utility Corridor and Communication Site map. Exceptions may be made for non-ground disturbing temporary facilities that are in place for less than one year. **Minerals, Oil, and Gas** *Oil and Gas Leasing Goal*: Offer oil and gas leasing opportunities under stipulations which protect resource values. *Standard 1*: Provides direction on lease options with elements limiting term periods, timing of exploration/operations, as well as surface use and occupancy. It also identifies areas legally unavailable for leasing, including but not limited to wilderness and recommended wilderness areas. *Standard 2*: Any new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system. *Standard 3*: All drill pads will be obliterated. **Recreation and Travel Management** *Developed Sites Goal*: High quality developed recreation facilities are strategically located to concentrate use, provide access to backcountry settings, and protect natural resources. Sites are clean, well maintained, and designed for universal accessibility. *Road and Trail Use Goa*l: A system of routes and areas designated for non-motorized and motorized use are identified and available for public use. A non-motorized recreation allocation (Summer Non-Motorized, Recommended Wilderness, or designated Wilderness) does close all routes within the area to motorized use. Resources are protected and user conflicts are minimized by allowing motorized wheeled travel only on designated routes and areas. A system of trails designated for non-motorized uses are also identified and available for public use. *Standard 2*: Motorized vehicles are not allowed in summer or winter non- motorized allocations except for permitted or administrative use. **Timber Management** *Lands Suitable for Timber Production & Lands Not Suitable for Timber Production Goals*: Manage lands suitable for timber production for growth and yield. Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range improvement, and grass and shrub land maintenance. *Standard 1*: Even aged harvest may occur only upon a finding that it is the appropriate and optimum method for the timber type and will contribute to meeting vegetative objectives for the site. Such harvest

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	must be consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources. *Standard 2*: Maximum size of openings created by one regeneration harvest operation shall not exceed 40 acres. *Standard 3*: Even aged management regeneration harvest shall not occur unless the stand has reached the culmination of mean annual increment, unless there are other resource purposes for treatment. *Standard 5*: When trees are cut to achieve timber production objectives the cuttings shall be made in such a way as to adequately restock the lands. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Unique Habitats Goal*: Trend toward an older forest is altered by increasing the younger age classes providing greater forest diversity in age classes. Stable or upward trends are achieved for declining or unique habitats. *Forested Vegetation Resiliency Objective*: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions. *Forested Vegetation Douglas-fir Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class on approximately 20,000 acres. *Forested Vegetation Lodgepole Pine Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class by approximately 74,000 acres. *Forested Vegetation Aspen Component Objective*: Increase the aspen component within lodgepole pine and other vegetation types, on 67,000 acres. *Forested Vegetation All Other Forested Vegetation Types Objective*: Manage within the historic range of variability. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to: 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, and providing secure habitat at the landscape scale to facilitate large animal movement. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Wildlife Security Goal: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Sensitive and Federally Listed Species Objective:* Outlines source information to consider when designing projects that may affect sensitive species or federally listed species. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Standard ALL S1: New or expanded permanent development and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.	**Lands** *Conservation Easement Goal:* Conservation easements are acquired where appropriate to protect important habitat or viewsheds. *Utility Corridors and Communication Sites Goal*: A network of designated utility corridors and communication sites is provided to minimize the proliferation of rights-of-way, facilities, and corridors across the landscape. Designation of a corridor does not constitute approval of any particular project. **Minerals, Oil, and Gas** *Oil and Gas Leasing Goal*: Offer oil and gas leasing opportunities under stipulations which protect resource values. *Standard 1*: Provides direction on lease options with elements limiting term periods, timing of exploration/operations, as well as surface use and occupancy. It also identifies areas legally unavailable for leasing, including but not limited to wilderness and recommended wilderness areas. *Standard 2*: Any new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system. *Standard 3*: All drill pads will be obliterated. **Recreation and Travel Management** *Developed Sites Goal*: High quality developed recreation facilities are strategically located to concentrate use, provide access to backcountry settings, and protect natural resources. Sites are clean, well maintained, and designed for universal accessibility.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Dispersed Sites Goal: Identify dispersed campsites causing adverse resource impacts. Develop mitigation or relocate the site to protect the resource. Close campsites where unacceptable resource damage cannot be mitigated. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Unique Habitats Goal*: Trend toward an older forest is altered by increasing the younger age classes providing greater forest diversity in age classes. Stable or upward trends are achieved for declining or unique habitats. *Forested Vegetation Resiliency Objective*: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions. *Forested Vegetation Douglas-fir Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class on approximately 20,000 acres. *Forested Vegetation Lodgepole Pine Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class by approximately 74,000 acres. *Forested Vegetation Aspen Component Objective*: Increase the aspen component within lodgepole pine and other vegetation types, on 67,000 acres. *Forested Vegetation All Other Forested Vegetation Types Objective*: Manage within the historic range of variability. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to: 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, and providing secure habitat at the landscape scale to facilitate large animal movement. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Road and Trail Densities by Landscape Objective: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Snags Objective*: Snags and woody debris are well distributed by vegetation category and size class over time. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Guidelines ALL G1: Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways or forest highways across federal land. Methods could include fencing, underpasses, or overpasses.	**Infrastructure** *Transportation System Goal*: The minimum transportation system necessary is identified and managed. Roads and trails are identified in the transportation atlas maintained at the Forest Supervisor's Office. Roads and trails are constructed, managed, and maintained to meet land and resource objectives. **Wildlife Habitat** *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Sensitive and Federally Listed Species Objective:* Outlines source information to consider when designing projects that may affect sensitive species or federally listed species. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Standard LAU S1: Changes in LAU boundaries shall be based on site-specific habitat information and after review by the Forest Service Regional Office.	The Forest updated habitat, including LAUs, in 2020. The Forest Service Regional Office reviewed and approved the updates to the BDNF Canada lynx habitat model (Appendix C: Updated Lynx Habitat Mapping Process Paper Hanvey 2020).
Vegetation management activities and practices (VEG) – apply to vegetation management projects in lynx habitat within lynx analysis units in occupied habitat. With the exception of Objective VEG 03 that specifically concerns wildland fire use, the objectives, standards, and guidelines do not apply to wildfire	

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
suppression, wildland fire use, or removal of vegetation for permanent developments such as mineral operations, ski runs, roads, and the like. None of the objectives, standards, or guidelines apply to linkage areas.	
Objective VEG 01: Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.	**Aquatic Resources** *Vegetation Management Objective*: Manage vegetation to reduce the risk of adverse wildfire impacts to isolated native fish populations and water resources at the sub-watershed scale (6th Code HUC). *Standard 1*: Riparian Conservation Area – any activity in RCAs shall be designed to enhance, restore, or maintain the physical and biological characteristics of the RCA. **Fire Management** *Fuels Management Goal*: A full range of fuels management activities is available to achieve ecosystem sustainability, including, economic, and social components. *Standard 2*: Wildland fire use is an available tool for all unplanned ignitions. **Timber Management** *Lands Suitable for Timber Production, Lands Not Suitable for Timber Production, and Lands Where Timber Harvest is Not Allowed Goals*: Manage lands suitable for timber production for growth and yield. Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range improvement, and grass and shrub land maintenance. Manage lands where timber harvest is not allowed, where no exception for timber harvest has been identified to protect resource values. *Standard 1*: Even aged harvest may occur only upon a finding that it is the appropriate and optimum method for the timber type and will contribute to meeting vegetative objectives for the site. Such harvest must be consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources. *Standard 2*: Maximum size of openings created by one regeneration harvest operation shall not exceed 40 acres. *Standard 3*: Even aged management regeneration harvest shall not occur unless the stand has reached the culmination of mean annual increment, unless there are other resource purposes for treatment. *Standard 5*: When trees are cut to achieve timber production objectives the cuttings shall be made in such a way as to adequately restock the lands. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Unique Habitats Goal*: The trend toward an older forest is altered by increasing the younger age classes providing greater forest diversity in age classes. Stable or upward trends are achieved for declining or unique habitats.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Forested Vegetation Resiliency Objective: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions. *Forested Vegetation Douglas-fir Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class on approximately 20,000 acres. *Forested Vegetation Lodgepole Pine Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class by approximately 74,000 acres. *Forested Vegetation Aspen Component Objective*: Increase the aspen component within lodgepole pine and other vegetation types, on 67,000 acres. *Forested Vegetation All Other Forested Vegetation Types Objective*: Manage within the historic range of variability. *Standard 1*: Mechanical vegetation treatments and prescribed fire in old growth stands do not reduce the age and number of large trees and basal area below the "minimum criteria" required for Eastern Montana old growth. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Snags Objective*: Snags and woody debris are well distributed by vegetation category and size class over time. *Sensitive and Federally Listed Species Objective:* Outlines source information to consider when designing projects that may affect sensitive species or federally listed species. *Standard 3*: Identifies snag levels/sizes required for retention during mechanical vegetation treatments. *Standard 4*: Identifies levels and sizes of green tree replacements required for regeneration harvests. *Standard 12*: Provides for the maintenance of existing large down wood (species and size) in regeneration harvest units.
Objective VEG O2: Provide a mosaic of habitat conditions through time that support dense horizontal cover and high densities of snowshoe hare. Provide winter showshoe hare habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation.	**Aquatic Resources** *Vegetation Management Objective*: Manage vegetation to reduce the risk of adverse wildfire impacts to isolated native fish populations and water resources at the sub-watershed scale (6th Code HUC). *Standard 1*: Riparian Conservation Area – any activity in RCAs shall be designed to enhance, restore, or maintain the physical and biological characteristics of the RCA. **Fire Management** *Fuels Management Goal*: A full range of fuels management activities is available to achieve ecosystem sustainability, including, economic, and social components. *Standard 2*: Wildland fire use is an available tool for all unplanned ignitions.

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	Timber Management *Lands Suitable for Timber Production, Lands Not Suitable for Timber Production, and Lands Where Timber Harvest is Not Allowed Goals*: Manage lands suitable for timber production for growth and yield. Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range improvement, and grass and shrub land maintenance. Manage lands where timber harvest is not allowed, where no exception for timber harvest has been identified to protect resource values. *Standard 1*: Even aged harvest may occur only upon a finding that it is the appropriate and optimum method for the timber type and will contribute to meeting vegetative objectives for the site. Such harvest must be consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources. *Standard 2*: Maximum size of openings created by one regeneration harvest operation shall not exceed 40 acres. *Standard 3*: Even aged management regeneration harvest shall not occur unless the stand has reached the culmination of mean annual increment, unless there are other resource purposes for treatment. *Standard 5*: When trees are cut to achieve timber production objectives the cuttings shall be made in such a way as to adequately restock the lands. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Unique Habitats Goal*: The trend toward an older forest is altered by increasing the younger age classes providing greater forest diversity in age classes. Stable or upward trends are achieved for declining or unique habitats. *Forested Vegetation Resiliency Objective*: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions. *Forested Vegetation Douglas-fir Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class on approximately 20,000 acres. *Forested Vegetation Lodgepole Pine Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class by approximately 74,000 acres. *Forested Vegetation Aspen Component Objective*: Increase the aspen component within lodgepole pine and other vegetation types, on 67,000 acres. *Forested Vegetation All Other Forested Vegetation Types Objective*: Manage within the historic range of variability. **Wildlife Habitat**

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	Habitat Goal: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Snags Objective*: Snags and woody debris are well distributed by vegetation category and size class over time. *Sensitive and Federally Listed Species Objective:* Outlines source information to consider when designing projects that may affect sensitive species or federally listed species. *Standard 4*: Identifies levels and sizes of green tree replacements required for regeneration harvests. *Standard 12*: Provides for the maintenance of existing large down wood (species and size) in regeneration harvest units.
Objective VEG 03: Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.	**Fire Management** *Fuels Management Goal:* A full range of fuels management activities is available to achieve ecosystem sustainability, including, economic, and social components. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.
Objective VEG O4: Focus vegetation management in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover.	**Aquatic Resources** *Standard 1*: Riparian Conservation Area – any activity in RCAs shall be designed to enhance, restore, or maintain the physical and biological characteristics of the RCA. **Fire Management** *Fuels Management Goal*: A full range of fuels management activities is available to achieve ecosystem sustainability, including, economic, and social components. *Standard 2*: Wildland fire use is an available tool for all unplanned ignitions. **Timber Management** *Lands Suitable for Timber Production, Lands Not Suitable for Timber Production, and Lands Where Timber Harvest is Not Allowed Goals*: Manage lands suitable for timber production for growth and yield. Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range improvement, and grass and shrub land maintenance. Manage lands where timber harvest is not allowed, where no exception for timber harvest has been identified to protect resource values. *Standard 1*: Even aged harvest may occur only upon a finding that it is the appropriate and optimum method for the timber type and will contribute to meeting vegetative objectives for the site. Such harvest must be consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Standard 2: Maximum size of openings created by one regeneration harvest operation shall not exceed 40 acres. *Standard 3*: Even aged management regeneration harvest shall not occur unless the stand has reached the culmination of mean annual increment, unless there are other resource purposes for treatment. *Standard 5*: When trees are cut to achieve timber production objectives the cuttings shall be made in such a way as to adequately restock the lands. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Unique Habitats Goal*: The trend toward an older forest is altered by increasing the younger age classes providing greater forest diversity in age classes. Stable or upward trends are achieved for declining or unique habitats. *Forested Vegetation Resiliency Objective*: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions. *Forested Vegetation Douglas-fir Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class on approximately 20,000 acres. *Forested Vegetation Lodgepole Pine Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class by approximately 74,000 acres. *Forested Vegetation Aspen Component Objective*: Increase the aspen component within lodgepole pine and other vegetation types, on 67,000 acres. *Forested Vegetation All Other Forested Vegetation Types Objective*: Manage within the historic range of variability. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Sensitive and Federally Listed Species Objective:* Outlines source information to consider when designing projects that may affect sensitive species or federally listed species. *Standard 4*: Identifies levels and sizes of green tree replacements required for regeneration harvests.
Standard VEG S1: Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages limit disturbance in each LAU as follows: • If more than 30 percent 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	**Fire Management** *Fuels Management Goal*: A full range of fuels management activities is available to achieve ecosystem sustainability, including, economic, and social components. *Standard 2*: Wildland fire use is an available tool for all unplanned ignitions. **Timber Management** *Lands Suitable for Timber Production, Lands Not Suitable for Timber Production, and Lands Where Timber Harvest is Not Allowed Goals*: Manage lands suitable for timber production for growth and yield.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
may be regenerated by vegetation management projects. Applies to all vegetation management projects that regenerate forests, except for fuel treatment projects within the WUI as defined by HFRA, subject to the following limitation: • Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). In addition, fuel treatment projects may not result in more than three adjacent LAUs exceeding the standard. • For fuel treatment projects within the WUI, see guideline VEG G10.	Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range improvement, and grass and shrub land maintenance. Manage lands where timber harvest is not allowed, where no exception for timber harvest has been identified to protect resource values. *Standard 1*: Even aged harvest may occur only upon a finding that it is the appropriate and optimum method for the timber type and will contribute to meeting vegetative objectives for the site. Such harvest must be consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources. *Standard 2*: Maximum size of openings created by one regeneration harvest operation shall not exceed 40 acres. *Standard 3*: Even aged management regeneration harvest shall not occur unless the stand has reached the culmination of mean annual increment, unless there are other resource purposes for treatment. *Standard 5*: When trees are cut to achieve timber production objectives the cuttings shall be made in such a way as to adequately restock the lands. **Wildlife Habitat** *Sensitive and Federally Listed Species Objective:* Outlines source information to consider when designing projects that may affect sensitive species or federally listed species. *Standard 3*: Identifies snag levels/sizes required for retention during mechanical vegetation treatments. *Standard 4*: Identifies levels and sizes of green tree replacements required for regeneration harvests. *Standard 12*: Provides for the maintenance of existing large down wood (species and size) in regeneration harvest units. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Forested Vegetation Resiliency Objective*: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions. *Forested Vegetation Douglas-fir Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class on approximately 20,000 acres. *Forested Vegetation Lodgepole Pine Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class by approximately 74,000 acres. *Forested Vegetation Aspen Component Objective*: Increase the aspen component within lodgepole pine and other vegetation types, on 67,000 acres. *Forested Vegetation All Other Forested Vegetation Types Objective*: Manage within the historic range of variability.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
Standard VEG S2: Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period. Applies to all timber management projects that regenerate forests, except for fuel treatment projects within the WUI as defined by HFRA, subject to the following limitation: • Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). • For fuel treatment projects within the WUI see guideline VEG G10.	**Timber Management** *Lands Suitable for Timber Production, Lands Not Suitable for Timber Production, and Lands Where Timber Harvest is Not Allowed Goals*: Manage lands suitable for timber production for growth and yield. Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range improvement, and grass and shrub land maintenance. Manage lands where timber harvest is not allowed, where no exception for timber harvest has been identified to protect resource values. *Standard 1*: Even aged harvest may occur only upon a finding that it is the appropriate and optimum method for the timber type and will contribute to meeting vegetative objectives for the site. Such harvest must be consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources. *Standard 2*: Maximum size of openings created by one regeneration harvest operation shall not exceed 40 acres. *Standard 3*: Even aged management regeneration harvest shall not occur unless the stand has reached the culmination of mean annual increment, unless there are other resource purposes for treatment. *Standard 5*: When trees are cut to achieve timber production objectives the cuttings shall be made in such a way as to adequately restock the lands. **Vegetation** Biodiversity Goal: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Forested Vegetation Resiliency Objective*: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions. *Forested Vegetation All Other Forested Vegetation Types Objective*: Manage within the historic range of variability. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Snags Objective*: Snags and woody debris are well distributed by vegetation category and size class over time. *Sensitive and Federally Listed Species Objective:* Outlines source information to consider when designing projects that may affect sensitive species or federally listed species. *Standard 3*: Identifies snag levels/sizes required for retention during mechanical vegetation treatments. *Standard 4*: Identifies levels and sizes of green tree replacements required for regeneration harvests. *Standard 12*: Provides for the maintenance of existing large down wood (species and size) in regeneration harvest units.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
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: 1) Within 200 feet of administrative sites, dwellings, outbuildings; or 2) For research studies or genetic tree tests evaluating genetically improved reforestation stock; or 3) Based on new information that is peer reviewed and accepted by the regional level of the Forest Service, and state level of FWS, where a written determination states: a) That a project is not likely to adversely affect lynx; or b) That a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat; or 4) For conifer removal in aspen, or daylight thinning around individual aspen trees, where aspen is in decline; or 5) For daylight thinning of planted rust-resistant white pine where 80 percent of the winter snowshoe hare habitat is retained; or 6) To restore whitebark pine. Exceptions 2 through 6 shall only be utilized in an LAU where Standard VEG S1 is met. Applies to all precommercial thinning projects, except for fuel treatment projects that use precommercial thinning as a tool within the WUI as defined by HFRA, subject to the following limitation: • Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest).	**Fire Management** *Fuels Management Goal*: A full range of fuels management activities is available to achieve ecosystem sustainability, including, economic, and social components. **Timber Management** *Lands Suitable for Timber Production, Lands Not Suitable for Timber Production, and Lands Where Timber Harvest is Not Allowed Goals*: Manage lands suitable for timber production for growth and yield. Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range improvement, and grass and shrub land maintenance. Manage lands where timber harvest is not allowed, where no exception for timber harvest has been identified to protect resource values. *Standard 1:* Even aged harvest may occur only upon a finding that it is the appropriate and optimum method for the timber type and will contribute to meeting vegetative objectives for the site. Such harvest must be consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources. *Standard 2*: Maximum size of openings created by one regeneration harvest operation shall not exceed 40 acres. *Standard 3*: Even aged management regeneration harvest shall not occur unless the stand has reached the culmination of mean annual increment, unless there are other resource purposes for treatment. *Standard 5*: When trees are cut to achieve timber production objectives the cuttings shall be made in such a way as to adequately restock the lands. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Forested Vegetation Resiliency Objective*: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions. *Forested Vegetation Douglas-fir Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class on approximately 20,000 acres. *Forested Vegetation Lodgepole Pine Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class by approximately 74,000 acres. *Forested Vegetation Aspen Component Objective*: Increase the aspen component within lodgepole pine and other vegetation types on 67,000 acres. *Forested Vegetation All Other Forested Vegetation Types Objective*: Manage within the historic range of variability. **Wildlife Habitat**

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
• For fuel treatment projects within the WUI see guideline VEG G10.	*Sensitive and Federally Listed Species Objective:* Outlines source information to consider when designing projects that may affect sensitive species or federally listed species. *Standard 4*: Identifies levels and sizes of green tree replacements required for regeneration harvests.
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, including infrastructure within permitted ski area boundaries; or 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). Exceptions 2 and 3 shall only be utilized in LAUs where Standard VEG S1 is met. Applies to all vegetation management projects that regenerate forests, except for fuel treatment projects within the WUI as defined by HFRA, subject to the following limitation: • Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). In addition, fuel treatment projects may not result in more than three adjacent LAUSs exceeding the standard. • For fuel treatment projects within the WUI, see guideline VEG G10.	**Fire Management** *Fuels Management Goal*: A full range of fuels management activities is available to achieve ecosystem sustainability, including, economic, and social components. **Timber Management** *Lands Suitable for Timber Production, Lands Not Suitable for Timber Production, and Lands Where Timber Harvest is Not Allowed Goals*: Manage lands suitable for timber production for growth and yield. Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range improvement, and grass and shrub land maintenance. Manage lands where timber harvest is not allowed, where no exception for timber harvest has been identified to protect resource values. *Standard 1*: Even aged harvest may occur only upon a finding that it is the appropriate and optimum method for the timber type and will contribute to meeting vegetative objectives for the site. Such harvest must be consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources. *Standard 2*: Maximum size of openings created by one regeneration harvest operation shall not exceed 40 acres. *Standard 3*: Even aged management regeneration harvest shall not occur unless the stand has reached the culmination of mean annual increment, unless there are other resource purposes for treatment. *Standard 5*: When trees are cut to achieve timber production objectives the cuttings shall be made in such a way as to adequately restock the lands. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Forested Vegetation Resiliency Objective*: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions. *Forested Vegetation Douglas-fir Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class on approximately 20,000 acres. *Forested Vegetation Lodgepole Pine Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class by approximately 74,000 acres. *Forested Vegetation Aspen Component Objective*: Increase the aspen component within lodgepole pine and other vegetation types on 67,000 acres.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Forested Vegetation All Other Forested Vegetation Types Objective: Manage within the historic range of variability. **Wildlife Habitat** *Sensitive and Federally Listed Species Objective:* Outlines source information to consider when designing projects that may affect sensitive species or federally listed species. *Standard 4*: Identifies levels and sizes of green tree replacements required for regeneration harvests.
Guideline VEG G1: Vegetation management projects should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scare or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat.	**Fire Management** *Fuels Management Goal*: A full range of fuels management activities is available to achieve ecosystem sustainability, including, economic, and social components. **Timber Management** *Lands Suitable for Timber Production, Lands Not Suitable for Timber Production, and Lands Where Timber Harvest is Not Allowed Goals*: Manage lands suitable for timber production for growth and yield. Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range improvement, and grass and shrub land maintenance. Manage lands where timber harvest is not allowed, where no exception for timber harvest has been identified to protect resource values. *Standard 1*: Even aged harvest may occur only upon a finding that it is the appropriate and optimum method for the timber type and will contribute to meeting vegetative objectives for the site. Such harvest must be consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources. *Standard 2*: Maximum size of openings created by one regeneration harvest operation shall not exceed 40 acres. *Standard 3*: Even aged management regeneration harvest shall not occur unless the stand has reached the culmination of mean annual increment, unless there are other resource purposes for treatment. *Standard 5*: When trees are cut to achieve timber production objectives the cuttings shall be made in such a way as to adequately restock the lands. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Unique Habitats Goal*: The trend toward an older forest is altered by increasing the younger age classes providing greater forest diversity in age classes. Stable or upward trends are achieved for declining or unique habitats *Forested Vegetation Resiliency Objective*: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Forested Vegetation Douglas-fir Type Objective: Increase the number of acres in the 0 to 5 inch DBH class on approximately 20,000 acres. *Forested Vegetation Lodgepole Pine Type Objective*: Increase the number of acres in the 0 to 5 inch DBH class by approximately 74,000 acres. *Forested Vegetation Aspen Component Objective*: Increase the aspen component within lodgepole pine and other vegetation types, on 67,000 acres. *Forested Vegetation All Other Forested Vegetation Types Objective*: Manage within the historic range of variability. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Standard 3*: Identifies snag levels/sizes required for retention during mechanical vegetation treatments. *Standard 4*: Identifies levels and sizes of green tree replacements required for regeneration harvests. *Standard 12*: Provides for the maintenance of existing large down wood (species and size) in regeneration harvest units.
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.	**Recreation and Travel Management** *Standard 3*: Restrict year-round, wheeled motorized travel to designated routes or areas. **Wildlife Habitat** *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less.
Guideline VEG G5: Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.	**Aquatic Resources** *Standard 1*: Riparian Conservation Area – any activity in RCAs shall be designed to enhance, restore, or maintain the physical and biological characteristics of the RCA. **Timber Management** *Lands Suitable for Timber Production, Lands Not Suitable for Timber Production, and Lands Where Timber Harvest is Not Allowed Goals*: Manage lands suitable for timber production for growth and yield. Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	improvement, and grass and shrub land maintenance. Manage lands where timber harvest is not allowed, where no exception for timber harvest has been identified to protect resource values. *Standard 5*: When trees are cut to achieve timber production objectives the cuttings shall be made in such a way as to adequately restock the lands. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed. *Forested Vegetation Resiliency Objective*: Reduce forest density in the large size classes of dry forest communities and some lodgepole pine communities to maintain or improve resilient forest conditions. *Forested Vegetation All Other Forested Vegetation Types Objective*: Manage within the historic range of variability. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.
Guideline VEG G10: Fuel treatment projects within the WUI as defined by HFRA should be designed considering standards VEG S1, S2, S5, and S6 to promote lynx conservation.	**Fire Management** *Fuels Management Goal*: A full range of fuels management activities is available to achieve ecosystem sustainability, including, economic, and social components. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.
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.	**Timber Management** *Lands Suitable for Timber Production, Lands Not Suitable for Timber Production, and Lands Where Timber Harvest is Not Allowed Goals*: Manage lands suitable for timber production for growth and yield. Manage lands where timber harvest is allowed to protect other resource values. Resource objectives may include, but are not limited to, protection of wildland urban interface, protection of improvements, aquatic system restoration, fuel reduction, wildlife habitat enhancement, fisheries habitat enhancement, range improvement, and grass and shrub land maintenance. Manage lands where timber harvest is not allowed, where no exception for timber harvest has been identified to protect resource values. **Vegetation** *Biodiversity Goal*: Promote the management of disturbance processes to maintain a mosaic of species and age classes of trees, shrubs, grasses, and forbs that contribute to wildlife cover and forage. Old growth is managed on a forest wide basis and is well distributed.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Unique Habitats Goal: Trend toward an older forest is altered by increasing the younger age classes providing greater forest diversity in age classes. Stable or upward trends are achieved for declining or unique habitats. *Standard 1*: Mechanical vegetation treatments and prescribed fire in old growth stands do not reduce the age and number of large trees and basal area below the "minimum criteria" required for Eastern Montana old growth. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Snags Objective*: Snags and woody debris are well distributed by vegetation category and size class over time. *Sensitive and Federally Listed Species Objective:* Outlines source information to consider when designing projects that may affect sensitive species or federally listed species. *Standard 3*: Identifies snag levels/sizes required for retention during mechanical vegetation treatments. *Standard 12*: Provides for the maintenance of existing large down wood (species and size) in regeneration harvest units.
Livestock management (GRAZ) - apply to grazing projects in lynx habitat in lynx analysis units in occupied habitat. They do not apply to linkage areas.	
Objective GRAZ 01: Manage livestock grazing to be compatible with improve or maintaining lynx habitat.	**Livestock Grazing** *Forage Use Goal***:** 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 or restore riparian function as defined in the allotment management plan. *Standard 1*: Contains elements that manage livestock forage utilization, streambank disturbance, and stubble heights to prevent reduction of existing water quality or physical or biological functions of riparian-wetland areas from management activities and provides standards for upland range utilization. *Standard 3*: Allotment management plans will identify specific criteria for special areas, such as wet meadows, where limiting grazing at certain times of the years or under certain conditions is necessary to protect resources. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.
Guidelines GRAZ G1: In fire- and harvest-created openings, livestock grazing should be managed so impacts do not prevent shrubs and trees from regenerating.	**Livestock Grazing** *Forage Use Goal***:** 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 or restore riparian function as defined in the allotment management plan. *Standard 1*: Contains elements that manage livestock forage utilization, streambank disturbance, and stubble heights to prevent reduction of existing water quality or physical or biological functions of riparian-wetland areas from management activities and provides standards for upland range utilization.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Standard 3: Allotment management plans will identify specific criteria for special areas, such as wet meadows, where limiting grazing at certain times of the years or under certain conditions is necessary to protect resources. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.
Guideline GRAZ G2: In aspen stands, livestock grazing should be managed to contribute to the long-term health and sustainability of aspen.	**Livestock Grazing** *Standard 1*: Contains elements that manage livestock forage utilization, streambank disturbance, and stubble heights to prevent reduction of existing water quality or physical or biological functions of riparian-wetland areas from management activities and provides standards for upland range utilization. *Standard 3*: Allotment management plans will identify specific criteria for special areas, such as wet meadows, where limiting grazing at certain times of the years or under certain conditions is necessary to protect resources. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.
Guideline GRAZ G3: In riparian areas and willow cars, livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	**Aquatic Resources** *Standard 14*: Grazing practices that prevent attainment of desired stream function, or are likely to adversely affect threatened or endangered species, or adversely impact sensitive species, are modified to attain desired stream function or population objectives (GM 1). *Standard 16:* Limit livestock trailing, bedding, watering, salting, loading, and other handling efforts to those areas and times that would not retard or prevent attainment of desired stream function or adversely affect native fish and sensitive aquatic species (GM 3). **Livestock Grazing** *Forage Use Goal***:** 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 or restore riparian function as defined in the allotment management plan. *Standard 1*: Contains elements that manage livestock forage utilization, streambank disturbance, and stubble heights to prevent reduction of existing water quality or physical or biological functions of riparian-wetland areas from management activities and provides standards for upland range utilization. *Standard 3*: Allotment management plans will identify specific criteria for special areas, such as wet meadows, where limiting grazing at certain times of the years or under certain conditions is necessary to protect resources. **Wildlife Habitat**

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Habitat Goal: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.
Guideline GRAZ G4: in shrub-steppe habitats, livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs, to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	**Livestock Grazing** *Forage Use Goal***:** 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 or restore riparian function as defined in the allotment management plan. *Standard 1*: Contains elements that manage livestock forage utilization, streambank disturbance, and stubble heights to prevent reduction of existing water quality or physical or biological functions of riparian-wetland areas from management activities and provides standards for upland range utilization. *Standard 3*: Allotment management plans will identify specific criteria for special areas, such as wet meadows, where limiting grazing at certain times of the years or under certain conditions is necessary to protect resources. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.
Human use projects (HU) – apply to human use projects, such as special uses (other than grazing), recreation management, roads, highways, and mineral and energy development, in lynx habitat in lynx analysis units in occupied habitat, subject to valid existing rights. They do not apply to vegetation management projects or grazing projects directly. They do not apply to linkage areas.	
Objective HU O1: Maintain the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat.	**Minerals, Oil, and Gas** *Standard 1*: Oil and gas leasing opportunities are limited in areas with special designations, such as timing restrictions, controlled surface use, no surface occupancy, or not available depending on the area affected. *Standard 2*: Any new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system. **Recreation and Travel Management** *Developed Sites Goal*: High quality developed recreation facilities are strategically located to concentrate use, provide access to backcountry settings, and protect natural resources. Sites are clean, well maintained, and designed for universal accessibility. *Dispersed Sites Goal*: Identify dispersed campsites causing adverse resource impacts. Develop mitigation or relocate the site to protect the resource. Close campsites where unacceptable resource damage cannot be mitigated. *Standard 2*: Motorized vehicles are not allowed in summer or winter non- motorized allocations except for permitted or administrative use. *Standard 3*: Restrict year-round, wheeled motorized travel to designated routes or areas. *Standards 7-9:* Provide seasonal restrictions for primitive, semi-primitive, and backcountry settings (both motorized and non-motorized).

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Standards 10, 12, and 13: Manage Wilderness or recommended Wilderness areas for non-motorized settings and limit road construction. **Wildlife Habitat** *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Snags Objective*: Snags and woody debris are well distributed by vegetation category and size class over time. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Objective HU O2: Manage recreational activities to maintain lynx habitat and connectivity.	**Recreation and Travel Management** *Developed Sites Goal*: High quality developed recreation facilities are strategically located to concentrate use, provide access to backcountry settings, and protect natural resources. Sites are clean, well maintained, and designed for universal accessibility. *Road and Trail Use Goal*: A system of routes and areas designated for non-motorized and motorized use are identified and available for public use. A non-motorized recreation allocation (Summer Non-Motorized, Recommended Wilderness, or designated Wilderness) does close all routes within the area to motorized use. Resources are protected and user conflicts are minimized by allowing motorized wheeled travel only on designated routes and areas. A system of trails designated for non-motorized uses are also identified and available for public use. *Dispersed Sites Goal*: Identify dispersed campsites causing adverse resource impacts. Develop mitigation or relocate the site to protect the resource. Close campsites where unacceptable resource damage cannot be mitigated. *Standard 2*: Motorized vehicles are not allowed in summer or winter non- motorized allocations except for permitted or administrative use. *Standard 4:* Extreme sport courses such as motocross trails, technical mountain bike courses, and motor vehicle challenge routes will not be constructed. *Standard 3*: Restrict year-round, wheeled motorized travel to designated routes or areas.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Standards 7-9: Provide seasonal restrictions for primitive, semi-primitive, and backcountry settings (both motorized and non-motorized). *Standards 10, 12, and 13*: Manage Wilderness or recommended Wilderness areas for non-motorized settings and limit road construction. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to: 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, and providing secure habitat at the landscape scale to facilitate large animal movement. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Objective HU O3: Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat.	***Lands*** *Utility Corridors and Communication Sites Goal*: A network of designated utility corridors and communication sites is provided to minimize the proliferation of rights-of-way, facilities, and corridors across the landscape. Designation of a corridor does not constitute approval of any particular project *Standard 1*: Energy transmission facilities shall be located only in designated utility corridors shown on the Utility Corridor and Communication Site map. Energy gathering or distribution facilities may be located outside of designated corridors.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Standard 2: Wireless telecommunication facilities shall be located in designated communication sites and utility corridors shown on the Utility Corridor and Communication Site map. Exceptions may be made for non-ground disturbing temporary facilities that are in place for less than one year. **Recreation and Travel Management** *Developed Sites Goal*: High quality developed recreation facilities are strategically located to concentrate use, provide access to backcountry settings, and protect natural resources. Sites are clean, well maintained, and designed for universal accessibility. *Standard 3*: Restrict year-round, wheeled motorized travel to designated routes or areas. *Standard 4:* Extreme sport courses such as motocross trails, technical mountain bike courses, and motor vehicle challenge routes will not be constructed. *Standards 7-9*: Provide seasonal restrictions for primitive, semi-primitive, and backcountry settings (both motorized and non-motorized). *Standards 10, 12, and 13*: Manage Wilderness or recommended Wilderness areas for non-motorized settings and limit road construction. **Wildlife Habitat** *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities.
Objective HU O4: Provide for lynx habitat needs and connectivity when developing new or expanding existing developed recreation sites or ski areas.	**Economics and Social Values** *Economy Contribution Goal***:** Contribute to the social and economic well-being of local communities by promoting sustainable use of renewable natural resources. Provide timber for commercial harvest, forage for livestock grazing, exploration and development opportunities for mineral resources, and recreation settings consistent with other resource goals. **Recreation and Travel Management** *Developed Sites Goal*: High quality developed recreation facilities are strategically located to concentrate use, provide access to backcountry settings, and protect natural resources. Sites are clean, well maintained, and designed for universal accessibility. *Road and Trail Use Goal*: A system of routes and areas designated for non-motorized and motorized use are identified and available for public use. A non-motorized recreation allocation (Summer Non-Motorized, Recommended Wilderness, or designated Wilderness) does close all routes within the area to motorized use. Resources are protected and user conflicts are minimized by allowing motorized wheeled travel only on designated routes and areas. A system of trails designated for non-motorized uses are also identified and available for public use. *Standard 3*: Restrict year-round, wheeled motorized travel to designated routes or areas. **Wildlife Habitat**

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Habitat Goal: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to: 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, and providing secure habitat at the landscape scale to facilitate large animal movement. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan.
Objective HU O5: Manage human activities, such as special uses, mineral and oil and gas exploration and development, and placement of utility transmission corridors, to reduce impacts on lynx and lynx habitat.	**Aquatic Resources** *Standard 20*: Sand and gravel mining and extraction within Riparian Conservation Areas (RCAs are prohibited) (MM 5). ***Lands*** *Utility Corridors and Communication Sites Goal*: A network of designated utility corridors and communication sites is provided to minimize the proliferation of rights-of-way, facilities, and corridors across the landscape. Designation of a corridor does not constitute approval of any particular project *Standard 1*: Energy transmission facilities shall be located only in designated utility corridors shown on the Utility Corridor and Communication Site map. Energy gathering or distribution facilities may be located outside of designated corridors. *Standard 2*: Wireless telecommunication facilities shall be located in designated communication sites and utility corridors shown on the Utility Corridor and Communication Site map. Exceptions may be made for non-ground disturbing temporary facilities that are in place for less than one year. **Minerals, Oil, and Gas** *Oil and Gas Leasing Goal*: Offer oil and gas leasing opportunities under stipulations which protect resource values. *Standard 1*: Provides direction on lease options with elements limiting term periods, timing of exploration/operations, as well as surface use and occupancy. It also identifies areas legally unavailable for leasing, including but not limited to wilderness and recommended wilderness areas. *Standard 2*: Any new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system. *Standard 3*: All drill pads will be obliterated. **Recreation and Travel Management**

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Developed Sites Goal: High quality developed recreation facilities are strategically located to concentrate use, provide access to backcountry settings, and protect natural resources. Sites are clean, well maintained, and designed for universal accessibility. *Road and Trail Use Goal*: A system of routes and areas designated for non-motorized and motorized use are identified and available for public use. A non-motorized recreation allocation (Summer Non-Motorized, Recommended Wilderness, or designated Wilderness) does close all routes within the area to motorized use. Resources are protected and user conflicts are minimized by allowing motorized wheeled travel only on designated routes and areas. A system of trails designated for non-motorized uses are also identified and available for public use. *Dispersed Sites Goal*: Identify dispersed campsites causing adverse resource impacts. Develop mitigation or relocate the site to protect the resource. Close campsites where unacceptable resource damage cannot be mitigated. *Standard 2*: Motorized vehicles are not allowed in summer or winter non- motorized allocations except for permitted or administrative use. *Standard 3*: Restrict year-round, wheeled motorized travel to designated routes or areas. *Standards 7-9*: Provide seasonal restrictions for primitive, semi-primitive, and backcountry settings (both motorized and non-motorized). *Standards 10, 12, and 13*: Manage Wilderness or recommended Wilderness areas for non-motorized settings and limit road construction. **Wildlife Habitiat** *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to: 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, and providing secure habitat at the landscape scale to facilitate large animal movement. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan.
Objective HU O6: Reduce adverse highway effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity, and to reduce the potential of lynx mortality.	**Wildlife Habitiat** *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to: 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, and providing secure habitat at the landscape scale to facilitate large animal movement.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
Guideline HU G1: When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat is maintained.	**Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.
Guideline HU G2: When developing or expanding ski areas, lynx foraging habitat should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.	**Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.
Guideline HU G3: Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.	**Recreation and Travel Management** *Developed Sites Goal*: High quality developed recreation facilities are strategically located to concentrate use, provide access to backcountry settings, and protect natural resources. Sites are clean, well maintained, and designed for universal accessibility. *Road and Trail Use Goa*l: A system of routes and areas designated for non-motorized and motorized use are identified and available for public use. A non-motorized recreation allocation (Summer Non-Motorized, Recommended Wilderness, or designated Wilderness) does close all routes within the area to motorized use. Resources are protected and user conflicts are minimized by allowing motorized wheeled travel only on designated routes and areas. A system of trails designated for non-motorized uses are also identified and available for public use. *Dispersed Sites Goa*l: Identify dispersed campsites causing adverse resource impacts. Develop mitigation or relocate the site to protect the resource. Close campsites where unacceptable resource damage cannot be mitigated. *Standard 4:* Extreme sport courses such as motocross trails, technical mountain bike courses, and motor vehicle challenge routes will not be constructed. *Standards 7-9*: Provide seasonal restrictions for primitive, semi-primitive, and backcountry settings (both motorized and non-motorized). **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to: 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, and providing secure habitat at the landscape scale to facilitate large animal movement. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Wildlife Security Goal: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Snags Objective*: Snags and woody debris are well distributed by vegetation category and size class over time. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Guideline HU G4: For mineral and energy development sites and facilities, remote monitoring should be encouraged to reduce snow compaction.	**Minerals, Oil, and Gas** *Oil and Gas Leasing Goal*: Offer oil and gas leasing opportunities under stipulations which protect resource values. *Standard 1*: Provides direction on lease options with elements limiting term periods, timing of exploration/operations, as well as surface use and occupancy. It also identifies areas legally unavailable for leasing, including but not limited to wilderness and recommended wilderness areas. *Standard 2*: Any new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system.
Guideline HU G5: For mineral and energy development sites and facilities that are closed, a reclamation plan that restores lynx habitat should be developed.	**Minerals, Oil, and Gas** *Standard 1*: Provides direction on lease options with elements limiting term periods, timing of exploration/operations, as well as surface use and occupancy. It also identifies areas legally unavailable for leasing, including but not limited to wilderness and recommended wilderness areas. *Standard 2*: Any new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system. *Standard 3*: All drill pads will be obliterated.
Guideline HU G6: Methods to avoid or reduce effects on lynx should be used in lynx habitat when upgrading unpaved roads to maintenance levels 4 or 5, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.	**Economics and Social Values** *Economy Contribution Goal*: Contribute to the social and economic well-being of local communities by promoting sustainable use of renewable natural resources. Provide timber for commercial harvest, forage for livestock grazing, exploration and development opportunities for mineral resources, and recreation settings consistent with other resource goals. **Minerals, Oil, and Gas**

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	Standard 2: Any new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system. **Wildlife Habitat** *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities.
Guideline HU G7: New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.	**Wildlife Habitat** *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to: 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, and providing secure habitat at the landscape scale to facilitate large animal movement. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Snags Objective*: Snags and woody debris are well distributed by vegetation category and size class over time. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Guideline HU G8: Cutting brush along low-speed, low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.	**Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities.
Guideline HU G9: On new roads built for projects, public motorized use should be restricted. Effective	**Minerals, Oil, and Gas**

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
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.	*Standard 2*: Any new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system. **Recreation and Travel Management** *Road and Trail Use Goal*: A system of routes and areas designated for non-motorized and motorized use are identified and available for public use. A non-motorized recreation allocation (Summer Non-Motorized, Recommended Wilderness, or designated Wilderness) does close all routes within the area to motorized use. Resources are protected and user conflicts are minimized by allowing motorized wheeled travel only on designated routes and areas. A system of trails designated for non-motorized uses are also identified and available for public use. *Standard 2*: Motorized vehicles are not allowed in summer or winter non- motorized allocations except for permitted or administrative use. *Standards 10, 12, and 13*: Manage Wilderness or recommended Wilderness areas for non-motorized settings and limit road construction.
Guideline HU G10: When developing or expanding ski areas and trails, consider locating access roads and lift termini to maintain and provide lynx security habitat if it has been identified as a need.	**Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Guideline HU G11: Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compaction, unless designation serves to consolidate use and improve lynx habitat. This may be calculated on an LAU basis, or on a combination of immediately adjacent LAUs.	**Recreation and Travel Management** *Developed Sites Goal*: High quality developed recreation facilities are strategically located to concentrate use, provide access to backcountry settings, and protect natural resources. Sites are clean, well maintained, and designed for universal accessibility. *Road and Trail Use Goal*: A system of routes and areas designated for non-motorized and motorized use are identified and available for public use. A non-motorized recreation allocation (Summer Non-Motorized, Recommended Wilderness, or designated Wilderness) does close all routes within the area to motorized

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to access regulated by Guideline HU G12. Use the same analysis boundaries for all actions subject to this guideline.	use. Resources are protected and user conflicts are minimized by allowing motorized wheeled travel only on designated routes and areas. A system of trails designated for non-motorized uses are also identified and available for public use. *Standards 7-9*: Provide seasonal restrictions for primitive, semi-primitive, and backcountry settings (both motorized and non-motorized). **Wildlife Habitat** *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Guideline HU G12: Winter access for non-recreation special uses and mineral and energy exploration and development, should be limited to designated routes or designated over-the-snow routes.	**Minerals, Oil, and Gas** *Oil and Gas Leasing Goal*: Offer oil and gas leasing opportunities under stipulations which protect resource values. *Standard 1:* Provides direction on lease options with elements limiting term periods, timing of exploration/operations, as well as surface use and occupancy. It also identifies areas legally unavailable for leasing, including but not limited to wilderness and recommended wilderness areas. *Standard 2*: Any new road constructed for oil and gas activity will be obliterated unless the road is needed as part of the Forest Service permanent transportation system. **Recreation and Travel Management** *Developed Sites Goal*: High quality developed recreation facilities are strategically located to concentrate use, provide access to backcountry settings, and protect natural resources. Sites are clean, well maintained, and designed for universal accessibility. *Road and Trail Use Goal*: A system of routes and areas designated for non-motorized and motorized use are identified and available for public use. A non-motorized recreation allocation (Summer Non-Motorized, Recommended Wilderness, or designated Wilderness) does close all routes within the area to motorized use. Resources are protected and user conflicts are minimized by allowing motorized wheeled travel only

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	on designated routes and areas. A system of trails designated for non-motorized uses are also identified and available for public use. **Wildlife Habitat** *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to: 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, and providing secure habitat at the landscape scale to facilitate large animal movement. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Linkage areas (LINK) – apply to all projects within linkage areas in occupied habitat, subject to valid existing rights.	
Objective LINK O1: In areas of intermingled land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges, or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat.	**Lands** *Conservation Easements Goal*: Conservation easements are acquired where appropriate to protect important habitat or viewsheds. *Property Lines Goal*: National Forest System property lines adjacent to private lands and boundaries of special areas such as the National Wilderness Preservation System are clearly marked where encroachment is likely. **Wildlife Habitat** *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to:

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
	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, and providing secure habitat at the landscape scale to facilitate large animal movement.
Standard LINK S1: When highway or forest highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings.	**Infrastructure** *Transportation System Goal*: The minimum transportation system necessary is identified and managed. Roads and trails are identified in the transportation atlas maintained at the Forest Supervisor's Office. Roads and trails are constructed, managed, and maintained to meet land and resource objectives. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs. *Connectivity Goal*: Forest management contributes to wildlife linkages between landscapes, unless landscape isolation is determined to be beneficial. Linkage areas are those areas identified for large carnivores and ungulates through multi-agency coordination. Options may include, but are not limited to: 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, and providing secure habitat at the landscape scale to facilitate large animal movement. *Secure Areas and Connectivity Goal*: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities. *Wildlife Security Goal*: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels specified in the Forest Plan. *Road and Trail Densities by Hunting Unit Objective*: From October 15 to December 1, reduce the open motorized road and trail densities in hunting units 215 to 1.5; 300 to 0.6; 302 to 1.0; 318 to 1.8; 333 to .9; 341 to .5; and 350 to 1.3 miles per square mile or less. *Road and Trail Densities by Landscape Objective*: Reduce the open motorized road and trail densities from May 16 to December 1 in the Boulder River Landscape to 1.9 and Jefferson River Landscape to 1.6 miles per square miles or less. *Standard 1*: From October 15 to December 1 Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail mileage (Scale - Hunting Units on National Forest lands). *Standard 2:* Landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage (Scale – Landscapes on National Forest System Lands).
Guideline LINK G1: NFS lands should be retained in public ownership.	**Lands** *Land Adjustments Goal*: Land ownership adjustments are pursued as opportunities arise, to improve national forest management through purchase, exchange, or other authority.

NRLMD Direction	Supporting Forest Plan Goals, Objectives, and Standards
Guideline LINK G2: Livestock grazing in shrub-steppe habitats should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	**Livestock Grazing** *Forage Use Goal***:** 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 or restore riparian function as defined in the allotment management plan. *Standard 1*: Contains elements that manage livestock forage utilization, streambank disturbance, and stubble heights to prevent reduction of existing water quality or physical or biological functions of riparian-wetland areas from management activities and provides standards for upland range utilization. *Standard 3*: Allotment management plans will identify specific criteria for special areas, such as wet meadows, where limiting grazing at certain times of the years or under certain conditions is necessary to protect resources. **Wildlife Habitat** *Habitat Goal*: Cover and forage for animals is provided by a mosaic of species and age classes of native trees, shrubs, grasses, and forbs.