
Chapter 3 Affected Environment & Effects

Introduction

Chapter 3 describes the potentially affected resources of the planning area and the effects of the alternatives on these resources.

Chapter organization

Chapter 3 is organized into sections by resource. The sections are:

- ♦ Lynx
- ♦ Other wildlife & fish
- ♦ Fire
- ♦ Forests
- ♦ Plants
- ♦ Range
- ♦ Recreation
- ♦ Transportation
- ♦ Minerals
- ♦ Land ownership
- ♦ Linkage habitat
- ♦ Special use permits
- ♦ Economic and social
- ♦ Other disclosures

Each section describes the affected environment for that resource and discloses the impacts of Alternative A, the no-action alternative; Alternative B, the Proposed Action; Alternatives C, D, and E, the other action alternatives in the DEIS; and Alternative F, the alternative developed from public comments on the DEIS. Alternative F is the FEIS preferred alternative.

Each resource section is supported by specialist reports and data that can be found in the Project Record.

NEPA regulations in Section 1500.5, Reducing Paperwork, says environmental documents should be short, written in plain language, analytic rather than encyclopedic, and discuss only briefly issues that are not significant. This document has been written to meet that direction while complying with all other laws, regulations, and policy.

Nature of effects

The proposal is programmatic in nature, consisting of direction that would be applied to future management activities. It does not prescribe site-specific activities on the ground, nor does it irreversibly commit resources. CEQ regulations define *direct effects* as those occurring at the same time and place as the proposal. There are no direct environmental consequences of the proposal; therefore this analysis discusses only *indirect* and *cumulative* effects of the alternatives. Direct effects would result from site-specific projects that implement this direction, and would be evaluated when those decisions are made.

In analyzing effects in this document, it is assumed the standards would be met

because complying with standards is mandatory. The analysis of effects is based primarily on projections of how future activities and areas would change because of the proposed standards. Such projections are inherently uncertain.

It is also assumed that the objectives generally would be achieved and the guidelines would generally be followed, though that may not always be true.

The baseline for effects disclosed in this chapter is the existing plans. The effects of existing plans have been previously determined and disclosed in the NEPA analyses that accompanied them. This FEIS describes changes in effects resulting from incorporating the lynx conservation measures into those plans.

Generally, effects are presented as changes from existing plans, represented by Alternative A, the no action alternative. In other cases effects on lynx are presented by comparing them to Alternative B, the

Proposed Action. Cumulative effects include the effects of the existing plans as disclosed in their accompanying NEPA documents. They are incorporated into the cumulative effects analysis by reference.

Significance of effects

NEPA requires an EIS to be prepared for proposals that significantly affect the quality of the human environment. This document was prepared as an EIS based on the level of public interest, not because of the presence of significant effects from any of the alternatives.

The overall effect of the action alternatives is to reduce the likelihood of effects from future projects. This analysis has not identified any environmental effects likely to be significant. This FEIS also discloses the indirect effects of not taking future actions (Alternative A).

Lynx

Analysis process

Planning area

The planning area includes lynx habitat in the 18 NFs described in Chapter 1 (see Table 1-1). The planning area includes more than half the lynx habitat in the Northern Rocky Mountains Geographic Area.

More than 38 million acres of National Forest System (NFS) lands are inside the planning area. Of these, nearly 18,500,000 acres are lynx habitat (see Table 3-1).

Almost half of the NFS lands have been mapped as lynx habitat (see Table 3-1, the *Proposed Action* section of Chapter 1, and Appendix B for a discussion of habitat mapping). About 43 percent of lynx habitat in the planning area is available for development and active management

– see Appendix E for a description of management area categories.

Analysis boundary

Generally, the boundary for evaluating effects, including cumulative effects is lynx habitat in LAUs in the planning area (Figure 1-1). This boundary was chosen because for most resources, the effects of the proposal are limited to changes in direction for lynx habitat within the administrative boundaries of the units whose plans are being amended.

The analysis boundaries for economics, lynx, and effects on human communities, are different. See those sections for descriptions of their analysis boundaries.

Some effects were evaluated based on

Table 3-1. Lynx habitat in the planning area

Area	Unit of measure
Planning area acres	38,530,000 acres
Habitat acres in planning area	18,470,000 acres
Habitat percent of agency land	48%
Habitat acres in development allocations ¹	7,940,000 acres
Percent habitat in development allocations	43%
Habitat acres in non-development allocations ²	10,530,000 acres
Percent habitat in non-development allocations	57%

¹ *Development land allocations* in existing plans allow *developments* like campgrounds and *active management* like timber sales

² *Non-development land allocations* are places where natural disturbance processes predominate, such as wilderness, roadless, and semi-primitive non-motorized areas
Appendix E contains a description of management area categories.

data compiled for administrative units (see Appendix K for that data). This data reflects information on the major program areas that may affect lynx. It generally includes information on the 10-year program of work by individual administrative units.

Analysis tools

Geographic inventory system (GIS) is a computerized mapping tool. GIS layers include:

- ♦ *Lynx habitat maps* – Each unit provided a map of lynx habitat based on vegetative data and snow depths – see Appendix B. Figure 1-1 is a compilation of those maps, used as a base layer for other analysis.
- ♦ *Linkage area maps* – Linkage areas were identified by an interagency group of biologists and state transportation planners, based on the criteria found in Appendix B. Figure 1-1 uses arrows to show the linkage areas. Linkage area maps were used to determine which highways might be affected by the proposal. The resulting map applies to all units in the planning area.
- ♦ *Management area maps*, which were used to evaluate how much lynx habitat is in developmental and non-developmental or wilderness allocations. These maps apply to all units in the planning area (Project file).
- ♦ *Fire perimeter maps*, which were used to evaluate how much lynx habitat in unsuitable condition exists in FS Region 1. This map applies to all units in FS Region 1 (Hillis et al. 2003).
- ♦ *2000 Census data map*, which provided population information. This map was used as a proxy for determining the wildland urban interface (WUI). The WUI was assumed to be the area within one mile of a population density of 28 people per square mile (Project file, GIS maps). This map was used to evaluate the amount of lynx habitat in the planning area in the WUI, as well as the type of lynx habitat in the WUI on the administrative units in Montana (Bush 2006, Project file Analysis FEIS FIA data). The basis for determining WUI was change between the Draft and Final EIS - see the Fire section for further discussion.

FIA (Forest inventory and analysis)

FIA is a systematic collection of vegetative data across the United States, managed by FS Research and Development. FIA data for Montana was used to find the acres of lynx habitat with an abundance of small trees (tree density as measured as trees per acre) that would be within the reach of snowshoe hares in winter – this information was used as a proxy for winter snowshoe hare habitat. In addition the data was used to determine stand structure (multi-story vs. single story). It was used to determine the amount of high- and low-density forests within and outside both wilderness and the WUI (Bush 2006).

Only Montana FIA data was used because it was the only data readily available. Montana provides a large sample of the planning area because it contains about half of the planning area's lynx habitat. Montana can serve as a surrogate for the

entire planning area, because northern Idaho is similar to western Montana, and southern Idaho, Wyoming and Utah are similar to southeastern Montana.

Typically, tools that describe habitat include some quantification of a number of variables to assess how suitable areas are as habitat. Factors known or believed to be important in providing lynx habitat include:

- ♦ Snow depth and condition (fluffy, not wet)
- ♦ Stand structure
- ♦ Vegetation type
- ♦ Density of small diameter trees that may provide snowshoe hare forage
- ♦ Availability of large down woody material for dens
- ♦ Stand size
- ♦ Juxtaposition of stands on the landscape

Other factors, such as slope and aspect, may also play a role in providing habitat for lynx. Knowledge about the quantification and relationships between these variables is limited.

The FIA analysis of winter snowshoe hare habitat is most appropriately used as an index to compare relative effects among the alternatives. It does not provide a definitive assessment of how much or of the quality of snowshoe hare habitat. Because the other variables could not be included, the FIA analysis likely overstates the amount and quality of snowshoe hare habitat.

Data by unit

Each National Forest provided data about its activities in the planning area and the acres that overlap lynx habitat. Data was

provided about precommercial thinning, fuel treatment program, grazing allotments, designated and groomed routes, ski areas, special use agreements, minerals, and forest roads – see Appendix K. The data was used to evaluate the potential effects on lynx and on each resource. Data regarding oil and gas leasing was updated between the Draft and Final EIS. Additional information on fuel treatments for the planning area was collected and utilized for the FEIS.

TSMRS (Timber stand management and resource system)

TSMRS is a computer program developed and used by FS Region 1 to track vegetation management and follow-up needs such as tree planting and precommercial thinning.

Each forest is broken down into large stands, and activities are tracked by stand. Such activities include but are not limited to timber harvest, planting, slashing, prescribed burning, reforestation surveys, etc. TSMRS data was used to evaluate the amount of lynx habitat in young regenerating forests created by timber harvest (Hillis et al. 2003), and to determine the amount of precommercial thinning scheduled during the next decade.

Since TSMRS is used to track reforestation and precommercial thinning program of work the information is generally accurate; especially in regards to date and type of timber harvest.

Cumulative effects analysis

Cumulative effects are summarized at the end of each resource section and supported by the information in Appendix L, which gives a description of all past, present, and reasonably foreseeable programmatic actions in the planning area. Appendix L describes which actions are included in the cumulative effects analysis for each resource, and how or why some actions do not affect a particular resource.

Analysis information

The analysis of the effects on lynx began with a review of literature related to Canada lynx and snowshoe hare biology, ecology, and habitat relationships. New literature, published since the release of the DEIS, has been reviewed and incorporated, where appropriate. Public comments collected during scoping and on the DEIS were reviewed to see whether any additional information about lynx was supplied. Personal communications were conducted with FS and FWS biologists and with researchers investigating lynx and snowshoe hares.

Analysis boundary for lynx

The analysis evaluates the effects of the alternatives on lynx in the planning area. Cumulative effects on lynx are evaluated for the entire Northern Rockies Geographic Area, an area with unique ecosystems and management histories (LCAS).

Assumptions

- 1) The analysis of effects is based primarily on projections of changes in future actions because of the proposed standards and guidelines.
- 2) The lynx habitat maps provided by FS administrative units were used as the geographic basis for assessing effects in lynx habitat – see the discussion of mapping in the *Proposed Action* section of Chapter 1.
- 3) Except for fire management and snow compaction, the majority of human-related effects on wildlife are in the development land allocations, where such things as ski areas and timber sales are allowed (Hickenbottom et al. 1999). See Appendix E.
- 4) Most effects to species are *short-term*, defined as the ten years from 2006 to 2015. *Long-term* effects are those expected to occur sometime after a decade. This time period was used because it is anticipated the plans subject to this proposal would be revised by 2015 and information about program activities can only be projected so far into the future.
- 5) The direction provided in existing plans is adequate to provide habitat for species other than lynx. The LCAS provides recommendations to reduce or eliminate risks and provide for lynx habitat needs based on the most comprehensive recent information about threats and risks to conserving lynx.

Biology

Canada lynx are medium-sized forest carnivores occupying northern forests with abundant snowfall. They have long ear tufts, lightweight body frames and very large paws for their size, which act like snowshoes supporting them on top of fluffy snow.

Lynx tend to have very large home ranges, varying from about 15,000 to 30,000 acres or ten to 20 square miles. Lynx are highly mobile; long-distance movements (greater than 60 miles) are characteristic (Aubry et al. 2000; Mowat et al. 2000).

They seem to prefer to move through continuous forests, and have been observed to avoid large openings until shrubs and trees provide enough cover to hide them (Ruggiero et al. 2000a; Appendix P). They tend to be reclusive so many people who have spent a lot of time in the woods in winter have never seen a

lynx.

Snowshoe hares are the primary prey of lynx, making up from 35 to 97 percent of the diet (Ruggiero et al. 1994, Apps 2000; Aubry et al. 2000; Mowat et al. 2000). Red squirrels may be an important alternate prey, especially when hare populations decline (Koehler 1990; O'Donoghue 1998). Indications are that the summer diet may include a greater variety of prey species (Mowat et al. 2000).

Lynx tend to be less successful hunters than other carnivores, like coyotes and owls, with which they compete. The main cause of lynx mortality is starvation – kittens and young adults both starve to death at high rates if prey – particularly snowshoe hares – is not abundant.

Habitat

Lynx habitat in the planning area is characterized by abundant moisture, with

Figure 3-1. Lynx photos

Lynx have light body frames



Lynx have big feet that let them walk on top of snow

deep winter snow. Habitat tends to be somewhat drier in the southern and eastern parts of the planning area.

Lynx habitat includes primarily cool, moist subalpine fir and Engelmann spruce forests, and moist lodgepole pine forests. Cool, moist forests of Douglas-fir, grand fir, western larch, and aspen contribute to lynx habitat where intermingled with or adjacent to Engelmann spruce or lodgepole pine. In extreme northern Idaho and in northwestern Montana, cedar-hemlock forests also are considered lynx habitat (Ruggiero et al. 2000a).

Lynx habitat is found generally at mid to upper elevations. Lower elevations range from about 3,500 feet in the north to 7,000 feet in the southern parts of the planning area.

Lynx use a variety of forest ages and structural stages. They use young regenerating forests and multistoried forests that provide habitat for snowshoe hares. They move through continuous forests, and frequently use ridges, saddles, and riparian areas (Koehler 1990; Staples 1995). They use forests with abundant dead and down trees for dens to raise their kittens, especially when denning sites are close to foraging habitat. In the winter, lynx do not appear to hunt in openings, where the lack of cover limits habitat for snowshoe hares.

Lynx habitat is affected by natural disturbances such as fire, and vegetation management such as timber harvest and prescribed fires.

Where lynx occur

About 60 percent of lynx habitat in the lower 48 states occurs in the northern Rockies (Appendix P); the Northern Rockies Geographic Area likely has the largest lynx population of the five geographic areas where lynx occur. This is likely due to relatively high quality lynx habitat in large blocks found in the northern Rockies. In addition, the northern Rockies are well connected throughout the geographic area and with Canada.

Lynx historically occurred in all four states of the planning area (Ruggiero et al. 2000a).

In May 2005, the FS and FWS jointly developed the definition of occupied lynx habitat (USDA FS, USDI FWS 2006a). Information from the FWS *Lynx Recovery Outline* (USDI FWS, 2005a) was considered during development of the definition of occupied habitat.

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

1. There are at least two verified lynx observations or records since 1999 on national forests 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.

Once an area is considered “occupied” it remains occupied. Lynx are wide ranging and their distribution expands and contracts to some degrees in the northern United States when populations in Canada expand and contract. Areas historically used by lynx (pre-1999) but which 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 become occupied by lynx.

Verified observation 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 (USDA FS, USDI FWS 2006a).

In addition, the *FWS Recovery Outline* (USDI FWS 2006a) also categorizes lynx habitat and occurrence into three categories: (1) core areas, which have the strongest long-term evidence of lynx; (2) secondary areas, which have fewer and more sporadic current and historical records of lynx; and (3) peripheral areas, which contain very few verified historical or recent records of lynx. See Chapter 1 for more discussion.

In *Idaho* lynx were never abundant but were distributed throughout northern portion of the state. The Idaho Panhandle, Clearwater, and Targhee National Forests have recent verified records of lynx occurrence and are considered occupied based on the National Lynx Survey and other documented sightings (Appendix P, USDA FS, USDI FWS 2006a).

The Idaho Panhandle and Targhee NFs contain both “core” and “secondary” habitat (see Chapter 1, pp. 4-5). The Clearwater NF contains secondary habitat.

No lynx have been verified on Nez Perce and Salmon-Challis National Forests since 1999. The Nez Perce National Forest has not been surveyed, but is being surveyed this winter (2006/2007). Based on the findings this unit would either be identified as occupied or not. The Nez Perce and Salmon-Challis are identified as secondary habitat in *FWS Recovery Outline*.

In *Montana*, numerous historic and current lynx records exist in the western part of the state. Lynx are currently known to be widely distributed throughout northwest Montana and breeding has been documented in multiple locations (USDI FWS 2005b). Historical records in southwestern Montana are fewer and more sporadic. As a result historical lynx abundance has been low and reproduction has not been documented.

All national forests in Montana, except the Bitterroot and Beaverhead-Deerlodge and disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark have recent verified records of lynx

occurrence since 1999 (USDA FS, USDI FWS 2006a) and are considered occupied.

The Flathead, Kootenai and Lolo NFs are identified as core areas. The Custer, Gallatin and Helena NFs contain both core and secondary habitat. The Beaverhead-Deerlodge and Bitterroot are considered secondary habitat. The isolated mountain ranges, the Pryor Mountains on the Custer and the Highwood and Snowy Mountains on the Lewis and Clark NF are considered peripheral habitat. The Lewis and Clark NF also has areas identified as core and secondary habitat.

In *Wyoming* most historical and recent records of lynx are from the northwestern mountain ranges. A lynx study began in western Wyoming in 1996, where a radio-collared female produced four kittens in 1998. Recent snow-track surveys indicated lynx have declined and now are quite rare in northwestern Wyoming (Squires, pers. com Dec 7, 2006). The decline is likely because the habitat is naturally marginal (more patchy and drier forests) and less capable of supporting snowshoe hares and is further from source populations (Appendix P).

Lynx detection surveys conducted in Yellowstone National Park from 2001 to 2004 documented lynx presence and reproduction (Murphy et al. 2006). In addition, up to four lynx from the Colorado introduction are currently (2006) resident within the Greater Yellowstone Area. Reproduction has not been documented for these introduced individuals, but males and females now

have overlapping home ranges so reproduction is likely in the future (J. Squires pers. com; Dec 7, 2006).

The Bridger-Teton and Shoshone National Forests in Wyoming have recent verified records of lynx occurrence and are considered occupied. The Bridger-Teton and Shoshone are identified as core areas. The Bighorn National Forest has no verified records of lynx occurrence since 1999 and is considered unoccupied. This unit is also identified as peripheral habitat in the FWS *Recovery Outline* because it contains few verified historical or recent records of lynx (USDI FWS, 2005a).

In *Utah* there are only 10 verified records of lynx since 1916. In 2002, lynx hair was detected on the Manti-La Sal National Forest in Utah. Before this, no lynx had been verified in Utah since 1991. This is most likely because forest habitat in Utah is remote and far away from source lynx populations (Appendix P).

The Ashley National Forest has no verified records of lynx occurrence since 1999 and is considered unoccupied. This unit is also identified as peripheral habitat in the FWS *Recovery Outline* because it contains few verified historical or recent records of lynx (USDI FWS, 2005a).

Lynx analysis unit (LAU)

An LAU is an area used to evaluate effects of management activities on individual lynx. It is about the size of a female lynx home range, from 15,000 to 30,000 acres or about 25 to 50 square miles.

Lynx risk factors

The LCAS identified the following risk factor categories that could affect lynx:

- ♦ *Productivity*
- ♦ *Mortality*
- ♦ *Movement*

This analysis evaluates how the alternatives affect these risk factors and to what degree.

Productivity risk factors

In the biological sense, *productivity* means the ability of an organism to successfully reproduce. Successful reproduction involves not only giving birth, but also whether the offspring survive into maturity, themselves capable of reproducing.

Lynx productivity is directly related to the quantity and quality of habitat and indirectly related to competition with predators. Productivity risk factors are:

- ♦ *Foraging habitat*
- ♦ *Denning habitat*
- ♦ *Competition from other predators*

This analysis focuses on the risks to foraging and denning habitat, and evaluates how competition from predators affects productivity.

A considerable amount of lynx research has been conducted in Alaska and Canada (Ruggiero et al. 2000a), documenting certain habitat needs and relationships. Research is also underway in the contiguous United States. See Appendix F for a summary.

Foraging habitat

Lynx foraging habitat is defined as habitat that supports snowshoe hares or red squirrels (LCAS).

Red squirrel habitat consists primarily of older, closed-canopied forests with substantial quantities of coarse woody debris.

Snowshoe hare habitat consists of (1) places where young trees or shrubs grow densely, often thousands of woody stems per acre or (2) places where mature forests grow which have high horizontal cover – meaning they have trees whose branches come down to snow level and a component of understory trees.

During winter, hare forage is limited to the twigs and stems that protrude above the snow and the hares can reach. *Since snowshoe hare forage is more limited during winter and hares are lynx primary winter prey, this analysis focuses on the effects of the alternatives to winter snowshoe hare habitat.*

The terms *foraging habitat* and *winter snowshoe hare habitat* are used interchangeably in this analysis.

Vegetation that provides hares with hiding cover is also important.

Winter snowshoe hare habitat occurs in three stages of forest development, the *stand initiation*, *understory re-initiation*, and *old forest multistoried* structural stages.

Stand structural stages

Figure 3-2. Vegetative structural stages and lynx habitat components

<u>Structural stage</u>	<u>Description</u>	<u>Contribution to lynx habitat</u>
Stand initiation, or young regenerating forests	After a stand replacing fire or regeneration harvest, new seedlings establish and develop. A single-story layer of shrubs, tree seedlings and saplings grow.	<i>Not used in the winter</i> for about the first ten to 30 years after disturbance because the trees and shrubs are not tall enough to protrude above the snow. May provide denning habitat. <i>Winter snowshoe hare habitat</i> after about ten to 30 years, if trees are dense enough and tall enough to protrude above the snowline in places that get deep snow.

Winter snowshoe hare habitat

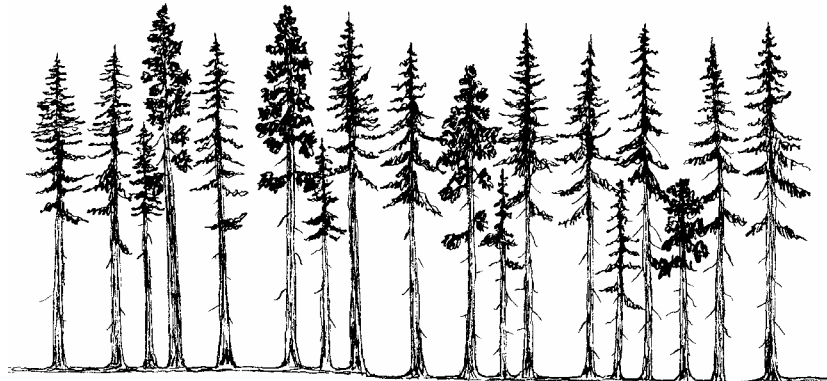


Stem exclusion

Trees initially may grow fast, slowing down as they compete for sunlight and moisture. There is limited understory because little light reaches the forest floor.

Generally, not denning or hare habitat because the live tree crowns are too high, and the understory and dead and down material too limited.

Not winter snowshoe hare habitat



Structural stage

Description

Contribution to lynx habitat

Young forest
multistoried

In this stage, three or more tree layers become established after minor disturbances kill some overstory trees.

Generally not winter snowshoe hare habitat because only a limited understory has developed within the reach of snowshoe hares.

Denning habitat if there are piles of coarse woody material.

***Not winter
snowshoe
hare habitat***



Understory
reinitiation;
one type of
older
multistoried
forests

As the forest ages, some overstory trees begin to die or are removed, making openings where a new generation of understory trees can grow in a multistoried condition.

Winter snowshoe hare habitat if the understory is dense enough to provide cover and forage, and is within reach of hares.

Denning habitat if there are piles of coarse woody material.

***Winter
snowshoe
hare habitat***



Structural stage

Description

Contribution to lynx habitat

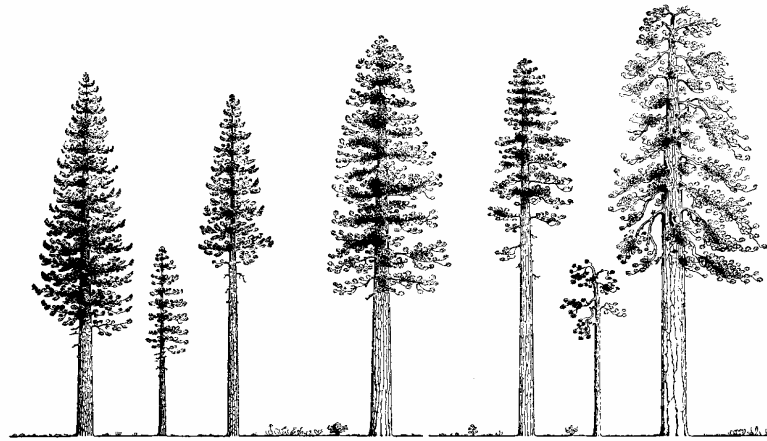
Old forest –
single storied

Many generations and vegetation layers mark this structural class. It usually contains large old trees; decaying falling trees may be present, and it has no understory.

Generally not winter snowshoe hare habitat because it lacks the small understory trees that provide cover and forage for snowshoe hares.

Denning habitat if there are piles of coarse woody material.

Not winter snowshoe hare habitat



Old forest –
multi-storied;
the other
older
multistoried
forest

Some old forests develop a multistoried structure with an understory.

Winter snowshoe hare habitat if understory is dense enough to provide cover and forage, and is within the reach of hares.

Denning habitat because it generally provides plenty of large coarse woody material.

Winter snowshoe hare habitat



Adapted from Oliver and Larson, 1996

Where & how winter snowshoe hare habitat occurs

High densities of young trees and shrubs occur in different stages of forest development – see Figure 3-3.

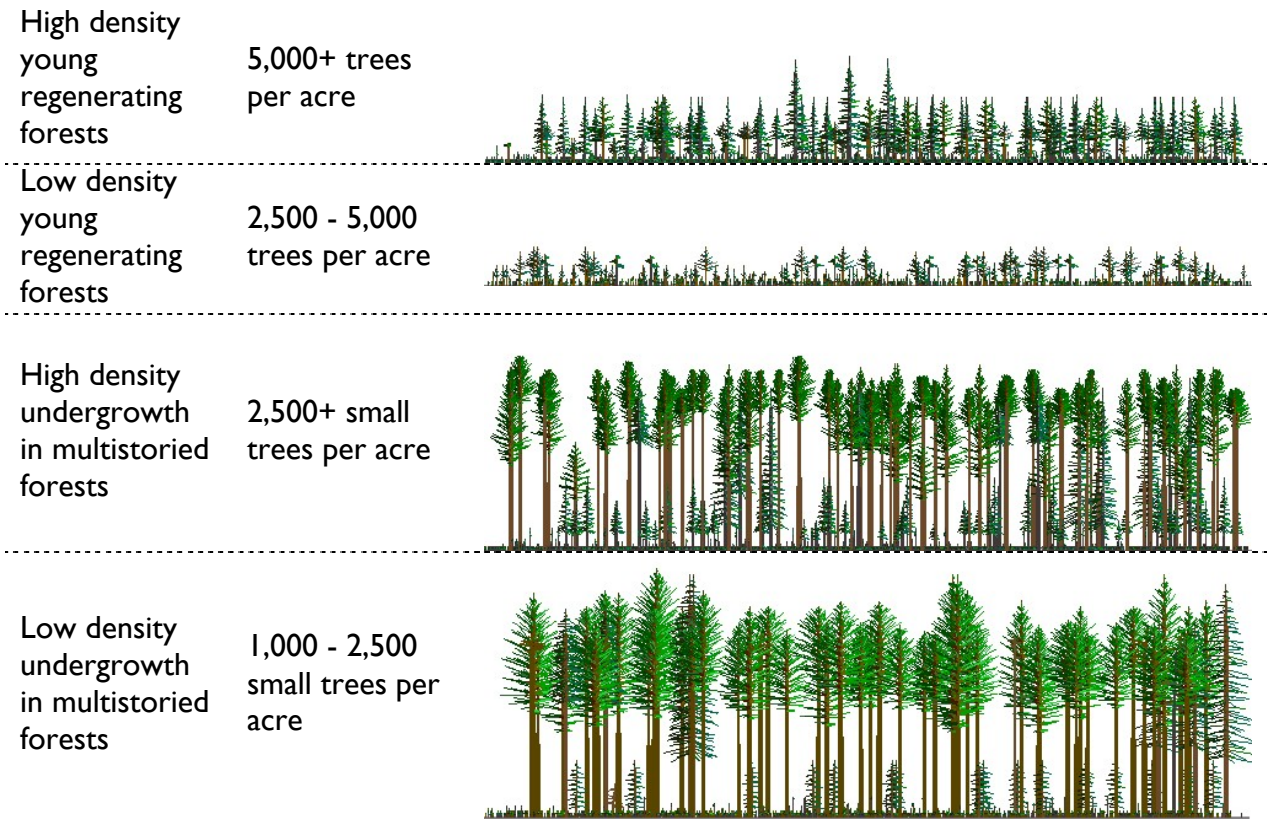
The *stand initiation stage* consists of young regenerating forests when the trees are all about the same age and size. Generally, about ten to 30 years after disturbance trees grow tall enough to provide good winter snowshoe hare habitat. Stand replacing fire and regeneration timber harvests can create these conditions. Many studies have shown hares prefer dense stands (Fuller 2006, Hodges 2000a, Hodges 2000b, McKelvey and McDaniel

2001, Shaw 2002).

Stand initiation structural stage that does not yet provide winter snowshoe hare habitat (previously called unsuitable habitat) consists of young regenerating forests when the trees and brush are generally less than ten to 30 years old and have not yet grown tall enough to protrude above the snow in winter. As time passes, the trees will grow taller and may provide *winter snowshoe hare habitat* if dense enough. Later, they will grow too tall and will be out the reach of snowshoe hares in winter.

The *understory reinitiation and old forest multistoried* are later stages in the life cycle of a forest. As the forest ages, tree heights begin to vary greatly, creating *multistoried*

Figure 3-3. Describing high and low density winter snowshoe hare habitat



forests. Multistoried forests can provide winter snowshoe hare habitat in places where small trees and shrubs grow thick enough to support snowshoe hares.

In northwest Montana, the highest snowshoe hare densities in summer were generally in younger forests with dense forest structure, whereas in winter, snowshoe hare densities were high or higher in mature forests with dense understory structure (USDI FWS 2005b).

Multistoried forest structures can develop from natural processes, such as insects and diseases and fire, or management actions like timber harvest can create small openings where trees and shrubs can grow.

In addition, the amount of winter snowshoe hare habitat across a landscape affects the abundance and density of snowshoe hares. In northeastern Washington, where lynx have existed for many years in areas where there was abundant, high quality winter snowshoe hare habitat, there were more hares than in areas where winter snowshoe hare habitat was sparse or surrounded by poorer quality habitat (USDI FWS 2005b).

Lynx evolved to adapt to an ever-changing forest condition. They require a mosaic of conditions of appropriate species composition, varying stand ages, and structure to support abundant snowshoe hare and lynx denning habitat. In addition, lynx are highly mobile, moving long distances to find abundant prey, and use a large area on the landscape as demonstrated by the large size of an average lynx home range (Appendix P).

Evaluating the amount of winter snowshoe hare habitat

For the purposes of this analysis, FIA data for Montana was used as a proxy to determine how much winter snowshoe hare habitat there may be (see FEIS, page 138 for a description of the data and its limitations). The query of the FIA data was developed in consultation with Kevin McKelvey and John Squires, research ecologist and wildlife research biologist, respectively, at the Rocky Mountain Research Station.

The analysis focuses on two variables – stand structure (mature or young) and stem density (number of trees per acre).

- ♦ It is likely young regenerating forests with 5,000 or more trees per acre less than five inches in diameter provide good foraging habitat (Ruggerio et al. 2000).
- ♦ Young regenerating forests with 2,500-5,000 trees per acre less than five inches in diameter may also provide foraging habitat depending on how the trees are distributed. Young forests with fewer trees may not provide enough cover for snowshoe hares.
- ♦ Multistoried forests with 2,500 or more trees per acre less than five inches in diameter in the understory also may provide good foraging habitat where small trees occur in dense, irregular clumps underneath the overstory.
- ♦ Multistoried forests with 1,000 to 2,500 trees per acre less than five inches in diameter in the understory may also provide good foraging habitat, depending on how the trees are

distributed. Multistoried forests with less than 1,000 trees per acre may not provide enough cover for snowshoe hares.

About 18 percent of the lynx habitat on NF lands in Montana is in young regenerating forests – about 10 percent has a high density of trees and 8 percent has a lower density. About 26 percent is in multistoried forests, which have been found to be an important habitat component in Montana. Sixteen percent of the multistoried forests have a high density of trees and 11 percent a lower

density. The high density conditions are likely to be very good forage, the low density forests may or may not be, depending on site-specific conditions like the tree species and spacing.

See Table 3-2. The amount of young regenerating forests is likely less extensive than it was historically because so many wildfires have been suppressed during the last 80 years (Hillis et al. 2003). At the same time, fire suppression may have increased the amount of winter snowshoe hare habitat available in older multistoried forests.

Figure 3-4. Winter snowshoe hare habitat in Montana
Percent of lynx habitat in Montana

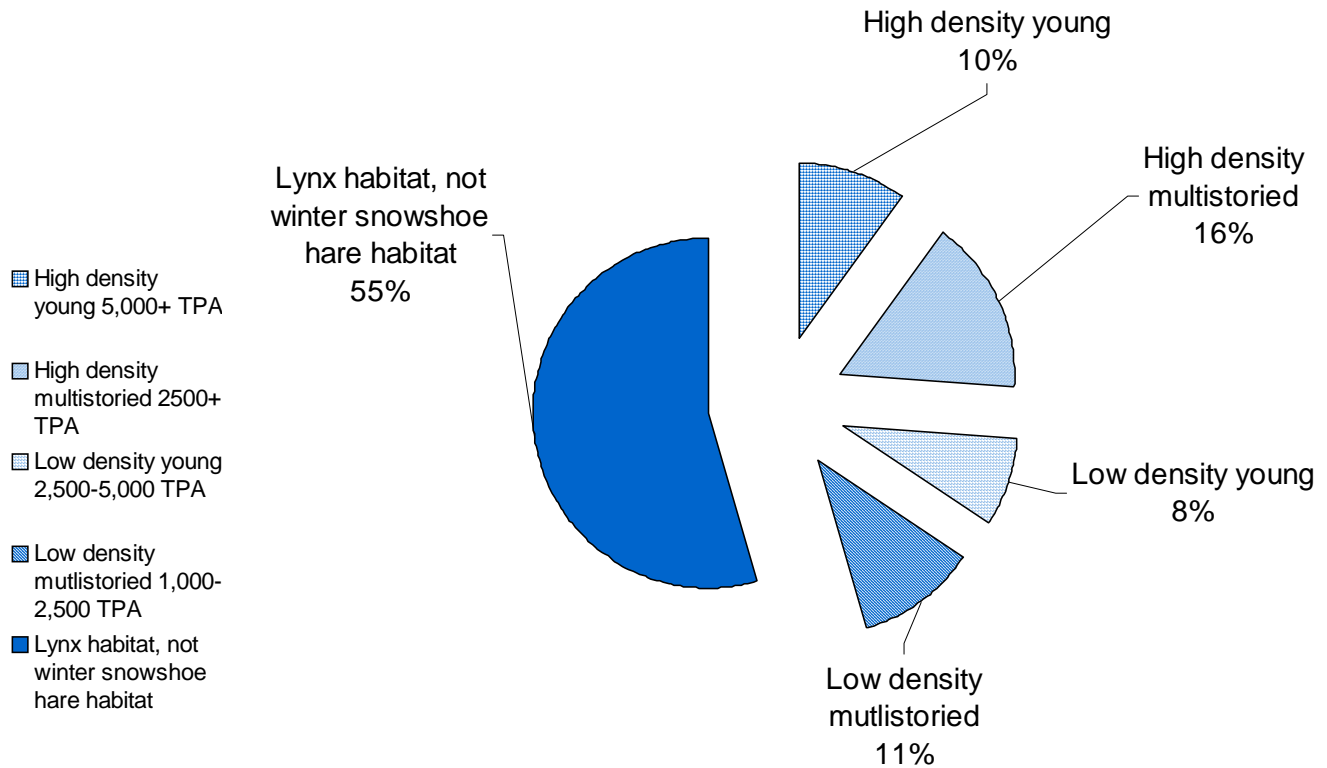


Table 3-2. Winter snowshoe hare habitat in Montana

	Area	Percent lynx habitat†	Percent NF lands‡
Young forests – too short for winter snowshoe hare habitat	~ 900,000 acres	10%	- - -
Winter snowshoe hare habitat	4,136,000 acres	45%	24%
<u>HIGH DENSITY</u>			
Total high density	2,369,000 acres	26%	14%
Young regenerating forests, with at least 5,000 trees per acre			
Wilderness	157,000 acres	2%	1%
Outside wilderness	737,000 acres	8%	4%
Total	894,000 acres	10%	5%
Multistoried forests, with at least 2,500 trees per acre			
Wilderness	355,000 acres	4%	2%
Outside wilderness	1,120,000 acres	12%	6%
Total	1,475,000 acres	16%	8%
<u>LOW DENSITY</u>			
Total low density	1,754,000 acres	19%	10%
Young regenerating forests, with from 2,500 to 5,000 trees per acre			
Wilderness	198,000 acres	2%	1%
Outside wilderness	546,000 acres	6%	3%
Total	744,000 acres	8%	4%
Multistoried forests, with from 1,000 to 2,500 trees per acre			
Wilderness	198,000 acres	2%	1%
Outside wilderness	812,000 acres	9%	5%
Total	1,010,000 acres	11%	6%

† 9,060,000 acres of lynx habitat in Montana

‡ 17,454,000 acres of NFS lands in Montana

Multistoried forests = plots with greater than or equal to 60 square feet of basal area in trees greater than 10 inches in diameter at breast height (DBH) (have an overstory component); and understory less than 5 DBH (have an understory component) with a height to live crown ratio of less than or equal to 5 feet (branches reach snow level).

Young regenerating forests = plots with less than 60 basal square feet per acre in trees greater than 10 inches in diameter (little to no overstory).

The amount of winter snowshoe hare habitat may be overstated because openings and small water bodies, for example, are too small to be discernable at the scale used in the analysis– see the discussion of analysis tools on pages 136 and 137.

Foraging habitat risks

Lynx productivity depends on the quantity and quality of foraging habitat. Foraging habitat may be affected by:

- ♦ Landscape patterns
- ♦ Precommercial thinning
- ♦ Other vegetation management practices
- ♦ Grazing

Landscape pattern risks to foraging habitat

A distribution of *age classes* is important so there are always parts of each LAU providing winter snowshoe hare habitat. Timber harvest, fire, insect outbreaks, avalanches, and wind all change landscape patterns. These actions can modify the quantity and quality of young regenerating forests, as well as multi-storied forests.

Fire plays an important role in lynx habitat. Stand-replacing fires burn mature forests and result in young regenerating forests. Fire suppression can alter the pattern and composition of vegetation within lynx habitat (Hillis 2003, Losensky 2002). These patterns, especially within stand-replacing fire regimes (spruce-fir and lodgepole pine communities), were likely important in providing young regenerating forests across the landscape.

- ♦ In *non-developmental allocations*, because of fire suppression, the large fires that used to burn have been fewer and smaller, so less foraging habitat has been created. Natural fires are allowed to burn but may not mimic historic fire patterns because of human concerns

about large fires (Hickenbottom et al. 1999).

- ♦ In *developmental allocations*, fire suppression tends to be more aggressive and as a result may limit the creation of young regenerating forests. In developmental allocations, timber harvest can result in young regenerating forests (Ruggiero et al. 2000a). Studies of lynx and snowshoe hare have documented lynx presence and reproduction and snowshoe hare abundance in a variety of managed landscapes (Appendix P).

How sites are reforested can also change landscape patterns. Sometimes lodgepole pine is removed and western larch is planted or otherwise encouraged to grow, converting the forest from one predominant tree species to another - this is called a *type conversion*. Western larch may not provide winter forage for hares because it loses its needles and may not provide the vegetative cover hares need during winter.

Precommercial thinning risks to foraging habitat

Precommercial thinning reduces stem densities to increase the growth of the remaining trees. Precommercial thinning generally occurs when forests are 10 to 30 years old, about the same time young regenerating forests are beginning to provide winter snowshoe hare habitat.

Precommercial thinning may reduce stem densities and cover to the point that the young forests have little or no value for snowshoe hares (Ruggiero et al. 2000a). In northwest Montana, hares preferred dense, unthinned sapling patches

(Ausband and Baty 2005). Researchers found precommercial thinning decreased snowshoe hare abundance, compared to unthinned patches (control plots) and areas where 80 percent of the stand was thinned but 20 percent was unthinned (Griffin and Mills, JWM in press). Declines were prominent in the second winter after treatment. In addition, estimated survival rates decreased as individuals spent proportionally more time in open young and open mature forests (Griffin and Mills, JWM in press). Additional research on different thinning scenarios is ongoing - see Appendix F.

Other vegetation management risks to foraging habitat

In multistoried forests, some fuel treatments and commercial timber sales may reduce winter snowshoe hare habitat because the small trees and brush that constitute foraging habitat are removed. Other projects may remove only tall trees and create openings, allowing new foraging habitat to develop.

Grazing risks to winter snowshoe hare habitat

Livestock grazing may reduce or eliminate foraging habitat in areas that grow quaking aspen and willow in riparian areas (LCAS). These localized changes in habitat may affect individual lynx; however no information indicates that grazing poses a threat to overall lynx populations (Appendix P, p. 40083).

Foraging habitat under Alternative A, no action

The Biological Assessment (BA) the FS and BLM completed on existing plans, (Hickenbottom et al. 1999) found management direction generally lacking for foraging habitat - see Table 3-3.

Under the no-action alternative, management direction to conserve lynx would not be incorporated into the existing plans. Winter snowshoe hare habitat likely would decline both in quality and quantity.

Landscape patterns under Alternative A
Under Alternative A, wildfires would continue to be suppressed at current levels, removing fire as an ecosystem

Table 3-3. BA findings about whether existing plans are adequate to protect winter snowshoe hare habitat

	Fully or substantially	Marginally	Do not	Unknown or n/a
Fire management	30%	55%	15%	- - -
Landscape patterns	15%	70%	15%	- - -
Precommercial thinning	10%	55%	35%	- - -
Habitat conversions	5%	35%	60%	- - -
Foraging habitat	35%	65%	- - -	- - -

- Fire management - Existing plans direct fire management to provide or improve lynx habitat
- Landscape patterns - Existing plans results in landscape vegetation patterns suitable for lynx habitat
- Precommercial thinning - Existing plans direct integrating lynx habitat needs in thinning projects
- Habitat conversions - Existing plans prohibit conversions that reduce habitat suitability
- Foraging habitat - Direction in existing plans would provide winter snowshoe hare habitat

driver creating foraging habitat. In development allocations where timber sales are allowed, regeneration timber harvest is not likely to make up for removing fire because of other resource considerations (Hillis et al. 2003).

In FS Region 1, less than 13 percent of the LAUs have more than 30 percent in young regenerating forests that do not yet provide winter snowshoe hare habitat. All were caused by wildfires in 1988 and 2000. About 13 percent had more than 15 percent in young regenerating forests (Hillis et al. 2003); timber harvest caused very few to exceed 15 percent in young regenerating forests that do not yet provide winter snowshoe hare habitat.

In some areas, it is possible for individual lynx to be affected because of the distribution of foraging habitat. Where large patches of very young regenerating forests have resulted from fire and timber harvest, these patches likely would become forage over time. Other places may lack young regenerating forests because they lack disturbance. Existing plans do not include management direction to provide a distribution of lynx habitat conditions.

Type conversions could occur and in some places reforestation could result in species that do not provide adequate winter cover for snowshoe hares.

Precommercial thinning under Alternative A
In the planning area 576,220 acres are scheduled for precommercial thinning over the next ten years; of this about 395,330 acres are in lynx habitat – see Table 3-4 and Appendix K, Table K-1. However, historically only 34 percent of the scheduled thinning has been funded. Based on historical funding about 133,000 acres may be thinned in lynx habitat over the next ten years.

Under Alternative A, the scheduled precommercial thinning (between 133,000 and 395,330 acres in lynx habitat) would likely occur in young regenerating forests that provide good winter snowshoe hare habitat. All thinning in lynx habitat would reduce winter snowshoe hare habitat which in turn would reduce snowshoe hare densities (Ruggerio et al. 2000, Griffin and Mills, in press).

For more information about thinning, see the *Forests* section later in Chapter 3; for a discussion about how funding affects thinning, see the *Economics* section.

Fuel treatments under Alternative A
Fuel treatments would not be limited under Alternative A. Fuel treatment projects have the potential to reduce or eliminate foraging habitat by removing understory vegetation that provides good winter forage. They are likely to reduce winter snowshoe hare habitat if they

Table 3-4. Lynx habitat scheduled for precommercial thinning or fuel treatments over the next decade under Alternative A

Treatment	Acres in lynx habitat
Precommercial thinning	395,330 acres
Fuel treatment	881,440 acres

reduce the density of small trees.

During the next decade, approximately 2 million acres within the planning area are scheduled for fuel treatment (Appendix M). About 881,000 acres would likely occur in lynx habitat (Table 3.5, next page). This amounts to about 4.8 percent of lynx habitat within the planning area. It is likely that some, but not all, of the treatments would reduce winter snowshoe hare habitat. For example, some fuel treatment projects may occur in mature lodgepole pine forests to break up the continuity of fuels – these forests generally lack the understory to provide winter snowshoe hare habitat. However, other forests, especially those in the mixed conifer type or spruce-fir type, may have a multistoried structure where removal of ladder fuels (understory trees that provide a source for fire to burn into the overstory) is desirable.

An analysis using Montana FIA and fuel treatment data was conducted to approximate the potential effects – see Table 3-5 and the discussion in the summary for effects of Alternative A.

Other vegetation management under Alternative A

Other vegetation management activities could occur in multistoried winter snowshoe hare habitat, such as using prescribed burning to restore whitebark pine. In some whitebark pine forests, understory trees may need to be removed before burning. During the next decade, about 50,000 acres of whitebark pine restoration could occur without using precommercial thinning. See the *Forests* and *Plants* sections later in Chapter 3.

Timber harvest could also affect foraging habitat, but how many acres might be affected depends on the number and size of site-specific projects implemented in the planning area. See the *Forests* for a description of the kinds of management actions that take place.

Activities that remove foraging habitat would be detrimental to lynx; where foraging habitat is maintained or prolonged, that would be beneficial.

Under Alternative A, no changes would be made to incorporate management direction to prolong or protect winter snowshoe hare habitat.

Grazing under Alternative A

About 1,765 active grazing allotments overlap lynx habitat in the planning area. About 15 percent lack management strategies that result in habitat conditions favorable for lynx. Under Alternative A, grazing on these allotments may reduce hare foraging habitat in aspen, willows and riparian areas, or in shrub-steppe areas, which could reduce localized habitat conditions favorable for lynx.

Summary of effects on foraging habitat under Alternative A

To evaluate the combined effects of precommercial thinning, fuel treatments and whitebark pine restoration, an analysis was done for Montana. Only Montana was included because FIA data was readily available only for this state (see pages 138 and 150 for further information). The effects on foraging habitat in the other planning-area states are likely to be similar to the effects in Montana.

Table 3-5. Montana hare forage affected under Alternative A in a decade with full funding

	High density young 894,000 ac	High density multistory 1,475,000 ac	Total high density 2,369,000 ac	Low density young 744,000 ac	Low density multistory 1,010,100 ac	Total low density 1,754,000 ac
Precommercial thinning (acres)	213,000	0	213,000	0	0	0
Fuel treatment (acres)	0	71,000	71,000	0	60,000	60,000
Whitebark pine restoration (acres)	40,000	0	40,000	0	0	0
No treatment (acres)	641,000	1,404,000	2,045,000	744,000	950,000	1,694,000
Percent winter snowshoe hare habitat treated	28% ¹	5% ²	14% ³	0% ⁴	6% ⁵	3% ⁶
Timber harvest	No effect	Number of acres depends on number and size of projects—some detrimental, some beneficial	Number of acres depends on number and size of projects – some detrimental, some beneficial	No effect	Number of acres depends on number and size of projects – some detrimental, some beneficial	Number of acres depends on number and size of projects – some detrimental, some beneficial
Grazing	Some hare forage could be reduced in local areas on 250 allotments	No effect	No effect	Some hare forage could be reduced in local areas on 250 allotments	No effect	Some hare forage could be reduced in local areas on 250 allotments

¹ 213,000 + 0 + 40,000 / 894,000 = 28%

² 0 + 71,000 + 0 / 1,475,000 = 5%

³ 213,000 + 71,000 + 40,000 / 2,369,000 = 14%

⁴ 0 + 0 + 0 / 744,000 = 0%

⁵ 0 + 60,000 + 0 / 1,010,000 = 6%

⁶ 0 + 60,000 + 0 / 1,754,000 = 3%

Assumptions

Precommercial thinning and whitebark pine restoration would occur only in high-density winter snowshoe hare habitat and would be fully funded

Fuel treatment would occur in proportion to the amount of forested habitat (Appendix M)

Other information

About 213,000 of the 395,330 acres of precommercial thinning scheduled in lynx habitat in the planning area, are in Montana (Appendix K, Table K2).

About 131,200 of the 881,440 acres of fuel treatment in lynx habitat in the planning area projected for the next decade are in Montana and would occur in high or low density winter snowshoe hare habitat (Appendix M)

About 40,000 of the 50,000 acres of whitebark pine restoration scheduled in lynx habitat in the planning area are in Montana

The analysis assumes precommercial thinning and whitebark pine restoration would occur in high density forests. About 213,000 acres of precommercial thinning and 40,000 acres of white-bark pine restoration are scheduled in Montana over the next ten years. These activities may reduce winter snowshoe hare habitat on about 28 percent of high density young forests (see Table 3-5). Precommercial thinning may result in the greatest effect since almost a quarter of the high-density young forests would be thinned at full funding.

These estimates are likely high because in the recent past, precommercial thinning has been funded only about 34 percent (see the *Economics* section) and because whitebark pine restoration in lynx habitat may not occur to the extent predicted.

Fuel treatment projects may affect winter snowshoe hare habitat found in multistoried forests. The analysis assumes fuel treatment projects would occur in proportion to their occurrence (see Appendix M). In Montana, about 337,000 acres of fuel treatment is likely to occur in lynx habitat over the next decade. Of that about 131,000 acres may be in winter snowshoe hare habitat.

Fuel treatments could reduce 5 percent of high density multistoried winter snowshoe hare habitat and 6 percent of low density multistoried winter snowshoe hare.

In lynx habitat, many of the forests have not missed a fire cycle, so even though they are subject to crown fires, fewer fuel treatments may occur. It is likely the priority for fuel treatments would be

outside lynx habitat (see the *Fire* section later in Chapter 3).

Other timber harvest could occur in multistoried forests however the amount that may be affected depends on number, size, and location of site-specific projects. In general, many timber harvest projects would reduce foraging habitat; although some projects may improve the habitat by creating small openings for new understory to develop.

Foraging habitat under Alternative B

Alternative B would add management direction to existing plans promoting winter snowshoe hare habitat. Table 2-1 in Chapter 2 contains the full text.

- ♦ Objectives VEG O1, VEG O2, VEG O3, VEG O4 and GRAZ O1 support emulating historic disturbances that would create and maintain foraging habitat.
- ♦ Standards VEG S1, VEG S2, VEG S5, VEG S6, GRAZ S1, GRAZ S2, GRAZ S3 and GRAZ S4 are discussed below.
- ♦ Guideline VEG G1 emphasizes considering creating more foraging habitat where it is lacking.

Landscape patterns under Alternative B

Objective VEG O1 describes managing vegetation similar to historic disturbance processes. Objective VEG O3 describes conducting fire use activities to restore ecological processes and maintain or improve lynx habitat. Objective VEG O4 describes designing regeneration harvest and reforestation to develop characteristics suitable for winter snowshoe hare habitat.

Standards VEG S1 and VEG S2 limit how much lynx habitat in an LAU can be regenerated by vegetation management. The overall limit is no more than 30 percent of an LAU would be in young forests that do not provide winter snowshoe hare habitat; timber harvest is limited to 15 percent in a decade. Under Alternative B, these standards could limit prescribed fire and timber harvest at the scale of an LAU. They would help provide an even flow of winter snowshoe hare habitat over time.

Alternative B also includes Guideline VEG G1 that encourages creating winter snowshoe hare habitat where it is lacking.

Precommercial thinning under Alternative B
Standards VEG S5 and VEG S6 would not allow precommercial thinning while forests provide winter snowshoe hare habitat; except precommercial thinning would be allowed within 200 feet of buildings.

During the next decade, precommercial thinning would be allowed on an estimated 2,200 acres within 200 feet of buildings – see Table 3-6. This is likely to have a negligible effect on lynx because of the small, scattered acreage and its proximity to human activity.

Precommercial thinning would not be allowed or would be deferred on between 132,000 to 394,000 acres (depending on

funding levels). Winter snowshoe hare forage would be maintained on these acres which would benefit lynx.

Fuel treatments under Alternative B
During the next decade about 881,000 acres of fuel treatments are projected to occur in lynx habitat. Alternative B would restrict fuel treatments done by precommercial or understory thinning in young regenerating forests and multi-storied forests. Prescribed burning or timber harvest could be used to reduce fuels because they are not specifically prohibited. It is likely that these activities would occur in multistoried forests. Removal of winter snowshoe hare habitat in these situations would be detrimental.

An analysis using Montana FIA and fuel treatment data was conducted to approximate the potential effects – see Table 3-7 and the discussion in the summary of effects of Alternative B.

Other vegetation management under Alternative B

Alternative B does not restrict timber harvest from removing foraging habitat. Some foraging habitat could be lost depending on project design, but how much is not known. Projects could be beneficial in multistoried forests if they prolonged or maintained the small trees and brush that constitute hare habitat, but detrimental if they removed the undergrowth.

Table 3-6. Lynx habitat that could be thinned next decade under Alternative B

Precommercial thinning	Acres winter snowshoe hare habitat
Within 200 feet of administrative sites, dwellings or outbuildings	2,190 acres

Grazing under Alternative B
Standards GRAZ S1, GRAZ S2, GRAZ S3 and GRAZ S4 would ensure livestock grazing in lynx habitat was managed in ways that make it possible for trees, shrubs, and aspen to regenerate. Shrub-steppe habitat and riparian areas would be managed similar to historic conditions,

helping maintain and provide foraging habitat and cover.

Summary of effects on foraging habitat under Alternative B

About 1,000 acres of precommercial thinning in Montana would be allowed under Alternative B.

Table 3-7. Hare forage affected under Alternative B in a decade with full funding – Montana

	High density young 894,000 ac	High density multistory 1,475,000 ac	Total high density 2,369,000 ac	Low density young 744,000 ac	Low density multistory 1,010,100 ac	Total low density 1,754,000 ac
Precommercial thinning (acres)	1,000	0	1,000	0	0	0
Fuel treatment (acres)	0	29,000	29,000	0	26,000	26,000
Whitebark pine restoration (acres)	40,000	0	40,000	0	0	0
No treatment (acres)	853,000	1,446,000	2,299,000	744,000	984,000	1,728,000
Percent winter snowshoe hare habitat treated	5% ¹	2% ²	3% ³	0% ⁴	3% ⁵	2% ⁶
Timber harvest	No effect	Number of acres depends on number and size of projects – some detrimental, some beneficial	Number of acres depends on number and size of projects – some detrimental, some beneficial	No effect	Number of acres depends on number and size of projects – some detrimental, some beneficial	Number of acres depends on number and size of projects – some detrimental, some beneficial
Grazing	No effect	No effect	No effect	No effect	No effect	No effect

$$^1 1,000 + 0 + 40,000 / 894,000 = 5\%$$

$$^2 0 + 29,000 + 0 / 1,475,000 = 2\%$$

$$^3 1,000 + 29,000 + 40,000 / 2,369,000 = 3\%$$

$$^4 0 + 0 + 0 / 744,000 = 0\%$$

$$^5 0 + 26,000 + 0 / 1,010,100 = 3\%$$

$$^6 0 + 26,000 / 1,754,000 = 2\%$$

Assumptions

Whitebark pine restoration would occur only in high-density winter snowshoe hare habitat.

No fuel treatment in young regenerating forests since precommercial thinning is prohibited.

Assumes 75 percent of fuel treatment in multistoried forests would be done without precommercial thinning (e.g. would be a commercial thin or regeneration harvest, which is not prohibited by the standards)

Other information

About 1,000 of the 2,190 acres of precommercial thinning scheduled in lynx habitat in the planning area, are in Montana (Appendix K, Table K2)

Whitebark pine restoration would not be affected because the standards do not prohibit prescribed burning.

Precommercial thinning and whitebark pine restoration may reduce winter snowshoe hare habitat on about 5 percent of high density young forests (see Table 3-7). Whitebark pine restoration may result in the greatest effect since over 4 percent of high-density young forests would be affected by this activity.

In Alternative B fuel treatments would not be accomplished through precommercial thinning; therefore there would be no effect to young regenerating forests due to this activity.

Fuel treatments could occur if some other method is used, such as commercial thinning, prescribed burning, or regeneration harvest. These activities are likely to occur in multistoried forests. The analysis assumes approximately 75 percent could be accomplished in multistoried forests through some other type of treatment. In Montana, about 131,000 acres of fuel treatment is projected to occur in winter snowshoe hare habitat, found in both young and multistoried forest, if there are no constraints. Under Alternative B, about 55,000 acres of winter snowshoe hare habitat in multistory forests could be affected by fuel treatment projects (assuming areas are treated in proportion to their occurrence – see Appendix M).

Fuel treatments could reduce 2 percent of high density multistoried winter snowshoe hare habitat and 3 percent of low density multistoried habitat.

Foraging habitat under Alternative C

Alternative C would add the same management direction as the Proposed Action, except:

- ♦ Standards VEG S1, VEG S5, and VEG S6 are changed as discussed below
- ♦ Standard VEG S2 is replaced by Guideline VEG G6

Landscape patterns under Alternative C

Standard VEG S1 would increase the size of the area to which the 30 percent limit was applied to an LAU or a fixed combination of adjacent LAUs.

Fire has been documented to occur in the planning area at scales many times larger than a single LAU or even multiple LAUs (Hillis et al. 2003). The LCAS identified historic fire disturbance patterns as a desired condition of lynx habitat. Expanding the size of the area would allow projects that more closely reflect historic fire disturbance patterns.

Compared to Alternative B, it is possible individual lynx would more likely be affected by expanding the size of area, because an LAU may have large patches of very young regenerating forests. However, because the multiple-LAU scale comes closer to historic disturbance patterns than a single LAU, Alternative C may provide greater benefits to lynx populations as a whole over the long term.

In Alternative C Standard VEG S2 is replaced by Guideline VEG G6. The amount of timber harvest resulting in young regenerating forests during a decade would have to be considered, but not limited if justified by other needs. In FS Region 1, timber harvest has resulted in more than 15 percent young regenerating

forests that do not yet provide winter snowshoe hare habitat in 13 percent of the LAUs (Hillis et al. 2003). The change to a guideline is likely to have limited effect.

Guideline VEG G1, encouraging projects that create or extend forage habitat, is changed to target the stem exclusion stage, which has little or no value for snowshoe hares.

Precommercial thinning under Alternative C
In young regenerating forests, precommercial thinning would most likely be the activity restricted because few other vegetation management projects occur. About 3,900 acres of precommercial thinning during the next decade would be allowed – see Table 3-8. The effects on lynx are likely minimal because most projects would take place near some form of human habitation.

Precommercial thinning would not be allowed or would be deferred on between 131,000 to 391,000 acres (depending on funding levels). Winter snowshoe hare forage would be maintained on these acres which would benefit lynx.

Fuel treatment projects under Alternative C
During the next decade about 881,000 acres of fuel treatments are projected to occur in lynx habitat. Under Alternative C, all fuel treatment projects would be designed to meet the standards, or dropped or deferred. No fuel treatment

projects would reduce winter snowshoe hare habitat which would benefit lynx.

Other vegetation management projects under Alternative C

Alternative C modifies Standards VEG S5 and VEG S6 to apply to all vegetation management projects not just precommercial thinning. The only projects allowed would be research, genetic tree tests, and within 200 feet of buildings.

In multistoried forests, only research projects and precommercial thinning within 200 feet of buildings would be allowed. How many acres this amounts to depends on the number and size of site-specific projects. It is likely few acres would be affected.

Alternative C would preclude prescribed burning for white pine restoration as well as most other activities that could reduce winter snowshoe hare habitat. In effect, Alternative C retains most winter snowshoe hare habitat; therefore there would be minimal effect to lynx.

An analysis using Montana FIA and fuel treatment data was conducted to approximate the potential effects – see table 3-9 and the discussion in the summary of effects of Alternative C.

Grazing under Alternative C

Grazing direction would ensure livestock grazing in lynx habitat was managed in

Table 3-8. Lynx habitat that could be thinned next decade under Alternative C

Precommercial thinning	Acres winter snowshoe hare habitat
For research	1,450 acres
For genetic tree tests	220 acres
Within 200 feet of administrative sites, dwellings or outbuildings	2,190 acres
Total	3,860 acres

ways that make it possible for trees, shrubs, and aspen to regenerate. Shrub-steppe habitat and riparian areas would be managed similar to historic conditions, helping maintain and provide foraging habitat and cover.

Summary of effects on foraging habitat under Alternative C

Alternative C precludes most activities that reduce winter snowshoe hare habitat; therefore it has very minimal effect, if any to lynx.

Precommercial thinning on 3,000 acres in Montana would be allowed under Alternative C. In addition, no whitebark

pine restoration activities would take place. Less than one-half of one percent of winter snowshoe hare habitat in young regenerating forests could be reduced.

No fuel treatment projects would be allowed that reduce winter snowshoe hare habitat; therefore all habitat in multistoried forests would be retained, which would benefit lynx.

Habitat does not remain static over time – some kind of disturbance is needed to maintain the dense understory favorable for snowshoe hares in multistoried forests. Alternative C would depend more heavily on natural processes to do the job.

Table 3-9. Hare forage affected under Alternative C in a decade with full funding - Montana

	High density young 894,000 ac	High density multistoried 1,475,000 ac	Total high density 2,369,000 ac	Low density young 744,000 ac	Low density multistoried 1,010,100 ac	Total low density 1,754,000 ac
Precommercial thinning (acres)	3,000	0	3,000	0	0	0
Fuel treatment (acres)	0	0	0	0	0	0
Whitebark pine restoration (acres)	0	0	0	0	0	0
No treatment (acres)	891,000	1,475,000	2,366,000	744,000	1,010,000	1,754,000
Percent winter snowshoe hare habitat treated	0.3% ¹	0% ²	0.1% ³	0% ⁴	0% ⁵	0% ⁶
Timber harvest	No effect	No effect	No effect	No effect	No effect	No effect
Grazing	No effect	No effect	No effect	No effect	No effect	No effect

¹ 3,000 / 894,000 = 0.3%

² 0 + 0 + 0 / 1,475,000 = 0%

³ 3,000 + 0 + 0 / 2,369,000 = 0.1%

⁴ 0 + 0 + 0 / 744,000 = 0%

⁵ 0 + 0 + 0 / 1,010,000 = 0%

⁶ 0 + 0 + 0 / 1,754,000 = 0%

Assumptions

Whitebark pine restoration would occur only in high-density winter snowshoe hare habitat.

No fuel treatment in young regenerating forests since precommercial thinning is prohibited.

Assumes 75 percent of fuel treatment in multistoried forests would be done without precommercial thinning (e.g. would be a commercial thin or regeneration harvest, which is not prohibited by the standards)

Other information

About 1,000 of the 2,190 acres of precommercial thinning scheduled in lynx habitat are in Montana

(Appendix K, Table K2)

Foraging habitat under Alternative D

Alternative D would add the same management direction as Alternative C, except the scale at which Standard VEG S1 would be applied is changed, and more activities are permitted under Standards VEG S5 and VEG S6.

Landscape patterns under Alternative D
Standard VEG S1 would further increase the size of the area to which the 30 percent in very young regenerating forests is applied, to a sub-basin or isolated mountain range. An area of this size is large enough to mimic large-scale historic disturbance patterns, such as large fires.

Under Alternative D, it is even more possible that individual lynx could be affected, because the distribution of foraging habitat over broad areas is more likely to fluctuate than under Alternatives B or C. Whole LAUs could end up in very young regenerating forests, similar to

what may have happened under natural disturbance patterns. However, because the sub-basin or isolated mountain range scale would allow historic disturbance patterns to be fully factored in, Alternative D may provide greater long-term benefits to lynx populations as a whole.

The requirement to restrict timber-harvest-created young regenerating forests to 15 percent is dropped. Timber harvest has resulted in exceeding the 15 percent requirement in less than 13 percent of the LAUs in FS Region 1 (Hillis et al. 2003). It is unlikely extensive regeneration harvest would occur anyway because of concerns about other resources; so dropping this standard is likely to have a limited effect.

Precommercial thinning under Alternative D
Standards VEG S5 and VEG S6 would allow some vegetation management projects that reduce foraging habitat.

Table 3-10. Lynx habitat that could be thinned next decade under Alternative D

Precommercial thinning	Acres winter snowshoe hare habitat
Research	1,450 acres
Genetic tree tests	220 acres
Within 200 feet of administrative sites, dwellings or outbuildings	2,190 acres
Aspen	3,050 acres
Whitebark pine	9,110 acres
Lodgepole pine	34,550 acres
<i>Subtotal</i>	<i>50,570 acres</i>
Daylight thinning where 80% of the cover is retained	
Planted western white pine	51,090 acres
Ponderosa pine	11,660 acres
Western larch	123,160 acres
<i>Subtotal daylight thinning only</i>	<i>186,000 acres</i>
Total	236,480 acres

20% snowshoe hare forage may be reduced on day light thinning acres = 20% of 186,000 = 37,200 acres
+ 50,570 acres traditional thinning = 87,770 acres where snowshoe hare forage may be reduced

In young regenerating forests, precommercial thinning would be allowed in the following situations:

- ♦ Research could be done
- ♦ Genetic tree tests could occur
- ♦ Vegetation could be thinned within 200 feet of administrative sites, dwellings, and outbuildings
- ♦ Conifers could be thinned out around aspen
- ♦ Thinning and prescribed fire could be done to restore whitebark pine or to develop future old growth characteristics in lodgepole pine

Daylight thinning – where the competitors are weeded out from around selected trees – could occur around western larch, ponderosa pine, and planted rust-resistant western white pine if 80 percent of the hare forage is retained. Daylight thinning may have a less detrimental effect on snowshoe hares than traditional thinning since so much cover is retained, but it is unknown how hares would respond.

Forage is likely to be reduced somewhere from 87,000 to 236,480 acres during the next decade (depending on funding levels). Retaining 80 percent of the cover in the 186,000 acres of daylight thinning may reduce the loss of foraging habitat. The worst-case scenario would be that winter snowshoe hare habitat would be greatly reduced on all thinned acres – see Table 3-10.

Precommercial thinning would not be allowed or would be deferred on between 45,000 to 159,000 acres (depending on funding levels). Winter snowshoe hare forage would be maintained on these acres which would benefit lynx.

Fuel treatment projects under Alternative D During the next decade about 881,000 acres of fuel treatments are projected to occur in lynx habitat. Under Alternative D, all fuel treatment projects would be designed to meet the standards, or dropped or deferred. No fuel treatment projects would reduce winter snowshoe hare habitat.

Other vegetation management projects under Alternative D in multistoried forests Alternative D would preclude most vegetation management in multi-storied forests. Projects could be done to restore western larch, ponderosa pine, and planted white pine where 80 percent of the cover is retained. Whitebark pine restoration projects also would be allowed.

Vegetation management projects could occur if it improved or maintained foraging habitat in the long term. Small openings could be created or mid-height trees removed so small trees and brush could grow. How many acres might be involved is unknown.

Grazing under Alternative D

Grazing direction would ensure livestock grazing in lynx habitat was managed in ways that make it possible for trees, shrubs, and aspen to regenerate. Shrub-steppe habitat and riparian areas would be managed similar to historic conditions, helping maintain and provide foraging habitat and cover.

Summary of effects on foraging habitat under Alternative D

Precommercial thinning on 139,000 acres in lynx habitat in Montana would be allowed under Alternative D, affecting about 15 percent of high density forage found in young regenerating forests. An additional 5 percent could be reduced by whitebark pine restoration projects.

In multistoried forests there would be no reduction to winter snowshoe hare habitat from fuel treatment projects - see Table 3-11. This would benefit lynx by retaining this habitat component.

Some other type of activities could occur in multistoried forests, however the amount is unknown. Most of the exceptions in Alternative D really apply to activities in young forests.

Projects that prolong or maintain forage habitat could have either no effect or a beneficial effect over time.

Foraging habitat under Alternative E

Landscape patterns under Alternative E
Alternative E has the same objectives as Alternative B, and Guideline VEG G1 is the same as under Alternative C.

Table 3-11. Hare forage affected under Alternative D in a decade with full funding - Montana

	High density young 894,000 ac	High density multistory 1,475,000 ac	Total high density 2,369,000 ac	Low density young 744,000 ac	Low density multistory 1,010,100 ac	Total low density 1,754,000 ac
Precommercial thinning (acres)	139,000	0	139,000	0	0	0
Fuel treatment (acres)	0	0	0	0	0	0
Whitebark pine restoration (acres)	40,000	0	40,000	0	0	0
No treatment (acres)	715,000	1,475,000	2,190,000	744,000	1,010,000	1,754,000
Percent winter snowshoe hare habitat treated	20% ¹	0% ²	8% ³	0% ⁴	0% ⁵	0% ⁶
Timber harvest	No effect	Likely minor some detrimental, some beneficial	Likely minor some detrimental, some beneficial	No effect	Likely minor some detrimental, some beneficial	Likely minor some detrimental, some beneficial
Grazing	No effect	No effect	No effect	No effect	No effect	No effect

¹ 139,000 + 40,000 / 894,000 = 20%
² 0 + 0 + 0 / 1,475,000 = 0%
³ 139,000 + 0 + 40,000 / 2,369,000 = 8%
⁴ 0 + 0 + 0 / 744,000 = 0%
⁵ 0 + 0 + 0 / 1,010,000 = 0%
⁶ 0 + 0 + 0 / 1,754,000 = 0%

Other information

No fuel treatments would occur

About 139,000 of the 236,500 acres of precommercial thinning allowed are in Montana (Appendix K, Table K-2)

About 40,000 of the 50,000 acres of whitebark pine restoration are in Montana

Standard VEG S1 would apply the 30 percent in very young regenerating forests based on an LAU or a fixed combination of adjacent LAUs, the same as in Alternative C. Alternative E would not limit fuel treatment projects that create young regenerating forests. Fuel treatment may proceed even if an LAU already exceeds 30 percent in very young regenerating forests. Since this situation describes only a few LAUs and they're recently burned areas, they're unlikely to need fuel treatment in the near future.

Alternative E does not include Standard VEG S2 which restricts timber harvest from creating more than 15 percent in a stand initiation structural stage over a 10 year period. In some areas timber harvest may exceed this value although it is not expected to occur often. This is because very few LAUs encounter this situation now and since timber harvest levels are lower than they were in the 1990s it is unlikely timber harvest would regenerate more than 15 percent of an LAU.

Precommercial thinning under Alternative E
Alternative E would allow precommercial thinning projects in young regenerating forests for fuel treatment, research, genetic tree tests, and within 200 feet of buildings. About 3,900 acres could be precommercially thinned – see Table 3-12. The effects on lynx are likely minimal because most projects would take place

near some form of human habitation.

Precommercial thinning would not be allowed or would be deferred on between 131,000 to 391,000 acres (depending on funding levels). Winter snowshoe hare forage would be maintained on these acres which would benefit lynx.

Fuel treatment projects under Alternative E
Fuel treatments developed in a collaborative manner would not be limited under Alternative E. About 881,000 acres are projected to occur in lynx habitat (see Appendix M). This amounts to about 4.8 percent of lynx habitat within the planning area.

Fuel treatment projects have the potential to reduce or eliminate foraging habitat by removing understory vegetation that provides good winter forage. It is likely that some, but not all, the treatments would reduce winter snowshoe hare habitat. For example some fuel treatment projects may occur in mature lodgepole pine forests to break up the continuity of fuels – these forests generally lack the understory to provide winter snowshoe hare habitat. However, other forests, especially those in the mixed conifer type or spruce-fir type, may have a multi-storied structure where removal of ladder fuels (understory trees that provide a source for fire to burn into the overstory) is desirable.

Table 3-12. Lynx habitat that could be thinned next decade under Alternative E

Precommercial thinning	Acres winter snowshoe hare habitat
Research	1,450 acres
Genetic tree tests	220 acres
Within 200 feet of administrative sites, dwellings or outbuildings	2,190 acres
Total	3,860 acres

An analysis using Montana FIA and fuel treatment data was conducted to approximate the potential effects to winter snowshoe hare habitat – see Table 3-13 and the discussion in the summary of effects for Alternative E.

Other vegetation management projects under Alternative E

Under Alternative E, Standard VEG S5 only limits precommercial thinning, as in Alternative B, not all vegetation projects,

as in Alternatives C and D. Activities, such as prescribed burning to restore whitebark pine would be allowed under Alternative E.

Under Alternative E, Standard VEG S6 is replaced by Guideline VEG G8. Winter snowshoe hare habitat in multistory forests would have to be considered when designing projects, but the projects could remove forage habitat when justified by other needs.

Table 3-13. Montana hare forage affected under Alternative E in a decade with full funding

	High density young 894,000 ac	High density multistory 1,475,000 ac	Total high density 2,369,000 ac	Low density young 744,000 ac	Low density multistory 1,010,100 ac	Total low density 1,754,000 ac
Precommercial thinning (acres)	3,000	0	3,000	0	0	0
Fuel treatment (acres)	0	71,000	71,000	0	60,000	60,000
Whitebark pine restoration (acres)	40,000	0	40,000	0	0	0
No treatment (acres)	851,000	1,404,000	2,255,000	744,000	950,000	1,694,000
Percent winter snowshoe hare habitat treated	5% ¹	5% ²	5% ³	0% ⁴	6% ⁵	3% ⁶
Timber harvest	No effect	Number of acres depends on number and size of projects – some detrimental, some beneficial	Number of acres depends on number and size of projects – some detrimental, some beneficial	No effect	Number of acres depends on number and size of projects – some detrimental, some beneficial	Number of acres depends on number and size of projects – some detrimental, some beneficial
Grazing	No effect	No effect	No effect	No effect	No effect	No effect

¹ 1,000 + 0 + 40,000 / 894,000 = 5%
² 0 + 71,000 + 0 / 1,475,000 = 5%
³ 3,000 + 71,000 + 40,000 / 2,369,000 = 5%
⁴ 0 + 0 + 0 / 744,000 = 0%
⁵ 0 + 60,000 + 0 / 1,010,000 = 6%
⁶ 0 + 60,000 + 0 / 1,754,000 = 3%

Other information

About 3,000 of the 4,000 acres of precommercial thinning scheduled in lynx habitat are in Montana (Appendix K, Table K2)
 All fuel treatment projected to occur in high and low density winter snowshoe hare habitat would take place (Appendix M)
 Whitebark pine restoration would take place
 40,000 of the 50,000 acres of whitebark pine restoration scheduled are in Montana

Grazing under Alternative E

Grazing standards are replaced by guidelines under Alternative E. If the guidelines are not followed in some areas then potential snowshoe hare habitat could be reduced which may affect an individual lynx. However, there is no information that grazing poses a threat to lynx populations (Appendix P); therefore the effects would only be localized and would not affect the population as a whole.

Summary of effects on foraging habitat under Alternative E

About 3,000 acres of precommercial thinning in Montana would be allowed under Alternative E.

Whitebark pine restoration would not be affected because the standards do not prohibit prescribed burning.

Precommercial thinning and whitebark pine restoration may reduce winter snowshoe hare habitat on about 5 percent of high density young forests – see Table 3-13. Whitebark pine restoration may result in the greatest effect since over 4 percent of high-density young forests would be affected by this activity.

Standard VEG S6 is changed to Guideline VEG G8. Fuel treatments would not be precluded if a reason warrants deviation from the guideline. In Montana, about 131,000 acres of fuel treatment project are projected to occur in winter snowshoe hare habitat if there are no constraints. Under Alternative E, it is assumed all of these projects would proceed and they would reduce winter snowshoe hare habitat. In lynx habitat, many of the forests have not missed a fire cycle, so

even though they are subject to crown fires, fewer fuel treatments may occur. It is likely the priority for fuel treatments would be outside lynx habitat – see the *Fire* section later in Chapter 3.

Fuel treatments could reduce 5 percent of high density multistoried winter snowshoe hare habitat and 6 percent of low density multistoried winter snowshoe hare.

Foraging habitat under Alternative F

Landscape patterns under Alternative F
Alternative F includes objectives to provide a mosaic of habitat conditions through time (VEG O1 and VEG O2).

Standards VEG S1 and VEG S2 limit how much lynx habitat in an LAU can be a stand initiation structural stage that does not yet provide winter snowshoe hare habitat. VEG S1 applies to all vegetation projects and limits the amount to 30 percent. VEG S2 applies to timber harvest and limits the amount to 15 percent in a ten-year period.

Fuel treatment projects within the WUI would be exempt from these standards, within limits. The number of acres exempt from Standards VEG S1, VEG S2, VEG S5, and VEG S6 would be capped at six percent of the lynx habitat on a national forest. In addition, Guideline VEG G10 encourages fuel treatment projects within the WUI to consider the standards in the design of the project.

Only a few LAUs have more than 30 percent in very young regenerating forests or 15 percent of young forests created by timber harvest; therefore it is unlikely many fuel treatment projects would

exceed these standards. For those projects that do exceed the standards they could create more young forests than desired and not provide the desirable mosaic of habitat conditions for lynx.

Precommercial thinning under Alternative F
 Under Alternative F, Standard VEG S5 only limits precommercial thinning, as in Alternatives B and E, not all vegetation projects, as in Alternatives C and D. Alternative F would allow precommercial thinning projects in young regenerating forests within 200 feet of buildings, for research and genetic test sites, for whitebark pine and aspen restoration, and around planted rust-resistant western white pine. About 67,000 acres could be precommercially thinned – see Table 3-14. Retaining 80 percent of the cover in the 51,000 acres of daylight thinning may reduce the loss of foraging habitat. The worst-case scenario would be that winter snowshoe hare habitat would be greatly reduced on all thinned acres.

In addition, precommercial thinning could also occur with the WUI if done for a fuel treatment purpose. The number of acres

done for this purpose is unknown. Winter snowshoe hare habitat and the quality of lynx habitat would be reduced on those acres thinned.

Precommercial thinning would not be allowed or would be deferred on between 111,000 to 328,000 acres (depending on funding levels). Winter snowshoe hare forage would be maintained on these acres which would benefit lynx.

Fuel treatment projects under Alternative F
 During the next decade about 881,000 acres of fuel treatments are projected to occur in lynx habitat. Of this about 284,000 acres (or about 3 percent of lynx habitat) are projected to be in lynx habitat in the WUI – see Appendix M. Under Alternative F, up to 6 percent of lynx habitat in the WUI could have fuel treatment projects that do not meet the vegetation standards. For those projects that occur in winter snowshoe hare habitat they would likely reduce this habitat component.

An analysis using Montana FIA and fuel treatment data was conducted to approximate the potential effects to winter

Table 3-14. Lynx habitat that could be thinned next decade under Alternative F

Precommercial thinning	Acres winter snowshoe hare habitat
Research	1,450 acres
Genetic tree tests	220 acres
Within 200 feet of administrative sites, dwellings or outbuildings	2,190 acres
Aspen	3,050 acres
Whitebark pine	9,110 acres
<i>Subtotal</i>	<i>16,020 acres</i>
Daylight thinning where 80% of the cover is retained	
Planted western white pine	51,090 acres*
Total	67,110 acres

* 20% snowshoe hare forage may be reduced on day light thinning acres. 20% of 51,090 = 10,200 acres + 16,020 acres traditional thinning = 26,240 acres where snowshoe hare forage may be reduced.

snowshoe hare habitat – see Table 3-15 and the discussion in the summary of effects for Alternative F.

Other vegetation management projects under Alternative F in multistoried forests, Alternative F would preclude most vegetation management except fuel treatment projects in the WUI. Projects adjacent to homes or for research could occur. In addition, removal of a minor amount of small trees would be allowed within skid trails for salvage operations. Salvage operations are allowed because

these operations remove larger trees which do not have tree limbs that come to snow level; therefore, they do not provide winter snowshoe hare habitat.

Vegetation management projects could occur if it improved or maintained foraging habitat in the long term. Small openings could be created or mid-height trees removed so small trees and brush could grow. How many acres might be involved depends on the number and size of site-specific projects

Table 3-15. Hare forage affected under Alternative F in a decade with full funding - Montana

	High density young 894,000 ac	High density multistory 1,475,000 ac	Total high density 2,369,000 ac	Low density young 744,000 ac	Low density multistory 1,010,100 ac	Total low density 1,754,000 ac
Precommercial thinning (acres)	20,500	0	20,500	0	0	0
Fuel treatment (acres)	0	24,400	24,400	0	21,800	21,800
Whitebark pine restoration (acres)	40,000	0	40,000	0	0	0
No treatment (acres)	833,500	1,720,600	2,284,100	744,000	988,200	1,732,200
Percent winter snowshoe hare habitat treated	7% ¹	2% ²	4% ³	0% ⁴	2% ⁵	1% ⁶
Timber harvest	No effect	Likely minor – some detrimental, some beneficial	Likely minor – some detrimental, some beneficial	No effect	Likely minor – some detrimental, some beneficial	Likely minor – some detrimental, some beneficial
Grazing	No effect	No effect	No effect	No effect	No effect	No effect

$$^1 20,500 + 0 + 40,000 / 894,000 = 7\%$$

$$^2 0 + 24,400 + 0 / 1,475,000 = 2\%$$

$$^3 20,500 + 24,400 + 40,000 / 2,369,000 = 4\%$$

$$^4 0 + 0 + 0 / 744,000 = 0\%$$

$$^5 21,800 / 1,010,000 = 2\%$$

$$^6 0 + 21,800 + 0 / 1,754,000 = 1\%$$

Assumptions

Whitebark pine restoration would occur only in high-density winter snowshoe hare habitat.

No restrictions on fuel treatments with the WUI; Fuel treatments outside the WUI would be precluded (Appendix M)

Other information

About 20,550 of the 67,100 of the acres of precommercial thinning scheduled in lynx habitat are in Montana (Appendix K, Table K2)

Grazing under Alternative F

Grazing standards are replaced by guidelines under Alternative F. If the guideline is not followed in some areas then potential snowshoe hare habitat could be reduced, which may affect an individual lynx. However, there is no information that grazing poses a threat to lynx populations (Appendix P); therefore the effects would only be localized and would not affect the population as a whole.

Summary of effects on foraging habitat under Alternative F

Precommercial thinning on 20,500 acres in Montana would be allowed under Alternative F which would affect about 2 percent of high density young forests. Another 5 percent of high density young forests could be affected by restoring whitebark pine through thinning then prescribed burning.

In Montana, about 131,000 acres of fuel treatment is projected to occur in winter snowshoe hare habitat if there are no constraints. In Alternative F fuel treatments would not be preclude in the WUI which amounts to about 46,000 acres. About 2 percent of the high density and 2 percent of low density multistoried winter snowshoe hare habitat could be reduced due to fuel treatments.

Most other activities in multistoried forests would be precluded. These activities would have little to no effect the overall amount of winter snowshoe hare habitat. In addition, some projects could be designed to enhance multistoried conditions.

Denning habitat

Denning habitat consists of the woody debris in which lynx make their dens – root wads, wind-thrown piles, or large down trees. Lynx productivity may be affected by the availability of denning habitat. It is used for birthing and rearing kittens. The debris protects the kittens from predators and from weather.

For denning habitat to be useful to lynx, it generally needs to be in or near foraging habitat. Because kittens are not very mobile early on, and the mother has to hunt to feed herself and her kittens, the juxtaposition of denning and foraging habitat is especially important.

Where denning habitat occurs

Den sites were found in the Yukon, in burned areas where woody debris was available (Slough 1999). Studies in the Seeley Lake area in northwest Montana are not complete, but preliminary results indicate most dens are under a deadfall of mature trees (J. Squires, pers. com. Oct 30, 2006). These sites may be in mature forests or under younger forest stands with a dead and down residual component of large trees. Smaller logs are also sometimes used for dens when they occur in “jack-strawed” condition (J. Squires, pers. com. Oct 30, 2006). Results in northwest Montana show lynx use a variety of conditions for den sites, including down logs (59 percent), rootwads with logs (22 percent), rocks and boulders with logs (11 percent), slash (11 percent), and under live trees (2 percent). Lynx mostly used mature forests (73 percent) for denning, but also used young regenerating forests (18 percent).

The important component for all lynx den sites appears to be the amount of down woody debris present, not the age of the forest (Mowat et al. 2000, Appendix P).

No quantitative assessment is available of the amount and distribution of woody material in the planning area. Denning habitat would be evaluated based on site-specific information available at the project level. However, based on additional studies completed or in progress since the DEIS, it appears that denning habitat is not a limiting factor because lynx use a variety of sites for denning and these habitat elements are generally found in most areas (J. Squires, pers. com. 2006)

In addition, the BA on existing plans found that generally denning habitat is likely not a limiting factor in the planning area because most existing plans include direction to provide for old growth or retain dead and down material (Hickenbottom et al. 1999). Plans for the Ashley and Deerlodge include no such direction.

Denning habitat risks

Risks to denning habitat include logging and fire. Prescribed fires and timber harvest remove woody material and may affect what is available. Salvage logging in particular removes denning habitat and potential denning habitat because it removes dead and down trees. If some areas of down woody debris or areas of dead trees are not retained then denning

habitat may become limiting, especially if pockets of large woody debris are not available elsewhere in an LAU.

Denning habitat under Alternative A, no action

Most existing plans contain provisions to retain dead-and-down woody material or to maintain old growth habitat, which the BA deemed adequate to meet lynx denning needs (Hickenbottom et al. 1999) – see Table 3-16.

For those units whose plans contain either very limited, incidental, or no direction, denning habitat could be reduced under Alternative A, so successful reproduction and kitten survival could be affected.

Under the no-action alternative, management direction to conserve lynx would not be incorporated into existing plans. Adequate denning habitat may be available on units with old growth or dead and down direction, and may not be available where such direction is lacking.

Denning habitat under Alternative B

Alternative B would add management direction to provide denning habitat.

- ♦ Objective VEG O2 says foraging habitat should be next to denning habitat
- ♦ Standards VEG S3 and VEG S4 are discussed below
- ♦ Guidelines VEG G2, VEG G3, and HU G1 emphasize locating foraging habitat near denning habitat, retaining denning habitat where it is unlikely to be consumed by stand-replacing fire

Table 3-16. BA findings about whether existing plans provide for denning habitat

	Fully or substantially	Marginally	Does not	Unknown or n/a
Twenty plans	80%	10%	10%	0%

and retaining woody debris when developing or expanding ski areas.

Standard VEG S3 requires ten percent denning habitat be provided in each LAU on lands capable of producing it, which would be beneficial for lynx.

Standard VEG S4 allows salvage logging in disturbed areas five acres or smaller only where public safety is at risk, such as in recreation sites or road or trail corridors. The area involved is likely to be small, and since the BA said denning habitat is probably not limiting in most of the planning area, the effect on lynx of allowing this logging is likely negligible.

For plans lacking it, Alternative B would add management direction to provide for denning habitat, increasing the likelihood that denning habitat would be available and distributed across all LAUs in the planning area, which would be beneficial to lynx.

Denning habitat under Alternative C

Like Alternative B, Alternative C would add management direction increasing the likelihood that denning habitat would be provided and distributed in lynx habitat across all LAUs in the planning area. This would be beneficial to lynx.

Alternative C differs from Alternative B in that Standard VEG S4 in Alternative C allows for salvage logging within 200 feet of dwellings, as well as for public safety. Again, because the area involved is small and close to human habitation, the effect on lynx is likely negligible.

Denning habitat under Alternatives D & E

Alternatives D and E modify Standard VEG S3 to say where ten percent denning

habitat is not present, projects should avoid reducing it, or if they do reduce it, the effects would be mitigated. Mitigation may involve retaining standing dead trees and coarse woody debris to provide future denning sites, which would be beneficial to lynx.

Alternatives D and E would also add management direction increasing the likelihood that denning habitat would be provided and distributed in lynx habitat across all LAUs in the planning area, which would be beneficial to lynx.

However, Standard VEG S4 is changed to Guideline VEG G7 in these two alternatives, so retaining dead trees in disturbed areas of five acres or smaller is no longer mandated, but would need to be considered.

These alternatives may result in some loss of denning habitat compared to Alternatives B and C, because the standard restricting salvage harvest is changed to a guideline.

Denning habitat under Alternative F

Alternative F consolidates all the denning management direction in Alternative B (Standards VEG S3, and VEG S4, Guidelines VEG G2 and VEG G3) into one guideline VEG G11.

The requirement to retain ten percent denning habitat was not included because (1) den sites are located in areas that have pockets of large amounts of woody debris - not every acre needs these piles - but they should be available across the LAU; and (2) if mature and old forests were used as a proxy to determine the amount of denning habitat there would be an abundance of denning habitat in most

LAUs. (See discussion in *Chapter 2, management direction considered.*) In addition, denning habitat can be found in young regenerating forests; therefore it is more important that an LAU have pockets of large woody debris versus ten percent denning habitat.

Guideline VEG G11 says denning habitat should be distributed in each LAU and if denning habitat appears to be lacking then projects should be designed to retain some coarse woody debris, piles or residual trees to provide denning habitat in the

Although specific standards and guidelines associated with salvage harvest are not included in Alternative F, salvage harvest projects would be required to evaluate whether or not there is denning habitat across an LAU and if not the project would be designed to leave some piles of large woody debris, or areas of dead trees; therefore Alternative F would result in long-term beneficial effects because it ensures denning habitat is provided.

Competition from other predators

Lynx have very large feet in relation to their body mass, providing them a competitive advantage over other carnivores in deep snow. Snow compaction may allow *competing carnivores* – primarily coyotes but also mountain lions and bobcats – winter access along compacted routes into lynx habitat, where they can hunt.

Where & how competition occurs

Snow conditions vary, both seasonally and from year to year. Periods of warm

and windy weather may result in hardened snow. How long the crusted snow lasts depends on location, aspect, slope, and snowfall and temperature changes. Heavy snowfalls are frequent in the northern Rockies. Compacted snow may exist regularly only where people repeatedly compact it throughout the winter.

Various reports and observations have documented coyotes using high elevation areas with deep snow (Buskirk et al. 2000a). Coyotes use open areas because the snow is more compacted there, according to research conducted in central Alberta (Todd et al. 1981). Another study in Alberta showed coyotes selected hard or shallow snow more than lynx (Murray et al. 1994). A study in eastern Canada showed much less snowshoe hare activity within 240 feet of repeatedly used snowmobile trails, with much more red fox activity (Neuman & Meriam 1972).

Within lynx habitat in northwestern Montana, twelve radio-collared coyotes were monitored over three winter seasons to assess how coyotes interacted with compacted snowmobile trails (Kolbe et al. in press). Coyotes remained in lynx habitat having deep snow conditions and traveled on compacted snowmobile trails more than expected by random chance. However, coyotes used compacted snowmobile trails for less than eight percent of their travel and used compacted and uncompacted roads similarly (Kolbe et al. in press). Coyotes did strongly select for shallower and more supportive snow surfaces when traveling off of compacted trails. In this study coyotes primarily scavenged ungulate

carrion that was readily available while snowshoe hare kills comprised only three percent of coyote feeding sites (Kolbe et al. in press).

In the Uinta Mountains of northeastern Utah and three comparative study areas (Bear River range in Utah and Idaho, Targhee NF in Idaho, Bighorn NF in Wyoming) Bunnell (2006) found the presence of snowmobile trails was a highly significant predictor of coyote activity in deep snow areas.

From track surveys it was determined that the vast majority of coyotes (90 percent) stayed within 350 meters of a compacted trail and that snow depth and prey density estimates (snowshoe hares and red squirrels) were the most significant variable in determining whether a coyote returned to a snowmobile trail (Bunnell et al. 2006). Of the four study areas recent lynx presence has only been documented on the Targhee NF.

Based on these new research results there still is no conclusive evidence that, if competition exists between lynx and other predators, it exerts a population level threat on lynx (Appendix P, p. 40097).

How competition may be affected by management activities

Competition risks from winter over-the-snow recreation

Winter recreation such as snowmobiling, cross-country skiing, dog-sledding, and snow-shoeing compacts snow throughout the winter in some places, potentially increasing the access other predators have into lynx habitat (Halfpenney et al. 1999). These activities are increasing in lynx

habitat – see the *Recreation* section later in Chapter 3.

About 13,000 miles of designated and groomed snowmobile and cross-country ski routes are in the planning area. Of these, about 8,000 miles are in lynx habitat. In the planning area, there are 359 special use permits and agreements for winter activities, 94 percent in lynx habitat. These activities compact the snow and may provide access for competing predators to areas with deep snow.

Competition risks from mineral & energy development

Mining and energy development may change or eliminate lynx habitat, and can promote winter access – see the *Minerals* section later in Chapter 3. Access roads may be plowed during winter, improving access for competing predators into lynx habitat. These effects are likely to be localized since there is no information to indicate that mining or energy development poses a threat to lynx populations as a whole (Appendices O and P).

Mineral materials (gravel, rock, sand)

About 2,600 active mineral materials pits exist in the planning area. Of these, between two to three percent (from 50 to 80) are in lynx habitat. Pit size ranges from less than one acre up to five acres. Currently, only one has winter operations.

Locatable minerals (gold, silver, copper, etc.)

In the year 2000, 142 Plans of Operations and 550 Notices of Intent to operate were processed for the planning area. During the last 15 years, about a third were inside lynx habitat. Most existing locatable minerals operations are less than 20 acres,

although there are five operations in lynx habitat that are from 100 to 600 acres. The potential for mineral discovery in lynx habitat is considered low.

Leasable minerals

There are about 820,000 acres under lease for oil and gas, with more acres pending for lease in the planning area. Only four wells have been drilled in lynx habitat during the past decade. Only one is still active. Recent estimates suggest that thirty-three more wells may be drilled. Currently, there are no pipelines in lynx habitat.

Competition risks from forest roads

Forest and backcountry roads and trails may make snow-compacting activities easier, which in turn may provide competing predators access into lynx habitat during the winter (LCAS). See the *Roads* section later in Chapter 3.

Competition under Alternative A, no action

The BA on existing plans (Hickenbottom et al. 1999) found most existing plans contain limited direction about snow-compacting activities – see Table 3-17. Under the no-action alternative, management direction to conserve lynx would not be incorporated into existing plans. Existing land management direction would continue to be implemented.

Winter recreation under Alternative A

Existing management direction for over-

the-snow winter recreation would continue. Grooming winter trails is likely to remain stable at current levels for at least the next five years because the amount of money for grooming is not likely to increase substantially. However, grooming may increase later in the decade to meet the continuing increase in demand, if funding becomes available.

Public demand for outfitter services is likely to increase, and outfitter growth would likely follow current business trends. Outfitters have been diversifying their businesses by shifting their services to winter recreation, although the number of outfitters has remained stable during the last decade.

Existing uses may provide packed trails for other carnivores to more easily enter lynx habitat, and compete with lynx for food or prey on lynx. Under existing plans, grooming and designated routes could expand into new areas, providing additional access.

Mineral & energy development under Alternative A

There is limited mineral and energy development in lynx habitat. Access roads that are plowed in winter could also improve the access for competing predators.

Forest roads under Alternative A

About ten miles of road construction could occur in lynx habitat during the next few years – see Table 3-18 next page.

Table 3-17. BA findings about whether existing plans manage snow-compacting activities

	Fully or substantially	Marginally	Does not	Unknown or n/a
Winter recreation	15%	40%	40%	5%
Minerals	20%	55%	20%	---
Forest roads	60%	15%	25%	---

About five miles could be located on ridge-tops where lynx may travel. New road construction may provide new areas for over-the-snow winter recreation and may provide improved access to competing predators.

Competition under Alternative B

Alternative B would minimize potential risks to lynx from competing predators – see Table 2-1 in Chapter 2 for the complete text of the alternatives.

Objective HU O1 would discourage new snow-compacting activities in lynx habitat.

- ♦ Standard HU S1 would limit increases in designated routes in an LAU.
- ♦ Standard HU S3 would restrict winter motorized access to designated routes for some activities.
- ♦ Guidelines HU G4, HU G5, and HU G9 would encourage remote monitoring reclaiming sites, restricting access, and decommissioning new roads.

Winter recreation under Alternative B

Standard HU S1 says new routes could not be designated in an LAU, unless the designation would consolidate use and improve lynx habitat. Grooming could expand onto routes that are currently designated but not groomed. No restrictions are imposed for off-trail use.

Alternative B would limit the amount of human-caused snow compaction occurring in new areas. Standard HU S1 would limit the potential competition

from other carnivores to existing areas.

Mineral & energy development under Alternative B

Standard HU S3 would restrict winter access for mineral and energy development to designated routes to help reduce snow compaction. Designating routes could benefit lynx by reducing the access competing predators have into lynx habitat.

Forest roads under Alternative B

Alternative B would provide guidance about what to consider during road construction to minimize or reduce the effects on lynx. Public access could be restricted on new roads, and new roads generally should not be built on ridge-tops.

Competition under Alternatives C & D

Alternatives C and D are similar to Alternative B for minerals and forest roads.

Winter recreation under Alternatives C and D

Standard HU S1 would increase the size of the area used to evaluate changes to groomed and designated routes, from a single LAU, to an LAU or a fixed combination of adjacent LAUs. Standard HU S1 would allow groomed and designated routes to expand into areas that are already consistently used and compacted, as identified in the baseline of areas and routes used between 1998 and 2000.

Table 3-18. Forest road management plans in lynx habitat in the planning area

Category of road	Miles
Road construction planned during the next <i>five</i> years that could remain open	10
Roads planned on ridge tops that could remain open during the next <i>decade</i>	5

Many existing snowmobile and cross-country ski routes traverse multiple LAUs. Managing larger route systems could consolidate use and provide a more effective way to reduce or eliminate effects beneficial effect on lynx populations as a whole. However, individual lynx may be affected.

Although expansion would be allowed, routes could expand only into areas already compacted, so there would be no net change in snow compaction in an LAU. This would allow for some expansion of groomed and designated routes, while maintaining the status quo on snow compaction.

Competition under Alternatives E & F

Alternatives E and F are similar to Alternatives C and D for winter recreation.

Mineral & energy development under Alternatives E and F

Alternatives E and F would change the management direction for over-the-snow use and mineral access from standards to guidelines. This change could allow snow compacting activities in new areas potentially affecting individual lynx that use these sites. However, these effects are likely to be localized since there is no information to indicate that over-the-snow compaction poses a threat to lynx populations as a whole (Appendices O and P).

Mortality risk factors

Mortality risks were the second major category of risks to lynx identified in the LCAS. A *mortality risk* is something that increases the likelihood lynx will be killed.

Direct mortality can be caused by:

- ♦ Vehicle collisions on highways
- ♦ Predation by other species
- ♦ Predator control activities
- ♦ Shooting
- ♦ Trapping

Most mortality is caused indirectly by starvation from lack of prey, as discussed previously.

Vehicle collisions on highways

Major high-use highways such as I-90, I-15, US-2, US-12, and US-93 may result in lynx deaths from vehicle collisions (LCAS). The effects of highways on lynx are discussed with movement risks beginning on the next page.

Predation by other species

Predation on lynx kittens by coyotes, grey wolves, mountain lions, bobcats, and birds of prey has been inferred or documented throughout the range of the lynx (LCAS).

Snow compacted by snowmobiling, skiing, etc., may facilitate the movement

of other predators into lynx habitat (Buskirk et al. 2000a). The effects of snow compaction on lynx were previously discussed with competition risks.

Predator control, shooting & trapping

The USDA Wildlife Services traps, shoots and poisons predators on federal lands, usually on domestic livestock allotments and sometimes inside lynx habitat. While these efforts are directed at specific species or offending animals, occasionally a lynx may be affected. Wildlife Services captured and released a lynx in Idaho in 1991 but there have been no other recent reports (LCAS). People on adjacent private lands may conduct similar efforts.

Lynx trapping is not permitted in any of the states in the planning area; however, lynx may be trapped incidentally. Lynx could be shot mistakenly by legal hunters or illegally by poachers.

This proposal does not address predator control, shooting, or trapping because they are outside the jurisdiction of the FS. For more discussion, see the Chapter 2 section, *Management direction considered*.

Movement risk factors

Risks to lynx movement were the third major category of lynx risk factors identified in the LCAS. A *movement risk* is anything that increases the likelihood lynx movements will be impeded or inhibited.

Lynx travel varies from 1.6 miles up to six miles per day. Lynx are known to regularly explore from nine to 25 miles beyond their home ranges, and to make long-distance moves of up to 600 miles when prey is scarce (LCAS).

Recent genetic work has shown that lynx throughout western North America are closely related (Schwartz et al. 2002), indicating populations have been well enough connected to maintain close kinship. Lynx seem to prefer to move through continuous forest, frequently use ridges, saddles and riparian areas (Koehler 1990, Staples 1995) and have been observed to avoid large openings (Ruggerio et al. 2000a).

At this time no natural or human-caused barriers that effectively prohibit movement of lynx between Canada and the northern Rockies have been identified (Appendix P, p. 40097).

The riparian corridors required by INFISH and PACFISH provide connectivity by making continuous forest or shrub cover available (Hickenbottom et al. 1999). INFISH and PACFISH apply to planning area NFs west of the Continental Divide.

As part of the Conservation Agreement, the agencies agreed to identify linkage areas. *Linkage areas* are places that connect blocks of lynx habitat, and have been

identified for Idaho, Montana, Wyoming and Utah. Federal, state, and tribal governments – including highway agencies – were involved. Figure 1-1 identifies linkage areas in the planning area; Appendix B documents the criteria used.

Movement risks

Movement risks from grazing

Livestock grazing may change, reduce, or eliminate snowshoe hare habitat in quaking aspen, willows, and riparian areas. In shrub-steppe habitat, grazing may change plant composition where shrubs provide cover and connectivity between blocks of lynx habitat. These effects are likely to be localized since there is no evidence grazing poses a threat to lynx populations as a whole (Appendix P).

Movement risks from highways

Highways can alter landscapes by fragmenting large tracts of land. The degree of impact increases as highways are upgraded from two lanes. However, no information exists to determine the level that traffic volume or roadway design affects lynx (Appendix P).

Major high-use highways such as I-15, US-55, US-12, US-95, and state highways 75 in Idaho and 83 in Montana, and US-14, US-26 and US-189 in Wyoming, and I-90 in Utah may impede lynx movement across the landscape (LCAS). While the FS does not have authority over these highways, the agency can influence the consideration of wildlife crossings if a right-of-way is involved.

Most state transportation departments are considering ways to provide wildlife crossings during highway construction and reconstruction projects (Wyoming Dept of Transportation 2005; Idaho Dept. of Transportation 2004; and Montana Dept of Transportation, FHWA, Confederated Kootenai and Salish Tribes 2006).

Parts of US-95 in Idaho and US-2 and US-93 in Montana were rebuilt in the last decade; none of the work was done where lynx linkage areas have been identified.

Movement risks from forest roads

As the standard of road increases from gravel to two-lane highway, traffic speeds and volume increase and can affect lynx movements. During the last decade, about 15 miles of two-lane roads were paved in the amendment area. There is no evidence that lynx avoid or are displaced by unpaved roads; therefore unpaved roads are not considered a threat to lynx movement (Appendix P).

In 2001, the FS established a detailed Roads Analysis policy (36 CFR 212.5(2)) to decide which roads to keep and which to decommission. Before any road is upgraded, a Roads Analysis must be completed. Lynx needs would be considered as part of this analysis.

Movement risks from land ownership

patterns

Private land development, especially four season resorts and developments along road corridors in mountain valleys, may fragment habitat and impede lynx movement (LCAS).

Movement risks from recreation

Winter developed recreation

Downhill and cross-country ski areas represent only a small fraction of lynx habitat – less than 30,000 of 18.5 million acres in the planning area – but their location on north facing slopes, high seasonal and year-round use and associated developments may affect lynx movement (LCAS). There are 18 downhill ski areas in lynx habitat in the planning area.

A survey of two ski areas in southern Canada showed that skiers did not seem to keep lynx from occupying and using the areas, and that lynx did not always run away from people (Creel et al. 2002). However, what level of human presence lynx can tolerate has not yet been determined (Roe et al. 2000).

Dispersed recreation

It is unlikely that spring, summer, or fall recreation sites, such as campgrounds, affect lynx because lynx appear to exhibit a low susceptibility to displacement by

Table 3-19. BA findings about whether existing plans manage habitat connectivity

	Fully or substantially	Marginally	Does not	Unknown or n/a
Connectivity	40%	50%	10%	---
Coordinating connectivity & land adjustments	20%	60%	20%	---
Land adjustments	---	50%	50%	---
Developed recreation‡	5%	---	95%	---

humans, even though there is probably some level of activity that would cause lynx to move. Lynx also have more foraging opportunities during these seasons. It is possible lynx could be displaced by activity near denning sites (LCAS). No management direction was developed for spring, summer, or fall recreation because of the low likelihood of conflicts. Therefore, it is not discussed further.

Movement risks under Alternative A, no action

The BA on existing plans (Hickenbottom et al. 1999) found most existing plans contain limited direction about habitat connectivity (Table 3-19). Under the no-action alternative, management direction for the conservation of lynx would not be incorporated into existing plans. The existing direction would continue.

Highways under Alternative A

Two highways in linkage areas could be expanded from two to four lanes during the next decade – US-95 in Idaho and US-30 in Wyoming. Wildlife crossings are being considered for these upgrades even though existing plans do not require them.

Roads under Alternative A

About 45 miles of two-lane roads on NF lands are planned for paving during the next decade – see Table 3-20. Existing plans contain no requirements to consider wildlife crossings, but a Roads Analysis would have to be done to consider resource needs before upgrading. If

wildlife crossings are not incorporated, lynx movement could be negatively affected by increasing the speed and traffic volumes on these roads. About 240 miles of road are planned for upgrading. Upgrading could increase traffic speeds and volumes, although not to the same degree as paving.

Land ownership under Alternative A

Existing plans require considering the effects on threatened and endangered species in land ownership adjustments.

About 375,000 acres may be considered for acquisition in the planning area during the next decade. Many acres are in lynx habitat or linkage areas. Acquiring these lands would improve federal landownership patterns.

It is also possible that when acquiring desirable lands, some lynx habitat or linkage areas could be disposed of, which could negatively affect lynx habitat connectivity in some situations.

Winter developed recreation under Alternative A

Twelve downhill ski areas have expansions planned during the next decade. One new ski area is being considered. Potential developments and expansions could result in losing habitat. Habitat fragmentation may increase and could impede the movement of lynx across the landscape.

Table 3-20. Forest road management plans in lynx habitat

Category of road	Miles
Two or more lanes, planned to be paved during the next decade	45
Roads planned to be upgraded during the next five years	240

Movement risks - Alternatives B, C, D, E & F*Grazing*

Standard LINK S2 says to manage livestock grazing in shrub steppe habitat to provide cover and connectivity between blocks of lynx habitat.

Under Alternatives E and F, standard LINK S2 is changed to a less restrictive guideline LINK G2. This change could result in some local reduction of cover and connectivity and may affect an individual lynx that is moving between blocks of lynx habitat. However, there is no evidence that grazing affects lynx populations as a whole (Appendix P). The effect of this change would most likely be felt on the east side of the northern Rockies. This is due to the fact that the INFISH and PACFISH amendments that require protection of riparian areas, which lynx use for travel, already apply west of the continental divide.

Roads and highways

- ♦ Objectives ALL O1, HU O6 and LINK O1 describe project design that considers how to maintain and provide for connectivity
- ♦ Standards ALL S1, LINK S1 are discussed below. Guideline ALL G1 requires project planners to consider using techniques to avoid or reduce adverse effects on lynx during highway construction and reconstruction
- ♦ Under Alternative B, Guideline HU G6 discourages upgrading roads in lynx habitat where the result would be increased traffic volumes or speeds
- ♦ Under Alternatives C, D, E and F, Guideline HU G6 says mitigation to

maintain lynx movement corridors should be considered when upgrades result in increased traffic volumes or speeds

Currently, wildlife needs are frequently considered in road and highway development. Adding Guidelines ALL G1 and HU G6 to existing plans would make sure they were considered.

Standards ALL S1 and LINK S1 should reduce the effects of habitat fragmentation from roads and highways, and provide for the movement and dispersal of lynx throughout the planning area.

Land ownership

- ♦ Objective LINK O1 encourages the FS to work with other landowners to find ways to reduce the potential for adverse effects in linkage areas
- ♦ Guideline LINK G1 encourages the FS to retain habitat in linkage areas

Alternatives B, C, D, E, and F should reduce habitat fragmentation from private land development and patterns of scattered land ownership, and enable lynx to move and disperse throughout the amendment area.

Winter developed recreation

- ♦ Objectives ALL O1, HU O2, HU O3 and HU O4 encourage maintaining or restoring lynx connectivity
- ♦ Standard ALL S1 requires new or expanded permanent developments to maintain connectivity

Under Alternative B, Standard HU S2 requires lynx diurnal security habitat to be provided where needed, although it is not found lacking everywhere. Under

Lynx

Alternatives C, D, E, and F this direction is changed to a guideline.

- ♦ Guidelines HU G2 and HU G3 say lynx movement must be considered when designing developed recreation sites

These objectives, standard, and guidelines do not prohibit new developments or prohibit expanding existing

developments. However, they do require considering lynx needs in facility design and operations. As a result, habitat connectivity would be provided in new or expanded operations, and lynx would more likely be able to use these areas and move unimpeded throughout the landscape under Alternatives B, C, D, E, and F.

Standard ALL S2

Alternative D

Alternative D contains Standard ALL S2 that would allow a project to deviate from one or more lynx standards if a determination of “not likely to adversely affect” lynx has been made, subject both to ESA requirements and to approval by the Regional Forester – see Table 2-1. The use of the standard would be monitored.

The 2000 BO says,

... for most agency actions, noncompliance with the standards in the LCAS increases the likelihood that actions would adversely affect lynx.

Possible effects include:

- ♦ Some projects may result in improving or maintaining winter snowshoe hare habitat over the long term
- ♦ Mandatory standards might not be implemented as intended, or standards might be applied less consistently throughout the planning area because of the many administrative jurisdictions
- ♦ Standard ALL S2 provides a less reliable regulatory mechanism because of the uncertainty of its application
- ♦ It may be more difficult to determine cumulative effects at the project level for larger scales such as meta - populations

Alternative E

Alternative E also contains Standard ALL S2. Under Alternative E, Standard ALL S2 would allow a project to deviate from one or more lynx standards if the project has short-term adverse effects on lynx, as long as it has long-term benefits to lynx and its habitat, subject to ESA requirements but without a higher level of review. The use of the standard would be monitored, as with Alternative D.

The possible effects are similar to those described under Alternative D, plus:

- ♦ Projects would have adverse effects on lynx and require formal consultation with FWS
- ♦ Given the current state of knowledge, it may be difficult to determine where, when, and how short-term adverse effects could be offset by long-term improvements in lynx habitat, both inside an LAU and over larger scales
- ♦ Short-term adverse effects on individual lynx could occur, because projects with short-term adverse effects could be concentrated in one LAU and combined with projects with long-term benefits in other LAUs
- ♦ The lack of higher-level review may lead to a greater degree of inconsistency in how standards are applied

Effects Summary

Table 3-21 summarizes how the alternatives address lynx risk factors.

Alternative A

There would be no change in management direction under Alternative A.

Consequently, there would be no change in effects from

those identified in the BA for existing plans (Hickenbottom et al. 1999).

Alternative A would not constrain vegetation management activities. Some activities may affect the quantity and quality of lynx habitat over time – see Table 3-22.

Table 3–21. How the alternatives address risk factors

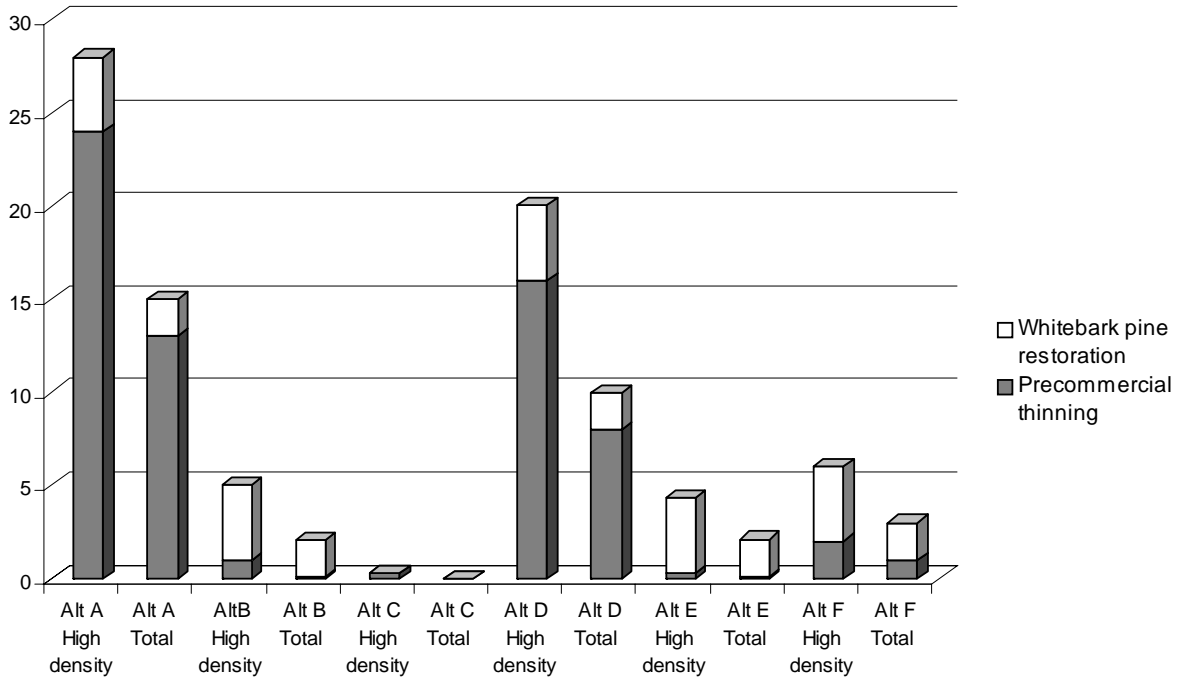
	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Incorporates regulatory mechanisms	N	Y	Y	P	P	P
Risk factors relating to quantity and quality of winter snowshoe hare habitat						
Direction limits amount of habitat in a stand initiation structure stage	N	Y	P	P	P	P
Direction limits timber harvest creating stand initiation structure stage	N	Y	P	N	N	P
Direction limits PCT in winter snowshoe hare habitat	N	Y	Y	P	P	P
Direction limits other vegetation projects in multi-story forest that provide winter snowshoe hare habitat	N	N	Y	P	P	P
Direction for fire	N	Y	Y	Y	Y	Y
Direction addresses grazing	P	Y	Y	Y	P	P
Risk factors relating to quantity and quality of denning habitat						
Direction for providing denning habitat	P	Y	Y	Y	Y	Y
Direction retains ten percent denning habitat	P	Y	Y	Y	P	N
Direction defers management activities in potential denning habitat	N	Y	Y	P	P	P
Direction limits salvage of small areas of dead/dying trees	N	Y	Y	P	P	P
Risk factors relating to competition from predators						
Direction for over-the-snow winter recreation	N	Y	P	P	P	P
Direction for ski areas	N	Y	Y	Y	Y	Y
Direction for minerals and energy development	N	Y	Y	Y	Y	Y
Direction for roads	P	Y	Y	Y	Y	Y
Risk factors relating to movement & connectivity						
Direction for highways	N	Y	Y	Y	Y	Y
Direction for land acquisition	N	Y	Y	Y	Y	Y
Direction for connectivity	P	Y	Y	Y	Y	Y

N = No management direction or only very limited direction included

P = Partial, some management direction exists or would be included to limit or avoid some effects caused by the risk factor. Direction may include some exceptions or be in the form of a guideline

Y = Yes, includes enough management direction to limit or avoid effects caused by the risk factor

Figure 3-5a. Percent of winter snowshoe hare habitat in young regenerating forests affected by major activity



The quantity and quality of winter snowshoe hare foraging habitat would likely decline due to the lack of management direction to:

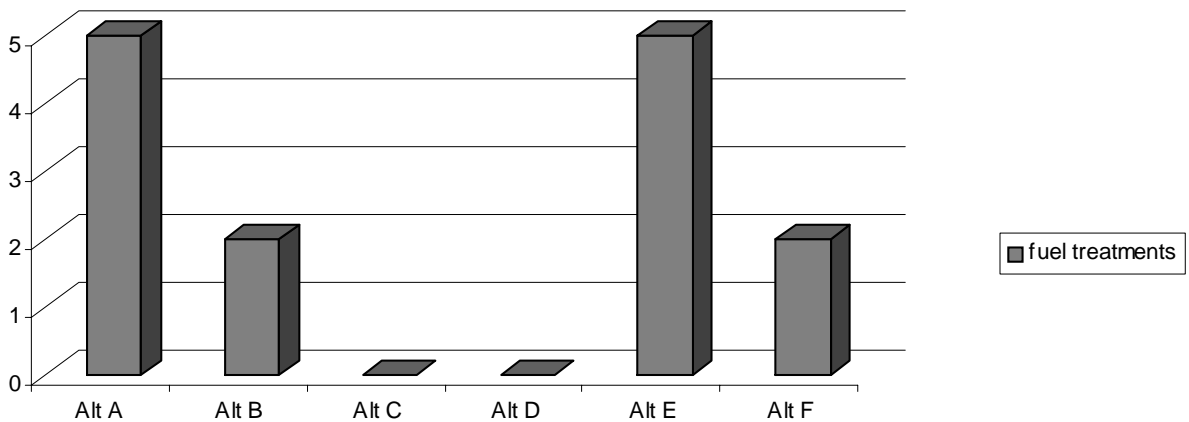
- ♦ Provide a distribution of age classes
- ♦ Restrict activities that reduce winter

snowshoe hare forage

- ♦ Promote actions that create forage where it is lacking

Alternative A could reduce the quantity and quality of high-density winter snowshoe hare habitat in young

Figure 3-5b. Percent of winter snowshoe hare habitat in multistoried forests affected by fuel treatments



regenerating forests by 28 percent during the next decade. The reduction would be the result of precommercial thinning and whitebark pine restoration - see Figure 3-5a.

In addition, Alternative A could reduce the quantity and quality of winter snowshoe hare habitat in multistoried forests by 5 percent during the next decade. The reduction would be the result of fuel treatments - see Figure 3.5b

An adequate amount of denning habitat may not be provided on those units that lack management direction to provide old growth or coarse woody debris. Denning habitat would likely be reduced in some places.

Existing plans would allow snow compacting activities to occur in new places, expanding the area where competition with other predators may occur. This expansion could affect individual lynx; however there is no evidence that if competition exists between lynx and competitors that it affects lynx at a population level (Appendix P).

Lynx movement may be restricted due to lack of management direction to provide habitat connectivity. No direction would be provided for:

- ♦ Managing roads, highways, and

development, or

- ♦ Managing grazing to provide cover, such as in riparian areas

Those plans already amended by PACFISH and INFISH would provide for lynx movement to some degree. Grazing in areas where plans have not been amended by PACFISH and INFISH may affect lynx in local areas by reducing habitat cover but there is no evidence that grazing poses a threat to lynx populations as a whole.

In summary, since specific management direction that address threats to lynx populations (specifically direction for timber harvest, thinning and fire suppression) is lacking in existing plans, adverse effects on lynx populations would continue. The plans also lack direction in some areas for grazing, minerals, roads and over-the-snow use; however, these specific risks are likely to only affect individual lynx, not populations as a whole.

Alternative B

Alternative B would incorporate management direction into existing plans to reduce or eliminate most known adverse effects on lynx populations and individuals, and contribute to conserving the species.

Alternative B would result in improved

Table 3-22. Lynx habitat that could be affected by the major vegetative management activities over the next decade by alternative

	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Precommercial thinning	395,330	2,190	3,860	236,480	3,860	67,110
Fuel treatment (unconstrained)	881,000	370,000	0	0	881,000	284,000
Whitebark pine restoration	50,000	50,000	0	50,000	50,000	50,000
Total	1,326,330	422,190	3,860	286,480	934,860	401,110

forage habitat for lynx in young regenerating forests. Alternative B would add management direction to:

- ♦ Provide a distribution of forest age classes
- ♦ Restrict precommercial thinning
- ♦ Promote actions that create forage where it is lacking

In young regenerating forests Alternative B would restrict precommercial thinning so only one percent of forage habitat would be reduced. However whitebark pine restoration could still occur, which could result in additional 4 percent reduction – see Figure 3-5a. In multistoried forests Alternative B only restricts precommercial thinning. Fuel treatments could reduce about 2 percent of multistoried habitat condition – see Figure 3-5b.

Alternative B would incorporate management direction for denning habitat that would protect denning habitat and den sites.

Grooming would not be allowed to expand beyond existing designated routes, and designated over-the-snow routes would not be allowed to expand into new areas. Competing predators would be limited to existing compacted areas, until more information about the effects of competitors using compacted trails can be gathered and analyzed. Alternative B would limit the potential effect on individual lynx.

Lynx habitat connectivity would be improved by providing management direction to retain cover adjacent to riparian areas and to coordinate with other landowners.

Alternative B also would add management direction for grazing, minerals, roads, and over-the-snow use which would minimize potential effects of these activities on individual lynx.

In summary, management direction to address threats to lynx populations, specifically direction for timber harvest and thinning, would be incorporated into existing plans, but multistoried foraging habitat still could be reduced.

Alternative C

Alternative C also would incorporate management direction to reduce or eliminate adverse effects on lynx and contribute to conserving the species.

Alternative C would result in improved winter snowshoe hare habitat by adding management direction to:

- ♦ Provide a distribution of forest age classes
- ♦ Restrict most vegetation management projects in forage habitat
- ♦ Promote actions that create forage where it is lacking in young regenerating forests

Less than one percent of winter snowshoe hare habitat in young regenerating and multistoried forests could be reduced during the next decade by the activities allowed by Standards VEG S5 and S6 – see Figures 3-5a and 3-5b.

Alternative C would expand the area to which Standard VEG S1 is applied, to a fixed combination of adjacent LAUs, to better reflect historic disturbance patterns. This may affect individual lynx because every forest age class may not be represented in a single LAU, but also may

result in a long-term beneficial effect on overall populations because it would better reflect historic disturbance patterns.

Changing Standard VEG S2 to a guideline would provide direction to consider the amount of timber harvest that could create unsuitable habitat, even though timber harvest rarely creates an overabundance of unsuitable habitat (Hillis et al. 2003).

Alternative C would incorporate direction for denning habitat that would protect denning habitat and den sites.

Alternative C would incorporate direction for snow compaction. Standard HU S1 also would be applied to multiple LAUs, and would allow grooming and designated routes to expand into places already compacted. Alternative C would not directly result in new places with human-compacted snow.

Alternative C would incorporate direction for habitat connectivity. Alternative C also adds management direction for grazing, minerals, and roads which would minimize potential effects of these activities on individual lynx. The analysis boundary for over-the-snow use would be expanded which could affect some individual lynx.

In summary, Alternative C would add management direction to address threats to lynx populations, specifically direction for timber harvest, fuel treatments, and precommercial thinning. Nearly all the winter snowshoe hare habitat would be protected.

However the analysis size for considering winter snowshoe hare habitat would be expanded, which could affect individual

lynx, but may be beneficial for the population as a whole.

Alternative D

Alternative D would incorporate management direction to reduce or eliminate many adverse effects on lynx and contribute to conserving the species.

Alternative D would add direction to distribute forest age classes, but under Standard VEG S1 expands the size of analysis area even more to allow considering historic disturbance patterns. This change could result in adverse effects on individual lynx, but is likely to provide long-term beneficial effects on lynx populations as a whole.

Alternative D could reduce the amount of quality winter snowshoe hare foraging habitat in young regenerating forests compared to Alternatives B and C because Standards VEG S5 and VEG S6 allow more activities in hare habitat.

During the next decade, Alternative D could reduce the amount of quality forage in young regenerating forests by 20 percent as a result of precommercial thinning and whitebark pine restoration – see Figure 3-5a.

Alternative D would constrain fuel treatments and most other vegetation activities in multistoried forests – see Table 3-22 and Figure 3-5b. This would benefit lynx by retaining this habitat component.

Alternative D provides direction to retain denning habitat and adds management direction for habitat connectivity.

Alternative D also adds management direction for grazing, minerals, and roads, which would minimize potential effects of these activities on individual lynx. The analysis boundary for over-the-snow use would be expanded which could affect some individual lynx.

In summary, Alternative D would add management direction to address threats to lynx populations, specifically direction for timber harvest, fuel treatment, and to some degree precommercial thinning. However some adverse effects would be allowed to occur which would adversely affect lynx.

The analysis size for considering winter snowshoe hare habitat would be expanded which could affect individual lynx, but may be beneficial for the population as a whole. The quality and quantity of winter snowshoe hare habitat could be reduced primarily in young regenerating forests.

Alternative E

Alternative E would incorporate management direction to reduce or eliminate many adverse effects on lynx and contribute to conserving the species.

Alternative E would add direction to distribute forest age classes, but under Standard VEG S1 expands the size of analysis area to allow considering historic disturbance patterns. This change could result in adverse effects on individual lynx, but is likely to provide long-term beneficial effects on lynx population.

Alternative E could reduce high-density winter snowshoe hare habitat in young regenerating forests by four to five percent

as a result of whitebark pine restoration – see Figure 3-5a.

Additional forage may be reduced in multistoried forests as the direction for maintaining multistoried winter snowshoe hare habitat is a guideline versus a standard. It is likely most fuel treatment projects, if they occur in this component, would change the structure and composition. About 5 percent of multistoried forests could be affected.

Alternative E provides direction to retain denning habitat – but changes Standard VEG S4 to a guideline VEG G7. There may be instances where denning habitat is not provided. Recent research shows lynx use a variety of conditions for dens sites and these habitat elements are generally found across broad landscapes. Therefore the change in management direction – as compared to Alternative B – would not likely affect lynx.

Alternative E would permit short-term adverse effects on lynx, but only if there are long-term beneficial effects.

Alternative E also adds management direction for grazing, minerals, and roads, which would reduce potential effects of these activities on individual lynx. The management direction is changed from standards to guidelines which could affect individual lynx if the guidelines are not followed; however this change would not affect lynx populations since these risks have been determined to not threaten the overall population of lynx.

In summary, Alternative E would add management direction to address threats to lynx populations but would allow some

adverse effects to occur. The analysis size for considering the amount of winter snowshoe hare habitat would be expanded, which could negatively affect individual lynx but may be beneficial for the population as a whole. The quality and quantity of winter snowshoe hare habitat in multistoried forests could be reduced by five percent due to allowing fuel treatments and whitebark pine restoration activities to occur.

Alternative F Scenario 1

Alternative F would incorporate management direction to reduce or eliminate many adverse effects on lynx and contribute to conserving the species.

Alternative F, Scenario 1, would apply the management direction to all lynx habitat in LAUs on all units in the planning area.

Alternative F would incorporate direction for those forested vegetative structural conditions important to lynx (both young regenerating forests and multistoried forests) at the scale of an LAU. This would ensure blocks of quality habitat are maintained within each LAU. In addition, Alternative F includes Standard VEG S2 which would limit the rate of change in lynx habitat within an LAU. This would ensure sufficient habitat for lynx through time and preclude LAUs being rendered incapable of supporting lynx by an activity or several activities over a short period of time.

Alternative F Scenario 1 would allow some reduction in the amount of quality winter snowshoe hare foraging habitat in young regenerating forests because some precommercial thinning would be

allowed. During the next decade, Alternative F Scenario 1 could reduce the amount of high density winter snowshoe hare habitat up to two percent as a result of precommercial thinning and an additional five percent due to whitebark pine restoration – see Figure 3.5a.

Alternative F provides direction for retaining winter snowshoe hare habitat within multistoried forests, in the form of a standard, although some activities would be allowed.

In multistoried forests, Alternative F exempts fuel treatments within the WUI from the vegetation standards. However, Guideline VEG G10 encourages projects to consider the vegetation standards during design, so it is likely many projects would still follow the standards. If all projects do not meet the standards in multistoried forests, then it is projected that up to 2 percent of the forage would be reduced.

In case the situation changes or more funding becomes available, a limitation was incorporated into the vegetation standards. The limitation is as follows: fuel treatment projects within the WUI that do not meet standards may occur on no more than 6 percent (cumulatively) of lynx habitat on a national forest. This cap ensures 94 percent of lynx habitat would have management direction to address risks to lynx.

Alternative F provides direction to retain denning habitat – but combines all denning related standards and guidelines into one guideline. Recent research shows lynx use a variety of conditions for dens sites and these habitat elements are generally found across broad landscapes.

Therefore the change in management direction—as compared to Alternative B—would not likely affect lynx.

Alternative F adds management direction for habitat connectivity, grazing, minerals, and roads, which would minimize potential effects of these activities on individual lynx. The analysis boundary for over-the-snow use would be expanded from a single LAU to an LAU or a fixed combination of adjacent LAUs, which could affect some individual lynx.

In summary, Alternative F Scenario 1 would add management direction to address threats to lynx populations, specifically direction for timber harvest, fuel treatments, and thinning. Some adverse effects would be allowed to occur, but with limitations. The analysis size for considering winter snowshoe hare habitat would be applied at the LAU level ensuring blocks of quality lynx habitat are maintained within each LAU. The total amount of winter snowshoe hare habitat could be reduced by about four percent.

Alternative F Scenario 2

Alternative F, Scenario 2 would incorporate management direction to reduce or eliminate many adverse effects on lynx and contribute to conserving the species. **Alternative F, Scenario 2, would apply the management direction to all OCCUPIED lynx habitat (as defined in the Amendment to the Conservation Agreement (USDA FS, USDI FWS 2006a) in LAUs on all units in the planning area.**

Lynx habitat on the Beaverhead-Deerlodge, Bitterroot, Nez Perce, Salmon-

Challis, Bighorn and Ashley NFs, and the isolated mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs are currently unoccupied; therefore the management direction would not apply to projects or activities in these areas. Management direction would be incorporated into these forest plans and would be “considered” in the design of projects or activities in these areas. If these administrative units and isolated mountain ranges become occupied in the future, then management direction would be applied.

The effects for areas which are occupied would be the same as described in Alternative F, Scenario 1. The remainder of this analysis summarizes the effects of Alternative F, Scenario 2, if management direction is not applied to the units described above.

The Beaverhead-Deerlodge, Bitterroot, Nez Perce, and Salmon-Challis NFs and the isolated mountain ranges on the Helena, Gallatin and Lewis and Clark NFs (except the Highwood and Snowy Mountains) have been identified as *secondary* habitat in the FWS Recovery Outline (USDI FWS, 2005a). Secondary areas are those with historical records of lynx but with no record of reproduction; or areas with historical records and no recent surveys to document the presence of lynx and /or reproduction. Only the Nez Perce NF falls into the second category. As of 2006 it had not been surveyed. Surveys are being conducted during the winter of 2006/07 to determine lynx occupancy. Based on the findings of

the survey the Nez Perce would either be identified as occupied or unoccupied.

According to the *Recovery Plan Outline* (USDI, FWS 2005a) habitat in secondary areas may be patchier, drier, and/or more maritime resulting in snow or habitat conditions that are not favorable to lynx. Another explanation may be that lynx populations were extirpated because of changes in vegetation structure that resulted in poor prey populations or some other disturbance, such as past trapping, and the area has not been recolonized by lynx.

The Ashley and Bighorn NFs, and the Pryor Mountains on the Custer NF and the Highwood and Snowy Mountains on the Lewis and Clark NF are considered

“peripheral” habitat (USDI FWS 2005a). These areas contain few verified historical or recent records of lynx. Quantity and quality of habitat to support adequate snowshoe hare or lynx populations are questionable. Habitat may occur in small patches and is not well-connected to larger patches of high quality habitat.

Management direction to distribute forest age classes (Standards VEG S1 and VEG S2) would not be applied on these units, until the areas become occupied by lynx.

In FS Region 1, less than 13 percent of the LAUs have more than 30 percent in young regenerating forests that do not yet provide winter snowshoe hare habitat. All were caused by wildfires in 1988 and 2000. About 13 percent had more than 15

Table 3-23. Winter snowshoe hare habitat in young regenerating forests that could be affected by precommercial thinning in “unoccupied” units or isolated mountain ranges over the next decade under Alternative F, Scenario 2

Unit	Acres of lynx habitat	Acres unoccupied	Acres of PCT in lynx habitat full funding	% lynx habitat affected over 10 yrs full funding
Beaverhead	2,060,000	All	21,280	1.0
Deerlodge				
Bitterroot	640,000	All	510	.08
Nez Perce	810,000	All	12,370	1.5
Salmon-Challis	1,800,000	All	22,000	1.2
Gallatin *	870,000	100,000	26,300	3.0
Helena *	440,000	110,000	3,830	.09
Custer *	230,000	30,000	1,010	.4
Lewis and Clark*	970,000	590,000	7,410	.08
Ashley	700,000	All	7,710	1.1
Bighorn	310,000	All	3,000	1.0

*Data is for only available for the whole forest, so activities in the isolated mountain ranges would be less than indicated in this table

Unoccupied habitat on the Ashley, Bighorn, Custer and 90,000 acres on the Lewis and Clark are considered peripheral habitat. All other areas are considered secondary (USDI FWS 2005a)

percent in young regenerating forests (Hillis et al. 2003); timber harvest caused very few to exceed 15 percent in young regenerating forests that do not yet provide winter snowshoe hare habitat.

In some areas, it is possible for individual lynx – if they were to occur - to be affected because of the distribution of foraging habitat. Where large patches of very young regenerating forests have resulted from fire and timber harvest, these patches likely would become foraging habitat over time. Other places may lack young regenerating forests because they lack disturbance.

Management direction to retain quality winter snowshoe hare habitat (Standards VEG S5 and VEG S6) would not be applied on these units, until the areas become occupied by lynx.

Alternative F, Scenario 2 would allow reduction in the amount winter snowshoe hare habitat in young regenerating forests because units that are unoccupied would not be constrained by the management direction.

Table 3-23 (on the previous page) displays how much precommercial thinning is anticipated over the next decade in the six unoccupied forests. Information specific

Table 3-24. Lynx habitat that could be affected by fuel treatment projects in affected “unoccupied” units or isolated mountain ranges over the next decade under Alternative F, Scenario 2

Unit	Acres of lynx habitat	Acres unoccupied	Acres of fuel treatment next 10 yrs in lynx habitat*	% lynx habitat affected over 10 yrs
Beaverhead Deerlodge	2,060,000	All	49,920	2.4
Bitterroot	640,000	All	21,080	3.3
Nez Perce	810,000	All	32,560	4.0
Salmon-Challis	1,800,000	All	49,500	2.8
Gallatin *	870,000	100,000	19,050	2.2
Helena *	440,000	110,000	31,150	7.1
Custer *	230,000	30,000	21,780	9.5
Lewis and Clark*	970,000	590,000	34,840	3.6
Ashley	700,000	All	132,850	19.0
Bighorn	310,000	All	32,400	10.5

Acres from Appendix M-1 and are based on the assumption that fuel treatments would occur in lynx habitat in proportion to the amount of habitat on the unit (e.g. 110,000 acres of fuel treatment are projected to occur on the Salmon-Challis NF. Since lynx habitat makes up 45% of the forest, then 45% of the fuel treatment program is assumed to occur in lynx habitat)

*Data is for only available for the whole forest, so activities in the isolated mountain ranges would be less than indicated in this table

Unoccupied habitat on the Ashley, Bighorn, Custer and 90,000 acres on the Lewis and Clark are considered peripheral habitat. All other areas are considered secondary (USDI FWS 2005a)

to the activities in the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs is not available, but the data for the whole unit is provided. Less than 3 percent of lynx habitat on any unit would be affected over the next ten years if the units received full funding. However, on average, across all units only 34 percent of the desired funding has been received. It is likely that even without management direction some winter snowshoe hare habitat in young regenerating forests on these units would not be affected by precommercial thinning. The agency has never received full funding and it does not appear the funding scenario in the future for precommercial thinning is likely to change.

Alternative F, Scenario 2 would allow reduction in the amount of quality winter snowshoe hare habitat in multistoried forests because units that are unoccupied would not be constrained by the management direction. Fuel treatments projects may occur in multistoried forests that provide winter snowshoe hare habitat. Table 3-24 displays how many acres of fuel treatment projects are anticipated to occur in lynx habitat over the next decade in the six unoccupied forests. Information specific to the activities in the disjunct mountain ranges on the Custer, Gallatin, Helena, and Lewis and Clark is not available, however, the data for the whole unit is provided.

Except for the Ashley, Bighorn, Custer and Helena NFs less than 5 percent of lynx habitat is likely to be affected by fuel treatments over the next ten years. About

10 percent of lynx habitat could be affected on the Bighorn, 20 percent on the Ashley, 10 percent on the Custer and 7 percent on the entire Helena NF. The amount potentially affected is over estimated for the Custer Gallatin, Helena and Lewis and Clark NFs since portions of these units are occupied and the management direction would be applied in those areas.

Over half of the fuel treatments on the Bighorn and Ashley would be in the form of prescribed fire. Some of the prescribed burning would not occur in winter snowshoe hare habitat because no pretreatment - reduction of ladder fuels - is proposed. Generally multistoried forests would be difficult to burn without pretreatment because of the ladder fuels associated with these types of forests. Those areas that do occur in winter snowshoe hare habitat would not support winter snowshoe hare habitat after treatment.

Management direction for denning habitat would not have to be applied to projects on the Beaverhead-Deerlodge, Bitterroot, Nez Perce, Salmon-Challis, Bighorn and Ashley NFs, and the isolated mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs. As noted in the discussion of denning habitat, recent research shows lynx use a variety of conditions for den sites and these habitat elements are generally found across broad landscapes; therefore denning habitat is a not limiting factor for lynx. In addition, most of these units include management direction in their existing plans to provide for down woody debris.

Grazing management direction would not be applied to the unoccupied units. However, all units, except the isolated mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs have similar direction as proposed because of INFISH and PACFISH; therefore there would likely be minimal effect from grazing practices.

Management direction for winter over-the-snow recreation would not be added. Over-the-snow recreation could increase on these units. However, grooming winter trails is likely to remain at current levels for at least the next five years because the amount of money available for grooming is not likely to increase substantially.

On these units outfitters could change their services toward winter use; they could groom more trails and increase the number of winter trips. However, because of how permits are processed it is unlikely there would be a substantial increase in winter outfitter use.

Management direction would not have to be applied to six downhill ski areas located on the Beaverhead-Deerlodge, Helena, Lewis and Clark, Salmon-Challis/Bitterroot and Bighorn National Forests. One ski area on the Beaverhead-Deerlodge, one on the Lewis and Clark and one on the Salmon-Challis/Bitterroot have expansions proposed. These ski areas are generally isolated; therefore there would be minimal effect on lynx.

Management direction for highways would not have to be applied. Methods to provide safe wildlife crossings are being researched by all state highway

organizations and are being incorporated into highway improvements; therefore lack of this management direction is likely to have minimal effect.

Management direction for forest roads would not have to be applied. On the Nez Perce NF only seven miles are planned to be paved over the next five years. On the Salmon-Challis NF twelve miles are planned for upgrades over the next five years. On the Beaverhead-Deerlodge NF five miles are planned to be paved, 2.4 miles of new roads are planned for construction and may remain open, and 1.5 miles are planned for upgrades over the next five years. On the Bitterroot NF no changes are anticipated. On the Ashley NF about two miles are planned to be paved and an additional two miles are planned for upgrades over the next 5 years.

On the Custer 6.6 miles are planned to be paved and 14 miles planned to be upgraded; on the Helena NF about five miles are planned to be paved and twenty miles are planned for upgrades; and on the Gallatin 8 miles are planned to be paved and five miles are planned to be upgraded; however it is unknown if these actions are in the isolated mountain ranges that are unoccupied by lynx. No roads are planned to paved or upgraded on the Lewis and Clark NF

Management direction would not have to be followed in the design of these actions. A FS Road Analysis would still be done prior to any work on NF roads.

Management direction would not have to be followed for actions related to mineral and energy development. The primary

effects from mineral and energy development is from access roads that are plowed during winter. These effects are likely to be localized. The only foreseeable activity related to mineral and energy development is related to oil and gas leasing. Nine wells are projected to occur in the future in lynx habitat; three on the Ashley; four on the Beaverhead-Deerlodge and two on the Custer NFs (see Appendix K, Table K-11). Generally, the FS designates the roads to be used for these activities; therefore the effects to lynx would be minimal.

Summary for Alternative F, Scenario 2

The FWS *Recovery Outline* says focusing lynx conservation efforts on core areas would ensure the continued persistence of lynx. It goes on to say recovery of lynx would be achieved when conditions have been attained that would allow lynx populations to persist in the long-term and within each of the identified core areas (USDI FWS 2005a).

The management direction under Alternative F, Scenario 2 would apply to all core areas because all core areas are occupied. The management direction also would apply to all areas identified as secondary habitat that are currently occupied by lynx. Core and secondary units occupied at this time include the Flathead, Kootenai, Lolo, Idaho Panhandle, Targhee, Bridger-Teton, Shoshone, and Clearwater NFs, and portions of the Custer, Gallatin, Helena and Lewis and Clark NFs (see Table 1-1, on p. 5 and Figure 1-1).

Applying the management direction to occupied core and secondary habitat

would: (1) retain adequate habitat of sufficient quality to support the long-term persistence of lynx populations; (2) ensure sufficient habitat is available to accommodate the long-term persistence of immigration and emigration between core areas and adjacent populations in Canada or secondary areas in the United States; (3) ensure habitat in secondary areas remains available for continued occupancy by lynx; and (4) ensure threats have been addressed so lynx populations would persist.

The Beaverhead-Deerlodge, Bitterroot, Nez Perce and Salmon Challis NFs are secondary habitat and unoccupied. Habitat in these areas may be modified in a way where the structure and composition of vegetation would be less capable of supporting lynx. However, given the ten year program of work for the major activities that affect lynx habitat, adverse habitat modification is unlikely to occur over a large area (see Tables 3-23 and 3-24). Management direction may still be considered in the design of projects in these areas. If, in the future, lynx are found to occupy these units, then the management direction would be applied.

About 1 million acres of lynx habitat is unoccupied and is considered peripheral habitat. This includes the Ashley and Bighorn NFs and the Pryor Mountains on the Custer NF and the Highwood and Snowy Mountains on the Lewis and Clark NF. Habitat in these areas may be modified in a way where the structure and composition would be less capable of supporting lynx. More habitat may be modified in these peripheral areas, but

even then, not all lynx habitat would be affected (see Tables 3-23 and 3-24). These areas have not been identified as needed for lynx conservation and recovery (USDI FWS, 2005a).

Cumulative effects

Alternative A

Management actions allowed by existing plans in the developmental land allocations on federal lands have the potential to adversely affect lynx (Hickenbottom et al. 1999). The activities identified as risk factors for lynx were incorporated into the analysis in the preceding section.

Management practices on state, corporate, and small private lands may also present a risk to lynx persistence in the long term. Preliminary research conducted on privately-owned corporate timber lands in northwestern Montana show that such lands provide varying levels of snowshoe hare densities (abundant to low), depending on the timber harvest regime (Appendix P).

Several private timber companies have developed lynx management plans. These companies are Boise Cascade Corporation (central Idaho and eastern Washington), Plum Creek Timber Company, Ltd. (Idaho and Montana) and Stimson Timber Company (northern Idaho and eastern Washington). These plans are generally developed to respond to the legal requirement that on private lands a landowner is required to not take actions that would result in the “taking” of lynx as defined under the Endangered Species

Act (ESA 1973 as amended). These private lands are not required to manage habitat for the conservation of lynx. A small portion of the Idaho Panhandle National Forest occurs within Washington State and the Washington Department of Fish and Wildlife has developed a *Lynx Recovery Plan* for that state (Stimson 2001). The Montana Department of Natural Resources (DNRC) has also developed a Habitat Conservation plan (HCP) as a Canada Lynx Conservation Strategy (DNRC 2005). Therefore, these plans provide for some lynx habitat needs on private lands.

The presence of major highways through the area, several large reservoirs, and residential and urban development pose movement obstacles.

Management direction incorporated through the PACFISH and INFISH amendments, the off-highway vehicle (OHV) amendment, Healthy Forest Rangeland Initiative, and Roadless Policy provides improved habitat conditions for lynx – see Appendix L. The two large national parks, Glacier and Yellowstone, provide large secure blocks of habitat.

Cumulatively, the past, present, and reasonably foreseeable programmatic actions described in Appendix L would generally improve habitat conditions for lynx. However, since existing plans would still lack management direction to reduce threats to lynx, adverse effects would continue.

Alternatives B, C, D, E & F

The action alternatives would incorporate management direction – to varying degrees – that would reduce or eliminate adverse effects from management actions in the planning area. The alternatives incorporate management direction to address programmatic direction for certain activities. For example, national policy and Congressional intent has established that reducing fuels within the WUI, as well as other areas, is an important focus on NFS lands. Because of this focus, the effects from these programs (National Fire Plan, Healthy Forests Initiative, and Healthy Forests Restoration Act) on lynx have been evaluated, including their potential cumulative effects.

Management direction would result in improved lynx habitat and connectivity. Cumulatively, this direction would have some beneficial effects on lynx. Activities on corporate and small private lands could still adversely affect lynx; however, the management direction requires consideration of activities on private land

when evaluating the effects of projects on federal land.

Northern Rockies Geographic Area

Several NFs and BLM units in the geographic area are not included in this proposal. Some have revised their plans, or are currently revising and have or would incorporate management direction for lynx. Others will be revising or amending plans in the near future and are considering the LCAS during project analysis – see Appendix D. The new direction should result in improved lynx habitat conditions.

United States

A similar effort is going on in the Southern Rockies Geographic Area, and the Great Lakes Forests have already amended their plans. Units in other geographic areas will incorporate management direction into their plans in the next several years – if they have not done so already. As these plans are updated, they should result in cumulative beneficial effects on lynx.

Other wildlife & fish

TEP species

Lists of threatened, endangered, and proposed (TEP) species for NFS lands that overlap lynx habitat were compiled – see Appendix H. Table 3-25 identifies the TEP species that may be affected by the proposal.

Various literature sources were reviewed to evaluate the occurrence of species within lynx habitat and the potential effects of various alternatives on TEP species (Ehrlich et al. 1988, Johnsgard 1990, Martin et al. 1951, Nussbaum et al. 1983, Schmidt et al. 1978, Sibley 2000, Whitaker 1996). Species information was also reviewed on the *NatureServe* website. This database contains comprehensive species information including habitat relationships. *NatureServe* can be accessed via the following link:

<http://www.natureserve.org/explorer>

The habitats of woodland caribou, bonytailed chub, Colorado pikeminnow, humpback chub, Kendall Warm Springs dace, pallid sturgeon, razorback sucker, white sturgeon, and bald eagle overlap

lynx habitat. These species would not be affected by the management direction in any alternative because suitable habitat is not present and/or the management direction does not affect their habitat. Therefore, these species are not discussed further.

Alternative A, no action

The no-action alternative includes the direction in existing plans. Alternative A would add no new management direction to conserve lynx.

Indirect effects on TEP species

There would be no change in effects on fish and wildlife resources from those of existing plans. Management area objectives, standards, and guidelines would remain unchanged.

Alternatives B, C, D, E & F Scenario I

Alternative B, the Proposed Action, would add management direction for lynx about:

- ♦ Vegetation management
- ♦ Winter snowshoe hare habitat

Table 3-25. TEP species that could be affected by the proposed management direction

<u>Mammals</u>	<u>Fish</u>
Threatened	
Canada lynx ‡	Bull trout ‡
Grey wolf ‡	Chinook salmon
Grizzly bear ‡	Steelhead trout
Endangered	
Grey wolf ‡	Sockeye salmon

‡ Management indicator species (MIS) on some units

- ♦ Lynx denning habitat
- ♦ Livestock grazing
- ♦ Winter recreation
- ♦ Minerals and energy exploration and development
- ♦ Roads and highways

Alternatives C, D, E, and F Scenario 1 add similar management direction with some variations. Alternative F, Scenario 1 applies the management direction to all lynx habitat in LAUs. The effects of the alternatives on TEP species listed in Table 3-25 are discussed below. Beneficial and/or detrimental effects are likely to be immeasurable due to the low amount of acreage potentially affected in lynx habitat.

Grey wolf & grizzly bear

Efforts to recover *grey wolf* populations include different approaches in different places. The wolves that naturally recolonized in northwest Montana and in Idaho north of Interstate 90 are a fully protected endangered species, but the reintroduced wolves in the Greater Yellowstone area and central Idaho are designated as nonessential experimental populations.

Grizzly bears are a threatened species in four ecosystems – the Selkirk in northern Idaho, the Cabinet-Yaak in northwestern Montana and northern Idaho, the Northern Continental Divide in western Montana, and the Yellowstone in southwestern Montana and portions of Wyoming and Idaho.

All alternatives, to different degrees, may beneficially affect both grizzly bears and grey wolves by maintaining riparian habitat, reducing the disturbance

associated with minerals and human uses, reducing habitat fragmentation, and providing for animal movement.

Grey wolves may benefit from the guidance to retain foraging habitat for snowshoe hare.

Standards VEG S5 and VEG S6 could reduce the forage available for bears and big game, the wolves' primary prey, by limiting the growth of grasses, forbs, and shrubs. Alternatives D, E, and F would allow some vegetation management to occur in winter snowshoe hare habitat, so would not reduce the forage as much as Alternatives B or C.

Alternative F Scenario 2

Alternative F Scenario 2 would have similar effects as described above except the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn National Forests, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx. On these units there would be no change in effects on fish and wildlife resources from those of existing plans while they remain unoccupied. If the areas become occupied at a future time, then the effects on these units would be the same as Alternative F, Scenario 1, described above and below.

TEP fish

Four threatened or endangered fish occur in the planning area that could be affected (Table 3-25). Guidelines HU G6 and G7 could increase the sediment delivered to streams if they limit paving and result in roads on side-slopes. However,

Other wildlife & fish

guidelines can be deviated from if reasons exist. During the next five years, paving is planned for only two miles of road, and road construction on ridge-tops is planned for only seven miles. Therefore, the effect of these guidelines is negligible.

The alternatives propose management direction for livestock grazing similar to the PACFISH and INFISH direction

amended into the existing plans of most units west of the Continental Divide. For units east of the Continental Divide whose plans do not contain similar direction, adding this grazing direction may beneficially affect fish by managing riparian-area grazing to achieve conditions similar to historic.

Sensitive species

For the FS, a *sensitive species* is one designated by the Regional Forester because of concern about the viability of its population as evidenced by significant current or predicted downward trends:

- ♦ In population numbers or density
- ♦ In habitat capability that may reduce an existing species' distribution

Since Regional Forester's Sensitive Species are not covered under ESA, management direction is provided by FS policy in Forest Service Manual 2670.

Lists of sensitive species for the three FS regions were compiled where they overlap lynx habitat – see Appendix H. Table 3-26 lists the sensitive species that may be affected by the proposal; the effects are discussed below. Other sensitive species are not affected by the proposal because their habitat would not be affected, so they are not discussed further – see Table 3-27.

Table 3-26. Sensitive species that could be affected by the proposed management direction

Mammals	Birds	Fish	Amphibians
Species detrimentally affected			
	Hammonds flycatcher		
Species beneficially affected			
Wolverine ‡	Blackbacked woodpecker ‡		Boreal toad
	Three-toed woodpecker ‡		Northern leopard frog
	White-headed woodpecker		
Species beneficially and detrimentally affected			
Fisher ‡	Boreal owl ‡	Arctic grayling ‡	
Marten ‡	Great gray owl ‡	Bonneville cutthroat trout ‡	
	Northern goshawk ‡	Burbot	
	Olive sided flycatcher	Colorado River cutthroat trout ‡	
		Interior redband trout	
		Mountain sucker	
		Pacific lamprey	
		Snake River spring/summer chinook ‡	
		Snake River cutthroat trout	
		Westslope cutthroat trout ‡	
		Yellowstone cutthroat trout ‡	

‡ MIS species on some units

Table 3-27. Sensitive species not affected, but with habitat in the planning area

Mammals	Birds	Amphibians & reptiles	Invertebrates
Fringed myotis	Baird's sparrow	Coeur d'Alene salamander	Hudsonian emerald
Great basin pocket mouse	Black swift	Great Plains toad	
Long eared myotis	Black tern	Greater short-horned lizard	
Long legged myotis	Blue-gray gnatcatcher	Milk snake	
Northern bog lemming	Brewer's sparrow ‡	Plains spadefoot toad	
Pallid bat	Burrowing owl	Ringneck snake	
Pygmy rabbit	Common loon ‡	Spotted frog ‡	
River otter	Ferruginous hawk ‡	Western hognose snake	
Spotted bat	Flammulated owl ‡	Wood frog	
Townsend's big eared bat ‡	Grasshopper sparrow		
Water vole	Harlequin duck ‡		
	Lewis' woodpecker		
	Loggerhead shrike		Fish
	Long-billed curlew		Northern red belly dace
	Mountain plover		Sturgeon chub
	Mountain quail		
	Northern harrier		
	Peregrine falcon ‡		
	Pygmy nuthatch		
	Sage grouse ‡		
	Sage sparrow		
	Short eared owl		
	Trumpeter swan ‡		
	Yellow-billed cuckoo		

‡ MIS species on some units

Alternative A, no action

Alternative A, the no-action alternative, would add nothing to existing plans.

Indirect effects on sensitive species

Alternative A would not change the effects on fish and wildlife from those of the existing plans.

Alternatives B, C, D, E & F Scenario 1

Alternatives B, C, D, E, and F add similar management direction; however, there are some variations among the alternatives. Alternative F Scenario 1 would apply the management direction to all lynx habitat in LAUs. The effects of the alternatives on sensitive species listed in Table 3-26 are discussed. Beneficial and/or detrimental effects are likely to be immeasurable due

to the low amount of acreage potentially affected in lynx habitat.

Sensitive mammals

Fisher, martin & wolverine

Wolverines may benefit from Standard HU S1 (in Alternatives B and C) or Guideline HU G11 (in Alternatives D, E, and F) that limits over-the-snow use in new areas and from Standard HU S3 and Guidelines HU G3 and HU G9 that result in reducing disturbance. *Wolverines* may also benefit from Standard VEG S4 (in Alternatives B and C) or Guideline VEG G7 (in Alternative D and E) or Guideline VEG G11 (in Alternative F) that retains dead and down material.

Standards VEG S5 and VEG S6 under Alternatives B, C, D, and F and Guideline VEG G8 under Alternative E, would maintain dense stands for the prey species *martens*, *fishers*, and wolverines rely on. Deferring vegetation management activities in winter snowshoe hare habitat would reduce the amount of human disturbance in some areas, which may also benefit wolverines.

However, deferring activities until winter snowshoe hare habitat is no longer provided could delay the development of mature stands, affecting when mature stands would be available. Even so, fire, and insects and disease would continue to suppress or kill some trees, releasing the growth of others to mature into large trees – see the *Forests* section later in Chapter 3.

Alternatives B and C would have similar effects. Alternative D would allow vegetation management under certain conditions that could result in more stands growing into mature, large trees.

Under Alternative E, fuel treatments would be allowed under Standard VEG S5, and Standard VEG S6 is dropped and replaced by Guideline VEG G8. Prey species that rely on dense stands may not be as abundant if fuel treatments reduce habitat density. It is likely that not all winter snowshoe hare habitat would be treated. Based on the projected annual fuels program, about five percent of winter snowshoe hare habitat may be reduced under Alternative E.

Under Alternative F Scenario 1, fuel treatments within the WUI would be allowed under Standard VEG S5 and VEG S6 – but would be limited to modifying six

percent of lynx habitat. Prey species that rely on dense stands may not be as abundant in these areas.

Alternative F Scenario 2

Alternative F Scenario 2 would have similar effects as described above except the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn National Forests, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx. On these units there would be no change in effects on sensitive mammals, birds, amphibians or fish from those of existing plans while they remain unoccupied. If the areas become occupied at a future time, then the effects on these units would be the same as Alternative F, Scenario 1, described in the previous and following sections.

Sensitive birds

Sensitive bird species would be affected mostly by vegetation management direction about retaining dead and down trees and the activities allowed in winter snowshoe hare habitat.

Black-backed woodpeckers, *three-toed woodpeckers*, and *white-headed woodpeckers* all feed on the insects and nest in the cavities found in dead and dying trees. Standard VEG S4 under Alternatives B and C, Guideline VEG G7 under Alternatives D and E, and Guideline VEG G11 under Alternative F would result in retaining more dead and down timber than the existing plans. Any increase in disease or tree mortality would be good for woodpeckers and sapsuckers.

Therefore, the action alternatives may benefit them.

Standards VEG S4 and VEG S5 could either retain or decrease habitat for *boreal owls*, *great grey owls*, *northern goshawks*, *olive-sided flycatchers* and *pygmy nuthatch*. These birds use dead and down trees as nesting sites, and the trees provide habitat for the small mammals on which they prey.

Standard VEG S4 or Guidelines VEG G7 or VEG G11 would retain more dead and down habitat than existing plans. Standard VEG S4 could decrease the amount of older forested habitat due to increased mortality from insects and disease. However, it is likely the decrease would be minimal since the standard applies only to areas smaller than five acres that have been disturbed by fire or insect and disease.

Standard VEG S5 would retain the dense regenerating stands that provide habitat for prey species and could delay the

development of mature forests. This may affect birds that use these stand conditions.

Sensitive amphibians

Boreal toad and *northern leopard frog* may be affected by road Guidelines HU G6 and HU G7. These guidelines could limit paving and would recommend building roads on side slopes, which may result in increased sediment delivered to streams. However, little paving or road construction is planned in the planning area, so the effect likely would be negligible.

Grazing standards may beneficially affect amphibians by managing livestock grazing in riparian areas.

Sensitive fish

Eleven sensitive fish species occur in the planning area that could be affected by the proposed management direction (Table 3-26). The effects on sensitive fish are the same as those described for TEP fish.

MIS species

Table 3-28. MIS species that could be affected by the proposed management direction

Mammals	Birds	Fish	Invertebrates
Species beneficially affected			
Beaver	Blue grouse		
Moose	Downy woodpecker		
	Hairy woodpecker		
	Mountain bluebird		
	Northern flicker		
	Red breasted nuthatch		
	Ruby-crowned kinglet		
	Willow flycatcher		
	Yellow bellied sapsucker		
	Yellow warbler		
Species affected both beneficially and detrimentally			
Black bear	Pileated woodpecker	Brook trout	Macro invertebrates
Bobcat		Cutthroat trout	
Elk		Rainbow trout	
Mule deer		Trout	
Red squirrel			
White-tailed deer			

Management indicator species (MIS) are managed under the authority of NFMA. MIS are listed in existing plans; Appendix I identifies MIS that overlap lynx habitat.

Several MIS species are also TEP or sensitive species, as noted with a “‡” in Tables 3-25, 3-26, and 3-27. Those species have been discussed previously and will not be discussed further.

Table 3-28 lists the MIS species that may be affected by the proposal; the effects are discussed below. Other species are not affected by the proposal because their habitat would not be affected, so they are not discussed further – see Table 3-29.

Table 3-29. MIS (not TEP or sensitive) not affected, but with habitat in planning area

Mammals	Birds	Fish
California bighorn sheep	Belted kingfisher	Ruffed grouse
Bighorn sheep	Golden eagle	Large mouth bass
Montane vole	Lark sparrow	Rufus-sided towhee
Mountain goat	Lincoln’s sparrow	Vesper sparrow
Mountain lion	Northern oriole	Warbling vireo
Northern bog lemming	Ovenbird	White-crowned sparrow
Water shrew	Prairie falcon	White-tailed ptarmigan
Western jumping mouse		

Alternative A, no action

Alternative A, the no-action alternative, would add no new management direction for lynx to existing plans.

Indirect effects on MIS species

Alternative A would not change the effects on fish and wildlife from those described in the existing plans.

Alternatives B, C, D, E & F Scenario 1

Alternatives B, C, D, E, and F Scenario 1 add similar management direction; however, there are some variations among the alternatives. These alternatives would apply the management direction to all lynx habitat in LAUs. The effects of the alternatives on MIS species listed in Table 3-28 are discussed. Beneficial and/or detrimental effects are likely to be immeasurable due to the low amount of acreage potentially affected in lynx habitat.

MIS mammals

Black bear

Some standards may beneficially affect *black bears* by retaining winter snowshoe hare habitat, which may provide for prey, retain denning habitat, maintain riparian habitat, reduce the disturbance associated with minerals, reduce habitat fragmentation, and help provide for animal movement.

Standards VEG S5 and VEG S6 under Alternatives B, C, D, and F and Guideline VEG G8 under Alternative E, could reduce the forage available to bears by limiting the growth of grasses, forbs, and shrubs. Alternatives D, E, and F would allow some vegetation management to occur in winter snowshoe hare habitat;

therefore, they would not reduce bear forage as much as Alternatives B or C.

Elk, mule deer, white-tailed deer & moose
Some standards may beneficially affect big game by retaining winter snowshoe hare habitat, which may provide hiding cover, maintain riparian habitat, reduce the disturbance associated with minerals, reduce habitat fragmentation, and help provide for animal movement.

Standards VEG S5 and VEG S6 under Alternatives B, C, D, and F and Guideline VEG G8 under Alternative E, could reduce the forage available for *elk, mule deer, and white-tailed deer* by limiting the growth of grasses, forbs, and shrubs; however, these standards maintain hiding cover. Alternatives D, E, and F would allow some vegetation management to occur in winter snowshoe hare habitat, and therefore would not reduce forage as much as Alternatives B or C.

Bobcat

All alternatives may beneficially affect *bobcats* by retaining winter snowshoe hare habitat, maintaining riparian habitat, reducing habitat fragmentation, and providing for animal movement. However, bobcat may be detrimentally affected if their prey species are reduced.

Beaver

All alternatives may beneficially affect *beaver* by maintaining riparian habitat.

Red squirrel

Red squirrels are an alternate prey for lynx. All alternatives may beneficially affect red squirrels. Standard VEG S3 and VEG S6 could result in retaining mature forests, red squirrel habitat.

Standard VEG S4 in Alternatives B and C, Guideline VEG G7 in Alternatives D and E, and Guideline VEG G11 would add management direction to retain dead and down trees where lacking.

Standard VEG S5 could delay the development of mature trees or result in more insect and disease outbreaks, which could reduce squirrel habitat if no other disturbance occurred.

Guideline VEG G5 says habitat for red squirrels should be provided in each LAU. Although guidelines are not mandatory, if this requirement were added to existing plans, it should benefit squirrels.

MIS birds

Blue grouse, yellow warbler, and willow flycatcher habitat is associated with riparian areas and willows. Grazing Standards GRAZ S1, GRAZ S2, and GRAZ S3 in Alternatives B and C and Grazing Guidelines GRAZ G1, GRAZ G2, and GRAZ G3 in Alternatives D, E, and F would retain willow, aspen, and riparian habitat, providing additional protection for these birds.

Mountain bluebirds, hairy woodpeckers, downy woodpeckers, northern flickers, red-breasted nuthatches, ruby crowned kinglets, and yellow-bellied sapsuckers all feed on the insects and nest in the cavities found in dead and dying trees. Standard VEG S3, in Alternatives B and C could result in retaining habitat beneficial to these species. Standard VEG S4 in Alternatives B and C, Guideline VEG G7 in Alternatives D and E, and Guideline VEG G11 in Alternative F would add management direction to retain small patches of dead and down trees.

Pileated woodpecker is another species that may benefit from this direction. Pileated woodpeckers also use older forests. Standard VEG S4 in Alternatives B and C could result in a reduction of older forests if increased mortality from insects and disease occurred, but it is unlikely there would be large losses because the direction applies only to patches of dead trees smaller than five acres. Standard VEG S6 in Alternatives B, C, D, and F and Guideline VEG G8 in Alternative E retain multistory forests which would benefit pileated woodpeckers.

MIS fish & macro invertebrates

Fifteen MIS fish species occur in the planning area; one NF has identified macro invertebrates as an MIS group. The effects for MIS fish and macro invertebrates are the same as those described for TEP and sensitive fish.

Alternative F Scenario 2

Alternative F, Scenario 2, would have similar effects as described above except the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn National Forests, and the disjunct mountain ranges on the on Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx. On these units there would be no change in effects on fish and wildlife resources from those of existing plans while they remain unoccupied. If the areas become occupied at a future time, then the effects on these units would be the same as Alternative F, Scenario 1, described in the previous sections.

Cumulative effects

Alternative A

Management direction incorporated through the INFISH and PACFISH amendments, the OHV amendment, additional forest travel planning, the Healthy Forest Rangeland Initiative, and the Roadless Policy provides improved habitat conditions for wildlife and fish by providing secure areas and protecting special habitats, even without the added protections that would be afforded by the lynx management direction

Cumulatively, the past, present, and reasonably foreseeable actions described in Appendix L, would generally improve habitat conditions.

Alternatives B, D, E & F

The action alternatives would incorporate management direction to improve habitat conditions for most species by maintaining riparian habitat, reducing the disturbance associated with minerals and human uses, reducing habitat fragmentation, and providing for animal movement.

As with Alternative A, cumulatively, the past, present, and reasonably foreseeable actions described in Appendix L, in addition to the lynx management direction, would improve habitat conditions.