Fire

Affected environment

Natural disturbances such as fire, wind, and insects and diseases, help shape forests. In the northern Rockies, periodic fire is the dominant disturbance process that changes forests.

While fire is widespread, it is seldom uniform. Every forest has its own characteristic pattern of fire intensity, frequency and size. *Fire regime* and *condition class* are used to characterize fire.

Fire regime

The fire regime describes the historic pattern of fire: how often (frequency); how hot (intensity); and how big (scale). Ecologists often describe three fire regimes for Western forests – *understory, mixed severity* and *stand replacing* (Agee 1993; Agee 2000; Arno and Bunnell 2002; Brown & Smith 2000; Fischer & Bradley 1987; Hessburg & Agee in press; Jones & Barrett in press; Keane et al. 2002; Smith & Fisher 1997).

- *Understory* – Understory fires burn frequently, from once a year, to about once every 35 years, as *low-intensity* surface fires that consume forest litter and kill small trees in small patches. Understory fires generally do not kill large, fire-resistant trees or substantially change the structure of *the forest.*
- *Mixed severity* – Mixed-severity fires burn about every 35 to 100 years, as a *mixture* of *understory* and *stand-replacing* fires, or as *intermediate-intensity* fires that kill fire-susceptible trees while the fire-tolerant trees survive. Mixed-severity fires produce a diverse forest in terms of both structure and species composition. The fires typically are medium sized.
- *Stand replacing* – Stand-replacing fires are infrequent, burning about every 100 to 200 years. Stand-replacing fires are large and *high-intensity,* killing most trees. They make way for a new forest.

Historically, fires at lower elevations tended to be understory and fires at higher elevations stand-replacing, although substantial variability has always existed.

Condition class

Condition class describes the departure from historic conditions based on the number of missed fire cycles and the amount of change in forest structure and species composition (Schmidt et al. 2002).

- *Condition Class 1* – Fires have burned as often as they did historically; the risk of losing key ecosystem components is low. Vegetation composition and structure is intact and functioning.
- *Condition Class 2* – Fires have not burned as often as they did

historically, missing one or more cycles. The risk of losing ecosystem components is moderate, with moderate changes in fire size, intensity, landscape patterns or vegetation.

- *Condition Class 3* – Fires have significantly departed from their historic frequency by missing multiple cycles. The risk of losing ecosystem components is high, with dramatic changes to fire size, intensity, landscape patterns, or vegetation.

Lynx habitat occurs in three kinds of forests in the planning area:

- *Mixed conifer*, which includes Douglas fir, western larch, grand fir, and western red cedar
- *Spruce/fir*, which includes Engelmann spruce, subalpine fir, alpine larch, hemlock, and whitebark pine
- *Lodgepole pine*

Table 3-30 describes the fire regimes and condition classes of the three kinds of forests that constitute lynx habitat in Montana.

In mid-elevation *mixed conifer forests,* fires range from understory to stand replacing. Fire suppression has limited how often fires burn. Some places have missed one or more fire cycles and fall into Condition Classes 2 or 3. Others are closer to historic conditions, in Condition Class 1.

Today, mixed conifer forests are generally denser and contain fewer fire tolerant species like western larch and ponderosa pine than when low- to intermediate-intensity fires kept parts of the forest thinned out (Quigley et al. 1996). Forest conditions today contribute to greater numbers of large high intensity fires.

In high-elevation *spruce/fir* and *lodgepole pine forests,* infrequent, severe fires are the norm. Because fires burn only about every 100 to 200 years in these cold, moist, high-elevation forests, fire suppression has had less of an effect than in other fire regimes. These naturally dense forests are close to historic conditions, generally in Condition Class 1.

Excluding fire has also reduced the role played by low- and intermediate-intensity fires. At higher elevations, such fires kill competing fir and spruce trees so whitebark pine can grow and some lodgepole pine can develop old growth characteristics.

Fire suppression has changed the natural age distribution of forests at the landscape level. Stand-replacing fires used to create

Table 3-30. Lynx habitat by forest type, fire regime & condition class in Montana

Forest type	Fire regime	Condition class	Estimated % lynx habitat
Mixed conifer	Mostly mixed severity	1, 2 or 3	26%
Spruce/fir	Mostly stand replacing with some mixed severity	1	40%
Lodgepole pine	Mostly stand replacing with some mixed severity	1	34%

a mosaic of even-aged forests across the landscape. Today there are proportionately fewer young even-aged forests and more, older forests (Hessburg et al. 1999; Hillis et al. 2003; Losensky 2002). Excluding fire has resulted in a more homogenous landscape with an increased potential for larger stand-replacing fires.

In dry, warm low-elevation forests, frequent low-intensity fires are the norm, maintaining stands of large, widely spaced trees. Fire suppression and fire exclusion has resulted in making many of these forests unnaturally dense, and the species composition has shifted away from ponderosa pine to Douglas fir.

These forests are where the greatest detrimental effects of excluding fire can be seen. These forests are in Condition Classes 2 and 3 (Arno & Bunnell 2002); these forests are not lynx habitat.

Policy

After 1910, when wildfires burned three million acres and killed 85 people in northern Idaho and western Montana, the Forest Service began to direct serious efforts toward suppressing wildfires. Severe fires occurred again in 1919, 1924, 1925, and 1934. In 1935, the agency adopted the "10 am policy," which said all fires were to be controlled by 10 am the day following their discovery. The policy was repealed in 1973 as the agency shifted from simply controlling fire to managing it and using it as a tool on federal lands.

Fire suppression for the last 80 years, along with grazing and logging, has changed the way fires burn and changed the age, species, and structure of some forests (Quigley et al. 1996). Further, as people have built more homes in the woods, the ability to allow fire has decreased even as the fire risk has increased.

The results of excluding fire became increasingly apparent during the last decade of the 20th century. The federal government re-examined wildland fire policies. In 1995, the *Federal Wildland Fire Management Policy* was written to recognize the essential and inevitable role of fire, and the need to return, not eliminate, fire from forests.

Other recent documents set goals for wildland fire policy:

- *Managing the Impact of Wildfires on Communities & the Environment - the National Fire Plan* (USDA FS & USDI 2000)
- *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment; 10-Year Comprehensive Strategy (USDA FS 2001a)*
- *The Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan (USDA FS 2002).*

  In May 2003 a Memorandum of Understanding (MOU) was signed among the five federal agencies responsible for managing Federal lands prone to wildfire. This MOU bound the signatories to developing an interagency Cohesive Fuels Treatment Strategy (USDA FS, USDI 2003).

  In February 2006 the Cohesive Fuels Treatment Strategy was signed (USDI

and USDA FS, 2006). This strategy aims to lessen risks from catastrophic wildfires by reducing hazardous fuels build-up with an emphasis on protecting communities.

In summary, these documents serve to provide a national prioritization system for the selection of hazardous fuel treatments on Federal lands with close coordination among the Federal, State, and other agencies as well as Tribes and communities. The criteria for prioritizing lands for hazardous fuels treatment generally correspond to: (1) closest proximity to communities at risk in the WUI; (2) strategic areas outside the WUI that prevent wildland fire spread into communities or critical infrastructure; (3) areas outside of WUI that are in Condition Classes 2 or 3; and (4) other considerations.

In addition to agency emphasis on reducing hazardous fuels, in 2003 Congress passes the Healthy Forests Restoration Act (HFRA) (H.R.1904). The purpose of the act is to improve the capacity of the Forest Service and BLM to conduct hazardous fuels reduction projects aimed at protecting communities, watersheds and certain other at-risk lands from catastrophic wildfires. The act further defined WUI.

WUI

In *the Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan* WUI is defined as "the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel". The Compressive Strategy says to focus hazardous fuel reduction treatments in the WUI and in Condition Classes 2 or 3 in fire regimes 1, 2, or 3 outside the WUI, and which are identified as high priority through collaboration consistent with the Implementation Plan.

The HFRA, §101 further defined WUI as:

A. an area within or adjacent to an at-risk community that is identified in recommendations to the Secretary in a community wildfire protection plan.

B. in the case of any area for which a community wildfire protection plan is not in effect –
   i. an area extending ½ mile from the boundary of an at-risk community;
   ii. an area within 1 ½ miles of the boundary of an at-risk community, including any land that –
      i. has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community;
      ii. has a geographic feature that aids in creating an effective fire break, such as a road or ridge top; or
      iii. is in condition class 3, as documented by the Secretary in the project-specific environmental analysis; and
   iv. an area that is adjacent to an evacuation route for an at-risk community that the Secretary determines, in cooperation with the at-risk community, requires hazardous fuel reduction to

provide safer evacuation from the at-risk community.

In order to evaluate effects of management direction on the ability to reduce hazardous fuels – specifically hazardous fuels adjacent to communities, WUI was approximated for the planning area. How WUI was evaluated was changed between the draft and final EIS to more closely align with the definition in the HFRA. In the DEIS, WUI was defined as the zone within a mile of where people live, liberally measured as just one person per 10 square miles.

In the FEIS, WUI has been defined as the zone within a mile of where people live – based on:

(1) The federal register lists of at-risk communities published in January 2001 and August 2001. (USDA FS, USDI BIA, BLM, FWS, NPS 2001a and 2001b)
(2) Year 2000 population census data was used to indicate where interface (population density of 250 or more per square mile) and intermix communities (population density of 28-250 people per square mile) are as described in the January 2001 *Federal Register Notice*. The Notice says the federal agencies will focus on communities in the interface or intermix category. The HFRA indicates that both types of communities may be "at-risk".
(3) A 1 mile buffer from communities was used because HFRA describes WUI as ½ mile or 1 ½ miles depending on certain features. One-mile splits this difference and is easy to approximate.

Based the above assumptions, about 3.7 million acres are in the WUI in the planning area, of which about 25 percent or 963,000 are lynx habitat – see Table 3-31.

Table 3-31. Acres within WUI and outside WUI, by State and lynx habitat

State	Acres of WUI	Acres of lynx habitat in WUI	Acres Outside WUI	Acres of lynx habitat outside WUI
Idaho	1,102,100	226,790	11,607,500	5,533,210
Montana	2,450,400	649,300	15,004,200	8,410,700
Wyoming	138,400	59,300	6,843,700	2,890,700
Utah	56,000	27,200	1,328,100	672,800
Total	3,746,900	962,590	34,783,500	17,507,410

See Appendix M for further detail and the project record (analysis/fire/FEIS/data).

Hazardous fuels reduction program

Congress annually sets goals, program size, and emphasis through its appropriations. Table 3-32 summarizes the projected fuels program over the next decade state.

Inside the WUI, fuel treatments most likely would be within a mile of structures and designed to reduce the intensity and spread of fire to communities. Many treatments would occur in the dry, low-to mid-elevation forests and sagebrush lands that have missed one or more fire cycles and are in Condition Classes 2 and 3. However, some may occur in Condition Class 1 forests, especially those experiencing insect and disease outbreaks.

At current and projected funding levels, about 86,000 acres or two percent of the WUI would be treated annually.

Outside the WUI, fuel treatments most likely would be designed to restore or maintain a semblance of the forest structure historically produced by fire. Generally, fuel reduction would occur on lands in Condition Classes 2 or 3, and fuel maintenance in Condition Class 1 lands. Other priorities include treating municipal watersheds, key habitat areas near key infrastructure, and areas experiencing or imminently threatened by insect and disease infestations (USDI, USDA 2006).

Annually about 131,000 acres would be restored or maintained by using prescribed fires and removing vegetation, generally in areas that have missed one or more fire cycles or areas with insect and disease infestations. Vegetation may be removed to reduce fire intensity before burning or as the sole method of treatment.

Based on the units five-year integrated strategies, at least 50 percent of all fuel treatments (in and out of WUI) would be completed with prescribed burns – and not mechanical harvest (project record - analysis/fire/FEIS/data).

Table 3-32. 10 year fuels program by State—in and out of WUI

	Inside WUI	Outside WUI	Total Acres
Idaho	168,000	429,000	597,000
Montana	513,000	424,000	937,000
Wyoming	119,000	257,000	376,000
Utah	64,000	199,000	263,000
Total	864,000	1,309,000	2,173,000

See Appendix M for further detail and the project record (analysis/fire/FEIS/data)

Overlap of fuel treatments and winter snowshoe hare habitat

FIA data for Region 1, Montana, was used to find how often fuel treatments might affect winter snowshoe hare habitat where management restrictions may apply. Three key assumptions were used in this analysis:

- Fuel treatments would occur evenly across the landscape, regardless of condition class;
- The WUI was defined as the zone within a mile of where people live, measured as 28 people per square mile; and
- Winter snowshoe hare habitat is composed of both high- and low-density forests – see the *Lynx* section.

Table 3-33 shows how much winter snowshoe hare habitat is estimated to be inside and outside the WUI.

Conditions in Montana can be summarized as follows:

1) About 52 percent[1] of the NF acres in Montana are lynx habitat
2) About 26 percent[2] of the WUI is lynx habitat
3) About 4 percent[3] of the WUI is high-density forests
4) About 4 percent[4] of the WUI is low-density forests
5) About 8.4 million acres, or about 4 percent[5] of the NF acres in Montana, are lynx habitat inside the WUI

[1] 9,060,000 / 17,454,000 = 52%

[2] 649,000 /2,450,400 = 26%

[3] 109,000 /2,450,400 = 4%

[4] 109,000 /2,450,400 = 4%

[5] 649,000 / 17,454,000 = 4%

Table 3-33. Acres of winter snowshoe hare habitat by density and size in Montana and the distribution by area

	Lynx habitat	High-density		Low-density	
		Young	Multistory	Young	Multistory
Inside WUI	649,300	61,000	41,000	55,000	61,000
Outside WUI	8,410,700	676,000	1,079,000	491,000	751,000
Wilderness	1,856,000	157,000	355,000	198,000	198,000
Total	9,060,000	894,000	1,475,000	744,000	1,010,000

Effects

Three factors influence fire behavior – weather, topography, and vegetation. Land managers can modify only vegetation.

The vegetation characteristics that influence fire behavior are the species composition, and the amount and arrangement of the vegetation.

Fuel treatments change fire behavior by changing the arrangement or reducing the amount of vegetation, which reduces how hot fires can burn. Fuel treatments are designed to reduce the spread and intensity of surface fire, and the initiation and spread of crown fire. Fuels can be reduced by burning or by physically removing vegetation.

Many fuel treatments designed to reduce the fire risk to communities occur within a mile of structures. Others may take place several miles away, when topography, wind patterns, and fuels combine to create the potential for fire to spread to a community. (USDI, USDA 2006)

For structures to be protected, landowners must clear the fuels 100 to 200 feet away from structures and build or change their structures to be fire-resistant (Cohen, 2000 a & b).

While fuel treatments do not prevent fires, they do increase the likelihood that structures would be left standing after fire. Even when the fuels have been treated, fires may still threaten communities and be outside the control of firefighters during extreme weather conditions.

Since fire is a natural and necessary forest disturbance process, the goal of some fuel treatments is to restore and maintain the presence of fire. The health of some forests is declining because fire has been excluded. Treatments are designed to resemble historic fire, or to reduce vegetation so when fire does occur, it would behave more like it did under historic conditions.

Restoration and maintenance are not directly associated with protecting homes in the WUI. However, depending on their location, such treatments may contribute to reducing the threat of crown fires to communities (Finney 2001).

Table 3-34. Projected ten-year fuel treatment program in the WUI*

State	Total fuel treatment program in WUI	Fuel treatment potentially *in lynx habitat* in WUI	Fuel treatment program *outside lynx habitat* in WUI
FS-Idaho	168,000	46,230	121,770
FS-Montana	513,000	151,630	361,370
FS-Utah	64,000	31,360	32,640
FS-Wyoming	119,000	54,870	64,130
Total	864,000	284,090	579,910

** See Appendix M Table M-2

Table 3-35. Projected ten-year fuel treatment program outside the WUI*

State	Total fuel treatment program outside WUI	Fuel treatment potentially *in lynx* habitat *outside WUI*	Fuel treatment program *outside lynx* habitat *outside WUI*
Idaho	429,000	203,000	226,000
Montana	424,000	185,020	238,980
Utah	199,000	101,490	97,510
Wyoming	257,000	107,840	149,160
Total	1,309,000	597,350	711,650

* See Appendix M

Alternative A, no action

Under the no-action alternative, agencies would implement the *National Fire Plan,* the *10-Year Comprehensive Strategy,* and the *Healthy Forests Initiative* within the direction set by existing plans.

In the planning area, about 2.2 million acres of fuel treatment are projected for the next decade. About 864,000 acres are inside the WUI (40 percent) and 1,309,000 acres are outside the WUI – see Table 3-32.

Within the WUI, of the 864,000 acres projected to be treated over the next decade about 284,000 acres or 32 percent are likely to be in lynx habitat – see Table 3-34. The no-action alternative would allow fuel treatments inside lynx habitat.

Outside the WUI, of the 1,309,000 acres projected to be treated over the next decade about 597,000 acres or 45 percent are likely to be in lynx habitat – see Table 3-35. The no-action alternative would allow fuel treatments inside lynx habitat.

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

Under alternatives B, C, D, E and F Scenario 1, agencies would add management direction that would apply to fuel treatments in all lynx habitat in LAUs. The management direction for these alternatives does not affect fire suppression – that is an emergency – or wildland fire use, which replicates the natural role of fire and typically occurs in wilderness areas. See Table 2-1 in Chapter 2.

Objectives VEG O1 & VEG O3

- Objective VEG O1 says to manage vegetation similar to historic patterns while maintaining the habitat components that help conserve lynx.
- Objective VEG O3 says to use fire to restore ecological processes and maintain or improve lynx habitat.

Both objectives are compatible with the *National Fire Plan* and the *10-Year Comprehensive Strategy*. The objectives support mechanically

removing vegetation and using fire to maintain and restore wildlands consistent with historic disturbance patterns.

Standard VEG S1
Standard VEG S1 says vegetation management projects may not result in more than 30 percent unsuitable habitat (stand initiation structural stage that does not yet provide winter snowshoe hare habitat) unless a broad-scale assessment substantiates higher historic levels. This standard applies to regeneration harvest. Many fuel treatments are designed to thin the understory and would not result in regeneration.

Alternative B
Under Alternative B, Standard VEG S1 would apply the 30 percent limit to a single LAU.

In Region 1, less than 13 percent of the LAUs currently exceed 30 percent unsuitable, mostly due to large wildfires (Hillis et al. 2003). The impact of the 30 percent standard limiting fuel treatments would be small because most LAUs are well within the standard. LAUs that do not meet the standard are less likely to need regeneration harvest to reduce fuels.

Alternative C
Under Alternative C, Standard VEG S1 would apply the 30 percent limit to a single LAU or a fixed combination of adjacent LAUs, but would not limit prescribed fires. Outside winter snowshoe hare habitat, vegetation could be removed to treat fuels before burning was done.

Mechanical fuel treatments may be prohibited in a few areas where large fires have burned, such as the 1988 Yellowstone fires (Hillis et al. 2003). The effects would be less than those under Alternative B.

Alternative D
Under Alternative D, Standard VEG S1 would apply the 30 percent limit to a sub-basin or isolated mountain range.

Prescribed fires and mechanical fuel treatments would be prohibited only in a very few areas that have had large landscape fires (Hillis et al. 2003). The effects would be less than those under Alternative C.

Alternative E
Under Alternative E, Standard VEG S1 would not apply to fuel treatments developed through a collaborative process; therefore, it would not constrain them.

Alternative F
Under Alternative F, Standard VEG S1 would not apply to fuel treatment projects within the WUI as defined by HFRA. Therefore if a fuel treatment in a WUI resulted in a stand initiation structural stage (equivalent to regeneration harvest) then the standard would not apply. The standard would apply to fuel treatments outside the WUI. In addition, Guideline VEG G10 says to consider Standard VEG S2 in

designing fuel treatment projects in the WUI.

The standard and guideline would have little to no effect on fuel treatment projects within the WUI that result in regeneration. Generally, projects can be designed to meet the standard, but if regeneration is needed to reduce fuels then this would be an appropriate reason for deviation.

Under Alternative F, the standard would be applied to an LAU; therefore there may be some cases where fuel treatments outside the WUI would be constrained. As noted above it is likely this would not happen often as most LAUs are not near having 30 percent of lynx habitat in a stand initiation structural stage.

Standard VEG S2
Standard VEG S2 says timber projects may not regenerate more than 15 percent of lynx habitat in an LAU in a ten-year period.

Many fuel treatments are designed to thin forests, not regenerate them. However, some fuel treatments are designed as fuel breaks – which in many cases are equivalent to regenerating an area.

Currently about 13 percent of the LAUs in Region 1 have more than 15 percent in a stand initiation structural stage, very few due to timber harvest (Hillis et al. 2003), so the impact of the 15 percent limit would be small.

Alternative B
Under Alternative B, the 15 percent limit applies only to commercial timber sales. It does not limit prescribed fires or mechanical treatments like piling and brushing that do not produce commercial wood products.

Timber sale proceeds would not be available to offset project costs. The number of fuel treatments, including stewardship projects, could be reduced.

Alternative C
Under Alternative C, the standard becomes a guideline, Guideline VEG G6. The need to treat fuels could be cited as a rationale to deviate from the guideline. Therefore, this alternative would have a limited effect on fuel treatments.

Alternatives D & E
Under Alternatives D and E, the direction is dropped altogether, so there is no effect.

Alternative F
Under Alternative F, Standard VEG S2 would apply to all timber management projects and those fuel treatment projects that use timber harvest to achieve objectives outside the WUI as defined by HFRA. In addition, Guideline VEG G10 says to consider Standard VEG S2 in designing fuel treatment projects in the WUI.

The standard and guideline would have little to no effect on fuel treatment projects within the WUI that result in regeneration.

Generally, projects can be designed to meet the standard, but if regeneration is needed to reduce fuels then this would be an appropriate reason for deviation.

Outside the WUI, it is still likely there would be little effect because so few LAUs have more than 15 percent of an LAU regenerated by timber harvest in the last decade.

Standard VEG S3
Standard VEG S3 would require maintaining ten percent denning habitat in an LAU. Denning habitat is most common in stands with plenty of coarse woody debris, which can provide fuel for fires.

Denning habitat is likely not limiting in most of the planning area (see Chapter 2 and Lynx Section of Chapter 3 for further discussion).

Alternatives B & C
Under Alternatives B and C, Standard VEG S3 would not allow fuel treatments in denning habitat or in areas with the most potential to develop into denning habitat, when less than ten percent exists in an LAU.

At most, this standard would affect fuel treatments in ten percent of an LAU. Since it does not affect the remaining 90 percent, there is likely to be little effect.

Alternative D
Alternative D would modify Standard VEG S3 by allowing the effects of fuel treatments to be mitigated. Treatments would need to leave enough overstory trees and coarse woody debris to provide den sites.

Generally, fuel treatments could be designed to meet the standard, so it would have very limited or no effect.

Alternative E
Under Alternative E, Standard VEG S3 would not apply to fuel treatments developed through a collaborative process; therefore, it would not constrain them.

Alternative F
Under Alternative F, Standard VEG S3 is changed to Guideline VEG G11. The guideline does not require maintaining a certain percentage of denning habitat. It says to consider leaving denning habitat (such as some piles of logs) where denning habitat is limited. The guideline would not limit fuel treatment projects.

Standard VEG S4
Alternatives B & C
Under Alternatives B and C, Standard VEG S4 would in most cases prohibit salvage harvest in disturbed areas smaller than five acres. The limit does not apply to disturbed areas larger than five acres, prescribed fires, or to mechanical treatments like brushing and piling that do not produce commercial wood products.

While most fuel treatments could be designed to meet the objectives of Standard VEG S4, timber sale proceeds would not be available to offset project costs. The number of fuel treatments, including

stewardship projects, could be reduced. Otherwise, the standard would have no effect or a very limited effect.

Alternatives D & E
Under Alternatives D and E, the standard is changed to Guideline VEG G7. Retaining small patches of dead trees would have to be considered, but salvage harvest could take place when there were reasons to deviate from the guideline.

Under Alternatives D and E, projects could be designed to meet Guideline VEG G7, so the guideline would have very limited or no effect.

Alternative F
Under Alternative F Standard VEG S4 and Guideline VEG G7 are incorporated into Guideline VEG G11. Salvage harvest could occur, but if denning habitat was limiting then some dead trees or piles of logs should be left to provide denning habitat in the future. This would not limit fuel treatment projects.

Standards VEG S5 and VEG S6
Standard VEG S5 limits precommercial thinning activities that reduce winter snowshoe hare habitat in young regenerating forests; Standard VEG S6 imposes limits in multistoried forests.

Generally, young regenerating forests are not a high priority for fuel treatment. Young forests are less capable of supporting high intensity fire in stand replacing fire regimes. As these forests grow up, fuels accumulate and they become more susceptible to fires of greater intensity and magnitude and may become a priority for treatment.

Some precommercial thinning activities may occur in young forests to change species composition to those tree species less susceptible to fire, or to reduce tree density.

Multistoried forests are more likely to be a priority for fuel treatment because they generally contain trees that provide ladder fuels for fires.

Alternative B
Under Alternative B, Standards VEG S5 and VEG S6 would allow precommercial thinning – thinning the understory trees that lack commercial value – only within 200 feet of structures. Prescribed burning or commercial timber sales could be used to treat fuels.

An analysis using FIA data in Montana was used to approximate the areas of fuel treatments over the next decade that could affect winter snowshoe hare habitat (Appendix M). About 55,000 acres of NF lands could be treated for fuels in Montana winter snowshoe hare habitat during the next decade. Under Alternative B, about 76,550 acres – 29,850 acres in the WUI – could be relocated to avoid thinning in winter snowshoe hare habitat – see 3-36. However, since other treatment methods are available, the effect is likely limited.

Alternative C
Under Alternative C, Standards VEG S5 and VEG S6 would allow

vegetation management projects only for research and within 200 feet of structures.

Under Alternative C, in Montana all treatments in winter snowshoe hare habitat would have to be relocated to avoid reducing winter snowshoe hare habitat – which is estimated at about 131,000 acres.

Where Standards VEG S5 and VEG S6 preclude fuel treatment, the ability to reduce fuels and fire risk could decrease. It is unknown if the standards would restrict the ability to treat fuels in critical places – each situation would have to be evaluated at the project level.

Alternative D

Under Alternative D, Standards VEG S5 and VEG S6 would allow precommercial thinning and other vegetation management projects either to restore tree species in decline or where the amount of winter snowshoe hare habitat is greater than the historic range – see the *Forests* section later in Chapter 3. However, how many acres would be allowed is not available, and would depend on the size and number of site-specific projects.

It is possible that all treatments in winter snowshoe hare habitat would have to be relocated to avoid reducing winter snowshoe hare habitat. In Montana this is estimated at about 131,000 acres. However, it is likely some of these acres could be treated under the exemptions in Alternative D.

Where Standards VEG S5 and VEG S6 preclude fuel treatment, the ability to reduce fuels and fire risk could decrease. It is unknown if the standards would restrict the ability to treat fuels in critical places – each situation would have to be evaluated at the project level.

Alternative E

Under Alternative E, Standard VEG S5 would not apply to fuel treatments developed in a collaborative manner and Standard VEG S6 is changed to Guideline VEG

Table 3-36. Fuel treatments in Montana possibly moved to avoid hare habitat in a decade

	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Inside WUI (46,200 acres fuel treatment projected)						
High density forests	0 acres	14,350 acres	20,500 acres	20,500 acres	0 acres	0 acres
Low density forests	*0 acres*	*15,500 acres*	*25,700 acres*	*25,700 acres*	*0 acres*	*0 acres*
Outside WUI (85,000 acres fuel treatment projected)						
High density forests	0 acres	28,000 acres	51,000 acres	51,000 acres	0 acres	51,000 acres
Low density forests	*0 acres*	*18,700 acres*	*34,000 acres*	*34,000 acres*	*0 acres*	*34,000 acres*
Total (540,000 acres)						
Total	0 acres	76,550 acres	131,200 acres	131,200 acres	0 acres	85,000 acres

It is possible some fuel treatments in low density forests would not need to be relocated because they may lack the horizontal cover needed to provide winter snowshoe hare habitat – see *Lynx* section.

Table 3-37. Acres of the 10 year hazardous fuel reduction program in lynx habitat that would be unconstrained (standards would not apply – but guidelines may)

Area	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
In WUI	284,000	>284,000	0	0	284,000	284,000
Outside WUI	597,000	>597,000	0	0	597,000	0
Total program	881,000	>881,000	0	0	881,000	284,000

S8. The need to treat fuels could be cited as a rationale to deviate from the guideline. Therefore, Standard VEG S5 and Guideline VEG G8 would have little to no effect on fuel treatments.

Alternative F

Under Alternative F, Standard VEG S5 and S6 would not apply to fuel treatments within the WUI as defined by HFRA. Guideline VEG G10 would apply, which says to design projects considering Standards VEG S5 and S6. In many cases, fuel treatments can be located to avoid reducing winter snowshoe hare habitat; however in some instances it may be necessary to remove ladder fuels, or thin vegetation. Under Alternative F there would be little to no effect on fuel treatments in the WUI.

Outside the WUI it is unknown if the standards would restrict the ability to treat fuels in critical places; each situation would have to be evaluated at the project level. It is possible effective treatment could be done instead in places that are not winter snowshoe hare habitat; however it is likely some projects would be precluded. In Montana, it is possible about 85,000 acres outside the WUI would be have to be relocated to avoid winter snowshoe hare habitat.

Effects summary

Alternative B

Alternative B constrains the amount of fuel treatment projects that result in regeneration or that use precommercial thinning as a tool in winter snowshoe hare habitat. These constraints could affect the ability to conduct some fuel treatments.

About 881,000 acres of fuel treatment projects are anticipated to occur in lynx habitat over the next decade. These projects would either meet the terms of the standards or could be designed to avoid lynx habitat components. Many projects would not be constrained in multistoried forests because precommercial thinning is the only activity prohibited. However it is still likely some hazardous fuel reduction would not occur on some portion of these areas. Alternative B may limit the ability to reduce fire size and intensity in some places.

Alternative C

Alternative C constrains the amount of fuel treatment projects that result in regeneration to a lesser degree than Alternative B, but constrains

most type of activities in winter snowshoe hare habitat.

Alternative C would likely affect the ability to conduct some fuel treatments. In many cases, fuel treatments can be designed to meet the standards, but in some situations some projects or portions of projects would not occur, especially projects that affect winter snowshoe hare habitat. Based on the management direction Alternative C is likely to limit the ability to reduce fire size and intensity.

Alternative D

Alternative D also would affect the ability to conduct fuel treatment, but to a lesser degree than Alternative C. Some standards become guidelines and more activities are allowed. It provides more options for designing fuel treatments. However, Alternative D restricts most fuel treatment activities in multistoried forests; therefore it is likely some fuel treatment projects in these areas would not occur. In some cases, Alternative D could affect the ability to reduce fire size and intensity.

Alternative E

Alternative E would allow all fuel treatments to occur; therefore the management direction would not limit the ability to reduce fire size or intensity.

Alternative F, Scenario 1

Alternative F Scenario 1 would not constrain fuel treatments in the WUI within limits. Alternative F Scenario 1 would apply the management direction to all lynx habitat in LAUs. Fuel treatment projects can only exceed the standards on six percent of lynx habitat within an administrative unit. The likelihood of exceeding this limit however is low given budgets and the anticipated program of work. Alternative F would not limit the ability to reduce fire size and intensity in the WUI.

Alternative F constrains fuel treatments outside the WUI. In many cases, fuel treatments can be designed to meet the standards, but in some situations some projects or portions of projects would not occur, especially projects that affect winter snowshoe hare habitat. In these cases Alternative F is likely to limit the ability to reduce fire size and intensity.

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.

Fuel treatments would not necessarily be constrained on these units. The management direction can still be considered, but would not have to be applied while the units remain unoccupied. Fuel

treatments were projected to occur in lynx habitat over the next decade on about 32,500 acres on the Nez Perce; 49,500 acres on the Salmon-Challis; 50,000 acres on the Beaverhead-Deerlodge; 21,000 acres on the Bitterroot; and 32,400 acres on Bighorn NF. Information about fuel treatments specific to the disjunct mountains on the Gallatin, Helena and Lewis and Clark NFs is not available. About 22,000 acres on the Custer, 19,000 acres on the Gallatin, 31,200 on the Helena and 34,800 acres on the Lewis and Clark NFs were projected to occur in lynx habitat on each of the forests in their entirety (Appendix M).

It is likely some of the projects would be designed to meet lynx needs and some would not. Alternative F, Scenario 2, would not limit the ability to reduce fire size and intensity on these units and isolated mountain ranges until such time as the areas become occupied. Once occupied the effects would be the same as described in Alternative F, Scenario 1.

Cumulative effects

Fire suppression has reduced the amount fire in Rocky Mountain forests since the early 1930s. Because these forests evolved with fire, its absence has altered forest conditions and health. Changes include increases in forest cover and density, and decreases in trees that cannot tolerate shade like pines and western larch. Fuel loads are unnaturally high.

As a result, the health of some forest ecosystems is in decline, especially in the warm, dry, low-elevation forests where fire used to occur frequently. Lynx habitat does not occur in such forests.

Under the *National Fire Plan* and the *10-Year Comprehensive Strategy, the Healthy Forests Initiative* fire suppression would continue, but the Forest Service would implement fuel treatments targeting the highest risk communities and forest ecosystems. This amounts to areas close to where people live with an understory or mixed-severity fire regime.

While fire exclusion has not yet significantly altered forests that evolved with infrequent fires, landscape changes are noticeable (Keane et al. 2002). Forests with young age class trees are often missing. Fuel treatments could benefit lynx by creating young stands that would develop into high-quality winter snowshoes hare habitat.

Alternatives A and E
The National Fire Plan and Healthy Forests Initiative have identified the need to treat hazardous fuels. Other programmatic decisions listed in Appendix L have had minimal effect on ability to reduce fuels where necessary.

Alternatives B, C, D
The management direction, in addition to the past, present, and

reasonably foreseeable actions listed in Appendix L would further limit or restrict where fuel treatments could occur. This could affect the ability to treat hazardous fuels – especially adjacent to communities in some situations. Alternative B would not affect the ability to treat the fuels to the same degree as Alternatives C and D would.

Alternative F

The management direction, in addition to the past, present, and reasonably foreseeable actions listed in Appendix L would not cumulatively affect the ability to treat hazardous fuels adjacent to communities; but could further limit or restrict opportunities outside the WUI. This could affect some opportunities to modify fire patterns.

Forests

This section describes the forested environment of the planning area and the effects of the alternatives. The *Economics* section later in Chapter 3 provides more information about the economic effects, particularly about the proposed precommercial thinning restrictions. More information can be found in the Project Record.

Disturbance regimes

Wildfire

Wildfire plays a major role in determining forest structure, composition, and landscape patterns in the northern Rocky Mountains. Fire history data from the Interior Columbia Basin region shows extensive fire activity at least every decade or two between the mid-1500s and the early 1900s (Barrett et al. 1997). An estimated 12 million acres burned in the northern Rockies between 1908 and 1947 (Lotan et al. 1985). The largest known fire years since 1900 each burned from two to three million acres in the Interior Columbia Basin region (Arno, records on file, Intermountain Fire Sciences Lab, Missoula, MT).

Wildfire plays a major disturbance role in the higher elevations (Ruediger et al. 2000). Although lynx habitat typically has mixed severity to stand-replacing fire regimes, some fires are low intensity, which allow some tree species to survive fire. See the discussion in the Chapter 3 *Fire* section.

Species such as western larch, lodgepole pine, ponderosa pine, quaking aspen, western white pine, and whitebark pine have adapted to fire as a major disturbance agent (Fischer & Bradley 1987; Smith & Fischer 1997). Due to fire suppression during the last 80 years, many of these species have declined (Quigley et al. 1996).

Logging

Logging has changed the landscape in some places. Extensive salvage logging took place after mountain pine beetles killed many trees during the 1960s through the 1980s in large areas in the southern and eastern parts of the northern Rocky Mountains.

The cedar-hemlock zone in north Idaho and the larch-lodgepole forests of western Montana, also have a history of logging on the more accessible terrain.

Timber harvest in these areas has contributed to the quantity of young regenerating forests, although fire has had a much greater impact.

Stand initiation stage

A forests *structure* consists of its appearance, species composition, growth, resistance to disturbance, etc. The structure is largely set by the spatial arrangement and heights of the trees by the time they reach the stem exclusion stage (see Figure 3-2 in the *Lynx* section). Precommercial thinning generally takes place in the stand initiation stage, before stem exclusion has occurred, and sets the stage for the future.

In mixed-species forests, dominant trees in the understory often grow rapidly after thinning releases them from competition. Species that need full sun die if they become much suppressed. Thinning must be done before trees loose their crowns because severely suppressed trees may never respond (Oliver & Larson 1996).

Most precommercial thinning occurs on lands in the suitable timber base. Historically, trees were thinned to a uniform spacing to improve growth and yield of future wood products.

The management objectives for the suitable time base have been broadened to include ecosystem and restoration purposes (USDA FS 1997b). Today, precommercial thinning using variable spacing is commonly used to promote structural and compositional diversity and to promote the historic representation of forest cover types.

Daylight thinning
Daylight thinning is a modified version of precommercial thinning that could preserve most of the forage and still provide relief from crowding for trees that need full sun. *Daylight thinning* would remove no more than 20 percent of the small trees and shrubs that provide winter snowshoe hare habitat. An area from eight to 20 feet in diameter would be cleared around the best performing trees; no trees or shrubs would be removed outside the cleared area.

- If eight-foot-diameter clearings were used, about 150 trees per acre could be released
- If 20-foot-diameter clearings were used, less than 30 trees per acre would be released

Western white pine
Western white pine *(Pinus monticola)* grows in the moist forests in northern Idaho and western Montana. This tree has been in major decline over the past 60 years.

The proportion of western white pine declined from 44 percent in 1941 to five percent in 1979 (Graham 1990). Since the 1930s, more than 95 percent of western white pine cover types have converted to grand fir, Douglas fir, or western red cedar/western hemlock (USDA FS 1998). Only about 90,000 acres in north Idaho and western Montana still exist in the western white pine cover type, according to Forest Inventory and Assessment data.

Western white pine blister rust (*Cronartium ribicola*) spread to the Pacific Northwest from Europe by the 1920s (Graham et al. 1993) and killed many trees in northern Idaho. Naturally occurring

rust-resistant wild trees were discovered in the 1940s; genetic resistance is carried in a low percentage of the population. It is the intent of selection to increase the frequency of resistant genes in western white pine planting stock (Byler et al. 1993). As such, rust-resistant trees are an important part of the genetic resource program.

Fire suppression and logging changed the distribution of western white pine. In pre-settlement times, low- and intermediate-intensity burns produced an irregular, patchy mosaic of vegetation. Fires frequently shortened how long the dense stem-exclusion stages lasted by thinning them and breaking holes in uniform canopies (Zack & Morgan 1994).

Western white pine is well adapted to mixed-severity fire regimes. In fact, it depends on the disturbance fire or timber harvest provides to remove competing conifers and allow it to become established (Graham 1990). Its relatively thin bark and moderately flammable foliage make it intermediate in fire resistance (Graham 1990). In the past, fire removed the competing conifers (Graham 1990).

Restoring western white pine

Restoring western white pine involves planting trees that can resist blister rust and thinning them (USDA FS 1998). About 96,000 acres were planted in FS Region 1 to rust-resistant western white pine between 1973 and 2001.

Neither natural forests nor plantations of western white pine respond well to thinning after they are 30 years old (Graham et al. 1993). Precommercial thinning reduces the probability of insect and disease attacks and stand-replacing fires by removing shade-tolerant trees.

About 70,700 acres of western white pine are scheduled for precommercial thinning during the next decade; 51,090 acres are in lynx habitat. See 3-38.

The thinning would help the planted trees survive and give them a competitive advantage over competing trees, without relying on other disturbances. The seed source of these rust-resistant trees represent is vital to the future of western white pine forests on the landscape.

Alternative A, the no action alternative

Precommercial thinning would continue, allowing planted rust-resistant western white pine to successfully compete with shade-tolerant trees. About 70,700 acres could be precommercially thinned. This amounts to almost 75 percent of the western white pine planted during the last 20 years. The no-action alternative would contribute to restoring this species.

Even if full funding is not received, these acres are the number one priority for thinning in FS Region 1; therefore, it is likely all 70,700 acres of thinning scheduled in planted western white pine would occur.

Table 3-38. Planted western white pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Western white pine	51,090 acres	19,610 acres	70,700 acres

Alternatives B, C & E
Alternatives B, C, and E would defer precommercial thinning on 51,090 acres inside lynx habitat. It is likely the western white pine seedlings planted would not reach maturity unless something disturbs the plantations, because the species can not compete without disturbance.

Western white pine does not respond to delayed thinning, after the forest no longer provides winter snowshoe hare habitat and the trees are 45 years old. The likely result of Alternatives B, C, and E would be the loss of white pine on more than 70 percent of these planted acres, the species' continued decline and the loss of most of the investment in these plantations.

Alternatives D & F Scenario 1
Under Alternatives D and F Scenario 1, daylight thinning could be used to restore planted western white pine while retaining winter snowshoe hare habitat. Alternative F Scenario 1 would apply the management direction to all lynx habitat in LAUs. The investments in rust-resistant trees could be protected on the 51,090 acres in lynx habitat.

Generally, trees were planted at a density of 300 per acre. Using daylight thinning, depending on the spacing, from about 150 to less than 30 trees per acre would be protected.

This restricted approach to thinning would not release all the planted trees from competition and may not be the ideal approach to restore this species, but some would survive into maturity and produce rust-resistant seed, resulting in future generations of rust-resistant trees. Alternatives D and F are likely to maintain and restore western white pine.

Alternative F Scenario 2
Under Alternative F, Scenario 2, the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx. No precommercial thinning to restore western white pine is projected to occur on any of these units. These units are outside the range of western white pine; therefore there would no difference in effect to western white pine.

Whitebark pine
Whitebark pine (*Pinus albicaulis*) is a hardy subalpine conifer that tolerates poor soils, steep slopes, and windy exposures. It grows at higher elevations across much of the northern Rockies.

Currently, whitebark pine is found mainly at the timberline. It is a component of many habitat types and is distributed across a variety of site conditions in the planning area.

In lynx habitat, whitebark pine is found in productive places where it grows densely with western white pine, spruce, and fir. It also grows in sparse clusters on harsh, rocky places in the upper subalpine zone. Harsh whitebark pine sites do not support the stem densities capable of supporting hare populations and are not considered lynx habitat.

Whitebark pine is hardier than other conifers and can become established on

dry, cold subalpine sites. It is a relatively slow growing tree and can be out-competed for growing space by conifers that are more shade tolerant. Where it competes with other species that need full sun, whitebark pine is often able to maintain its presence (Tomback et al. 2001).

Historically, whitebark pine accounted for ten to 15 percent of the forest cover in the northern Rocky Mountains (Arno & Weaver 1990); now it amounts to only about five percent. In the planning area, about 1.5 million acres are in the whitebark pine cover type. Blister rust and fire suppression have substantially reduced its presence. Epidemics of mountain pine beetles have further reduced isolated populations.

Historically, mixed severity fires maintained whitebark pine at high elevations by removing competing species. Without fire, whitebark pine is eventually replaced by subalpine fir and spruce. The long-term consequence of keeping fire out is changing the fire regime from mixed severity to stand-replacing (Arno & Hoff 1990; Keanne et al. 2002).

Restoring whitebark pine

Restoring historic fire regimes at the landscape level would be the most successful restoration technique for whitebark pine (Tomback et al. 2001; Keane et al. 2000; Arno pers. com.). Indeed, the viability of the species may depend on broad-scale landscape solutions (Keane et al. 2000). In national parks and wilderness areas where larger landscape fires may be manage for resource benefits, both prescribed fire and silviculture practices can be used (Tomback et al. 2001). Prescribed fire has been used experimentally to restore whitebark pine on a small scale.

In a practical sense, restoring a historic fire regime throughout the range of whitebark pine would be difficult. Silvicultural treatments that imitate the effects of a mixed fire regime, primarily thinning and precommercial thinning in subalpine fir habitat types, are recommended (Tomback et al. 2001; Arno pers. com.). Thinning out understory shade-tolerant trees is one alternative to fire that can create openings in the forest canopy and imitate the results of the low- and mid-intensity fires. Precommercial thinning combined with fire, followed by planting blister-rust resistant seedlings, may be the best way to restore these communities (Tomback et al 2001).

When a new whitebark pine stand grows up after fire, it may be overly dense and need thinning. Thinning whitebark pine is not recommended in places that are at high risk for blister rust because the disease may attack and kill nonresistant trees (Tomback et al 2001). It is also possible that thinning the competing conifers and shrubs could create habitat

Table 3-39. Whitebark pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Whitebark pine	9,110 acres	250 acres	9,360 acres

for the alternate host of blister rust, although forest openings that receive less than 80 to 90 percent full sunlight would generally not support the alternate host (Tomback et al. 2001).

About 9,110 of the 9,360 acres of the precommercial thinning in whitebark pine scheduled for the next decade are in lynx habitat (see Table 3-39). Another 51,000 acres in lynx habitat are planned for prescribed fire without thinning. Some of these acres are likely winter snowshoe hare habitat.

Alternative A, the no action alternative
Precommercial thinning that favors whitebark pine may take place during the next decade on 9,360 acres under the no-action alternative if fully funded. Most of this thinning is in lynx habitat. The no-action alternative would allow precommercial thinning and other restoration activities like prescribed fire to help maintain and restore whitebark pine.

Alternatives B & C
Alternatives B and C would defer precommercial thinning in lynx habitat until the forests self-pruned above the reach of snowshoe hares. These alternatives would result in the continued decline of whitebark pine on 9,110 acres in lynx habitat. Some decline would likely continue anyway unless full funding was received, and there is no guarantee of that.

Under Alternative B, other restoration activities such as prescribed fire could still take place to help whitebark pine.

Under Alternative C, Standards VEG S5 and VEG S6 would preclude using prescribed fire in winter snowshoe hare habitat, leaving no tools except wildfire to restore whitebark pine, resulting in an even greater decline.

Alternatives D, E & F Scenario 1
Alternatives D and F Scenario 1 would allow using whatever methods are needed to restore and maintain whitebark pine. Alternative F Scenario 1 would apply the management direction to all lynx habitat in LAUs. Alternative E would allow projects that restore fire-adapted ecosystems to restore whitebark pine.

Restoring whitebark pine forests could involve removing competing vegetation and returning fire to the landscape. Removing competing vegetation would improve the vigor and growth of individual trees, improving its ability to survive future fires and produce seed to regenerate naturally.

Assuming full funding, about 9,110 acres of whitebark forests in lynx habitat could be precommercially thinned in the next decade.

Alternative F Scenario 2
Under Alternative F, Scenario 2, the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx. Precommercial thinning to restore whitebark pine in lynx habitat is projected to occur on about 300 acres of the Salmon-Challis NF; 1,000 acres on the Gallatin; 500 acres on the Helena; 1,000 acres on the Custer. Regardless of which scenario is applied, precommercial thinning to

restore whitebark pine would be allowed; therefore there would be no difference in effect to whitebark pine.

Quaking aspen

Quaking aspen *(Populus tremuloides)* is a species that needs full sun that commonly grows in even-aged forests. Aspen is distributed throughout the northern Rockies in small, isolated areas. It is more extensive east of the Continental Divide in Montana and in the southern half of the planning area in Wyoming and Utah (Mueggler 1985). About 500,000 acres of aspen grow in the planning area, according to FIA data.

Some single-storied aspen forests have two distinct generations, consisting of a more or less substantial scattering of old veterans that stand among younger, more slender trees. The older trees usually are the survivors of fire a decade or more earlier that killed much of the stand and gave rise to the younger trees. Many of the younger trees grow as tall as the older ones, and with them, form a closed canopy (Jones & DeByle 1985).

Conifers growing beneath aspen are generally younger than the aspen because aspen regenerates so quickly from existing roots (Sheppard & Jones 1985). Many aspen forests are threatened with invasion by shade-tolerant conifers. From 50 to 70 percent of the quaking aspen in FS Region 1 has been lost because of fire suppression and grazing (USDA FS 1998). Grass, forbs, shrubs, or conifers may replace aspen in the absence of fire (Jones & DeByle 1985).

Fire has been the most important disturbance factor in aspen, changing structural stages and composition and minimizing competition by conifers. If fire takes place infrequently (every 50 years or so) and is intense enough to kill most or all of the aspen trees and the competing conifers, aspen is retained (Jones & DeByle 1985).

Mixed-severity fires where aspen grow at mid- and high elevations historically regenerated aspen and maintained the balance between aspen and conifers. Severe or repeated burns may reduce site quality, resulting in reduced growth rates.

Restoring quaking aspen

Silvicultural treatments at the stand scale have been too small to effectively maintain quaking aspen at the landscape scale (USDA FS 1998). Without fire, human intervention appears to be necessary for the continued well-being of aspen (Jones and DeByle 1985).

Precommercial thinning to restore aspen is scheduled in 6,120 acres of young forests during the next decade; 3,050 acres are in lynx habitat (see Table 3-40).

Alternative A, the no action alternative

When conifers compete with aspen, precommercial thinning can lengthen the time aspen has a competitive advantage. If fully funded, precommercial thinning may take place on 3,050 acres in lynx

Table 3-40. Quaking aspen precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Quaking aspen	3,050 acres	3,070 acres	6,120 acres

habitat, so aspen could be retained.

Alternatives B, C & E
Alternatives B, C, and E would not allow precommercial thinning in lynx habitat until forests have self-pruned above the reach of snowshoe hares. Precommercial thinning would be deferred on about 3,050 acres in lynx habitat. Some precommercial thinning may be allowed under Alternative E if the purpose is to restore fire-adapted ecosystems.

Conifer encroachment would result in reducing aspen dominance. This would reduce the likelihood aspen would be able to regenerate from root suckering and dominate future generations by overwhelming a site with suckers.

Although the alternatives do not affect many acres, without the compensating results of returning fire to the landscape, aspen would likely continue its decline and become an even smaller part of the ecosystem.

Alternatives D & F Scenario 1
Alternatives D and F Scenario 1would allow precommercial thinning to restore aspen. Conifers would be removed, so aspen can establish a healthy root system capable of suckering or sprouting when the stand is next disturbed by fire or harvest. Thinning would give it a competitive advantage and encourage it as hare forage.

Aspen forests may be maintained and restored on up to 3,050 acres in lynx habitat if fully funded.

Alternative F Scenario 2
Under Alternative F, Scenario 2, 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. Precommercial thinning to restore aspen in lynx habitat is projected to occur on about 1,100 acres of the Salmon-Challis NF; 220 acres of the Beaverhead-Deerlodge NF; 390 acres of the Ashley NF; 90 acres of the Bighorn NF; 30 acres on the Gallatin; and 190 acres on the Helena NF. Regardless of which scenario is applied, precommercial thinning to restore aspen would be allowed; therefore there would be no difference in effect to aspen.

Western larch
Western larch *(Larix occidentalis)* is found in northern Idaho and western Montana. Larch grows in diverse habitats, ranging from moist Douglas fir and grand fir, western red cedar and western hemlock, to cooler subalpine fir sites.

Larch is the conifer species that most needs full sun in the northern Rockies. It regenerates in full sunlight and large openings after major disturbance. To survive, larch must maintain a dominant position in the stand. If overtopped by other trees, larch growth would slow and the trees usually die (Fielder & Lloyd 1995).

Larch is extremely well adapted to fire. Mature larch have bark that is often more than six inches thick, containing little resin, with branches far above the ground and foliage of low flammability.

Larch is able to tolerate crown scorch and defoliation, producing new foliage and re-branching on the trunk. At least some of the old larch usually survives even intense fires, at least long enough to produce a seed crop to regenerate the stand where there are receptive seedbeds (Schmidt & Shearer 1995).

Even young larch wounded at the base of the stem in a surface fire, heal and continue to grow for centuries. On burned seedbeds, larch seedlings generally outgrow their competitors (Arno & Fischer 1995).

Historically, fire maintained larch (Schmidt & Shearer 1995). Stand-replacing fires burned moist larch sites at mean intervals of from 120 to 350 years. Low- to intermediate-intensity fires favored larch by thinning out much of the competition (Arno & Fischer 1995; Carlson et al. 1995).

After fire, a residual cover of 20 percent or fewer large trees was common historically (Quigley et al. 1996). This structure of large residual trees, occurring singly or in small groups, has declined in many areas. The big larch has been logged out in many places.

In most places lacking fire or thinning, trees that are more shade-tolerant can replace larch in 90 to 140 years. With fire or thinning, larch can maintain dominance for 200 years or more.

Western larch has declined in the northern Rockies because of fire suppression and logging (USDA FS 1998). Tree species composition has shifted to shade-tolerant Douglas fir, grand fir, and lodgepole pine. Because of the shift, current fire-return intervals are longer than 100 years and fire behavior is more extreme, rather than the combination of fires that favored larch (USDA FS 1998).

Restoring western larch

Much of the remaining young larch is too dense to survive to maturity (USDA FS 1998). Restoring western larch includes precommercial thinning to maintain its competitive advantage and insure progress into mature trees that can help areas naturally regenerate after fire.

Precommercial thinning is an important approach to help restore western larch and is scheduled on 168,440 acres of young forests during the next decade; 123,160 acres are in lynx habitat (see Table 3-41).

Alternative A, the no action alternative

The no-action alternative would continue the current precommercial thinning program, increasing the probability of developing a structural component of old-growth larch that can survive fire to regenerate future forests. If fully funded, precommercial thinning may take place on up to 123,160 acres in lynx habitat.

Many larch plantations lack an overstory. Without thinning, they may never develop into mature trees that can survive fire. The no-action alternative would

Table 3-41. Western larch precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Western larch	123,160 acres	45,280 acres	168,440 acres

maintain larch on the landscape by imitating natural disturbance processes.

Alternatives B, C, E & F Scenario 1
These alternatives would restrict precommercial thinning in all lynx habitat in LAUs until the forests no longer provide winter snowshoe hare forage, and larch likely would continue to decline there.

Many of these forests lack the mature, fire-resistant trees capable of reseeding burned landscapes consistent with historic patterns. Since large trees are missing, without extensive fire and expensive artificial regeneration, larch likely would continue to decline on about 123,160 acres in lynx habitat.

Some thinning may be allowed under Alternatives E and F if the purpose is to restore fire to the ecosystem.

Alternative D
Alternative D would permit daylight thinning, retaining up to 80 percent of the winter snowshoe hare habitat. Thinning would release young larch from suppression, so large trees could develop, survive fire, and re-seed future forests.

Trees would be selected based on which are the healthiest larch. To retain 80 percent of the cover, about 20 trees per acre could be daylight thinned to a radius of 12 feet.

This restricted approach to thinning would help return the competitive advantage to this fire-resistant species that needs full sun. Daylight thinning would not protect all the trees and may not the be the ideal approach to restore this species, but some would survive into maturity and produce seed, resulting in future generations and resulting in long-lived snags. Alternative D would help maintain this species on the landscape.

Daylight thinning in lynx habitat would provide enough trees to perpetuate the species through natural regeneration after stand-replacing fire. If fully funded, about 123,160 acres of larch could be thinned in lynx habitat.

Alternative F Scenario 2
Under Alternative F, Scenario 2, the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx. Precommercial thinning to restore larch in lynx habitat is projected to occur on 120 acres on the Nez Perce NF and 190 acres on the Helena NF. Under Alternative F Scenario 2, this thinning could go forward, unless the areas become occupied. This minor amount of precommercial thinning for western larch would have little effect in restoring the species since only 310 acres of the 123,160 acres in lynx habitat could be treated.

Ponderosa pine
Ponderosa pine *(Pinus ponderosa)* is not significantly represented in lynx habitat in the northern Rockies. Generally, it grows in places too dry to support snowshoe hare and lynx; however, it is represented in lynx habitat in the warm, moist cedar forests of northern Idaho and western Montana.

Fire has played a major role in cedar forests with ponderosa pine. The diverse species and structures indicate pre-settlement fire patterns were highly variable. Shorter fire-return intervals likely favored ponderosa pine. Most cedar forests experienced mixed-severity fire. The ponderosa pines were able to survive some stand-replacing fires (Smith & Fischer 1997).

In most of lynx habitat, shade-tolerant trees out-compete ponderosa pine without some disturbance that reduces stem densities. Even if fire were returned to these ecosystems, the younger ponderosa pine would need to be thinned out for them to grow large enough to be able to endure fire. In many places, timber harvest has removed the large pines. In other places, the big trees are so stressed from high understory stem densities that needle diseases and bark beetles are killing them at high rates.

Historically, ponderosa pine forests developed because frequent low-intensity surface fires killed the competing conifers and prepared a seedbed for the pine (Steele 1987). Low-intensity fires helped maintain them because sapling and larger ponderosa pine are more fire resistant than most other species (Oliver & Ryker 1990; Saveland & Bunting 1987).

Restoring ponderosa pine
The small, low-intensity fires are no longer occurring. Instead, even-aged harvest and the changes in wildfire during the last 80 years, mean that more disturbances would be needed to maintain ponderosa pine as a major component.

With full funding, 11,660 acres of ponderosa pine could be precommercially thinning during the next decade in lynx habitat (see Table 3-42).

Alternative A, the no action alternative
The no-action alternative would help maintain ponderosa pine forests in lynx habitat, resulting in more-resilient ecosystems because they would contain fire-adapted species. About 11,660 acres of ponderosa pine in lynx habitat would be precommercially thinned under the no-action alternative if fully funded.

Alternatives B, C, E & F Scenario 1
These alternatives would restrict precommercial thinning in all lynx habitat in LAUs. Ponderosa pine is both more shade-tolerant than larch and less fire resistant. Restricting precommercial thinning would have a similar effect to what is described for western larch, but on fewer acres. Some thinning may be allowed under Alternatives E and F if the purpose is to restore fire to the ecosystem.

Alternative D
Alternative D would allow daylight thinning in ponderosa pine, retaining about 80 percent of the winter snowshoe hare habitat. The ecological effects are similar to Alternative D for western larch.

About 11,660 acres would be thinned, giving the pine a chance to grow large

Table 3-42. Ponderosa pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Ponderosa pine	11,660 acres	48,450 acres	60,110 acres

enough to survive fire. This restricted approach would not protect all the trees and may not be the ideal approach, but some would survive into maturity and produce seed, resulting in future generations. Alternative D would help maintain this species on the landscape.

Alternative F Scenario 2
Under Alternative F, Scenario 2, the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx.

Precommercial thinning to restore ponderosa pine in lynx habitat is projected to occur on 120 acres on the Nez Perce NF; 100 acres on the Bitterroot NF; 2,200 acres on the Salmon-Challis NF; and 90 acres on the Bighorn NF. Under Alternative F Scenario 2, this thinning could go forward, unless the areas become occupied. Precommercial thinning could go forward on about 2,500 acres in lynx habitat, which would help maintain the ponderosa pine component in these forests. 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.

Lodgepole pine
Lodgepole pine *(Pinus contorta)* is the main cover type on about seven million acres in the planning area. Extensive landscapes of near-pure lodgepole or lodgepole/spruce/fir are common in the eastern and southern half of the planning area. Lodgepole pine grows larger and mixes readily with western larch, grand fir, and western white pine on moister sites in the northern and western portion of the planning areas.

Lodgepole is a short-lived tree in western Montana and northern Idaho, and long-lived in eastern Montana and the central Rocky Mountains. Lodgepole is fire-adapted, establishing itself on burned areas (Lotan et al. 1985). Stocking can be as high as 10,000 to 40,000 stems per acre. Most lodgepole forests in the Rocky Mountains were established because of fire.

Historically, fire burned more frequently in lodgepole pine than previously believed. It used to be considered that lodgepole forests were merely the result of stand-replacing fires, but research has shown fire-free intervals of only 22 to 50 years in many lodgepole-dominated forests (Lotan et al. 1985), suggesting fire reduced stand densities. This indicates fire plays a role in both establishing and perpetuating lodgepole pine.

The effects of low-intensity fires in lodgepole forests depend on the availability of seed and amount of duff removed. These low-intensity fires removed some trees, allowing others to grow into large trees. Without some disturbance, lodgepole forests become quite dense with small-diameter stems, small crowns, and little diversity.

Except for extensive timber harvests in eastern Montana in the 1950s and 1960s, and mountain pine beetle salvage harvests in the southeast part of the planning area in the 1970s and 1980s, fire suppression

has resulted in extensive areas of mature lodgepole.

Much of it is susceptible to infestation by mountain pine beetles. Large-scale infestations result in conditions favorable to stand-replacing wildfires or succession to shade-tolerant species (USDA FS 1998).

Restoring lodgepole pine old growth
Precommercially thinning young lodgepole has a dramatic effect on their ability to grow to large diameters (Lotan & Perry 1983). Differences of from four to six inches in diameter were observed by the time the trees were 90 years old, depending on whether there were 500 trees per acre or 2,500.

Studies have shown that unless lodgepole is released from suppression when very young, stagnant growth persists after reductions in density. High stand densities reduced crown diameters and changed the distribution of foliage (Bassman 1984). In some situations, precommercial thinning is necessary to grow merchantable trees.

To provide old growth stand conditions, lodgepole requires disturbance to reduce stem densities. About 35,000 acres of lodgepole pine have been scheduled for precommercial thinning to provide for future old growth in lynx habitat (see Table 3-43).

Alternative A, the no action alternative
Although not an exact substitute, precommercial thinning can have results similar to low-intensity fires. Alternative A would continue precommercial thinning to develop old-growth lodgepole pine, and improve sawtimber yields and product value on up to 34,550 acres in lynx habitat if fully funded.

Alternatives B, C, E & F Scenario 1
Alternatives B, C, E and F would defer precommercial thinning on 34,550 acres in lodgepole forests in all lynx habitat in LAUs, until the forests no longer provide winter snowshoe hare forage.

Generally, precommercial thinning would be deferred until the trees are about 45 years old. Allowing high stem densities to persist beyond 45 years can result in thick forests, with little diversity, producing a landscape out of equilibrium after stand-replacing fire (Shaw 2002).

Delaying thinning until the trees are 45 years old results in tall, skinny trees, with little or no live crown, meaning they have little or no capacity to grow. If they are thinned after age 45, they are easily damaged or felled by snow and wind, and heavy fuel loads result.

Delaying thinning also allows mountain pine beetles to become active earlier in the larger trees, shifting stand structure away from goshawk nesting habitat (Shaw 2002). Any future economic benefits of thinning would not be realized in lynx habitat.

Table 3-43. Lodgepole pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Lodgepole pine	34,550 acres	6,420 acres	40,970 acres

Alternative D
Alternative D would allow precommercial thinning to provide future old growth conditions on up to 34,550 acres in the planning area, if fully funded. Thinning would help add structural diversity to these forests and landscapes.

Alternative F Scenario 2
Under Alternative F, Scenario 2, the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx.

Precommercial thinning to restore lodgepole pine in lynx habitat is projected to occur on 21,020 acres on the Beaverhead-Deerlodge NF and 2,200 acres on the Salmon-Challis NF. Under Alternative F Scenario 2, this thinning could go forward, unless the areas become occupied. Precommercial thinning could go forward on about 23,220 acres in lynx habitat, which would help maintain the lodgepole pine component in these forests. 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.

Research program
About 1,450 acres would be thinned to complete research studies in lynx habitat if fully funded during the next decade (3-44). Most of this research is designed to understand the effects of various thinning methods on tree composition and growth and its effect on wildlife, such as how snowshoe hares respond to various thinning methods.

Genetic resource program
About 220 acres of the 540 acres of genetic test sites are inside lynx habitat (see Table 3-44). Genetic test sites are plantations established to determine the genetic worth of particular trees for future breeding programs (Howe et al. 1996). The plantations are thinned after the test trees begin to compete with one another.

Alternative A, the no action alternative
Using precommercial thinning for various research objectives would continue on 1,530 acres if fully funded; 1,450 acres are inside lynx habitat. Research objectives, such as spacing trials on timber productivity, effects on snowshoe hare populations, and effects on other wildlife, would be met.

Under Alternative A, long-term genetic tests would continue to be implemented according to Regional Tree Improvement Plans on about 540 acres; 220 acres are in lynx habitat.

Alternative B for research
Alternative B would not allow precommercial thinning for research needs. Eliminating research in lynx habitat could prevent us from

Table 3-44. Research & genetics precommercial thinning next decade at full funding

	Inside lynx habitat	Outside lynx habitat	Total
Research	1,450 acres	80 acres	1,530 acres
Genetic tests	220 acres	320 acres	540 acres

understanding more fully the effects of different precommercial thinning prescriptions on winter snowshoe hare habitat.

Alternative B also would not allow precommercial thinning for genetic tests on the 220 acres in lynx habitat. Although not a large part of the precommercial thinning program, the tests and trials are important in the development of improved planting stock. Restricting precommercial thinning would eliminate the potential to implement established research, designed to evaluate the genetic material in the appropriate environment.

Alternatives C, D, E & F Scenario 1
Alternatives C, D, E and F would allow precommercial thinning for research needs and for long-term genetic tests; therefore, the effects would be the same as Alternative A.

Alternative F Scenario 2
Under Alternative F, Scenario 2, the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot,

Table 3-45. Scheduled precommercial thinning allowed by alternative next decade

Precommercial thinning	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt F
Total at historic average funding [1]	*193,530*	*61,450*	*62,470*	*148,420*	*62,470*	*82,880*
Total at full funding	576,220	183,080	184,750	417,370 [2]	184,750	248,000
Research	1,530	80	1,530	1,530	1,530	1,530
Genetic tests	540	320	540	540	540	540
Within 200 feet of dwellings	6,360	6,360	6,360	6,360	6,360	6,360
Restoration [3]	355,700	123,080	123,080	355,700	123,080	186,330
Planted western white pine	70,700 [4]	19,610	19,610	70,700	19,610	70,700
Whitebark pine	9,360	250	250	9,360	250	9,360
Aspen	6,120	3,070	3,070	6,120	3,070	6,120
Western larch	168,440	45,280	45,280	168,440	45,280	45,280
Ponderosa pine	60,110	48,450	48,450	60,110	48,450	48,450
Lodgepole pine	40,970 [5]	6,420	6,420	40,970	6,420	6,420

Acres are those scheduled during the next decade in the planning area; actual acres could change.
[1] *All other figures are based on full funding – assumes historic average 34 percent of program request* – see the *Economics* section, Table K-6 in Appendix K & the vegetation section of the Project Record
[2] The figure for Alternative D does not include what might be allowed if a broad-scale assessment found winter snowshoe hare forage conditions exceed the historic range.
[3] Restoration = western white pine + whitebark pine + aspen + larch + ponderosa pine + lodgepole, both inside & outside lynx habitat if fully funded
[4] The figure for Alternative A represents only the planted rust-resistant western white pine scheduled to avoid loss of competitive advantage to competition from shade-tolerant trees. Total scheduled western white pine thinning is more than 70,700 acres.
[5] The figure for Alternative A represents only those lodgepole pine forests where thinning would be used to encourage old growth. Total scheduled lodgepole pine thinning is greater than 40,970 acres.

Tables K-1 through K-6 in Appendix K show thinning data by unit.

Ashley and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx. Regardless of which scenario is applied (Alternative F, Scenario 1 or 2), precommercial thinning to for research and genetic tests would be allowed; therefore there would be no difference in effect.

Summary of precommercial thinning in the stand initiation stage

A variety of vegetation management projects may take place during the stand initiation phase. These projects may or may not reduce winter snowshoe hare habitat, depending on how much vegetation is removed and when it is done.

Some projects do not reduce winter snowshoe hare habitat because they remove little cover or take place when the trees are not considered foraging habitat. Such activities include pruning western white pine to control blister rust, weed and release, cutting Christmas trees, and digging landscaping trees for transplant. Since these activities are very limited in scope and either have limited effects or may be modified to limit their effects, they are not discussed further in this EIS. Project Record, Forests section provides additional detail.

Precommercial thinning generally does remove winter snowshoe hare habitat. Thinning takes place in thick stands when the trees have grown taller than the average winter snow depth, when they are providing winter snowshoe hare habitat.

About 576,000 acres of precommercial thinning is scheduled to be thinned during the next decade in the planning area (see Tables 3-45 on previous page and 3-46 on next page). Of that, about 395,000 acres or about two-thirds are inside lynx habitat.

There is no guarantee of full funding. On the average in recent years, funding was received to thin only about 20,000 acres per year in the planning area (see Tables 3-45 and 3-46). Funding reductions affect all acres, not just those scheduled inside lynx habitat. See the *Economics* section later in Chapter 3 and Table K-6 in Appendix K for a discussion of historic average funding.

Effects in the stand initiation stage

Precommercial thinning is the primary vegetation management activity in the stand initiation stage. It can be done to restore and perpetuate rust-resistant western white pine, whitebark pine, aspen, western larch, ponderosa pine, and old growth lodgepole pine in the absence of wildfire or other disturbances.

Standard VEG S5 would defer precommercial thinning in winter snowshoe hare habitat in the stand initiation stage. Most, if not all of the precommercial thinning program is scheduled in these young regenerating forests.

Standard VEG S6 would also defer precommercial thinning; however, VEG S6 focuses on lynx habitat in multistoried stages. Very little, if any precommercial

thinning is scheduled in multistoried stages; therefore, the effects of this standard would be limited and it is not discussed further in this section.

Alternative A, the no action alternative

Under Alternative A, the scheduled precommercial thinning program would not be affected. If full funding were available, up to 576,220 acres of thinning could take place in the planning area during the next decade; 395,330 acres are in lynx habitat. If the precommercial thinning program were funded similar to historic average levels, up to 193,530 acres may take place during the next decade (see Table 3-46).

Alternative A would allow using precommercial thinning to restore up to 355,700 acres of species in decline to help retain them on the landscape. Thinning trees in dense young stands results in improved health and vigor (Oliver & Larson 1996). Growth would be concentrated on selected trees that have desired characteristics and future value would be improved where commercial harvest is desired. More trees would grow into large mature trees, especially in areas where fire is suppressed.

Alternative B

Under Alternative B, Standard VEG S5 would defer precommercial thinning in winter snowshoe hare habitat in the stand initiation stage, allowing thinning within only 200 feet of administrative sites, dwellings, and outbuildings to create a space defensible from fire. This means that precommercial thinning, other than adjacent to structures, would not take place until after the trees are 45 years old, and in most cases, would not take place at all.

This standard would result in deferring about 68 percent of the scheduled precommercial thinning, leaving 180,890 acres available during the next decade mostly outside lynx habitat. Under the historic average funding, about 61,950 acres would be precommercially thinned during the next decade (see Table 3-46). Research and genetic tests on 1,670 acres would not take place.

If fully funded, restoration thinning on up to 232,620 acres in lynx habitat would be forgone. The delay until young forests no longer serve as winter snowshoe hare habitat has long-lasting consequences to species that need full sun and are not able to tolerate dense stocking without a significant loss in live crown.

Without reducing stem densities, the ability to keep these species well represented would be seriously impacted. The impact is greatest on planted rust-resistant western white pine, the number one priority for thinning in FS Region 1,

Table 3-46. Alternatives A & B precommercial thinning next decade

	PCT inside lynx habitat	PCT outside lynx habitat	Total if fully funded	Historic average funding
Alternative A	395,330 acres	180,890 acres	576,220 acres	193,530 acres
Alternative B	2,190 acres	180,890 acres	183,080 acres	61,950 acres

because almost three-quarters of the plantations ready for thinning are inside lynx habitat. Generally, the thinning allowed outside lynx habitat would be in drier places, where western white pine, whitebark pine, and larch do not grow.

Delayed thinning can substantially increase the fuel loading. Fiber-thinning in previously un-thinned 50-year old lodgepole/larch forests on the Bonners Ferry Ranger District have resulted in considerable fuel loading, even when the material removed was used for pulp down to three inches in diameter. Fuel treatments on these thinned areas averaged $50 per acre (Barry Wynsma, pers. com.).

Alternative C

Under Alternative C, Standard VEG S5 allows vegetation management projects in winter snowshoe hare habitat in the stand initiation stage for research, genetic tests sites and within 200 feet of dwellings and associated outbuildings.

While the range of management activities affected has been broadened, the primary activity affected would be precommercial thinning. Alternative C would result in about 184,750 acres thinned in the next decade if fully funded, of which 3,860 acres would be in lynx habitat. Under historic average funding, only 62,470 acres would be accomplished (see Table 3-47).

The effects of Alternative C would be similar to Alternative B. If fully funded, restoration thinning would be forgone on up to 232,620 acres in lynx habitat.

Alternative D

Alternative D modifies Standard VEG S5 to allow a number of vegetation management projects:

- For research and genetic test sites;
- Within 200 feet of dwellings or associated outbuildings;
- To restore western larch, aspen, old growth lodgepole pine, ponderosa pine, western white pine, and whitebark pine forests;
- When a broad-scale assessment has found winter snowshoe hare habitat exceeds the range of historic conditions

Alternative D could result in thinning up to 417,370 acres in the next decade if fully funded; 236,480 acres are in lynx habitat. More acres could be thinned if a broad-scale assessment determines winter snowshoe hare forage conditions exceed the range of historic conditions. Under historic average funding, only 138,420 acres would be thinned (see Table 3-47).

Alternative D would contribute to

Table 3-47. Alternatives C, D, E, & F precommercial thinning next decade

	PCT inside lynx habitat	PCT outside lynx habitat	Total if fully funded	Historic average funding
Alternatives C & E	3,860 acres	180,890 acres	184,750 acres	62,470 acres
Alternative D	236,480 ‡ acres	180,890 acres	417,370 acres	148,420 acres
Alternative F	67,110 acres	180,890 acres	248,000 acres	82,880 acres

‡ For 185,910 acres, only 20 percent of the winter snowshoe hare forage would be removed

restoring whitebark pine, aspen, ponderosa pine, western larch, planted rust-resistant western white pine, and to develop future old growth lodgepole pine. These species and structures require disturbance early in their life cycles to maintain them on the landscape.

Alternative E

Alternative E is similar to Alternative C, except that it allows precommercial thinning for fuel projects. Some thinning may occur to restore fire to the ecosystem; however, the number of acres that may be done as "fuel treatment projects" is not known. It is most likely to take place in aspen, larch, western white pine, and whitebark pine forests.

Alternative F Scenario 1

Alternative F Scenario 1 would apply the management direction to all lynx habitat in LAUs. Alternative F modifies Standard VEG S5 to allow precommercial thinning:

- Within 200 feet of dwellings or associated outbuildings;
- For research and genetic test sites;
- To restore aspen, western white pine and whitebark pine forests; or
- Based on new information that is peer reviewed and accepted by the regional/state levels of the Forest Service and Fish and Wildlife Service, where a written determination states: (1) that a project is not likely to adversely affect lynx; or (2) that a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat; or
- In the WUI.

Alternative F could result in thinning up to 248,000 acres over the next decade if fully funded; 67,110 acres are in lynx habitat. Under this historic average funding, only 82,880 acres would be thinned (see Table 3-47). More acres could be thinned if new information shows that precommercial thinning would have limited effect or would result in a short term adverse affect, but long-term beneficial effect. Research is being conducted to see if in some situations winter snowshoe hare habitat could be prolonged. Alternative F would contribute to restoring aspen, whitebark pine, and planted rust-resistant white pine.

Alternative F Scenario 2

Under Alternative F, Scenario 2, the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx.

The effects to those forests currently occupied would be the same as described in Alternative F, Scenario 1. On the currently unoccupied units (100 percent unoccupied), precommercial thinning could occur on an additional 66,870 acres in lynx habitat over the next decade (see Table 3-23 on page 195). This assumes lynx are not considered in project design, which may or may not be the case. Some portion of an additional 38,550 could be thinned on the units with isolated mountain ranges.

Alternative F, Scenario 2, could result in thinning between 315,000 and 353,500 acres over the next decade, if fully funded. About 133,980 acres could be in lynx habitat if fully funded. This includes 67,110 acres as allowed under Alternative F, Scenario 1 and an additional 66,870 acres that could be thinned on the units that are unoccupied. Plus some portion of 38,500 acres of precommercial thinning on the isolated mountain ranges could occur in lynx habitat.

Under the historic average, only 110,000 acres are likely to be thinned (see Table 3-47). Some thinning on the unoccupied units may still not be done if the units consider lynx in the design of their activities. Alternative F, Scenario 2 would contribute to restoring aspen, whitebark pine, and planted rust-resistance white pine. If the areas become occupied at a future time, then the effects on these units would be the same as Alternative F, Scenario 1.

Older multistoried stages

Management actions in older multistoried stages

A multistoried structure generally forms as trees grow old and die and new trees regenerate underneath the canopy of older trees. Two older multistoried stages – the *understory reinitiation* and the *old forest multistoried* – can provide winter snowshoe hare habitat (Ruggiero et. al 2000a; John Squires, pers. com.).

In winter snowshoe hare habitat, an overstory layer of large trees grows above dense undergrowth of trees and shrubs with live crowns within the reach of snowshoe hares during winter when the snow is at its average maximum depth.

Some multistoried forests do not provide winter snowshoe hare habitat because the understory is not dense enough, or the understory live crowns are too far above the snow for the hares to reach.

Forest Inventory and Assessment (FIA) data for Montana was used to gauge how much lynx habitat exists in multistoried stages – for more discussion, see the *Lynx* section. About 1.5 million acres or 16 percent of lynx habitat is multistoried and provides some level of winter snowshoe hare habitat – see Table 3-48 here and Table 3-2 earlier in the *Lynx* section.

About 75 percent of the multistoried forests are outside wilderness. It is likely that a similar percentage occurs in the rest of the planning area, since western Montana is similar to northern Idaho and eastern Montana is similar to Wyoming, Utah, and southern Idaho.

Vegetation management projects that may take place in multistoried forests outside of wilderness include:

Precommercial thinning
Precommercial thinning removes some small trees to improve the growing conditions for the remaining trees. Precommercial thinning takes place mostly in the young forests created by regeneration harvest or fires. Little precommercial thinning takes place in multistoried forests. Precommercial thinning can negatively affect snowshoe hare populations (LCAS).

Understory thinning
Understory thinning, or thinning from below, removes smaller trees growing under taller ones, to remove ladder fuels or to improve the health and vigor of the overstory. Understory thinning may or may not provide commercial products.

Winter snowshoe hare habitat may or may not be directly affected depending on the

Table 3-48. Multistoried lynx habitat on NFS lands in Region 1Montana

	Inside wilderness	Outside wilderness	Total
High density forests	355,000 acres	1,120,000 acres	1,475,000 acres
Low density forests	198,000 acres	812,000 acres	1,010,000 acres
Total	553,000 acres	1,932,000 acres	2,485,000 acres

size of trees removed. Winter snowshoe hare habitat would be affected if the entire understory were removed, including the trees within reach of hares. If mid-story trees are removed, some of the winter snowshoe hare habitat may be affected.

Commercial thinning
Commercial thinning generally removes mid-story trees to reduce competition with other trees. Some commercial thinning may take place in multistoried forests. Winter snowshoe hare habitat would not be substantially affected because small trees are not removed, except in skid trails, unless it is combined with understory thinning.

Even-age harvests
Even-age harvests include clearcuts, seed tree cuts, and shelterwood harvests. These harvest methods remove mid- and overstory trees with commercial value, to regenerate even-age forests. Clearcutting removes all the trees. Seed tree cuts retain some large trees and shelterwood cuts retain more overstory trees, until seedlings become established.

Typically, all the understory trees are removed; even-aged harvests remove winter snowshoe hare habitat.

Two-age harvests
Two-age harvests are clearcuts, seed tree cuts, and shelterwood cuts that retain some overstory trees. They retain structural diversity and result in a two-age stand as an understory of younger trees regenerate. Typically, all the understory trees are typically removed in two-aged treatments; two-age harvests remove winter snowshoe hare habitat.

Uneven-age harvests
Uneven-age harvests remove trees with commercial value either individually or in groups. They maintain a multi-age structure by removing some trees of all sizes and by regenerating the openings.

Uneven-age harvests can either create or remove winter snowshoe hare habitat.

- If understory trees are removed during logging, forage could be lost.
- If openings are created providing space where young trees can grow, forage could be created.

Salvage logging
Salvage logging removes trees that are dead, damaged, or dying in order to recover economic value. Salvage harvest typically results in removing the dead or dying, large overstory trees, but not the small understory trees or live large overstory trees whose branches come down to the snowline, that make up winter snowshoe hare habitat. Some small trees may be incidentally removed in skid trails or skyline corridors.

Prescribed fire
Prescribed fire removes the understory trees, and sometimes overstory trees as well, depending on the management objective. Prescribed fire may or may not include mechanical treatment such as slashing or understory thinning before burning. Prescribed fires remove understory trees and winter snowshoe hare habitat.

Table 3-49. Projects allowed in multistoried winter snowshoe hare habitat under Standard VEG S6

Kind of project	Alt A	Alt B	Alt C	Alt D	Alt E	‡‡Alt F
Precommercial thinning	Yes, where allowed in plans	No, except near structures	No, except near structures or for research	No, except near structures, for research, for restoring whitebark pine, western white pine, larch, ponderosa pine & old growth lodgepole, or when there's an abundance of multistoried winter snowshoe hare forage	Possible to deviate from Guideline VEG G8 with rationale	No, except in WUI, near structures, research, or incidental removal during salvage
Understory thinning	Yes	Yes, if commercial; No, if non-commercial	Same as above	Same as above	Same as above	Same as above
Commercial thinning ‡	Yes	Yes	Same as above	Same as above	Same as above	Same as above
Even-age harvest	Yes	Yes	Same as above	Near structures, to recruit forage in openings, or when there's an abundance of multistoried winter snowshoe hare forage	Same as above	Same as above
Two-age harvest	Yes	Yes	Same as above	Same as above	Same as above	Same as above
Uneven-age harvest ‡	Yes	Yes	Same as above	To recruit forage in openings	To recruit forage in openings	To recruit forage in openings
Salvage ‡	Yes	Yes	Same as above	Near structures, to create openings or to improve or maintain forage	Yes, incidental removal of forage allowed	Yes, incidental removal of forage allowed
Prescribed fire ‡	Yes	Yes	Same as above	Near structures, to create openings, to improve or maintain forage, or for whitebark pine	Possible to deviate from guideline VEG G8 with rationale	No, except in WUI

† Under Alternative E, Standard VEG S6 is dropped and replaced by Guideline VEG G8
‡ Vegetation management projects can take place without reducing winter snowshoe hare forage, depending on where the forage is and where the target trees are. It's likely that under Alternatives C, D, E and F, some foraging habitat would be removed – these projects would be deferred.
‡‡ Alternative F Scenario 1 would apply the management direction to all lynx habitat in LAUs. Alternative F Scenario 2 would apply the management direction to occupied lynx habitat in LAUs.

Effects in older multistoried stages

This analysis evaluates the effects of the alternatives on a variety of vegetation management projects that could take place in the multistoried forests. However, the analysis is qualitative because there is little information on how many of the 1.9 million acres of multistoried lynx habitat outside wilderness are likely to need treatment. Effects on fuel treatments are discussed in the *Fire* section.

Standard VEG S6 applies to multistoried forests and would limit certain activities depending on the alternative.

Alternative A, the no action alternative

Under the no-action alternative, no changes would be made to existing plans. Vegetative management projects would not be precluded in multistoried forests except as already precluded in existing plans.

Alternative B

Standard VEG S6

Under Alternative B, Standard VEG S6 would not allow precommercial thinning that reduces winter snowshoe hare habitat in multistoried forests. It allows thinning within 200 feet of administrative sites, dwellings, and outbuildings to create a space defensible from fire.

Under Alternative B, Standard VEG S6 defers only precommercial thinning or understory treatments. It does not defer prescribed burning, even-age, two-age, uneven-age, or salvage harvests.

Table 3-49 (previous page) shows which vegetation management projects that reduce winter snowshoe hare habitat in multistoried forests would be limited by Standard VEG S6 under the different alternatives.

Alternative C

Under Alternative C, Standard VEG S6 would not allow any vegetation management projects that reduce winter snowshoe hare habitat in multistoried forests except for those:

- Within 200 feet of administrative sites, dwellings or outbuildings
- For research studies

Understory trees are not distributed uniformly, so it may be possible to remove trees without affecting foraging habitat.

Standard VEG S6 also would defer prescribed fire and precommercial thinning to restore whitebark pine in some places. Whitebark pine treatments are planned on about 60,000 acres during the next decade.

It is not known how many of those areas provide winter snowshoe hare habitat. It is likely some areas would not be treated due to this standard, further contributing to the decline of whitebark pine.

It is difficult to determine what effect this standard would have on timber sales. It is likely some activities would not occur in some places or would be deferred because of this standard.

Most timber harvest takes place on the suitable timber base, where timber harvest is allowed under existing plans. About half of the multistoried habitat that could provide winter snowshoe hare habitat is in the suitable timber base.

Alternative D

Under Alternative D, Standard VEG S6 would allow vegetation management projects that reduce winter snowshoe hare habitat in multistoried forests:

- Within 200 feet of administrative sites, dwellings or outbuildings
- For research studies
- To restore whitebark pine
- To restore or maintain western white pine, western larch, ponderosa pine so long as 80 percent of the winter snowshoe hare habitat is retained
- To develop future old growth characteristics in lodgepole pine
- To improve or maintain winter snowshoe hare habitat in the long term
- When a broad scale assessment determines that the amount of multistoried winter snowshoe hare habitat exceeds what is expected in the normal range of historic conditions.

Other projects would be deferred until forests no longer provide foraging habitat. Some projects would be allowed if they improve or maintain forage habitat in the long term.

Multistoried forests include a variety of conditions. Some forage habitat is likely to be growing out of reach of snowshoe hares – removing these trees under these conditions and initiating a new crop of trees could prolong forage.

Under Alternative D, it is difficult to determine the effect Standard VEG S6 would have on timber programs. Alternative D allows vegetation management projects under a variety of circumstances. One condition allows projects that improve forage over the long term – timber harvest could be used to create openings for new forage to develop. Still, it is likely some vegetation management projects would not take place because of this standard.

Alternative D would not interfere with efforts to restore whitebark pine. It would allow projects that restore and maintain this species.

Alternative E

Under Alternative E, Standard VEG S6 is dropped and the management direction added in Guideline VEG G8. The guideline recommends retaining winter snowshoe hare habitat in multistoried forests but allows timber harvest where understory forage is lacking.

Winter snowshoe hare habitat would have to be considered when designing timber projects, but it could be removed if reasons can be documented.

Alternative F Scenario 1

Alternative F Scenario 1 would apply the management direction to all lynx habitat in LAUs.

Under Alternative F, Standard VEG S6 would not limit vegetation management activities in multistoried forests adjacent to dwellings, for research studies, for incidental removal during salvage harvests, or for fuel treatment projects in

the WUI. The standard allows harvest, such as group selection, in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories. Essentially removing groups of trees in these areas may provide improved conditions for developing a young understory component.

Under Alternative F, it is difficult to determine the effect Standard VEG S6 would have on timber programs. Alternative F allows vegetation management projects under a few circumstances. However, it is likely some activities would not occur in some places or would be deferred because of this standard.

Alternative F Scenario 2

Under Alternative F, Scenario 2, the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx. Under Alternative F Scenario 2, activities in multistoried winter snowshoe hare habitat could occur, unless the areas become occupied. Management direction can still be considered; therefore it is likely some projects would be designed to meet lynx needs and some would not.

Other vegetation standards and guidelines that could affect timber harvest

Several other standards and guidelines may affect the ability to harvest timber in lynx habitat. They vary by alternative, and include:

- *Standard VEG S1:* Vegetation management projects would be restricted in LAUs with 30 percent or more in a stand initiation structural stage that does not yet provide for winter snowshoe hare habitat. These areas include forests that are regenerating following timber harvest or fire and the trees or shrubs are too short to provide forage and cover for snowshoe hares during winter. Generally, this stage exists for ten to 30 years after disturbance.
- *Standard VEG S2:* Regeneration timber harvest would be restricted in LAUs if it leads to 15 percent or more in a stand initiation structural stage that does not yet provide for winter snowshoe hare habitat created during the past decade.
- *Standard VEG S3:* Vegetation management projects would be restricted when there is less than ten percent denning habitat in an LAU.
- *Standard VEG S4:* Generally, salvage logging would not be allowed in disturbed areas five acres or smaller. However, when field validation and mapping finds an LAU contains ten percent denning habitat well distributed, small patches may be salvage logged.

- *Guideline VEG G1:* Create winter snowshoe hare habitat where it is scarce or absent.

Alternative A, no action

Under the no-action alternative, no changes would be made to existing plans. Vegetative management projects would not be precluded in multistoried forests except as already precluded in existing plans.

Timber harvest and salvage logging could take place where currently allowed.

Alternative B

Standard VEG S1

Under Alternative B, Standard VEG S1 would limit vegetation management projects when there is more than 30 percent in very young regenerating forests in an LAU unless a broad scale assessment substantiates different historic levels.

Only a few LAUs (less than 13 percent in FS Region 1) exceed 30 percent, resulting from wildfires that burned large areas (Hillis et al. 2003).

Salvage harvest generally would not be constrained by this standard because removing dead trees does not create the stand initiation structural stage. The original disturbance created this condition.

Standard VEG S2

Under Alternative B, Standard VEG S2 would limit timber harvests if they produced more than 15 percent in a stand initiation structural stage that does not yet provide for winter snowshoe hare habitat in a 10-year period. About 13 percent of the LAUs in Montana have more than 15 percent in a young stand initiation structural stage, mostly resulting from wildfires.

Salvage harvest would not be constrained by this standard.

Standard VEG S3

Under Alternative B, Standard VEG S3 restricts projects in LAUs with less than ten percent denning if they remove vegetation from areas with the highest potential to develop denning habitat.

Generally, denning habitat is not likely a limiting factor in the planning area (Hickenbottom et al. 1999). Where there is not enough, projects would be precluded, which would primarily affect salvage logging.

Standard VEG S4

Under Alternative B, Standard VEG S4 generally restricts salvage logging where trees have been killed in pockets smaller than five acres. However, it does not apply when an LAU has been mapped and field-verified to contain ten percent denning habitat.

It is likely many LAUs provide enough denning habitat, but some salvage may be precluded.

Guideline VEG G1

Under Alternative B, Guideline VEG G1 says projects should be planned to develop winter snowshoe hare habitat where it is lacking. A variety of projects could be done where there is less than 30 percent in a stand initiation structural stage, or less than 15 percent created by timber harvest.

Summary for Alternative B
Alternative B may defer timber projects in some areas because of Standards VEG S1, VEG S2, and VEG S3. Guideline VEG G1 encourages vegetation management, including timber harvest to create winter snowshoe hare habitat.

It is likely there would be no change in overall timber harvest outputs, but there may be changes in what material is harvested and where. The effect of Alternative B on salvage projects is likely to be limited because it is likely many – if not all - LAUs provide ten percent denning.

Alternative C

Standard VEG S1
Under Alternative C, Standard VEG S1 applies to multiple LAUs. Some projects that create more than 30 percent in a stand initiation structural stage that is too short to provide winter snowshoe hare habitat may be deferred, but only where large fires burned, such as the 1988 Yellowstone and Canyon Creek fires (Hillis 2003).

Standard VEG S2 dropped, Guideline VEG G6 added
Under Alternative C, Standard VEG S2 is dropped and the management direction added in Guideline VEG G6. Guideline VEG G6 would have limited effect on timber projects both because it is a guideline and because few LAUs exceed 15 percent in a stand initiation structural stage caused by timber harvest. It would not affect salvage logging.

Standards VEG S3 & VEG S4
Alternative C includes the same version of Standard VEG S3 as Alternative B. It also includes Standard VEG S4, which would allow salvage logging on patches smaller than five acres next to homes.

Generally, these standards would not limit timber or salvage projects because it is likely many – if not all - LAUs provide enough denning habitat, but some projects could be deferred or dropped.

Guideline VEG G1
Under Alternative C, Guideline VEG G1 has been changed to encourage projects in the stem exclusion stage.

Summary for Alternative C
Alternative C may defer timber projects in some areas because of Standards VEG S1 and VEG S6 and Guideline VEG G6. Guideline VEG G1 encourages projects that create winter snowshoe hare habitat.

It is likely there would be no change in overall timber harvest outputs, but there may be changes in what material is harvested and where. The effect of Alternative C on salvage projects is likely to be limited because it is likely most LAUs provide ten percent denning.

Overall, fewer timber projects are likely to be deferred under Alternative C because Standard VEG S1 is less constraining than Alternative B.

Alternative D

Standard VEG S1
Under Alternative D, Standard VEG S1 applies to a sub-basin or isolated mountain range. The standard is likely to constrain vegetative management projects that create a stand initiation structural stage only in areas that had very large

fires such as the 1988 Canyon Creek and Yellowstone fires (Hillis 2002).

Standard VEG S2 & Guideline VEG G6 both dropped
Alternative D drops Standard VEG S2 and Guideline VEG G6 as well, so they have no effect to timber management.

Standard VEG S3
Alternative D modifies Standard VEG S3 to let project design mitigate effects in denning habitat. Projects would still need to leave some overstory and enough coarse woody debris to provide den sites. Generally, salvage projects could be designed to meet these objectives.

Standard VEG S4 dropped, Guideline VEG G7 added
Under Alternative D, Standard VEG S4 is dropped and the management direction added in Guideline VEG G7. Retaining the small patches of dead trees would be considered, but salvage harvest could take place if there is reason to do so.

Summary for Alternative D
Alternative D may defer timber projects in some places because of Standards VEG S1 and VEG S6. Alternative D is not likely to affect timber projects, except even-age or two-age harvests where large fires have occurred.

It is likely there would be no change in overall timber outputs, but there may be changes in what material is harvested and where. Alternative D would have limited effects on salvage harvest.

Overall, fewer timber projects are likely to be deferred under Alternative D because Standards VEG S1 and VEG S6 are less constraining than Alternatives B or C.

Alternative E

Standard VEG S1
Under Alternative E, Standard VEG S1 applies to multiple LAUs. Some projects that create more than 30 percent in a stand initiation structural stage may be deferred, but only where large fires had burned. The standard would not apply to timber harvest used to meet fuel treatment objectives.

Standard VEG S2 & Guideline VEG G6 both dropped
Alternative E drops Standard VEG S2 and Guideline VEG G6, the same as under Alternative D, so they have no effect to timber management.

Standard VEG S3
Under Alternative E, Standard VEG S3 would require leaving some overstory and enough coarse woody debris to provide den sites if denning habitat was lacking. It would not apply to salvage logging done for fuel treatment.

Standard VEG S4 dropped, Guideline VEG G7 added
Under Alternative E, Guideline VEG G7 would encourage retaining small patches of dead trees, but salvage harvest could take place with adequate rationale.

Summary for Alternative E
Alternative E has similar effects on timber harvest as Alternative C. Standard VEG S1 and Guidelines VEG G6 and VEG G8 may defer harvest in some areas, but Guidelines VEG G6 and VEG G8 also encourage projects creating winter snowshoe hare habitat where it is lacking. Timber harvest would not be precluded if done to meet fuel treatment objectives

developed through a collaborative process.

It is likely there would be no change in overall timber harvest outputs, but there may be changes in what material is harvested and where. Alternative E also would not constrain fuel treatment, so it would have less effect on timber outputs than Alternative C.

The effects of Alternative E on salvage projects are similar to Alternative D.

Alternative F Scenario 1

Alternative F Scenario 1 would apply the management direction to all lynx habitat in LAUs. Under Alternative F, Standard VEG S1 applies to a single LAU. Some projects that create more than 30 percent in a stand initiation structural stage may be deferred, but only where large fires had burned. The standard would not apply to regeneration harvest used to meet fuel treatment objectives in the WUI.

Standard VEG S2
Under Alternative F, Standard VEG S2 would limit regeneration harvests if they result in more than 15 percent in a stand initiation structural stage in a 10-year period. About 13 percent of the LAUs in Montana have more than 15 percent in a young stand initiation structural stage, mostly resulting from wildfires.

Salvage harvest would not be constrained by this standard.

Standard VEG S3, Standard VEG S4 dropped, Guideline VEG G11 added
Under Alternative F, Standards VEG S3 and S4 are dropped and are replaced by Guideline VEG G11. This guideline says denning habitat should be distributed in an LAU and if not, projects should be designed to retain some coarse woody debris or residual trees. Very few, if any timber harvest projects would be constrained due to this guideline.

Summary for Alternative F Scenario 1
Standards VEG S1 and S2 may defer regeneration harvest in some areas, but Guideline VEG G1 encourages projects creating winter snowshoe hare habitat where it is lacking. Some timber harvest may be redesigned or dropped in to meet lynx needs.

It is likely there would be no change in overall timber harvest outputs, but there may be changes in what material is harvested and where. Alternative F also would not constrain fuel treatment in the WUI, so it would have less effect on timber outputs than Alternatives B, C or D, but more than E.

Alternative F, Scenario 2

Under Alternative F, Scenario 2, the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied by lynx.

Under Alternative F, Scenario 2, Standards VEG S1 and S2 would not have to constrain projects on unoccupied forests. Generally, these standards are not exceeded anyway, so there would be likely little change (Hillis et al. 2003). Management direction can still be considered; therefore it is likely some

projects would be designed to meet lynx needs and some would not. In the cases lynx are considered then some timber harvest may be redesigned or dropped. In other cases there would be no change in design.

On the unoccupied units it is likely there would be no change to overall timber harvest outputs, but there still could be changes in what material is harvested and where.

Effects to ASQ and LTSY

Several people felt the management direction may affect the Allowable Sale Quantity (ASQ) and Long Term Sustained Yield (LTSY). Therefore this section has been included in the FEIS to fully disclose the effects on these components.

ASQ

ASQ is the quantity of timber that may be sold from the area of suitable land covered by the forest plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity" (36 CFR 219.3 (1982 regulations)).

Under any alternative standards VEG S1 and VEG S2 may defer regeneration harvest in some areas, but commercial thinning, or other "intermediate" treatments could occur in lieu of regeneration harvest. In addition, Guideline VEG G1 encourages projects creating winter snowshoe hare habitat (regeneration harvest) where winter habitat is lacking. Based on this, the management direction would likely have no change in overall timber harvest outputs, but the direction may change what material is harvested and where. The management direction would not modify the quantity of timber that may be sold from the area of suitable land covered by the forest plan; therefore there would be no change to the ASQ on any unit.

LTSY

LTSY is the highest uniform wood yield that may be sustained under specified management intensities consistent with multiple-use objectives after stands have reached desired conditions (36 CFR 219.3 (1982 regulations) and FSH 1909.12 60.5).

All alternatives limit precommercial thinning to some degree. Limiting precommercial thinning in lodgepole pine forests could affect LTSY because it reduces the ability for these forests to grow and become merchantable. As noted in the section on lodgepole pine, if these forests are not thinned they become suppressed and would not release without some type of disturbance and generally no other tree species would replace them.

Limiting thinning in other forest types, such as in mixed conifer and spruce fir types does not have the same effect. Trees that require full sun, such as white pine or larch would just be replaced by other tree species that do not require sun; so there would be no difference in the amount of wood yield from the site, but there would be a difference in the species.

The Beaverhead-Deerlodge and Bridger-Teton National Forests are the only units that have a majority of their precommercial thinning scheduled over

the next ten years in lynx habitat and in lodgepole pine (Appendix K, Table K-5). However, under current programs, the units only have funding for about 34 percent of their thinning program, so it is difficult to distinguish the effects from the management direction in this proposal from the effects of budgets. Only under substantial increased budgets would there be an identifiable effect, and such budgets are unlikely.

Alternative D would allow precommercial thinning in lodgepole pine forests; therefore this alternative would not affect LTSY.

Alternatives B, C, and E would limit precommercial thinning and lodgepole pine forests; therefore they could have an effect on LTSY.

Alternative F Scenario 1 limits precommercial thinning in lodgepole pine forests in lynx habitat, but allows for consideration of new information. It is possible new information would become available that would indicate some thinning in these forests may be beneficial to winter snowshoe hare habitat by increasing the length of time forage is available. (See the project record, DEIS comment # 505. This comment contains a summary of a thesis paper and discusses this possibility and reference Shaw 2002.) Therefore, for Alternative F it is uncertain whether or not LTSY would be affected.

Under Alternative F Scenario 2 the management direction only applies to occupied lynx habitat. At this time the Beaverhead-Deerlodge National Forest is considered unoccupied; therefore the management direction would not apply.

The Forest Plans for both the Beaverhead-Deerlodge and Bridger-Teton National Forests are being revised. The Beaverhead-Deerlodge should complete their revision process in 2007. Their draft EIS for the Forest Plan recognizes the potential cumulative contribution the management direction may have on reducing growth and yield (DEIS, page 326); therefore their plan is accounting for this change. The Bridger-Teton should complete its revision in 2008.

Cumulative effects

Alternative A

On species of decline

Disturbance processes such as fire would continue to shape the landscapes of the northern Rockies. Fire suppression would also continue, resulting in forests with too many trees and continuing the change in species composition from those that depend on fire to those that do not. Efforts to restore species of decline would continue through reforestation, thinning, and prescribed fire, cumulatively improving conditions over time.

On timber program

Past, present, and reasonably foreseeable actions listed in Appendix L have reduced the area available for timber harvest. Other tools, such as prescribed fire would be used to meet resource objectives in these areas.

Alternatives B, C, D, E, and F

On species of decline

Like Alternative A, the natural disturbance processes and fire suppression would continue. Using fire would be encouraged to restore ecosystems. The tools used to restore tree species in decline would be more limited; it is likely that some would experience further decline. However, restoration could take place outside lynx habitat or in areas that do not provide winter snowshoe hare habitat. More tools would be available under Alternatives D and F, so the extent of effect would not be as great.

On timber program

Past, present, and reasonably foreseeable actions listed in Appendix L have reduced the area available for timber harvest. Other tools, such as prescribed fire would be used to meet resource objectives in these areas. The proposal would have a limited cumulative effect on the timber program. There could be a change in the type of material harvested and where.

Plants

Affected environment

The planning area contains populations of 283 rare plant species (see Appendix J). They include eleven federally listed species, four federal candidate species, and 268 Regional Foresters' Sensitive Species (USDA FS 2004c, 2004d, 2005a, and 2007).

These plants occur infrequently and are generally found in specific habitats. Many are found in wetter areas because they need more moisture to survive. Some are found in older stands of lodgepole pine, grand fir, or subalpine fir. A few are associated with young regenerating stands, and some require periodic disturbance to maintain their populations.

Of the federally listed plant species, only two have known occurrences or suitable habitat in lynx habitat or lynx linkage habitat. These two species are water howellia (*Howellia aquatilis*) and Ute ladies' tresses (*Spiranthes diluvialis*). In addition, one candidate for listing, slender moonwort *(Botrychium lineare)* has known occurrences and suitable habitat in lynx habitat and lynx linkage habitat.

The Biological Assessment for threatened and endangered plant species (in project file) contains the detailed descriptions and analysis of the threatened and endangered plant species in the lynx planning area. The following is a brief description of their occurrences and habitat needs:

Water howellia (*Howellia aquatilis*) is a federally listed threatened species. It grows in wetland fens, pothole ponds, and old oxbows along river drainages (Shelly 1988, USDA Forest Service 1997c). In the lynx planning area it is known primarily from the Swan River Valley in Montana, although it is also known from one location in Idaho (Montana Natural Heritage Program 2007).

Ute ladies'-tresses *(Spiranthes diluvialis)* is a federally listed threatened species. It grows in some of the shallow, braided wetlands and seep areas in Montana and Idaho (Heidel 1997). It also occurs in Utah (Utah Division of Wildlife Resources 1998).

Slender moonwort *(Botrychium lineare)*, a candidate for federal listing (USDI FWS 2001), has known populations in Montana and Idaho in open areas such as roadsides and other areas dominated by low-growing plants.

Although **whitebark pine** is not a threatened, endangered, or sensitive (TES) plant, whitebark pine is in steep ecological decline due to a number of threats to the species; the threats are fire suppression, white pine blister rust, and mountain pine beetle. Thinning can imitate some of the effects of the fires that historically favored whitebark pine over its competitors in mid- and high-subalpine zones after stand-replacing wildfire.

Effects

The proposal would add restrictions and encourage such activities as wildland fire use at the programmatic level. It would have no direct effects.

It is difficult to determine indirect effects of programmatic direction to individual populations or habitat niches except on a very broad scale. Therefore, this analysis evaluates potential effects at the broad scale from the restrictions imposed and activities encouraged, focusing primarily on the objectives, standards and guidelines for vegetation management.

Alternative A, the No Action Alternative

Under the no-action alternative, the existing management direction in the existing plans for threatened, endangered, and sensitive species plants would remain in place. Alternative A would have no direct, indirect, or cumulative effects on threatened, endangered, and sensitive species plants beyond those of the current plans. Current plans require site-specific analysis before projects can be implemented, so any effects on TES plants would be subject to future site-specific analysis at the time a project is analyzed.

Alternatives B, C, D, E, and F

Vegetation objectives

In all the action alternatives, Objectives VEG O1 through VEG O4 describe managing vegetation based on historical succession and disturbance processes, and encourage the development of snowshoe hare habitat, as the desired future condition.

Using historic succession and disturbance regimes, including fire, to restore ecological processes should help create a dynamic array of habitat types distributed across the landscape for TES plants.

Vegetation standards

In all action alternatives Standards VEG S1 through VEG S6 limit the location or extent of vegetation management projects more than the existing plans.

The impact of Standard VEG S1 is virtually the same among the action alternatives; the difference in the standard among the alternatives is at what scale the standard is applied. VEG S1 basically says that if more than 30 percent of lynx habitat currently does not yet provide winter snowshoe hare habitat no additional habitat may be harvested at that time (see Table 2-1 for the specific wording for each alternative). Generally, these limitations would not adversely affect TES plants because they constrain projects more than do the existing plans.

Alternative B, the Proposed Action

Vegetation standards and guidelines

Under Alternative B, Standards VEG S1 through VEG S6 and Guidelines VEG G1 through VEG G5 limit the location or extent of vegetation management projects. Generally, these limitations would not adversely affect TES plants because they constrain projects more than do the existing plans.

Standard VEG S2

Timber management projects shall not change more that 15 percent of the lynx habitat in an LAU in any ten-year period. Generally, this limitation would not

adversely affect TES plants because it constrains projects more than do the existing plans.

Standards VEG S3 & S4
These standards concern maintaining adequate amounts of lynx denning habitat on the landscape. Generally, these limitations would not adversely affect TES plants because they constrain projects more than do the existing plans.

Standards VEG S5 & VEG S6
Under Alternative B, Standards VEG S5 and VEG S6 would prohibit precommercial thinning in lynx habitat, but would allow thinning to treat fuels within 200 feet of dwellings.

Prohibiting precommercial thinning would not have detrimental effects on the habitat types or ecological communities upon which any TES plants depend, and may prove beneficial to some in the long run. Allowing precommercial thinning with 200 feet of dwellings would not substantially affect any TES plants or habitat.

Young regenerating forests
In young regenerating forests, limiting thinning could help diversify habitats. Adverse effects on plants are the greatest when the thinning is heavy. Generally, light thinning has no effect, and sometimes if an underburn follows light thinning, the effect is beneficial.

Older multistory forests
In older multistory forests, plants often become established in the gaps created when overstory trees die or otherwise no longer fully occupy their growing space. Such plants can be characterized by their ability to establish and grow in reduced sunlight.

Restoring whitebark pine
Returning historic fire regimes would be the most successful way to restore whitebark pine, but would be difficult to implement. Current restoration efforts rely on thinning and precommercial thinning in subalpine fir forests to mimic the effects of fire. Precommercial thinning could not be used under Alternative B, but prescribed burning could.

Therefore, Alternative B may result in a reduced ability to plan and implement whitebark pine restoration projects. Losing precommercial thinning as a tool would affect the ability to manage for the species across its range.

Grazing
Under Alternative B, Objective GRAZ O1 and Standards GRAZ S1 through S4 provide direction for the management of livestock grazing to assure the regeneration and sustainability of trees and shrubs. Standard LINK S2 requires the management of livestock grazing in linkage areas to contribute to maintaining or moving the shrub-steppe habitat to mid or late serial stage. There are no grazing guidelines under Alternative B.

Many of the TES plants in the planning area depend on riparian areas, so the management of livestock grazing may prove beneficial to them in the long term. Applying Standard GRAZ S4 in *shrub-steppe* (dry places where grasslands are mixed with shrubs often including sagebrush) and Standard GRAZ S3 in wet areas would help recreate historic conditions.

Human uses
Under Alternative B, Objectives HU O1 through HU O6, Standards HU S1 through HU S3, and Guidelines HU G1 through HU G9 would limit the amount of disturbance allowed from special uses, mineral exploration, and development.

Any ground-disturbing activity that removes vegetation or soil, or fragments habitat, can affect TES plants. Alternative B should reduce these impacts.

Water howellia
Beneficial effects to water howellia may result in the long term if historic succession and disturbance regimes are restored. Although no vegetation activities would occur in water howellia habitat, the species would benefit indirectly through the maintenance of the historic hydrologic regime resulting from permitted vegetation treatments.

Ute ladies'-tresses
Beneficial effects to Ute ladies'-tresses may result in the long term if historic succession and disturbance regimes are restored. The grazing direction would benefit this riparian-dependent species.

Slender moonwort
There may be beneficial effects to slender moonwort from the management direction in Standard GRAZ S1 concerning young regenerating forests.

Alternative C

The effects of Alternative C are likely to be mostly beneficial to most TES plants and similar to Alternative B, particularly for grazing and human uses.

Vegetation standards and guidelines
Under Alternative C, Standards VEG S1, VEG S3 through VEG S6, and Guidelines VEG G1 through VEG G6 limit the location or extent of vegetation management projects. Generally, these limitations would not adversely affect TES plants because they constrain projects more than do the existing plans.

Standard VEG S2
This standard is changed to Guideline VEG G6 in Alternative C. It says that timber management project should not change more that 15 percent of the lynx habitat in an LAU in any ten-year period. Generally, this limitation would not adversely affect TES plants because it still constrains projects more than do the existing plans.

Standards VEG S3 & S4
Standard VEG S3 is slightly reworded in Alternative C, and Standard VEG S4 is changed to Guideline VEG G7 in Alternative C. Both the standard and guideline concern maintaining adequate amounts of lynx denning habitat on the landscape. Generally, these limitations would not adversely affect TES plants because they still constrain projects more than do the existing plans.

Standards VEG S5 & VEG S6
Under Alternative C, Standards VEG S5 and VEG S6 restrict all vegetation management projects, not just precommercial thinning. Research studies and treating fuels within 200 feet of administrative sites, dwellings, and outbuildings would, however, be allowed.

Effects on TES plants would be minimal because of the minimal extent of the

projects. Such projects already take place under existing plans; few TES plants are associated with the young regenerating forests where such projects would likely take place.

Alternative C would not allow vegetation management, including prescribed burning, to help restore whitebark pine, and so would result in a reduced ability to do whitebark pine restoration projects.

Grazing
Under Alternative C the grazing objective and standards, and the linkage standard are identical to those in Alternative B, therefore the effects would be the same. Objective GRAZ O1 and Standards GRAZ S1 through S4 provide direction for the management of livestock grazing to assure the regeneration and sustainability of trees and shrubs. Standard LINK S2 requires the management of livestock grazing in linkage areas to contribute to maintaining or moving the shrub-steppe habitat to mid or late serial stage. There are no grazing guidelines under Alternative C.

Many of the TES plants in the planning area depend on riparian areas, so the management of livestock grazing may prove beneficial to them in the long term. Applying Standard GRAZ S4 in *shrub-steppe* (dry places where grasslands are mixed with shrubs often including sagebrush) and Standard GRAZ S3 in wet areas would help recreate historic conditions.

Human uses
Under Alternative C, Objectives HU O1 through HU O6 are identical to those in Alternative B. Standards HU S1 has been reworded to allow no increase in designated over the snow routes outside of areas of consistent snow compaction. Standard HU S2 has been changed to Guideline HU G10, and Guideline HU G6 has been slightly reworded. Standard HU S3 and the rest of the guidelines have remained the same as in Alternative B. As in Alternative B, the direction would limit the amount of disturbance allowed from special uses, mineral exploration, and development.

Any ground-disturbing activity that removes vegetation or soil, or fragments habitat, can affect TES plants. Alternative C should reduce these impacts.

Water howellia
Beneficial effects to water howellia may result in the long term if historic succession and disturbance regimes are restored. Although no vegetation activities would occur in water howellia habitat, the species would benefit indirectly through the maintenance of the historic hydrologic regime resulting from permitted vegetation treatments.

Ute ladies'-tresses
Beneficial effects to Ute ladies'-tresses may result in the long term if historic succession and disturbance regimes are restored. The grazing direction would benefit this riparian-dependent species.

Slender moonwort
There may be beneficial effects to slender moonwort from the management direction in Standard GRAZ S1 concerning young regenerating forests.

Alternative D

The effects of Alternative D are likely to be mostly beneficial to most TES plants and

similar to Alternatives B and C, particularly for grazing and human uses.

Vegetation standards and guidelines
The VEG standards and guidelines limit the location or extent of vegetation management projects. Generally, these limitations would not adversely affect TES plants because they constrain projects more than do the existing plans.

Standards VEG S1 through VEG S4
Under Alternative D, Standard VEG S1 is applied at the sub-basin or isolated mountain range scale rather than at the LAU scale. There is no Standard VEG S2. Standard VEG S3 allows management that moves the LAU towards the 10 percent denning habitat. Standard VEG S4 is included as part of Guideline VEG G7. Generally, these limitations would not adversely affect TES plants because they constrain projects more than do the existing plans.

Standards VEG S5 & VEG S6
Under Alternative D, Standards VEG S5 and VEG S6 would restrict all vegetation management projects, not just precommercial thinning. However, more types of projects would be allowed.

Projects would be allowed that restore whitebark pine; that remove conifers in aspen stands; and that release larch, ponderosa pine, and white pine by daylight thinning, removing no more than 20 percent of the forest cover. Research studies and treating fuels within 200 feet of administrative sites, dwellings, and out buildings also would be allowed.

Management would also be allowed to help develop future old growth characteristics in lodgepole stands. Management would be allowed when a broad scale assessment determines the amount of winter snowshoe hare habitat in the stand initiation stage exceeds what would be expected under the normal range of historic conditions.

Any of these types of projects would be conducted in young, regenerating forests, and so would not substantially affect TES plants since few TES plants occur where most of these types of projects would take place.

Under Alternative D, Standard VEG S6 would also allow projects in multistoried stands that maintain or improve winter snowshoe hare habitat in the long term.

Generally, the limitations under Standards VEG S5 and S6 would not adversely affect TES plants because they still constrain projects more than do the existing plans. Projects could include uneven aged management, salvage, or prescribed fire that could impact TES plants. As in the other alternatives, site-specific analysis for TES plants would be conducted before any projects could take place.

Grazing
Under Alternative D the grazing objective and standards, and the linkage standard are identical to those in Alternatives B and C, therefore the effects would be the same. Objective GRAZ O1 and Standards GRAZ S1 through S4 provide direction for the management of livestock grazing to assure the regeneration and sustainability of trees and shrubs. Standard LINK S2 requires the management of livestock grazing in linkage areas to contribute to maintaining or moving the shrub-steppe habitat to mid

or late serial stage. There are no grazing guidelines under Alternative D.

Many of the TES plants in the planning area depend on riparian areas, so the management of livestock grazing may prove beneficial to them in the long term. Applying Standard GRAZ S4 in *shrub-steppe* (dry places where grasslands are mixed with shrubs often including sagebrush) and Standard GRAZ S3 in wet areas would help recreate historic conditions.

Human uses
Under Alternative D, the objectives, standards, and guidelines are identical to those in Alternative C. As in Alternative C, the direction would limit the amount of disturbance allowed from special uses, mineral exploration, and development.

Any ground-disturbing activity that removes vegetation or soil, or fragments habitat, can affect TES plants. Alternative D should reduce these impacts.

Water howellia
Beneficial effects to water howellia may result in the long term if historic succession and disturbance regimes are restored. Although no vegetation activities would occur in water howellia habitat, the species would benefit indirectly through the maintenance of the historic hydrologic regime resulting from permitted vegetation treatments.

Ute ladies'-tresses
Beneficial effects to Ute ladies'-tresses may result in the long term if historic succession and disturbance regimes are restored. The grazing direction would benefit this riparian-dependent species.

Slender moonwort
There may be beneficial effects to slender moonwort from the management direction in Standard GRAZ S1 concerning young regenerating forests.

Alternative E

The effects of Alternative E are likely to be mostly beneficial to most TES plants. Alternative E is not expected to have any major effect on TES plant habitat. As with the other alternatives, site-specific analyses would be conducted for TES plants before any projects could take place.

Vegetation standards and guidelines
The VEG standards and guidelines limit the location or extent of vegetation management projects. Generally, these limitations would not adversely affect TES plants because they still constrain projects more than do the existing plans.

Standards VEG S1 through VEG S4
Under Alternative E, Standard VEG S1 is applied to individual LAUs or a combination of immediately adjacent LAUs, however the standard does not apply to collaborative fuel treatment projects. There is no Standard VEG S2. Standard VEG S3 is like Alternative C's however the standard in Alternative E does not apply to collaborative fuel treatment projects. Standard VEG S4 is included as part of Guideline VEG G7, same as Alternative D. (See Table 2-1 for the exact wording of each standard and guideline.) Generally, these limitations would not adversely affect TES plants because they constrain projects more than do the existing plans.

Standards VEG S5 & VEG S6
Under Alternative E, Standard VEG S5 would allow precommercial thinning only within 200 feet of administrative sites, dwellings, or outbuildings; for research studies or genetic tree tests; or for fuel treatment projects identified through a collaborative approach.

Standard VEG S6 is dropped and replaced with Guideline VEG G8. VEG G8 states vegetation management projects should provide habitat conditions through time that maintain winter snowshoe hare habitat… [and] should be used to improve lynx habitat where dense understories are lacking." In general, the guideline encourages projects to maintain or improve lynx foraging conditions.

Alternative E is not expected to have any major effect on TES plant habitat. As with the other alternatives, site-specific analyses would be conducted for TES plants before any projects could take place.

Grazing
Under Alternative E the grazing objective is the same as in Alternatives B, C, and D. The standards have been changed to Guidelines GRAZ G1 through G4, and LINK G2. Objective GRAZ O1 and Guidelines GRAZ G1 through G4 provide direction for the management of livestock grazing that should regenerate and sustain trees and shrubs in fire- and harvest-created openings. Guideline LINK G2 should continue to maintain the shrub-steppe habitat conditions that occurred under historic disturbance regimes.

Many of the TES plants in the planning area depend on riparian areas, so the management of livestock grazing may prove beneficial to them in the long term. Applying Standard GRAZ S4 in *shrub-steppe* (dry places where grasslands are mixed with shrubs often including sagebrush) and Standard GRAZ S3 in wet areas would help recreate historic conditions.

Human uses
Under Alternative E, the objectives and guidelines are identical to those in Alternatives C and D. Standards HU S1, S2, and S3 have been changed to guidelines. The direction would limit the amount of disturbance allowed from special uses, mineral exploration, and development.

Any ground-disturbing activity that removes vegetation or soil, or fragments habitat, can affect TES plants. Alternative E should reduce these impacts.

Water howellia
Beneficial effects to water howellia may result in the long term if historic succession and disturbance regimes are restored. Although no vegetation activities would occur in water howellia habitat, the species would benefit indirectly through the maintenance of the historic hydrologic regime resulting from permitted vegetation treatments.

Ute ladies'-tresses
Beneficial effects to Ute ladies'-tresses may result in the long term if historic succession and disturbance regimes are restored. The grazing direction would benefit this riparian-dependent species.

Slender moonwort
There may be beneficial effects to slender moonwort from the management direction in Standard GRAZ S1 concerning young regenerating forests.

Alternative F Scenario 1

Alternative F Scenario 1 would apply the management direction to all lynx habitat in LAUs. The effects of Alternative F are likely to be mostly beneficial to most TES plants and similar in effects to Alternative E.

Vegetation standards and guidelines
The VEG standards and guidelines limit the location or extent of vegetation management projects. Generally, these limitations would not adversely affect TES plants because they still constrain projects more than do the existing plans.

Standards VEG S1, S2, S5 & S6
Under Alternative F the VEG standards apply to all vegetation management projects and to fuel treatment projects *outside* the WUI. Fuel treatment projects within the WUI would follow Guideline VEG G10, which states, "Fuel treatment projects within the WUI as defined by HFRA should be designed considering standards VEG S1, S2, S5, and S6 to promote lynx conservation." The cumulative total of fuel treatment projects in the WIU that do not meet the vegetation standards shall not exceed 6 percent of mapped lynx habitat.

Standards VEG S5 & VEG S6
Under Alternative F, Standard VEG S5 applies to precommercial thinning and fuel treatment projects that use precommercial thinning to achieve objectives outside the WUI as defined by the HFRA. Precommercial thinning may occur within 200 feet of administrative sites, dwellings, and outbuildings; for research studies and genetic tree tests; for conifer removal and daylight thinning around aspen; for daylight thinning of rust-resistant white pine; to restore whitebark pine; or based on new information and a written determination that the project is not likely to adversely affect lynx, or the project would have a short-term adverse but long term benefit to lynx. This alternative would allow vegetation management projects to treat fuels and restore fire to the ecosystem in areas outside the WUI.

Under Alternative F Standard VEG S6 applies to all vegetation management projects and fuel treatment projects outside the WUI. Projects that reduce snowshoe hare habitat in multistory mature or late successional forest may occur only within 200 feet of administrative sites, dwellings, outbuildings, and special use permit improvements; for research or genetic tree tests; or for incidental removal during salvage.

Within the WUI, fuel treatment projects would follow Guideline VEG G10, which says fuel treatment project should be designed considering Standards VEG S1, S2, S5, and S6 to promote lynx conservation. The vegetation standards and guidelines under Alternative F are not expected to have any major effect on TES plant habitat beyond those effects already discussed in the existing plans. Site-specific analyses would be conducted for

TES plants before any site-specific projects could take place.

Grazing
Under Alternative F the grazing objective is the same as in Alternatives B, C, D, and E. As in Alternative E, the standards have been changed to Guidelines GRAZ G1 through G4, and LINK G2. Objective GRAZ O1 and Guidelines GRAZ G1 through G4 provide direction for the management of livestock grazing that should regenerate and sustain trees and shrubs in fire- and harvest-created openings. Guideline LINK G2 should continue to maintain the shrub-steppe habitat conditions that occurred under historic disturbance regimes.

Many of the TES plants in the planning area depend on riparian areas, so the management of livestock grazing may prove beneficial to them in the long term. Applying Standard GRAZ S4 in *shrub-steppe* (dry places where grasslands are mixed with shrubs often including sagebrush) and Standard GRAZ S3 in wet areas would help recreate historic conditions.

Human uses
Under Alternative F, Objectives HU O1 through O4 are identical to those in Alternative E. HU O5 has been rephrased to be clearer. As in Alternative E, Standards HU S1, S2, and S3 have been changed to guidelines. Guidelines HU O1 through HU G10 and HU G12 are the same as in Alternative E. Guideline HU G11 was rewritten from Alternative E to clarify that the guideline refers to *designated* play areas. The direction would limit the amount of disturbance allowed from special uses, mineral exploration, and development.

Any ground-disturbing activity that removes vegetation or soil, or fragments habitat, can affect TES plants. Alternative E should reduce these impacts.

Water howellia
Beneficial effects to water howellia may result in the long term if historic succession and disturbance regimes are restored. Although no vegetation activities would occur in water howellia habitat, the species would benefit indirectly through the maintenance of the historic hydrologic regime resulting from permitted vegetation treatments.

Ute ladies'-tresses
Beneficial effects to Ute ladies'-tresses may result in the long term if historic succession and disturbance regimes are restored. The grazing direction would benefit this riparian-dependent species.

Slender moonwort
There may be beneficial effects to slender moonwort from the management direction in Standard GRAZ S1 concerning young regenerating forests.

Alternative F would have a negligible effect on TES plants within the WUI. Most TES plants within this zone are generally the lower elevation and valley bottom species. Fuel reduction projects generally involve thinning and prescribed burning designed to reduce fuel loadings. The level of activities associated with fuel reduction projects is anticipated to provide minimal impacts to any existing TES plant populations that occur within the treatment zones. Treatments may

open up forest canopy or reduce shading for some species. Treatments may also result in localized dryer growing conditions for some species as soils are potentially exposed to more sunlight. However, the total impact of fuel reduction projects that do not meet the vegetation standards would be limited to 6 percent of lynx habitat in the planning area. The impact, therefore, would be negligible.

Alternative F is not expected to have any major effect on TES plant habitat. As with the other alternatives, site-specific analyses would be conducted for TES plants before any projects could take place.

Alternative F Scenario 2

Alternative F, Scenario 2 would have similar effects as described in Alternative F, Scenario 1 except the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn NFs, 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 plant 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.

Cumulative effects

Alternative A
The past, present, and reasonably foreseeable actions listed in Appendix L have generally benefited threatened, endangered, proposed, and sensitive plants by limiting disturbance. Since Alternative A would not change the existing plans it would not have any cumulative effects on threatened, endangered, and sensitive species plants beyond those of the current plans.

Alternatives B, C, D, E & F
Alternatives B and C could cumulatively result in the continued decline of whitebark pine in some areas because the use of prescribed fire and thinning would be precluded in winter snowshoe hare habitat. However, restoration activities outside winter snowshoe hare habitat could continue.

Alternatives D and F would allow restoration of whitebark pine using both precommercial thinning and prescribed fire as tools. Therefore, they would contribute to the restoration of this species.

The proposal using any of the action alternatives would, in addition to the past, present, and reasonably foreseeable actions listed in Appendix L, continue to benefit threatened, endangered, proposed, and sensitive plants. The proposal would incorporate landscape considerations into project planning, and could further limit disturbances that could affect plants especially in riparian habitats.

Range

Affected environment

An active grazing allotment is a place where a term grazing permit is in effect and where livestock grazing is expected to occur most years. Depending on how the allotment is classified and the language in the term grazing permit, this may consist of either cattle or sheep, or occasionally both. In general, the season of use extends from early June to late September, although this varies depending on elevation, plant communities, and management requirements.

The planning area contains 1,878 Forest Service grazing allotments. Of these, 1,420 or 75 percent contain habitat suitable for lynx, and 1,289 of these are active (Table 3-50). Table K-7 in Appendix K shows a breakdown by administrative unit. The Project Record (analysis/range-deis/data) contains more data and background information.

The analysis of active grazing allotments containing lynx habitat shows that:

- 23 percent have less than a quarter of their acreage in lynx habitat;
- 40 percent have more than a quarter but less than half of their acreage in lynx habitat;
- 37 percent have more than half of their acreage in lynx habitat; and
- 19 percent lack management strategies similar to the LCAS.

Effects

Livestock grazing can affect lynx in two main ways:

- Livestock grazing has contributed to a decline in aspen (USDA FS 1998). Aspen provide snowshoe hare habitat, and are often associated with riparian areas (LCAS).
- Livestock grazing may change the structure or composition of shrub-steppe habitats, changing their ability to support lynx and its prey (USDA FS 1998). Shrub-steppe habitats provide forage for lynx

Table 3-50. Grazing allotments overlapping lynx habitat

Number of allotments	1,878
Allotments with lynx habitat	1,420
Active allotments with lynx habitat	1,289
Active allotments with less than 25 percent lynx habitat	291
Active allotments with from 25 to 50 percent lynx habitat	522
Active allotments with more than 50 percent lynx habitat	476
Active allotments with lynx habitat with management strategies similar to the LCAS	1,040

prey, as well as cover for lynx movement (LCAS).

However, the FWS, using the best scientific and commercial data presently available, has no information to indicate that grazing is a threat to lynx at this time. While this information does not indicate that grazing is a threat to lynx conservation and recovery at this time, adverse effects to individual lynx could result from grazing activities.

Under term grazing permits, livestock is managed according to the objectives, standards, and guidelines in the existing plans. Objectives describe desired conditions for range management. Existing plan standards and guidelines provide sideboards for grazing, so the short-term effects are within limits that make it possible to achieve the long-term objectives.

Existing plan standards and guidelines may include restrictions about the length of the grazing season, allowable use, and residual stubble height. Annual management is specified in the annual operating instructions to the permittee.

Alternative A, no action

The no-action alternative would not change existing Plan standards and guidelines for grazing. Current livestock grazing practices would not change on Forest Service grazing allotments. Therefore, Alternative A would have no effect on the livestock grazing policies and practices.

Alternatives B, C & D

The Alternatives B, C, and D include one objective and five standards that concern managing livestock grazing to provide for lynx habitat needs (see Chapter 2, Table 2-1). These are Objective GRAZ O1, and Standards LINK S2, GRAZ S1, GRAZ S2, GRAZ S3, and GRAZ S4. These standards and the objective are identical in Alternatives B, C, and D. The impacts to grazing (discussed on next page) are the same among the three alternatives since there are no differences in the grazing standards in Alternatives B, C, and D.

Alternatives E & F Scenario 1

Alternatives E and F include one objective and five guidelines that concern managing livestock grazing to provide for lynx habitat needs. Alternative F Scenario 1 would apply the management direction to all lynx habitat in LAUs. The Objective GRAZ O1 is the same as the objective in Alternatives B, C, and D. In Alternatives E and F five guidelines have replaced the five standards found in Alternative B, C, and D. They are called Guidelines LINK G2, GRAZ G1, GRAZ G2, GRAZ G3, and GRAZ G4. The difference between the standards and the guidelines is the word *should* has been inserted into the four guidelines to indicate there is some flexibility in the use of the guidelines (see definitions of *standard* and *guideline* in the glossary).

The effects of Alternatives B, C, D, E & F Scenario 1 on grazing

The effects on grazing, whether from the standards or the guidelines, would be substantially the same. These standards and guidelines both focus on protecting woody growth (shrub and tree regeneration, healthy aspen and willow stands, and shrub-steppe habitats) in the grazing allotment. See Table 2-1 for the specific wording for each standard or guideline.

About 81 percent of the active grazing allotments within lynx habitat already have management direction that provides similar protection to what is proposed in this proposal (see Appendix L). Many existing plans have been amended to include such direction as found in the *Inland Native Fish Strategy* (INFISH) which applies to National Forests west of the Continental Divide, and the *Interim Strategy for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Potions of California* (PACFISH), which applies to National Forests with anadromous fish.

Such existing direction includes requirements for maintaining and limiting livestock use in riparian areas. It generally provides enough direction to manage grazing so it does not adversely impact lynx habitat. Little change would be needed to meet the standards or guidelines proposed in this proposal.

For the 19 percent of active allotments in lynx habitat whose existing plans do not contain similar management direction—all of them east of the Continental Divide—the action alternatives would add direction to make sure livestock grazing management would maintain or enhance lynx habitat.

The bottom line is that any of the alternatives would have only minimal effect on livestock grazing operations. In specific instances where a potential exists for negative impacts to shrub and tree regeneration, healthy aspen and willow stands, or shrub-steppe habitats due to grazing, application of the standards or guidelines could result in a need to change some aspect of the present livestock management. In most cases, this would likely consist of changing the timing, intensity, duration, or frequency of livestock use in a specific area. In a very few cases, structural improvements, such as fences, may be required to make sure livestock could be managed to maintain woody plants in the grazing allotment. What would be needed in any particular allotment to satisfy the new standards or guidelines would require a site-specific analysis.

Alternative F Scenario 2

Alternative F, Scenario 2, would have similar effects as described in Alternative F, Scenario 1 except the management direction would not have to be applied to the Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark NFs until these areas are occupied

by lynx. Most of these areas are already have similar management direction as PACFISH and INFISH so little change is anticipated.

Cumulative effects

Alternative A
The past, present, and reasonably foreseeable actions listed in Appendix L have cumulatively limited or restricted where or how livestock grazing can occur, especially west of the Continental Divide. These actions in addition to social, market, and other forces have resulted in a slow downward trend in the number of grazing allotments. Alternative A would not add any additional standards or guidelines to the existing plans, and so, would not cumulatively add to existing impacts on grazing.

Alternatives B, C, D, E & F
The management direction, in addition to the past, present, and reasonably foreseeable actions listed in Appendix L, would further limit or add restrictions to grazing. In particular, choosing any of the action alternatives would extend the management direction that already is in place west of the Continental Divide to those allotments on the east side of the Continental Divide.

In areas west of the Continental Divide there would be very limited cumulative effects because most of the management direction proposed to protect woody plants is already included in existing plans. East of the Continental Divide, due to the cumulative addition of past, present, and reasonably foreseeable actions in conjunction with the management direction in this proposal, some change in livestock management may be necessary in order to protect woody growth. This may, to a very small amount, add to the slow downward trend in the number of cattle or sheep allowed on the allotments. However, cumulatively, livestock management would not be precluded.

Impact of lynx on the grazing industry
There has been concern voiced by some sheep ranchers about lynx killing sheep. The concern is that cumulatively, with wolves, bears, and other predators that are now being protected; any increase in the lynx population would put the ranchers out of business.

Due to the naturally low density of lynx (LCAS, Ruediger 2000, p. 1-5; Ruggiero et al, 2000, pp. 387 to 390), the rarity of lynx taking ungulates of any kind (cattle, sheep, horses, deer, goats, etc.) (Ruggiero et al, 1999, pp. 375 to 378), and the low number of allotments that have substantial amounts of lynx habitat (Table 3-50), conserving the lynx population in the planning area would not cumulatively add to the loss of sheep from predators in any measurable way.