

Supplemental
Biological Assessment of the Southern Rockies Lynx Amendment on
Threatened, Endangered and Proposed Species

For The Following National Forest Land and Resource Management Plan
Amendments:

Arapaho and Roosevelt National Forests;
Grand Mesa, Uncompahgre and Gunnison National Forests;
Pike and San Isabel National Forests;
Medicine Bow and Routt National Forests;
Rio Grande National Forest;
San Juan National Forest;
White River National Forest

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Supplemental Biological Assessment for the Southern Rockies Lynx Amendment

I. Introduction

This document is an evaluation of the potential effects of implementation of the Southern Rockies Lynx Amendment (SRLA) proposed action on aquatic and terrestrial threatened, endangered and proposed taxa. The proposed standards and guidelines would be applicable within lynx habitat on specific National Forest System lands in the SRLA area.

Within the contiguous United States, lynx range extends into different regions, or geographic areas, that are separated from each other by ecological barriers consisting of large areas that are not suitable for lynx, e.g., the Northern Great Plains and the Wyoming Basin. The Lynx Conservation Assessment and Strategy (LCAS) describes five geographic areas in the contiguous United States. The Final Rule listing the lynx as a Threatened species describes four geographic areas, combining the Northern Rocky Mountains and Cascades Geographic Areas into one. The Rocky Mountain Region of the Forest Service administers lands in two of these geographic areas. The Shoshone and Bighorn National Forests in northern Wyoming are included in the Northern Rocky Mountain Geographic Area. The Medicine Bow National Forest in southern Wyoming and all of the National Forests in Colorado are in the Southern Rocky Mountain Geographic Area. The focus of the proposed action is on eight forest plans for the portion of the Rocky Mountain Region of the Forest Service that is within the Southern Rocky Mountain Geographic Area (SRMGA).

In November 2006, the U. S. Fish and Wildlife Service (FWS) designated critical habitat for the contiguous United States distinct population segment of the Canada lynx (USDI, Fish and Wildlife Service 2006). The FWS did not designate critical habitat for any NFS lands covered under the SRLA. These lands were not included because through the *Conservation Agreement* between the U. S. Forest Service (USFS) and the FWS (USDA Forest Service 2005) the USFS agreed to consider the conservation measures in the LCAS to guide actions on those lands they administer. Refer to the Federal Register (2006) notice for details of the critical habitat designation. The Recovery Outline (USDI FWS 2005) identifies core areas, secondary areas and peripheral areas, based on historical and current occurrence records, as well as confirmed breeding. The Southern Rockies (Colorado and southern Wyoming) were identified as a Provisional Core Area. This designation was identified because this area contains a reintroduced population, which has documented reproduction in the last three years.

II. Consultation History

The *Biological Assessment of the Effects of National Forest Land and Resource Management Plans, and Bureau of Land Management Land Use Plans on Canada Lynx* (Hickenbottom et al. 1999), and the responding U.S. Fish and Wildlife Service's *Biological Opinion* (National BO) (USDI Fish and Wildlife Service 2000) completed ESA section 7 conferencing/consultation (for

“Proposed” species) on all the existing Forest Plans and BLM Land Use plans within the range of Canada lynx within the United States. The National BO concluded that: “the current Plans, as implemented in conjunction with the Conservation Agreements, are not likely to jeopardize the continued existence of the lynx.” The “no jeopardy” conclusion was “based upon continued implementation of the Conservation Agreements until such time Plans are amended or revised to consider the needs of lynx. Furthermore, if Plans are amended or revised incorporating the conservation measures in the LCAS, or the equivalent thereof, we conclude at this time that the Plans would likely not jeopardize the continued existence of lynx.....We conclude that the programmatic and project-level objectives, standards, and guidelines in the LCAS provide comprehensive conservation direction for Plans adequate to reduce the potential for adverse effects to lynx and to preclude jeopardy to the lynx DPS.”

Table 1. Adequacy of existing plans in the Southern Rockies lynx amendment area in providing for the conservation of Canada lynx as determined by Hickenbottom et al. (1999).

S. ROCKIES Risk Factors								
USFS	Medicine Bow 0206	Routt 0211	Arapaho-Roosevelt 0210	White River 0215	GMUG 0204	San Juan 0213	Rio Grande 0209	Pike-San Isabel
1. Denning	F	S	S	S	S	S	M	F
2. Foraging	M	M	M	M	M	S	M	M
3. Habitat Convert	M	M	M	N	N	N	N	N
4. Thinning	N	M	M	N	M	M	M	N
5. Fire Mgmt	N	M	N	M	N	F	F	M
6. Landscape Pat	M	M	S	M	M	M	M	M
7. Road Mgmt	F	M	S	M	S	S	M	M
8. Developed Rec	M	M	M	N	N	N	N	N
9. Non-winter Rec	M	S	F	N	M	M	S	N
10. Winter Rec	N	S	S	N	M	M	S	N
11. Minerals	S	M	M	S	S	N	N	S
12. Connectivity	S	M	S	M	M	M	M	M
13. Land Adjust	N	M	M	N	M	N	M	M

14. Coordination	M	M	M	N	N	N	M	N
15. Monitoring	S	M	M	N	N	N	N	N

Legend:

F	Fully meets the criterion; near certainty the criterion is met
S	Substantially meets the criterion; highly probable the criterion is met
M	Marginally meets the criterion; criterion may or may not be met
N	Does not meet the criterion; criterion not met at all or is unlikely met
U	Unknown if the criterion is met; inadequate information to assess
N/A	The criterion is not applicable on the administrative unit

Formal consultation on the Southern Rockies lynx amendment was initiated on July 2, 2007 and a Biological Opinion was received from the US Fish and Wildlife Service on September 7, 2007. The Forest Service has subsequently modified the Proposed Action and reinitiation of consultation is needed.

III. Proposed Action

The Proposed Action is to amend eight Land and Resource Management Plans within the Southern Rocky Mountain Geographic Area to include the applicable or similar Conservation Measures for Canada lynx, from the Lynx Conservation Assessment and Strategy (LCAS). It would not change management prescriptions for any Forest Plan. It would add standards and guidelines for lynx conservation to six of the eight plans, and would change the existing standards and guidelines for lynx conservation on the Medicine Bow and White River National Forests in order to ensure consistency throughout the SRLA. See **Appendix B** for the complete Proposed Action, which is a slightly modified version of Alternative F in the FEIS. **Appendix D** is a comparison of the Baseline, Alternative F in the FEIS and the final Proposed Action (Alternative F modified).

The Proposed Action incorporates management direction recommended in the LCAS as described under Alternative B (Baseline). Alternative F- modified provides some changes or exceptions in objectives, standards and guidelines as compared to Alternative B. This alternative also provides exceptions to some standards and guidelines for fuel treatments within the Wildland Urban Interface (WUI) for up to 3 percent of the mapped lynx habitat acreage for each administrative unit. It also allows for an additional 1% of lynx habitat within each LAU pre-commercial thinning treatments inside or outside of WUI. See Appendix D for a comparison of all management direction between the baseline (Alternative B), Alternative F and Alternative F-modified.

IV. Species Evaluated in Action Area

A. Action Area

The Action Area includes seven National Forest administrative units in Colorado and southern Wyoming:

Arapaho and Roosevelt National Forests;
Grand Mesa, Uncompahgre and Gunnison National Forests;
Pike and San Isabel National Forests;
Medicine Bow and Routt National Forests;
Rio Grande National Forest;
San Juan National Forest;
White River National Forest.

The Action Area includes the seven National Forests previously listed (the “Amendment Area”) that are all within the SRMGA. The Amendment Area covers a large portion of the SRMGA, but does not include any other federal, state or private lands within the SRMGA.

The Action Area will be called the SRLA throughout this document. (Southern Rockies Lynx Amendment area). The Medicine Bow and Routt National Forests were recently combined, and are operating under separate Forest Plans, which will result in eight Forest Plans being amended. See Appendix A for a map of the SRLA.

B. Species Evaluated

An updated list was received by the USFWS on December 31, 2003, with a list of all threatened and endangered species that occur on or adjacent to the seven amendment forests. This list was reviewed and updated again in March, 2007. For this Supplemental BA, a new list was received from the USFWS on April 10, 2008. Since the March 2007 BA, the bald eagle has been de-listed, and the Gunnison prairie dog has become a “candidate” species. There are no species “proposed” for listing that occur within the SRLA. Suitable habitat for many of the listed species occurs outside of lynx habitat, Lynx Analysis Units (LAU’s) and linkage areas, and therefore will not be assessed in this analysis. See Table 6 for this complete list by Forest.

The following species (Table 2) are the threatened (T) and endangered (E) species that occur on, may occur, or have the possibility of being affected, and/or have suitable habitat within LAU’s or lynx linkage areas within the action area.

Table 2.

Common Name Scientific Name

Mammals

Canada lynx (T)	<i>Lynx canadensis</i>
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Birds

Southwestern willow flycatcher (E)	<i>Empidonax traillii extimus</i>
Mexican spotted owl (T)	<i>Strix occidentalis lucida</i>
Bald eagle (Delisted 2007)	<i>Haliaeetus leucocephalus</i>

Invertebrates

Uncompahgre fritillary butterfly (E)	<i>Bolaria acrocneema</i>
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Plants

Penland alpine fen mustard (T)	<i>Eutrema penlandii</i>
Osterhout milkvetch (E)	<i>Astragalus osterhoutii</i>

There will be no water depletions associated with any of the action alternatives that have not already completed Section 7 consultation, therefore, the following species affected by water depletions will not be addressed in this BA:

Humpback chub	<i>Gila cypha</i>
Bonytail chub	<i>Gila elegans</i>
Colorado pikeminnow	<i>Ptychocheilus lucius</i>
Razorback sucker	<i>Xyrauchen texanus</i>
Pallid sturgeon	<i>Scaphirhynchus albus</i>
Whooping crane	<i>Grus americanus</i>
Least tern	<i>Sternula antillarum</i>
Piping plover	<i>Charadrius melodus</i>

1. Canada lynx

Much of the discussion in the general description of the Action Area is based on information contained in the LCAS, the Final Rule listing the Canada lynx as threatened (Federal Register, Vol. 65, No. 58, pages 16052-16086, 03/24/2000), the Interagency Biological Assessment (Hickenbottom et al. 1999), the Fish and Wildlife Service Biological Opinion (USDI Fish and Wildlife Service 2000), and the Lynx Science Team report, *The Ecology and Conservation of Lynx in the United States* (Ruggiero et al. 2000). These documents represent a review and synthesis of virtually all published literature pertaining to Canada lynx and its primary prey, the snowshoe hare, as well as information from ongoing studies. In light of this, individual citations from the scientific literature are not presented in the text, for the most part. General references to the documents are mentioned here. Sources of information used that are not from these four documents are appropriately identified. Since publication of the *Ecology and Conservation of*

Lynx in the United States (Ruggiero et al. 2000a) and the *Canada Lynx Conservation Assessment and Strategy* (Ruediger et al. 2000), a considerable amount of research on lynx has taken place or is currently underway. This research is summarized in Appendix C.

The first sections pertain to various components of lynx habitat in the SRLA: denning and foraging habitat, linkage areas, and connectivity between habitats. Several of the risk factors affecting lynx productivity and lynx movements identified in the LCAS will be described, and effects due to potential changes in habitat from implementing each alternative are disclosed. These are the risk factors the Forest Service has the most ability to affect through land management. Risk factors affecting lynx mortality identified in the LCAS (trapping, predator control, incidental and illegal shooting, competition and predation, connectivity problems) will be addressed, as well as the effects to lynx for each alternative due to human activities.

Lynx Habitat Characteristics in the SRLA

The SRLA area includes 7 national forests in Colorado and Wyoming (Map – Appendix A). This area encompasses approximately 12 million acres of National Forest System Lands. Mapped lynx habitat includes some inclusions of non-lynx habitat (lakes and ponds, rocky areas and alpine habitats).

In the contiguous United States, the distribution of the lynx is associated with the southern boreal forest comprised primarily of subalpine coniferous forest in the West and mixed coniferous/deciduous forest in the East. The southern boreal forest of Colorado and southeastern Wyoming is isolated from boreal forest in Utah and northwestern Wyoming by the Green River Valley and the Wyoming Basin. At its southern margins, the boreal forest becomes naturally fragmented into various sized patches as it transitions into other vegetation types. These southern boreal forest habitat patches are small relative to the extensive northern boreal forest of Canada and Alaska, which constitutes the majority of the lynx range. Lynx in the contiguous United States are considered part of a larger metapopulation whose core is located in the northern boreal forest of central Canada. Colorado is the southern edge of the range of the lynx.

Lynx habitat in the SRLA is usually found in the subalpine and upper montane forest zones, typically between 8,000 and 12,000 feet in elevation. Upper elevation subalpine forests are dominated by subalpine fir and Engelmann spruce. As the subalpine zone transitions down to the upper montane, spruce-fir forests begin to give way to a predominance of lodgepole pine, aspen, or mixed stands. Engelmann spruce and/or subalpine fir may retain dominance on cooler, more mesic mid-elevation sites, intermixed with aspen, lodgepole pine, and Douglas-fir. White fir appears in the San Juan Mountains and Sangre de Cristo Range in southern Colorado.

The lower montane zone is dominated by ponderosa pine, pinyon pine/juniper communities and Douglas-fir, with pine typically dominating on lower, drier, more exposed sites, and Douglas-fir occurring on moister and more sheltered sites. Although this forest zone is generally below lynx habitat, montane forests can be important as connective travel habitat where they may facilitate lynx

dispersal and movements between blocks of lynx habitat, and may provide some foraging opportunities during those movements.

In summary, lynx habitat should be thought of in terms of a habitat mosaic within these southern boreal forest landscapes, rather than as simple vegetation types. Spruce-fir, lodgepole pine, white fir, aspen, and mesic Douglas-fir may all provide foraging and/or denning habitat for lynx. Also potentially important in many parts of the SRLA are the high elevation sagebrush and mountain shrub communities found adjacent to or intermixed with forested communities, affording potentially important alternate prey resources. Riparian and wetland shrub communities (e.g.: willow, alder, serviceberry) found in valleys, drainages, wet meadows, and moist timberline locations may also support important prey resources.

In the SRMGA, most lynx habitat forest types occur on federal lands in public ownership including National Parks, Bureau of Land Management, and National Forest System lands. Forests in the SRLA are naturally patchy, with many openings and breaks in forested canopies. Much of the SRLA is in non-developmental management designations such as Wilderness Areas, Research Natural Areas, and other NFS lands where Forest Plans place additional restrictions on human impacts.

Lynx habitat in southern Wyoming and Colorado is geographically isolated from the rest of the Rocky Mountain chain by the vast sagebrush and desert shrub expanses of the Wyoming Basin and the Red Desert in Wyoming and similar vegetation patterns in the Green and Colorado River plateaus in western Colorado and eastern Utah. This geographic isolation may have some long-term implications for maintenance of lynx populations in the SRMGA, as lynx from the northern meta-populations may not be able to easily disperse into this area.

Snowshoe hares are strongly associated with stands that are densely stocked or have a dense understory and with coniferous cover in the winter months. Densities of snowshoe hare appear to be positively correlated with density of horizontal cover that is one to three meters in height (above the average snow depth in winter). This structure (dense horizontal cover) is common in early seral stages, but also may occur in mature stands that have a well-developed understory (Hodges 2000).

Studies in northern Wyoming (Beauvais 1997) and a more limited study in Colorado found that snowshoe hares had a strong affinity for the higher elevation mature to late-successional spruce-fir forests. The Wyoming study showed that hares were out-competed by other species in early successional stages (less than 15 years of age), however, these altered conditions probably were not yet providing hare habitat. In Colorado, Dolbeer and Clark (1975) reported higher survival of snowshoe hares in mature spruce-fir forests and mixed spruce-fir/lodgepole pine forests, which contained dense undercover, than in open lodgepole stands lacking understory. The Colorado study was conducted in a very limited area, and did not sample younger sapling stage stands (15 to 40 years) to compare hare densities with those that were reported for mature and late-successional spruce-fir forests. Therefore, it remains somewhat unclear what role early-successional forests play in providing snowshoe hare habitat in the SRMGA; however, it is generally accepted that they are of

more value than mid-successional stages, especially in lodgepole pine, based on literature from the northern boreal forests.

Both timber harvest and natural disturbance processes can provide good foraging habitat for lynx when the resulting understory has enough horizontal cover to meet the forage and cover needs of snowshoe hare. These characteristics include a dense, multi-layered understory that maximizes cover and browse at both ground level and at varying snow depths throughout the winter (stems and branches from one to three meters above the ground).

Lack of widespread disturbance processes in lodgepole pine for much of this century have led to many highly stocked, even-aged mid-seral stands that do not now provide the dense ground- and snow-level cover and forage necessary to support higher densities of snowshoe hare, but may provide red squirrel or other prey species. The crowns of these dense stands have lifted far above the reach of hares, and the dense canopies limit light penetration, contributing to the often depauperate (somewhat barren) understory. Late successional spruce-fir forests, by contrast, do provide cover and forage for hares and red squirrels, and thus are generally more valuable than mature lodgepole forests, in providing stable supplies of prey resources. Lodgepole pine is the more dominant vegetation type in the northern portions of the SRMGA, especially on the Medicine Bow-Routt and Arapaho-Roosevelt National Forests. Some large extensive areas of the dry site, climax lodgepole stands that are not in close proximity to denning habitats are not mapped as lynx habitat in this portion of the SRMGA, as they would not be able to function as part of a home range.

Extensive pure stands of aspen may not provide quality habitat for hares due to deficiencies in winter habitat characteristics. These habitat conditions exist in some areas on the western portions of the SRMGA: Grand Mesa, Uncompahgre, and Gunnison, San Juan, and White River National Forests. Some of these pure aspen stands have not been mapped as lynx habitat in this portion of the SRMGA, as they are not in close enough proximity to winter or denning habitats, and therefore would not be expected to provide the required components for lynx home ranges.

Many parts of the Southern Rockies have a shortage of dense early successional forest stands, particularly in lodgepole pine. This may make it very important to protect existing sites that have high densities of snowshoe hares. Regenerating stands of lodgepole pine and mixed conifer-aspen stands, to maximize densities of horizontal cover at ground through maximum snow depth height, would improve habitat for snowshoe hares. It is equally important to protect and encourage those habitats that are good producers of alternate prey, such as red squirrels, grouse, and other lagomorph species (rabbits, hares and pikas). Woody debris can also improve cover where vegetation is lacking.

Lynx habitat in the SRMGA is naturally fragmented due to alpine tundra, open valleys, shrubland communities, and dry vegetation types associated with southerly and westerly exposures or lower montane zone elevation. Because of the southerly latitude, spruce-fir, lodgepole pine, and mixed aspen-conifer forests constituting primary lynx habitat are typically found in elevational bands along the flanks of mountain ranges or on high plateaus. Although naturally fragmented, it remains

generally interconnected through the numerous mountain chains and intervening low elevation forests and brushlands. There are important topographic features and vegetation communities that link these fragmented forested landscapes of habitat together, providing for movement of individuals within and between LAUs. Connectivity may be provided by narrow forested mountain ridges or plateaus that connect more extensive mountain habitats, or wooded riparian communities that provide travelways across open valley floors between mountain ranges. Lower elevation ponderosa pine, pinyon-juniper woodlands, or shrublands may also serve the same function.

Disturbance Regimes Important to Lynx Habitat in the Southern Rockies

Fires have been, and will continue to be, a significant influence in forests inhabited by lynx. Fire intensity tends to be high with long natural fire return intervals in southern boreal forests in the West. Generally, in forests with high-severity fire regimes, a number of smaller fires burn a small proportion of the forests, while fewer larger fires account for most of the area burned over time (See Fuels and Fire Ecology section). This creates extensive even-aged patches of regenerating forests.

Fires in the SRMGA spruce-fir forests are generally stand replacement events because of their severity or the inability of the trees to withstand even moderate temperatures associated with fires. Fire frequency in the SRMGA boreal forests ranges from 100 to 400 years. Natural barriers, such as large open parklands, lakes, reservoirs and barren ridges, often play a role in how extensive fires become in the SRMGA boreal forests. In some geographic locations, the spruce-fir forest may be considered to be included in the non-fire regime, due to topographic location and local climatic conditions.

Insects also play a role in the disturbance regimes of SRMGA boreal forests. Most important are the mountain pine beetle in lodgepole pine, and the spruce beetle in spruce-fir forests. Mountain pine beetle generally infest large diameter trees, which can naturally thin, or create openings within the lodgepole pine stands. In an extreme epidemic, an entire even-aged stand could be killed, thus regenerating the stand. Spruce beetle, at endemic levels, create small openings or canopy gaps by killing small areas of mature trees. At epidemic levels, which are most common in over mature stands, the predominant response is the release of sub canopy trees of both spruce and fir (Veblen et al. 1994), but stands tend to be dominated by subalpine fir after an outbreak (Schmid and Hinds 1974). These large outbreaks also result in additional herbaceous growth on the forest floor.

All national forests in the SRMGA have mapped their lynx habitat. Models for denning and foraging habitat were developed using habitat definitions and descriptions contained in the LCAS. Interpretations of the LCAS and development of mapping protocols have been a cooperative dialogue between State, Forest Service, and USDI Fish and Wildlife Service Biologists, as well as the Lynx Biology Team, who authored the LCAS, and the Lynx Science Team, who authored the "Ecology and Conservation of Canada Lynx in the United States". Please refer to the Glossary for more detailed definitions. Each Forest has documented the criteria used, along with their rationale as to how they developed their lynx habitat mapping.

Lynx Occurrence

Most of the records and literature on lynx abundance and distribution indicate that historical lynx populations were relatively rare in the SRMGA, compared to populations in Alaska and the northern portions of Washington and Montana.

Verified records after the 1920's are rare in southern Wyoming and in Colorado, with central Colorado being the "core" area of lynx records until the early 1970's. A statewide lynx verification program was conducted in Colorado from 1978-1980 and concluded that a viable but low-density lynx population persisted in Eagle, Pitkin, Lake, and Clear Creek counties with evidence of lynx occurrence in Grand and Park Counties. Lack of evidence from other parts of lynx range in Colorado may have been due to lack of adequate surveys. Several surveys conducted since then have not confirmed lynx to be present. While the surveys did not cover the entire state, they were sufficient to conclude that lynx at that time were rare in the Southern Rockies.

Even though lynx individuals appeared to persist in the SRMGA landscape, the population had not rebounded despite the removal of key suppressing factors such as commercial trapping and indiscriminate predator control. It was believed that the population was so small in Colorado that it was incapable of rebounding and was augmented with a re-establishment program in 1999. The Colorado Division of Wildlife has released a total of 218 lynx in the San Juan Mountains from 1999 to 2006. Of the total 218 lynx released, there are 80 known mortalities as of June, 2006: 21% due to starvation or disease, 31% were human-induced which were attributed to vehicle collisions or gunshot and 33% unknown causes (Dr. Tanya Shenk, Research Wildlife Biologist, Colorado Division of Wildlife, periodic lynx update, 11/2006). This mortality pattern can be expected from reintroduced animals due to unfamiliarity with the area and large-scale movements often characteristic of reintroduced animals. Reproduction has been documented, with 37 dens with an average of 3 kittens each located from 2003-2006. In 2006, a female lynx that was born in Colorado gave birth to a litter of kittens, documenting the first recruitment of a Colorado-born lynx into the Colorado breeding population. 113 kittens have been documented born to date in Colorado, and the Colorado Division of Wildlife is safely estimating that, with all mortalities documented, there are approximately 200 lynx currently alive in Colorado. The CDOW is not planning on any re-introduction of additional lynx in 2007. The current core area for lynx is from the New Mexico border to the north to Gunnison, west to Taylor Mesa and east to Monarch Pass (letter from Colorado Dept. of Natural Resources, 2007). See Appendix E for satellite lynx locations map.

The *Occupied Mapped Lynx Habitat Amendment to the Canada Lynx Conservation Agreement* (USDA Forest Service and USDI Fish and Wildlife Service 2006) established criteria for defining occupied lynx habitat. According to this amendment:

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

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

All National Forests within the SRLA are considered to be “occupied”, as there are at least 2 verified lynx observations since 1999 on each forest. See Lynx Location maps, Appendix E.

V. Environmental Baseline

A. Canada lynx

The U.S. Fish and Wildlife Service’s *Biological Opinion* (National BO) (USDI Fish and Wildlife Service 2000) completed section 7 conferencing/consultation (for “Proposed” species) on all the existing Forest Plans and BLM Land Use Plans within the range of Canada lynx within the United States. The National BO concluded that: “... the current Plans, as implemented in conjunction with the Conservation Agreements, are not likely to jeopardize the continued existence of the lynx.” The “no jeopardy” conclusion was “based upon continued implementation of the Conservation Agreements until such time Plans are amended or revised to consider the needs of lynx. Furthermore, if Plans are amended or revised incorporating the conservation measures in the LCAS, or the equivalent thereof, we conclude at this time that the Plans would likely not jeopardize the continued existence of lynx.....We conclude that the programmatic and project-level objectives, standards, and guidelines in the LCAS provide comprehensive conservation direction for Plans adequate to reduce the potential for adverse effects to lynx and to preclude jeopardy to the lynx DPS.”

The Conservation Agreement states that the Forests will “consider” the conservation measures within the LCAS for each project. No Forest Service proposed project with an adverse effect determination may proceed until Forest Plans are revised. The White River and Medicine Bow NF’s have revised, so they can currently go forward with Forest Service proposed adverse affect projects, after Section 7 consultation. Third Party proposed projects with an adverse effect determination may proceed on all Forests, with Section 7 consultation. As the Forests have been under this agreement since August of 2000, this is the more realistic Environmental Baseline for this Biological Assessment. This baseline is approximated by Alternative B in the FEIS, which will be compared to Alternative F-modified, which is the Proposed Action for this BA. The only difference between operating under the Conservation Agreement and Alternative B is that Forest Service proposed projects with an adverse effect on lynx would be able to proceed with Section 7 consultation and go forward once the plans are revised. Appendix D displays the comparison between the Baseline and the Proposed Action (Alternative B and Alternative F-modified).

1. Current Lynx Habitat Data By Forest

Mapped LAUs for national forests in the SRMGA tend to be large, generally from 65,000 – 120,000 acres in size. As suggested in the LCAS, lynx habitat may not support comparable densities of lynx

in the lower 48 states as high as in northern boreal forests due to lower prey densities and inherent habitat patchiness. Lower prey densities are thought to result in increased home range size. Therefore, although this is somewhat speculative, a gradient in home range size may occur in the U.S., with largest home range size occurring in the patchy habitats of the SRMGA.

Table 3 shows the currently modeled denning, additional winter foraging, and other lynx foraging habitat within LAUs for the Amendment Area. There are approximately 10.9 million acres of NFS lands within LAUs, of which approximately 7.6 million acres is lynx habitat.

Table 3. NFS Acres of Lynx Habitat within the Southern Rockies Amendment Area

National Forest	Total NFS Lynx habitat Acres	NFS Denning/Winter Forage Habitat*	NFS Winter Forage (Non-denning)*	NFS Other Lynx Foraging	Total NFS Suitable Lynx Habitat	NFS Currently Unsuitable Lynx Habitat
Arapaho-Roosevelt	690,082	159,630	481,654	32,354	673,638	16,444
GMUG	1,641,664	615,822	224,208	787,537	1,627,568	14,096
Medicine Bow/Routt	1,192,466	171,103	128,978	858,852	1,158,933	33,533
Pike-San Isabel	826,156	274,515	269,385	276,546	820,446	5710
Rio Grande	1,035,420	373,005	187,538	392,357	952,900	82,520
San Juan	1,048,567	452,392	110,361	427,280	990,033	58,534
White River	1,142,794	459,800	321,382	344,580	1,125,762	17,032
Total:	7,577,149	2,506,267	1,723,506	3,119,506	7,349,280	227,869

GMUG: Grand Mesa, Uncompahgre, Gunnison NF's

*Denning habitat, in this table, is also considered winter foraging habitat, so the two columns need to be added to get total winter forage habitat.

To provide an adequate amount of habitat to support a resident lynx and to provide a continuous supply of foraging habitat, the LCAS recommends limiting the early seral stages of lynx habitat due to timber harvest and fire to 30 percent of lynx habitat within an LAU, until a broadscale assessment of historical natural conditions can be completed. The 30 percent limitation would apply to the early successional stages of forested stands created by both silvicultural treatments and prescribed fire, and was established based on studies from three independent sources (Poole et al. 1996, Koehler 1990, and Brittell et al. 1989) which indicate that limiting the proportion of a lynx home range currently in unsuitable condition to no more than 30 percent is a reasonable approach to conserve lynx, until more local analysis can be completed.

Table 4 displays acres of lynx habitat that are considered to be currently in unsuitable condition. This is defined in the Glossary as “areas within identified and mapped lynx habitat that are in early successional stages as a result of recent fires or vegetation management, and in which the vegetation has not developed sufficiently to support snowshoe hare populations during all seasons.” Management created openings would include clearcut and seed tree harvest units, and might include shelterwood and commercially-thinned stands depending on unit size and remaining stand composition and structure.

Table 4. Acres of Suitable and Currently Unsuitable Lynx Habitat in the Amendment Area

National Forest	SUITABLE (NFS acres)	UNSUITABLE (NFS acres)	Total Lynx Habitat (NFS)	Percent Unsuitable (forestwide average)
Arapaho/Roosevelt	673,638	16,444	690,082	2
GMUG	1,627,568	14,096	1,642,473	<1
Medicine Bow-Routt	1,158,933	33,533	1,192,466	3
Pike-San Isabel	820,446	5710	826,156	<1
Rio Grande	952,900	82,520	1,035,420	8
San Juan	990,033	58,534	1,048,567	5
White River	1,125,762	17,032	1,142,794	1.5

The above data were current as of January, 2007. At that point in time, within the Amendment Area, there was only one LAU with 30 percent or more of the lynx habitat in currently unsuitable condition, and this was due to a large wildfire in 2004 (Missionary Ridge fire on the San Juan NF). The currently unsuitable lynx habitat is assumed to be the young regenerating stands of lynx habitat types. Most of the LAU's range from 3 to 8 percent of the lynx habitat being in a "currently unsuitable condition". However, the recent pine beetle epidemic in the central and northern portions of Colorado have significantly changed some LAU's habitat since 2006. The Arapaho-Roosevelt, Routt and White River have experienced significant change in the lodgepole pine stands, but have not yet been able to update the spatial vegetation coverages at this point in time. The following table is from the Forest Vegetation section of the FEIS, as of 2006.

Table 5. Acres of Bark Beetle Infestation

Administrative Unit	2001 Acres		2004 Acres		2006	
	Spruce Beetle	Mtn Pine Beetle	Spruce Beetle	Mtn Pine Beetle	Spruce Beetle	Mtn Pine Beetle
Grand Mesa, Uncompahgre, and Gunnison NFs	432	2,841	939	3,386	2,850	750
Medicine Bow and Routt NFs	4,119	23,048	53,775	163,226	51,348	303,945
Rio Grande NF	273	9,025	156	5,520	13,223	3,877
Arapaho and Roosevelt NFs	6	24,114	10	99,076	5,540	154,385
Pike and San Isabel NFs	0	52,192	188	25,433	381	13,648
San Juan NF	153	1,135	7,376	0	20,472	142
White River NF	2,321	12,192	627	65,143	4,090	100,046

TOTAL	7,304	124,547	63,071	361,784	97,904	576,793
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The acres of national forest lands currently supporting epidemic populations of spruce and mountain pine beetle continues to increase. Spruce beetle increased over 1200% (spruce beetle infestations are difficult to detect using aerial surveys) and mountain pine beetle in lodgepole pine increased nearly 400% in the past 5 years. The acres with current beetle infestations are not cumulative. Once all the trees in an area have been killed, the area is no longer considered to be supporting the epidemic populations. As of the 2007 aerial forest health survey, over 1,500,000 cumulative acres of lodgepole pine have been affected by mountain pine beetle in Colorado, and another 300,000 cumulative acres of spruce-fir have been affected by the spruce beetle.

2. Lynx Habitat By Land Allocation Categories

National Forests in the SRLA area have completed modeling and mapping their lynx habitat and LAU maps since the national BA and Final Rule were published. An examination of the distribution of management area prescriptions on NFS lands within mapped lynx habitat provides better insight into the distribution of management activities, hence, the relative amounts of protection as well as potential impacts or risks to lynx habitat. Table 6 shows three broad groups of management area emphasis for national forests in the SRLA. Non-developmental allocations generally include management area categories 8 and 10 in the original forest plans, and categories 1 and 2 in the newer, second generation forest plans. Developmental allocations are managed for a broader range of multiple-uses, and are separated into two groups in Table 6. The first represents development allocations characterized by generally lower levels of multiple-use (less development) and includes management area categories 2 and 3 in the original forest plans, and categories 3 and 4 in the newer forest plans. The second group of development allocations represents full multiple-use management activities (allows for more development) and includes management area categories 1, 4, 5, 6, 7, and 9 in the original forest plans, and categories 5, 6, 7, and 8 in the newer forest plans. Included are the forest plans being amended, therefore, they are automatically incorporated by reference. (See individual Forest Plans for detailed descriptions of the Management Area Descriptions).

**Table 6. Groups of Land Management Allocations
by Percent of Lynx Habitat**

Forest	Percent Non-developmental	Percent Developmental (low multiple use – some development)	Percent Developmental (full multiple use – allows more development)
Arapaho- Roosevelt	41% (cat. 1, 2)	30% (cat. 3, 4)	29% (cat. 5, 7, 8)
GMUG	20% (cat. 8, 10)	21% (cat. 2, 3)	59% (cat. 1, 4, 5, 6, 7)
Medicine Bow/Routt	37% (cat.1,2)	11% (cat. 3,4)	52% (cat. 5,7,8)
Pike-San Isabel	25% (cat. 8, 10)	29% (cat. 2, 3)	46% (cat. 1, 4, 5, 6, 7, 9)
Rio Grande	22% (cat. 1, 2)	35% (cat. 3, 4)	43% (cat. 5, 6, 7)
San Juan	34% (cat. 1.1's, 10)	34% (cat. 2, 3)	32% (cat. 1B, 4, 5, 6, 7)
White River	46% (cat. 1,2)	8% (cat. 3,4)	46% (cat. 5,6,7,8)
Average (%)	32	24	44

The Medicine Bow/Routt, Arapaho-Roosevelt, Rio Grande and White River National Forests follow newer forest plan management area descriptors. The Grand Mesa-Uncompahgre-Gunnison (GMUG), Pike-San Isabel, and San Juan National Forests follow the older forest plan management area descriptors.

In the Amendment Area, a total of 2.37 million acres (32 percent) of all NFS acres of lynx habitat within lynx habitat are in non-developmental management area allocations. Most of these “non-developmental allocation” lands are in wilderness areas, research natural areas, and other similar allocations that generally have minimal impacts from human activities. The risks to lynx and lynx habitat are considered minimal within these allocations but the lack of vegetative management activity limits opportunities to create foraging habitat. However, there are some management activities occurring or being considered in wilderness areas, such as grazing and fire use and management (which include prescribed and natural ignition fires) that may have limited effects on lynx or lynx habitat. Incorporation of the lynx conservation measures into Amendment Area Forest Plans would result in little or no change in current management direction for these areas, with the exception of possibly allowing fire to play more of a natural role in these areas. Changes to lynx and lynx habitat would be negligible because these resource values are already being addressed by current Forest Plan direction, with the possible exception of the fire management. The LCAS objective of allowing fire to play its natural role as a disturbance process, which could create younger successional stages of forested stands in a natural mosaic, may benefit lynx habitat long term.

Twenty-four percent of all NFS lands in mapped lynx habitat are in developmental management area allocations in which potential impacts from management activities are low to moderate. These lands include allocations for special interest areas, backcountry uses, scenic rivers and byways, a variety of dispersed recreation uses, municipal watersheds, and corridors connecting core areas. There are a variety of potential impacts to lynx and lynx habitat from multiple use activities. Anticipated impacts from habitat modification, road construction, motorized recreation, developed recreation, or other developments are relatively low and/or localized due to restrictions placed on them in existing forest plans. The proposal to incorporate lynx conservation measures into SRLA Forest Plans may not change the existing level of activities in these management areas, but may limit increases of winter dispersed recreational activities into currently unused areas. Standards and guidelines associated with the maintenance of lynx habitat, the competitive advantage of lynx, and habitat connectivity could affect specific locations, distribution, and timing of some activities. Therefore, implementation of the proposed action would emphasize conservation actions that provide greater benefit (e.g. connectivity, reduced road mortality) to lynx and lynx habitat within these management area allocations than the current direction in the Forest Plans.

Forty-four percent of all Amendment Area lands in mapped lynx habitat are in developmental management area allocations managed for a full range of multiple use activities. These lands include allocations for forest vegetation management (wood fiber production), range vegetation management, other forest products, big game winter range, habitat for wildlife management indicator species, ski-based resorts and other developed recreation complexes, administrative sites, residential/forest interface, and utility corridors. Potential impacts to lynx and lynx habitat from multiple use activities associated with these land allocations are the greatest relative to other land allocations. The proposal to incorporate lynx conservation measures into Amendment Area Forest Plans would have the greatest potential to reduce or remove risks to lynx and lynx habitat identified in the LCAS and Final Rule on these land allocations. These lands probably also provide the greatest opportunity to maintain or increase lynx foraging habitat through vegetation manipulation and other land management activities.

B. Other Threatened and Endangered Species

1. Species Considered

An updated list was received by the USFWS on March, 2007, with a list of all threatened and endangered species that occur on or adjacent to the seven amendment forests, or that could be affected by Forest activities, such as water depletions (See Table 7).

Table 7. T&E Species for SRLA

Legend:

K - Species currently documented to occur on National Forest System (NFS) lands. (K= known)

L - Species or habitat is suspected to occur on NFS lands, but unconfirmed. (L=likely)

P - Potential site for reintroduction of the species has been identified. (P=potential reintro site)

N - Species not known or suspected to occur on NFS lands, however it may occur in planning area vicinity. Evaluate whether indirect effects from Forest Service management actions may occur. (N=Not Known or suspected)

STATUS: ENDANGERED

Nat'l Forest	GMUG	MBR	RIOG	AR	PSI	SANJ	WR
MAMMALS							
black-footed ferret <i>Mustela nigripes</i>							
BIRDS							
least tern <i>Sternula antillarum</i>		N		N			
piping plover <i>Charadrius melodus</i>		N		N	N		
whooping crane <i>Grus americana</i>		N		N	N		
southwestern willow flycatcher <i>Empidonax trailii extimus</i>			L			K	
AMPHIBIANS							
Wyoming toad <i>Bufo baxteri</i>		N					
FISHES							
bonytail chub <i>Gila elegans</i>	N	N		N		N	N
Colorado pikeminnow <i>Ptychocheilus lucius</i>	N	N		N		N	N
humpback chub <i>Gila cypha</i>	N	N		N		N	N
razorback sucker <i>Xyrauchen texanus</i>	N	N		N			N
pallid sturgeon <i>Scaphirhynchus albus</i>		N		N			
INVERTEBRATES							

Uncompahgre fritillary butterfly <i>Boloria acrocynema</i>	K		K		N	N	L
PLANTS							
<i>Osterhout milkvetch</i> <i>Astragalus osterhoutii</i>		N		N			

STATUS: THREATENED

Nat'l Forest GMUG MBR RIOG ARP PSI SANJ WHRR

MAMMALS							
Canada lynx <i>Lynx canadensis</i>	K	K	K	K	K	K	K
Preble's meadow jumping mouse <i>Zapus hudsonius preblei</i>		K		K	K		
BIRDS							
Mexican spotted owl <i>Strix occidentalis lucida</i>	N		L	L	K	K	L
bald eagle <i>Haliaeetus leucocephalus</i>	K	K	K	K	K	K	K
FISHES							
greenback cutthroat trout <i>Oncorhynchus clarki stomias</i>				K	K		
INVERTEBRATES							
Pawnee montane skipper <i>Hesperia leonardus montana</i>					K		
PLANTS							
<i>Eutrema penlandii</i>					K		K
<i>Sclerocactus glaucus</i>	L						
<i>Spiranthes diluvialis</i>		N		N	L		

Note: Species associated with National Grasslands on the administrative units are not displayed.

Suitable habitat for many of these species occurs outside of lynx habitat, Lynx Analysis Units (LAU's) and linkage areas, and therefore will not be assessed in this analysis. They are: Preble's jumping mouse, black-footed ferret, Wyoming toad, Pawnee montane skipper, *Sclerocactus glaucus*, and *Sprianthes diluvialis*.

There will be no water depletions associated with the proposed action therefore; the following species affected by water depletions will not be addressed in this BA:

Humpback chub	<i>Gila cypha</i>
Bonytail chub	<i>Gila elegans</i>
Colorado pikeminnow	<i>Ptychocheilus lucius</i>
Razorback sucker	<i>Xyrauchen texanus</i>
Pallid sturgeon	<i>Scaphirhynchus albus</i>
Whooping crane	<i>Grus americana</i>
Least tern	<i>Sternula antillarum</i>
Piping plover	<i>Charadrius melodus</i>

2. T&E SPECIES EVALUATED (Other than Lynx)

The following are the threatened (T) and endangered (E) species, other than lynx, that occur or may occur within lynx habitat or linkage areas, or have the possibility of being affected, within the action area, and are therefore evaluated in this BA.

Birds

Southwestern willow flycatcher (E)	<i>Empidonax traillii extimus</i>
Mexican spotted owl (T)	<i>Strix occidentalis lucida</i>
Bald eagle (T)	<i>Haliaeetus leucocephalus</i>

Fish

greenback cutthroat trout	<i>Oncorhynchus clarki stomias</i>
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Invertebrates

Uncompahgre fritillary butterfly (E)	<i>Bolaria acrocneuma</i>
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Plants

Penland alpine fen mustard (T)	<i>Eutrema penlandii</i>
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Osterhout milkvetch (E)

Astragalus osterhoutii

Mammals

Gunnison prairie dog (C)

Cynomys gunnisoni

VI. Analysis of Effects to Species Evaluated

A. Assumptions

- 1) Lynx habitat maps provided by the National Forests were utilized as the geographic basis for assessing effects on species within lynx habitat throughout the SRLA area.
- 2) Effects are generally presented as changes relative to Alternative B, which represents a strategy that is expected to conserve lynx. Alternative B also represents the baseline or current practices based upon the current Conservation Agreement (USDA et al. 2005). Cumulative effects include the effects of the entire plans (past actions), which are incorporated by reference.
- 3) Effects described in this document are the expected result of modifying Forest Plans under Alt. F-modified.
- 4) Direct effects to fish, wildlife and invertebrate species are those associated with direct mortality or injury such as predation, shooting, trapping and vehicle collisions. Any amendment alternative analyzed in this document will have no direct effects on any species because the amendment does not prescribe any level of site-specific activities on the ground. Indirect effects are those activities or actions that affect short or long-term changes in habitat suitability for a particular species or their food sources or may affect the presence or distribution of denning, nesting or resting sites.
- 5) With the exception of some fire management and some human induced snow compacting activities, the majority of effects on wildlife species would occur within developmental land allocations.
- 6) The analysis of effects is primarily based on projections of changes in future activities and areas because of the proposed standards. Compliance with standards is mandatory and guidelines are assumed to be followed, but may not be where compelling reasons such as the protection of other species at risk or protection of public safety are an issue.
- 7) The majority of effects to species will occur over the short-term, which is defined as a ten-year period from 2008-2017. This period was used because it is estimated that all Forest Plans subject to the amendment are currently being revised or will be revised over

the next 10 years. Long-term effects are those effects estimated to occur beyond 10 years up to 50+ years in the future.

- 8) With the exception of Canada lynx, existing direction provided in Forest Plans is expected to provide for the maintenance of species viability.
- 9) The LCAS provides the most current and comprehensive review of threats and risks to conserving lynx and defines objectives, standards and guidelines for the management of lynx habitat. The LCAS standards and guidelines are important measures in providing for the conservation of lynx.

B. Methods

The following effects analysis will be grouped by LCAS Risk Factors. The information used in this analysis included a review of pertinent literature related to Canada lynx and snowshoe hare biology, ecology and habitat relationships. Personal communications were conducted with National Forest and USFWS biologists, USFS Regional Office fish and wildlife staff and individuals conducting research on lynx and snowshoe hares. Public comments collected during the scoping period and comments received on the DEIS were also reviewed to evaluate whether any new information regarding the management of lynx was available.

The individual species evaluated in this analysis use a variety of habitat types and structural stages within lynx habitat in the SRLA area. A discussion of individual species habitat relationships is not included here. Various literature sources were reviewed to evaluate potential effects to TEP species (Ehrlich et al. 1988, Johnsgard 1990, Martin et al. 1951, Nussbaum et al. 1983, Schmidt et al. 1978, Sibley 2000, Whitaker 1996). Species information was also reviewed on the *NatureServe* website. This database contains comprehensive species information including habitat relationships and can be accessed via the following link:

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

(*NatureServe* was formed in July 1999 as the *Association for Biodiversity Information* when *The Nature Conservancy* and the *Natural Heritage Network* jointly established an independent organization to advance the application of biodiversity information to conservation.)

C. Canada lynx

Comparison of Baseline Conditions (Alternative B) and Proposed Action (Alt. F modified) Effects for Each Risk Factor Identified in the LCAS

In the *Notice of Remanded Determination of Status for the Contiguous United States Distinct Population Segment of the Canada Lynx* the FWS (USDI Fish and Wildlife Service 2003) reviewed threats to lynx that were identified and discussed in the Biological Opinion (BO). In

this review the USFWS determined that threats from timber harvest and thinning were low because the Forest Service (USFS) is generally following the LCAS and the Forest Service has a *Conservation Agreement* (USDA Forest Service et al. 2005) in place in which they agree to avoid projects that would permit adverse affects to lynx. **As stated previously, because the agencies are considering and generally following the LCAS, the management direction described under Alternative B is representative of baseline conditions.** The only difference between the Conservation Agreement and Alternative B would be that no Forest Service proposed projects with an adverse effect on lynx are currently going forward (except the White River and the Medicine Bow NF's), which would be allowed when Forest Plans are amended. See **Appendix D** for Tables displaying a comparison between Baseline, Alternative F and the Proposed Action, and the rationale for changes.

Two additional risk factors, forest roads and competition (competing predator access into deep snow habitats as a result of snow compacting activities) were determined in the *Remand Notice* (USDI Fish and Wildlife Service 2003) to not be a threat at this time. These later determinations were not based on new information but on the lack of any existing data that indicates an affect to lynx or lynx habitat. A discussion of the risk factors and the potential effects on lynx and lynx habitat follows.

Risk Factors

1. Trapping

Lynx seem to be vulnerable to trapping and as a result may have been over exploited in the past. Road access may increase the vulnerability of lynx to trappers. At low population levels, or in situations where reproduction or recruitment are low, trapping mortality can be additive and lead to population declines. Incidental trapping may occur where regulated trapping is permitted for other species (such as coyote and fox) whose range overlaps with that of the lynx.

Regulation of trapping is not within the jurisdiction of the Forest Service but is regulated by the states. Trapping seasons are closed for lynx in Wyoming and Colorado. It is possible that lynx could be incidentally trapped during trapping seasons for other species in Wyoming. Trapping with leghold traps for all species is illegal in Colorado. The Final Rule for listing indicates trapping does not currently appear to be a significant mortality factor in the SRMGA. The July 3, 2003 Remanded Final Rule reiterated this indication.

Both the Baseline (Alternative B) and the Proposed Action (Alternative F-modified) do not address trapping; therefore there will be **no change** from existing situation. It will continue to be regulated by the States, with a small potential for incidental or illegal trapping occurring.

2. Predator Control

Predator control activities occur on public lands throughout this geographic area to protect livestock from predation. Methods include trapping, shooting, and poisoning. These activities are directed at specific animals or target species. Predator control activities can occur in lynx habitat, but more often take place outside of lynx habitat and at lower elevations.

Predator control activities on NFS lands in lynx habitat are limited. Any predator control activity is directed at a particular species or offending animal and is usually done on sheep allotments in the higher elevations. Unintentionally trapped lynx can be released. Information provided by the Animal and Plant Health Inspection Service shows that no lynx have been incidentally taken in the Western Region for the past 30 years. Predator control activities that affect lynx or lynx habitat on NFS lands must be done in compliance with the Endangered Species Act.

The Proposed Action would not change the current practices of predator control on public lands. Predator control activities conducted by APHIS-Wildlife Services are subject to their own separate Section 7 consultation process. Therefore, there will be **no change** from the existing situation.

3. Incidental or Illegal Shooting

Lynx can be mistakenly shot by hunters or illegally killed by poachers. The magnitude of shooting mortality within the contiguous United States is unknown. Road access into lynx habitat can increase the risks of accidental shootings.

Regulation of shooting of animals is not within the jurisdiction of the Forest Service but rather rests with the States. There are very few records of lynx being shot in the SRMGA, before the translocation of lynx into Colorado. Of the reintroduced lynx in Colorado, 31% of the mortalities have been documented by being human caused, ie: shooting or vehicle mortalities (Dr. Tanya Shenk, Research Wildlife Biologist, Colorado Division of Wildlife, periodic lynx update November, 2006), with at least 14 possibly from being shot. (9 confirmed gunshot mortalities). Recently released lynx may be more mobile than lynx with established home ranges, making them more vulnerable to being shot. One of the shooting mortalities occurred in western Nebraska.

Neither the Baseline nor the Proposed Action specifically addresses shooting, but both the Baseline and the Proposed Action may reduce public use of special project and special use roads due to proposed standards and guidelines. This may indirectly reduce illegal shooting, however, any change would be unquantifiable. There will be **no change** from Baseline to the Proposed Action.

4. Competition and Predation

Lynx interact with other carnivores throughout their range. Competition with coyotes, mountain lions, and bobcats have been inferred or documented throughout the range of the lynx. Definitive data on the threats of mountain lions on lynx is somewhat lacking, but because lions and lynx occupy different ecological niches and depend on different prey species, the effects of mountain lions on lynx populations is believed to be minimal

There is no evidence that the bobcat out-competes the lynx for habitat and food resources. There is, however, one confirmed mortality of a released lynx in Colorado due to bobcat predation (Shenk 2003).

Buskirk et al. (in Ruggiero et al. 2000a) described the two major competition impacts to lynx as exploitation (competition for food) and interference (avoidance). Of several predators examined (birds of prey, coyote, wolf, mountain lion, bobcat and wolverine), coyotes were deemed to most likely pose local or regionally important exploitation impacts to lynx; coyotes and bobcats were deemed to possibly have important interference competition effects on lynx (LCAS 1-12). Coyotes have greatly expanded their range, and the use of packed snow trails and plowed roads may allow them to occupy winter habitats of lynx in some cases. The lynx and coyote seem to hunt under different snow conditions with coyotes using shallower and more compacted snow while lynx tend to use deeper snow areas.

With respect to winter recreation activities, the LCAS describes a programmatic planning standard and guidelines involving the mapping of a winter snow compaction baseline and then mapping and monitoring the location and intensity of snow compaction activities that coincide with lynx habitat, to facilitate future evaluation of effects on lynx as information becomes available (Ruediger et al. 2000, LCAS page 7-9). Widespread human activity (snowshoeing, cross-country skiing, snowmobiling, snow cats, etc.) may lead to patterns of snow compaction that make it possible for competing predators such as coyotes and bobcats to occupy lynx habitat throughout the winter, reducing its value to and even possibly excluding lynx (Ruediger et al. 2000, Ruggiero et al. 2000, Chapter 4).

The Forests within the SRLA have completed their baseline snow compaction mapping, and the total number of miles of snow compacted routes and trails within lynx habitat in the Amendment Area is estimated to be approximately 4,825 miles.

While there is some concern that predation on lynx could occur due to the abundance of mountain lions in the Region, predation is not documented to be a factor that is threatening the lynx in the SRLA. It is hypothesized that coyotes, bobcats, and mountain lions could be competitors with lynx. Where historically the ranges of these species overlapped with the lynx, deep snow excluded them from winter habitats for the lynx. Lynx have evolved a competitive advantage in deep soft snow environments that tend to exclude other predators during the middle of winter, a time when prey is most limiting. Widespread human activity on the snow may lead to patterns of snow compaction that make it possible for competing predators such as coyotes and bobcats to occupy lynx habitat through the winter, reducing its limited prey base. Even though there is no hard scientific evidence that snow compaction can lead to increased competition from other predators as yet, the LCAS recommends that “Until conclusive information is developed concerning lynx management, we recommend the agencies retain future options. That is, choose to err on the side of maintaining and restoring habitat for lynx and their prey.” (Ruediger et al. 2000a).

Alteration of forests and development of compacted trails through the snow could facilitate movement of potential lynx competitors into lynx habitat in the winter. Lynx and carnivore biologists (Bider 1962, Ozoga and Harger 1966, Murray and Boutin 1991, Koehler and Aubry 1994, Murray et al. 1995, and Lewis and Wenger 1998, all cited in Ruggiero et al. 1999) have suggested that packed trails created by snowmobiles, cross-country skiers, snowshoers, as well as by other predators, may serve as travel routes for potential competitors and predators of lynx, especially coyotes. Buskirk et al. (in Ruggiero et al. 2000a) hypothesizes that the usual spatial segregation of lynx and coyotes “may break down where human modifications to the environment increase access by coyotes to deep snow areas. Such modifications to the environment include expanded forest openings throughout the range of the lynx in which snow may be drifted, and increased snowmobile use in deep snow areas of the western mountains.” Recent advances in snowmobile technology allow snowmobiles to travel through deeper snow and into areas that were not accessible with the older machines. Coyotes have been shown to increase their use of open habitats between November and March due to the increase in packed snow conditions and the load-bearing strength of snow in openings. It is this strong prey and habitat switching ability of the coyote that may contribute to its success as a competitor (LCAS p. 2-8).

Some timber harvest practices increase edges and openings that may improve conditions for generalists that can move into the areas and compete with lynx. Plowed roads and snow compaction of roads and trails associated with a variety of forest management and recreational activities may also increase the potential for competitors to move into lynx habitat.

Alternative B, the environmental baseline, under standard **HU S1**, restricts increases in “groomed or designated” recreational snow compacting activities to areas that are already consistently compacted, thus limits to a certain extent, potential increased competition and predation risks to lynx. “Designated” snow compacting activities are those activities that the Forest Service authorizes, promotes or encourages, through special use permits, agreements with Snowmobile Clubs, signing, trailheads, etc. This standard allows for some management flexibility in allowing new authorizations for over the snow activities in areas in which the snow is already consistently compacted by dispersed recreational use. These baseline areas and routes are mapped based on what existed in the years 1998-2000. This standard would maintain the status quo as much as possible, in regards to the areas of snow compaction that allow access in the winter to competitors of lynx. However, **HU S1** allows for increases in grooming on the already designated snow compacted areas. Increased grooming of trails along existing routes could indirectly lead to an increase in use and possibly an increase in snow compacted areas at the end of the newly groomed trails. This is based upon the assumption of grooming greatly increasing use of trails, bringing more users into formerly difficult to access areas.

Proposed Action (Alt. F-modified)

Standard HU S1 under the baseline has been replaced by guideline HU G11 that provides similar management guidance but is not mandatory. Research to date has not provided any conclusive evidence that snow compacting activities in lynx habitats are having adverse effects on lynx. Although expansion of special use winter snow compacting activities could occur under this

alternative, expansion is only likely to occur in areas of existing snow compaction identified in the baseline period (1998-2000). This would minimize the potential for carnivore competition with lynx over compacted snow routes.

5. Vegetation Management- Denning and Foraging Habitat

All the Vegetation and Grazing standards and guidelines will be analyzed as to their effects on lynx denning and foraging habitats.

a. Lynx Denning Habitat

Approximately 2.5 million acres currently meet modeled denning habitat characteristics for the Amendment Area forests (Table 3). Denning habitat is defined as habitat used during parturition and rearing of young until they are mobile, and is characterized by large amounts of coarse woody debris that provides escape and thermal cover (see Glossary for more complete definition). Denning habitat in the Southern Rockies is likely to occur most often in late-successional spruce-fir forest with a substantial amount of large diameter woody debris on the forest floor. Lodgepole pine and Douglas fir stands can also be denning habitat provided that the cool, moist conditions and coarse woody debris are present. Usually these conditions occur in lodgepole stands that are successional to the spruce-fir habitat type. Engelmann spruce and subalpine fir are often present in the stand. Denning habitat often is found on, but is not restricted to, northerly exposures due to the cooler conditions. Current research in Colorado (Grant and Shenk 2006) describes 37 den sites that have a mean elevation of 11,004 feet, with a mean 30 degree slope, generally north facing, with a dense understory of coarse woody debris. The minimum elevation was 10,226 feet and the maximum was 11,765 ft. In the SRLA, all modeled denning habitat is also considered foraging habitat, as lynx denning habitat contains the habitat characteristics needed by snowshoe hares, as well.



Photo of den site from Merrill and Shenk 2006.

Currently in the Amendment Area, most of the LAUs have 20-50 percent of each LAU in modeled denning habitat. This is due to the large occurrence of older successional stage forested stands in the Southern Rockies, which were regenerated during the large fires of the mid to late 1800's. Lack of large fires and long fire return intervals for spruce-fir are the most probable reasons for the large amount of mature spruce-fir, which usually provides good denning habitat due to the natural disturbances processes associated with it, such as blowdown, insects and disease. These processes all create snags and down logs, which provide the structure on the forest floor that is used for denning by lynx.

Baseline Conditions of Denning Habitat

Table 8. Summary of Direction in Existing SRLA Forest Plans that affects structural denning habitat

Forest	Old Growth Requirement*	Snag Requirement	Dead and Down Log Requirement
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Medicine Bow	10% VEG S3 and VEG S4	20-30/10 ac	33-50 linear ft/ac VEG S4
Routt	Guideline to provide a mix of successional stages (young to late-successional)	1/acre	33-50 linear ft/ac
Arapaho-Roosevelt	Objective to manage for increase in mature and old growth	1/acre	33-50 linear ft/ac
GMUG	5-12%	200-300/100 ac	10-20 tons/ac 50 linear ft/ac
Pike-San Isabel	10%	20-30/10 ac	33-50 linear ft/ac
Rio Grande	None	2/acre	33-50 linear ft/ac
San Juan	5%	20-30/10 ac	33-50 linear ft/ac
White River	10% denning, 30 % late-successional in spruce-fir. VEG S3 and VEG S4	3/ac, 1 large/5 acres	150 linear ft/ac (spruce-fir) VEG S4

GMUG = Grand Mesa, Uncompahgre, and Gunnison National Forests.

* Mature and old growth standards are generally by Diversity Unit, Fourth Order Watershed, or other landscape boundaries, to ensure good distributions across the Forest.

In most Forest Plans, existing direction for the maintenance of old growth or late-successional forest approximates direction for lynx denning habitat contained in the LCAS (minimum of 10%). Within the SRLA, an average of 32 percent of the land base is in non-developmental management allocations, much of which includes denning habitat. All existing Forest Plans in the SRLA contain some provision for both standing and dead and down coarse woody debris. All existing plan requirements for dead and down logs range from 33-50 linear feet per acre. This standard can usually be met with only one or two downed logs per acre, which represents an essentially bare forest floor, which would not be considered enough down woody debris for denning habitat. Existing Forest Plan requirements for snags (standing dead trees) range from one to three snags per acre. Standing dead trees represent future recruitment to the dead and down log component. The minimum amounts of biomass necessary to meet these two standards is very low and does not compare to the amounts of coarse woody debris characteristic of denning sites. However, it must be kept in mind that these standards represent minimums and actual amounts in natural forest conditions within the SRLA are usually much higher.

Alternative B, Environmental Baseline, also has direction specific to lynx denning habitat and for addressing denning habitat on a large scale. **VEG S3** addresses denning habitat at the LAU scale by maintaining a minimum of 10 percent of each LAU in denning habitat in patches generally larger than 5 acres each. **VEG S4** addresses denning structure at the site-specific scale, maintaining those natural disturbance patches of less than 5 acres such as blowdown, small fires, insect and disease patches, or other mortality. Under Alternative B, there are exceptions for salvaging these smaller than 5 acre patches of dead and/or down trees within:

- developed recreation or administrative sites; designated road and trail corridors for public safety;
- LAU'S where denning habitat has been field validated and is at least 10% of the LAU;

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- the structure ignition zone, which is within 200 feet of administrative sites, dwellings and/or associated outbuildings. This allowance is to provide for defensible space from wildfires.

These exceptions would not result in any quantifiable negative effects to lynx habitat, as the intent of the standard is to maintain denning habitat structure on the forest floor, and *in most cases*, actual lynx denning would occur away from areas with high amounts of human activity, i.e: near dwellings, developed recreation sites or open roads.

Proposed Action, Alternative F-modified

Under Alternative F-modified, there are no standards addressing denning. VEG S3 and S4 are substituted with a **Guideline (G11)**, which states: “Denning habitat should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees (“jackstrawed piles). If denning habitat appears to be lacking in the LAU (ie: less than 10%), then projects should be designed to retain some coarse woody debris piles, or residual trees to provide denning habitat in the future.”

As stated previously, the USFWS Biological Opinion (USDI 2000) on the current Forest Plans stated that within non-developmental allocations, denning habitat would likely be maintained at or above historic levels, and that within developmental allocations, existing Plan direction to maintain old growth habitat was judged to be adequate to provide for lynx denning habitat in the SRMGA. The SRMGA forests have since modeled and mapped lynx denning habitat, and it does appear that denning habitat may not be a limiting factor for lynx in the SRMGA, based on the amounts of denning habitat within LAU’s (See Table 3.) Therefore, the Guideline VEG G11 may be effective to maintain good distributions of denning structure.

b. Lynx Foraging Habitat

Foraging habitat for lynx in the SRLA includes all of the primary forest types that make up lynx habitat (spruce-fir, lodgepole pine, Douglas-fir, and aspen). Spruce-fir occupies 45 percent of the lynx habitat in the Amendment Area. Aspen stands account for 25 percent of the lynx habitat, lodgepole occurs on 22 percent, and Douglas-fir and mixed conifer occupy 8 percent of the lynx habitat within the Amendment Area. Also potentially important are the high elevation sagebrush and mountain shrub communities, as well as riparian and wetland shrub communities found in adjacent valleys, drainages, wet meadows, and moist timberline locations, which all may support alternate prey resources. Forests in the SRLA area have modeled winter foraging habitat as a subset of all lynx habitat. Winter is a limiting factor for many wildlife species. Winter foraging areas are those that have the structural characteristics (described earlier) that provide cover and food for snowshoe hares through the deep snow conditions of winter. Griffin (2004) states that winter hare densities were slightly higher in mature dense forests (0.53 hares/ha) than in young dense forests (0.47 hares/ha), and both were much higher than in open forests (0.2 and 0.12 hares/ha).

Winter foraging areas actually provide yearlong habitat for hares. In summer, hares shift their diet to a higher proportion of grasses, forbs, and herbaceous portions (new growth) of shrubby species that are not available in winter, and thus may occupy additional areas in summer where these plants are more abundant and available. Currently there are approximately 4.23 million acres of modeled winter foraging habitat in the Amendment Area (Table 3).

Most of the lynx habitat within the LAUs in the amendment area is currently suitable for foraging, with generally only three to eight percent of most of the LAUs being in the currently unsuitable condition—in an early seral stage (See **Table 4** for forest-wide averages).

The LCAS also infers that limits must be placed on the extent of habitat alteration that can occur at one time within an LAU, to limit the short term effects to an individual lynx, as most treatments to create future foraging habitat can result in short term (15-20 years) unsuitable habitat conditions. Unsuitable habitat conditions are considered to be early structural stages of a forested stand within lynx habitat (primarily coniferous) that do not provide either snowshoe hare or red squirrel (primary prey sources) habitats.

Fire and Fuels Management - It is generally acknowledged that in the Southern Rocky Mountains fire suppression has altered historic vegetative patterns. This effect has been most pronounced within vegetation communities where fire regimes are of low intensity or mixed severity. It is generally agreed that spruce-fir habitats have been little affected by fire suppression because the fire regimes within this type tend to be stand-replacing events occurring at long intervals (100+ years). Depending on the moisture regime, large stand-replacing fires within lynx habitat may produce young age class snowshoe hare habitat after approximately 10-30 years. Although this vegetative condition may provide some high quality snowshoe hare habitat, mature forests are also very important as winter foraging habitat.

Precommercial thinning - Precommercial thinning occurs both to enhance growth on remaining trees, and to reduce fuels in fuels treatment areas. In the SRLA, this would primarily occur in the lodgepole pine type (22 percent of lynx habitat) and the mixed conifer (8 percent) cover types, which are the ecosystems primarily affected with unnatural fuel build-ups due to fire suppression, within lynx habitat. Only minor amounts of precommercial thinning occur in spruce-fir cover type, generally to reduce stocking of subalpine fir. The LCAS assumes that maintaining high-quality foraging habitat within each LAU through time is very important. Stem density and/or horizontal cover appear to be directly and positively correlated to snowshoe hare density (Conroy et al. 1979, Sullivan and Sullivan 1988, Koehler 1990, Hodges 2000a, Squires and Ruggiero 2007). Precommercial thinning reduces the density of sapling sized conifer trees and understory shrubs, and therefore, is likely to be detrimental to snowshoe hare habitat. Reducing dense horizontal structure through silvicultural thinning will likely reduce an area's carrying capacity for snowshoe hares (Ruggiero et al. 2000b). In northwestern Montana, Ausband and Baty (2005) found that within individual forest stands, hares had a significant affinity for dense, unthinned sapling patches. Research conducted in northwestern Montana found that precommercial thinning (PCT) decreased snowshoe hare abundance, compared to both control and PCT thinned stands where 80 percent of the

entire stand was thinned but 20 percent of the total stands was retained with saplings uncut (Griffin, 2004). Declines were prominent in the second winter after treatment. In addition, estimated survival rates decreased as individuals spent proportionately more time in open young and open mature forest stand structure types (Griffin 2004). Additional research to investigate the relationship of various stand conditions to snowshoe hares is currently underway in several different regions of the western United States (Appendix C).

Baseline Foraging Habitat Conditions

Limits on habitat alterations in LAUs are intended to aid in maintaining a distribution of suitable lynx habitat across the landscape and over time. Application of certain conservation measures at the LAU scale allows blocks of quality lynx habitat to be maintained within each LAU, thereby maintaining a good distribution of lynx habitat at the scale of a lynx home range.

One of the major standards in the LCAS that is designed to limit habitat alteration is **VEG S1**, which limits currently unsuitable lynx habitat to no more than 30 % per LAU. In conifer habitats, unsuitable habitat conditions persist for about 20-30 years after a fire or some types of vegetation treatments.

Standard **VEG S2** in the Proposed Action is related to the standard described above, however, it regulates the rate of timber harvest alone (not including natural disturbances) that would change suitable lynx habitat into an unsuitable condition. "Timber management projects shall not regenerate more than 15% of lynx habitat on NFS lands in an LAU in a ten year period". This does not pertain to prescribed or wildland fire, as the intent of the LCAS is to encourage fire. According to the LCAS, timber harvest is not an exact ecological substitute for natural disturbance processes. For a list of these differences, see the LCAS, page 2-2 and 2-3.

This standard could still result in up to 30 percent of an LAU in unsuitable condition within 20 years, but it is highly unlikely that this amount of regeneration harvest would occur in an individual LAU in the SRLA. On average, the LAUs in the Amendment area have between three to eight percent of the lynx habitats in currently unsuitable conditions, including both timber activities and fire (wild and prescribed). Most of the LAUs within the SRLA have spruce-fir habitat as the basis for lynx habitat within the LAU's, and typically, clearcutting is not the preferred method of harvest for spruce-fir. However, overstory removal could result in unsuitable habitat conditions in some cases in spruce-fir. Generally, it is the clearcutting in lodgepole pine that results in unsuitable habitat conditions temporarily. Clearcutting in aspen also can cause unsuitable conditions temporarily, but aspen can regenerate very quickly, providing snowshoe hare forage above snow levels in five to 10 years.

Standard **VEG S3**, although intended for denning habitat, also provides for well-distributed foraging habitat. Denning habitat also serves as good foraging habitat, as it typically provides habitat for both snowshoe hare and red squirrel, the two primary prey species for lynx.

Standard VEG S5: *“Precommercial thinning may be allowed only when stands no longer provide snowshoe hare habitat (e.g. self-pruning processes or stand composition and/or stand structure do not provide snowshoe hare cover and forage availability during winter conditions with average snowpack)...except within 200 feet of administrative sites, dwellings and/or associated outbuildings”*. This standard protects the majority of the highest quality snowshoe hare habitats, the young, densely regenerating coniferous stands, which may have a higher density of hares than other structural stages of forest, and can serve as an important foraging area in which a lynx may regularly hunt/forage. It also protects the areas of mature stands that provide moderate densities, but likely more stable populations of snowshoe hare. The acreage of foraging habitat potentially affected by the exception for structure ignition zones is unknown, but expected to be very minor.

It has been well documented through numerous studies (Ruggiero et al. 2000, also see Appendix C), that thinning in hare habitat results in a corresponding decrease in the abundance of snowshoe hares. Losses of snowshoe hare habitat may have an adverse effect on lynx. Under the baseline, precommercial thinning (PCT) is delayed until the young regenerating stand no longer provides snowshoe hare habitat. One exception is the White River NF, which also delays precommercial thinning, but very specifically defines PCT as thinning to encourage growth of other trees, as opposed to thinning for fuels treatment objectives. Therefore, fuel treatment precommercial thinning would be allowed under the baseline for the White River, even though it may be an adverse effect to lynx.

Standard **VEG S6** in the Baseline (Alternative B) states “Management practices and activities in mature and late successional, multi-layered Engelmann spruce-subalpine fir stands shall provide for winter snowshoe hare habitat.”

This standard would protect the majority of the winter foraging or snowshoe hare habitats that are found in the mature and late successional Engelmann spruce and subalpine fir stands. These stands “shall provide for winter snowshoe hare habitat except in a few specific cases, such as the structure ignition zone, which is to provide for defensible space for dwellings, and other buildings. The acreages potentially affected by the allowances under this standard are expected to be very minor.

Standards **GRAZ S1 and S2** would help to manage grazing to protect the regeneration of stands. These vegetation standards would contribute to the maintenance of lynx populations across the landscape of the Amendment Area, as they meet the intent of the conservation recommendations in the LCAS, which is based on the most up to date information available on the potential risks to lynx viability.

Fuel reduction projects have the potential to reduce or eliminate lynx habitat by simplifying stand structure and/or reducing stem densities and horizontal cover below levels that provide forage and cover for snowshoe hares. Treatment of some habitat that is currently not in a

suitable condition would have little effect on lynx other than possible displacement during project activity.

Baseline fuel treatments are displayed in Table 9 displays the average annual accomplishment by Fire Regime for the forests within the amendment area. The Forests have treated less than 9,000 acres per year for hazardous fuels reduction activities in Fire Regimes IV and V (generally lynx habitats).

Table 9.- Five Year (FY 2002-2006) Average Annual Acres of Fuels Treatments by Fire Regime for Amendment Area

Fire Regime	WUI*Actual Acres Treated	Non-WUI Actual Acres Treated	Total Actual Acres Treated	WUI Percent of Actual Acres Treated	Non-WUI Percent of Actual Acres Treated	Fire Regime % of Total Acres Treated
I	11,234	7,285	18,518	61%	39%	30%
II	5,090	5,606	10,696	48%	52%	17%
III	9,658	8,519	18,177	53%	47%	30%
IV	4,199	1,517	5,716	73%	27%	9%
V	860	1,531	2,392	36%	64%	4%
Unknown	4,285	1,705	5,990	72%	28%	10%
Total	35,327	26,163	61,490	57%	43%	100%

*WUI – Wildland Urban Interface

Approximately 60% of the treatment acres were located within the wildland urban interface. Most significant is the fact that more than 80% of all treatments (hazardous fuels and other vegetation management that contributes to restoring fire adapted ecosystems) in the Amendment area occurred in Fire Regimes 1, 2 or 3. Lynx habitat is primarily Fire Regimes 4 and 5. Less than 15 % of treatments occurred in Fire Regimes 4 and 5.

Proposed Action, Alt. F-modified

VEG S3 and S4 (Denning habitat measures) are replaced in Alternative F-modified with guideline **VEG G11**. It states: “Denning habitat should be well-distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small windthrown trees (“jackstrawed” piles). If denning habitat appears to be lacking in the LAU, then projects should be designed to retain some coarse woody debris, piles, or residual trees to provide denning habitat in the future. Although VEG S3 and S4 are intended to maintain denning habitat, denning habitat also serves as good foraging habitat, as it typically provides habitat for both snowshoe hare and red squirrel, the two primary prey species for lynx.

As a guideline, it does not provide the stronger direction that the standards provide. If this denning habitat direction is not implemented, forest management activities could result in negative effects to

denning and foraging habitat, and therefore indirectly to individual lynx. In most cases, however, denning habitat is maintained by other Forest Service policies and direction (See Table 8).

Under the Proposed Action, **VEG S1, and S2** are basically the same as Alternative B with the following exception: “Fuel treatment projects within the WUI that do not meet Standards VEG 1, VEG S2, VEG S5 and VEG S6 may occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (National Forest or combined National Forests). In addition, fuel treatment projects may not result in more than three adjacent LAU’s exceeding the standard. For fuel treatment projects within the WUI, see guideline VEG G10, which says “Fuel treatment projects within the WUI, as defined by HFRA, should be designed considering standards VEG S1, S2, S5 and S6. Fuel treatments outside of the WUI should follow the VEG standards.” WUI is defined in the glossary, but can vary from ½ mile to 1.5 miles from a “community at risk” as defined in the Federal Register (66 Fed. Reg. 753, January 4, 2001). Community Plans are supposed to define this at the local level, but most plans are not yet completed. Fuel reduction projects have the potential to reduce or eliminate lynx habitat by simplifying stand structure and/or reducing stem densities below levels that provide suitable forage and cover conditions for snowshoe hares.

For **VEG S1**, (Limits unsuitable habitat by LAU to 30 percent) this could lead to 33% of an LAU being in a “Currently Unsuitable” condition. Worst case scenario, however, more than 33% could be affected in a specific LAU, as the exception is monitored for 3% additional treatments within WUI at the Forest level, not the LAU level. Fuel treatment projects in the WUI count toward the overall 30 percent within an LAU and would serve to limit creation of currently unsuitable habitat beyond the 3 percent exception discussed above. Under this alternative, some currently suitable lynx habitat within the WUI would be treated for fuels reduction but be limited by the 3% (per forest) cap. It is likely that some or all of these fuels treatments would detrimentally alter lynx habitat resulting in adverse effects to lynx.

For **VEG S2**, (Limits timber & fuel projects which create unsuitable habitat) this could lead to 18% of an LAU being in a “Currently Unsuitable” condition due to timber and fuel management projects. Worst case scenario, however, more than 18% could be affected in a specific LAU, as the exception is monitored for 3% additional treatments in WUI at the Forest level, not the LAU level. Treatment of currently suitable lynx habitat may alter its structure and composition in a way that reduces or eliminates the value of these stands for snowshoe hares. As a result, individual lynx may be adversely affected.

Under the Proposed Action, **VEG S5**, which limits or delays precommercial thinning, has the same fuel treatment exceptions within the WUI as above: “Fuel treatment projects within the WUI that do not meet Standards VEG 1, VEG S2, VEG S5 or VEG S6 may occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (National Forest or combined National Forests)”. **VEG S5 (Proposed Action)** also has an additional exception (#5) to allow for additional PCT outside of WUI as long as it does not exceed 1% per LAU for the life of the amendment, which is assumed to be 15 years. These additional PCT projects would have to have appropriate site-specific analysis, and would be designed to maintain lynx habitat

connectivity and hare habitat over the long term. As with any other project that may lead to adverse effects to individual lynx, some of these projects may have to go through formal consultation with the USFWS. Other exceptions to the VEG S5 in the Proposed Action are:

1. Within 200 feet of administrative sites, dwellings, or outbuildings;
2. For research studies or genetic tree tests evaluating genetically improved reforestation stock;
3. For conifer removal in aspen, or daylight thinning around individual aspen trees, where aspen is in decline; or
4. Based on new information that is peer reviewed and accepted by the regional/state levels of the Forest Service and FWS, where a written determination states that the project is not likely to adversely affect lynx or the 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.

Exceptions 1-4 are estimated to occur on no more than .5% of lynx habitat, for effects analysis purposes. Actual acreage affected is more likely to be less than this amount.

Overall, for **VEG S5**, these exceptions could lead to a degradation of snowshoe hare habitat on up to 4.5% of the winter foraging habitats, and is most likely in lodgepole pine or mixed conifer. 3% of lynx winter forage habitat could be degraded within the WUI on each administrative unit, and an additional 1% winter forage per LAU could be degraded based on Exception #5, except in those LAU's that exceed the 30% currently unsuitable habitat threshold under VEG S1.

The proposed action has standard **VEG S6** stated as follows: Vegetation management projects that reduce winter snowshoe hare habitat in multi-story mature or late successional conifer forests may occur only:

1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or
2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or
3. For incidental removal during salvage harvest (e.g. removal due to location of skid trails).
4. Where uneven-aged management (single tree and small group selection) practices are employed to maintain and encourage multi-story attributes as part of gap dynamics. Project design must be consistent with VEG O1, O2 and O4, except where impacts to areas of dense horizontal cover are incidental to activities under this exemption (e.g., construction of skid trails).

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However, fuel treatment projects in conifer multi-storied stands within the WUI are excluded from this standard up to a maximum of 3% of lynx habitat by administrative unit. Guideline

VEG G10 provides direction to follow provisions of vegetation treatment standards (VEG S1, S2, S5 and S6). Under this alternative, some winter foraging lynx habitat within the WUI could be treated for fuel reduction up to the 3 percent cap, which could result in a degradation of lynx habitat.

Some other changes to standard VEG S6 as compared to Alternative B (baseline) are also identified under this alternative. These include vegetation treatments that may reduce winter snowshoe hare habitat within 200 feet of administrative sites, dwellings and/or associated outbuildings, research and genetic tests (i.e. performance test, long-term field tests and realized gain) necessary to evaluate genetically improved reforestation stock and for incidental removal during salvage harvest (e. g. skid trails).

Exceptions for both VEG S5 and VEG S6 for within 200 feet of structures, for research studies, for conifer removal in aspen habitat(VEG S5), and incidental removal (VEG S6) are expected to be minor, and likely would not add up to more than .5% of lynx habitat in the SRLA. The exception to VEG S5 for pre-commercial thinning based on new peer-reviewed research is not expected to occur without review from the FWS and/or the interagency lynx biology team. The exceptions under VEG S5 for additional precommercial thinning of up to 1% per LAU and 3% in WUI, added to the .5% above, could result in a degradation, (worst case scenario), in 4.5% of lynx habitat in the SRLA.

227,315 acres (3%) of lynx habitat within the WUI would be exempt from standards VEG S1, S2, S5 and S6 (cumulatively) for fuels treatments. Some or all of these acres would be treated in various ways that could be incompatible with lynx habitat needs.

However, the above effects are worst case scenario for each standard, as the fuels exception is a cumulative 3% for all Vegetation standards. It is unlikely all 3% would be in one type of vegetation treatment.

A total of 340,972 acres (4.5%) of all lynx habitat (WUI and non-WUI) could be affected by all the exceptions to the Vegetation standards.

See Tables 9 and 10 for precommercial thinning estimates and lynx habitat within a 1 mile buffer of Communities at Risk, which were used to estimate the effects to lynx and lynx habitat.

To provide context to the exceptions for precommercial thinning within lynx habitats, the following is the likely scenario and assumptions:

- The overall expected use of precommercial thinning for treatments within lynx habitat for fuels treatment within WUI is expected to be very limited in amount and intensity.
- In most cases, precommercial thinning for fuels treatments in lodgepole pine stands would be in stands that do not currently provide snowshoe hare winter habitat, (the

crowns have lifted to above 3 meters above the ground) which would not be restricted in any way by any other lynx conservation measures under any alternative.

- 32% of the lynx habitat in the SRLA is in non-developmental management prescriptions (ie: Wilderness and Research Natural Areas), which would preclude timber treatments in most cases. Therefore, the worst case scenario of a degradation of 4.5% of lynx habitat is not likely to occur.
- Very minor amounts of precommercial thinning would be needed in spruce/fir types, only for fuelbreaks and defensible space more than 200 feet from a dwelling. Fuelbreaks are terrain dependent, generally ridgetops, saddles, etc. that would be “critical” to suppressing a fire. These are moderately limited across landscapes.
- Lynx habitats are displayed within one mile of a Community at Risk in the SRLA area in Table 11, which was assumed to be a conservative estimate of WUI at the programmatic level.
- The WUI is defined as an area between ½ mile and 1.5 miles of communities at risk. This definition of “Communities at Risk” was originally published in the Federal Register (2001a).
- Lynx habitat would be treated in proportion to its occurrence on the landscape.
- An estimate of up to 121,620 acres (1.6%) of lynx habitat may be treated over the next fifteen-year period to reduce fuels. Some or all of these acres would be treated in various ways that may be incompatible with lynx habitat needs. (Estimate based on Table 9 data).

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Therefore, it is expected, given this context, that effects to lynx foraging habitat from the fuels treatments in the WUI exception could be somewhat limited across the landscape. This exception for precommercial thinning (VEG S5) for fuels treatments may also provide the flexibility to enable more fire use (prescribed and wildfire) activities in higher risk areas. In the long term, this may improve lynx foraging habitat, as long as it is designed with lynx habitat components in mind. The effects to foraging habitat from Exception #5 (additional 1% PCT) under VEG S5 would be limited to those LAU’s that are in multiple use management prescriptions, which is displayed in Table 6. 32% of the SRLA lynx habitat is in areas that do not allow timber treatments. Based on budget limitations and historical amounts of PCT, Table 10 estimates the most likely amounts of PCT that would occur under Alternative F-modified.

Table 10. Estimated Acres of Precommercial Thinning in the SRLA.

ADMINISTRATIVE UNIT	Baseline Alt. B Avg Annual Acres of Thinning	Proposed Action Alt. F-modified Avg Annual Acres of Thinning (estimated)
Grand Mesa, Uncompahgre, and Gunnison NFs	0	500
Medicine Bow and Routt NFs	1,500	2,200
Rio Grande NF	40	150
Arapaho and Roosevelt NFs	250	500
Pike and San Isabel NFs	500	600
San Juan NF	700	700
White River NF	50	100
TOTAL	3,040	4,750

Under Alternative F-modified this amounts to approximately 1710 acres (4,750 minus 3,040) within lynx habitat in the WUI that are likely to be treated annually (25,650 acres over the next fifteen years) with precommercial thinning while under the baseline an estimate of 1/2% of lynx habitat may have precommercial thinning treatments (structure ignition zones, developed recreation sites, administrative sites, special use improvements).

Table 11. Lynx habitat in the SRLA area within a 1-mile “Communities at Risk” as defined in HFRA.

Unit	Acres of lynx habitat	Acres lynx habitat w/i 1 mile of Communities at risk (% of total acreage w/i 1 mile)	Percent of Unit’s lynx habitat w/i 1 mile of Communities at Risk
Arapaho-Roosevelt	690,082	30,780	4.5%
Grand Mesa, Uncompahgre and Gunnison	1,642,473	77,514	4.7%

Unit	Acres of lynx habitat	Acres lynx habitat w/i 1 mile of Communities at risk (% of total acreage w/i 1 mile)	Percent of Unit's lynx habitat w/i 1 mile of Communities at Risk
Medicine Bow-Routt	1,192,466	4,431	<1%
Pike-San Isabel	826,156	33,043	4%
Rio Grande	1,035,420	29,977	2.9%
San Juan	1,048,567	18,198	1.7%
White River	1,142,794	71,494	6.2%
Total		265,437	

Grazing Guidelines (GRAZ G1 - G4) - Under Alternative F-modified, this direction encourages grazing management practices that provide for the regeneration of trees, shrubs and aspen clones in lynx habitat. Further guidance is provided to manage shrub-steppe habitats, riparian areas and willow carrs to provide mid or later seral stages similar to historic disturbance regimes. This management direction would help in maintaining and providing potential habitat for snowshoe hares and other potential prey species and provide cover for lynx within these habitats across the landscape. Under Alternative B (baseline) grazing management direction contains the same language, however, it is in the form of standards.

6. Habitat Connectivity: Factors Potentially Affecting Lynx Movements

Habitat connectivity (landscape) is defined as cover (vegetation) in sufficient quantity and arrangement to allow for the movement of lynx. Linkage areas are defined as “Habitat that provides landscape connectivity between blocks of habitat. Linkage areas occur both within and between geographic areas, where blocks of lynx habitat are separated by intervening areas of non-habitat such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between blocks. Connectivity provided by linkage areas can be degraded or severed by human infrastructure such as high-use highways, subdivisions or other developments” (LCAS revised definition, Oct. 2001). Special management emphasis is recommended to maintain or increase the permeability of linkage areas.

Alpine tundra, open valleys, shrubland communities, and dry southern and western exposures naturally fragment lynx habitat within the subalpine and montane forests of the Southern Rockies. Because of the fragmented nature of the landscape, there are inherently important natural

topographic features and vegetation communities that link these fragmented subalpine forested landscapes together, providing for dispersal movements and interchange among individuals and subpopulations of lynx. Landscape connectivity may be provided by: (a) narrow forested mountain ridges and plateaus connecting more extensive mountain forest habitats, (b) wooded or willow riparian communities providing travel cover across open valley floors between mountain ranges, or (c) lower elevation ponderosa pine, pinyon-juniper woodlands or shrublands that separate high elevation spruce-fir forests.

Since the mid-to-late 1800's, human actions have continually affected forested landscape linkages in the SRLA. The gold rush began in the mid-1800s and continued to the end of the century. The effects of mining and large-scale logging are still evident today in much of the landscape. Permanent habitat loss and road building have continued into this century. Building of residences and roads on and into private in-holdings has continued. A rapidly developing ski industry, a growing and affluent population, and telecommuting capabilities have converged to spur rapid growth in many mountain valleys. Transportation corridors have been, and continue to be modified and expanded to handle increasing volumes of traffic and higher speeds, thus altering historical movement patterns of wide-ranging species and creating barriers to movement. These and other factors, both historical and current, have combined to eliminate or degrade many landscape connections within the SRMGA.

The National BA states the Southern Rockies Geographic Area is the most distant geographic area from Canadian source population. Hostile desert environments separating the geographic area from the Northern Rockies combine with urban, rural, and recreational development and highway impacts to further isolate and fragment landscape connections in this geographic area. Maintaining a persistent population will be challenging in this area and dependent on maintaining landscape linkages primarily within the geographic area itself. (Hickenbottom et al. 1999).

It is suggested in the Ecology and Conservation of Canada Lynx (Ruggiero et al. 2000a) that lynx in the contiguous United States may exist as several smaller, but effectively isolated metapopulations. An example of this is the boreal forests in Colorado and Utah are separated from the larger areas of boreal forest in northern Wyoming by at least 100 km. Metapopulation stability depends not only on habitat quality, but also on successful dispersal between isolated habitat patches. The likelihood of subpopulation persistence declines with increasing fragmentation and isolation. That does not mean that more isolated, and therefore more vulnerable, subpopulations are unimportant. In addition, these subpopulations may contain valuable genetic, physiological or behavioral adaptations that allow them to persist (Hickenbottom et al. 1999). Lynx and snowshoe hare habitats are more prone to a metapopulation structure in the western forests due to fragmented landscapes and heterogeneous distribution of topographic, climatic, and vegetative conditions.

Ruggiero et al. (2000b) indicates that we know little about the degree of connectivity or its role in the viability of lynx, but assumes that connectivity plays an important role. Protecting, maintaining, and improvement of lynx habitat afforded by the various conservation measures contribute to the conservation of lynx and population viability. Maintaining habitats to provide for dispersal

movements and interchange among individuals and subpopulations may be the most important provision for maintenance of population viability contained in the LCAS. An interconnected ecosystem can be essential to maintain the ability of subpopulations to expand and colonize new habitats, to recolonize areas where subpopulations have been locally extirpated, to provide population support to declining populations, to allow individuals to find mates among neighboring subpopulations, and to effect dispersal and genetic interchanges (Noss and Cooperrider 1994).

The negative effects of highways on rare carnivores include habitat fragmentation, direct mortalities, direct loss of habitat, displacement due to noise and human activity, and secondary loss of habitat due to associated urban sprawl. When traffic volume increases, there is an evolution of highways from gravel roads to paved two lane roads, and from two lane highways to more problematic four lane highways, and the interstate highways, which have the most adverse effects to wildlife movements. The result of this progression of upgrades in the transportation system is the mortality of individuals attempting to cross the highway and potential sub-population isolation, both of which result in a slow decline in the population and ultimately can affect viability for some of the low-density carnivores such as lynx and wolverine (Ruediger, et al. 2000a). Critical points in development of highways occur when gravel forest or backcountry roads are paved, which results in higher speeds, higher traffic volumes and increased human developments.

For most connectivity issues, lynx require a regional or sub-regional approach to management because of their free ranging habits. Lynx need to be able to move between different geographic areas and mountain ranges. In some cases, they move long distances through unfavorable habitat. If linkages or corridors are blocked because of human alteration, lynx populations can become isolated and more vulnerable to extirpation in the long term.

The Southern Rockies has a naturally fragmented spatial pattern of primary habitat. The capability to maintain a meta-population in this area depends on successful dispersal between habitat fragments, and potentially between geographic areas. Increased fragmentation and isolation has occurred due to cumulative impacts from highways and residential and recreational development often tied to ski areas developed on National Forest System lands (Hickenbottom et al. 1999). While the ecosystem remains largely interconnected at this time, ongoing development and other activities continue to pressure those linkages. The I-70 highway corridor along with the development of resort and the associated subdivisions and entire communities, have compromised the permeability of portions of the area in the center of the SRMGA. As the SRMGA may not be connected to the Northern Rockies due to large expanses of desert in between, maintenance of regional scale habitat connectivity is perhaps more important in this geographic area than any other. (Hickenbottom et al. 1999).

Alternative B (Baseline) contains provisions for the maintenance of connectivity between patches of lynx habitat within and between LAUs, through the objectives, standards and guidelines to be applied in the overall lynx habitat as well as the additional objectives, standards, and guidelines specific to the identified linkage areas. Within the LAU's, these measures include **ALL 01, ALL S1, ALL G1 and HU G6**, which would help to ensure that connectivity within lynx habitat would

not be severed or greatly decreased, in most cases. The **All S1** standard applies not only in linkage areas, but all lynx habitat as well and is as follows: ***“New or expanded permanent developments and vegetation management practices and activities must maintain habitat connectivity***
For the SRLA Linkage areas, the Alternative B measures include **ALL O1, ALL S1, ALL G1, LINK 01, LINK S1, LINK S2, and LINK G1** . These special provisions under alternative B would help to facilitate movement of lynx throughout and between landscapes within the Amendment Area. Under the baseline (Alt. B), objectives, standards and guidelines under “ALL Management Activities and Practices”, as well as the direction under “Linkage Areas” would apply to all NFS lands within linkage areas that are within the Amendment Area, not just the lynx habitat. They would not apply to other federal or private lands.

The White River National Forest Plan Revision and the Medicine Bow Revised Plan have already incorporated direction similar to the LCAS conservation measures, which may help to maintain habitat and habitat connectivity in the central and northern most portions of the SRMGA. The linkage area standards and guidelines the White River National Forest has adopted will pertain to the linkages that are on the White River National Forest. This Forest is in the center of the SRLA, and is critical for maintaining connectivity within the geographic area. The Medicine Bow NF currently has connectivity and linkage standards and guidelines for the two linkage areas occurring on that unit. This should retain connectivity between the Colorado National Forest units and the Wyoming National Forest units. The Medicine Bow NF may be a crucial link in providing dispersal connectivity between the Northern Rockies and the Southern Rockies.

Alternative F-modified contains provisions for the maintenance of connectivity between patches of lynx habitat within and between LAUs, through the objectives, standards and guidelines to be applied in the overall lynx habitat as well as the additional objectives, standards, and guidelines specific to the identified linkage areas. Within the LAU’s, these measures include **ALL O1, ALL S1, ALL G1 and HU G6**, which would help to ensure that connectivity within lynx habitat would not be severed or greatly decreased, in most cases. The **All S1** standard applies not only in linkage areas, but all lynx habitat as well and is as follows: ***“New or expanded permanent developments and vegetation management practices and activities must maintain habitat connectivity in an LAU and/or linkage area.*** This is the same as the baseline.

For the Amendment Area Linkage areas, the Alternative F-modified measures include ALL O1, ALL S1, ALL G1, LINK 01, LINK S1, LINK G1, and LINK G2. The only difference between the baseline and Proposed Action is that LINK S2 became a guideline LINK G2. LINK G2 is “Livestock grazing in shrub-steppe habitats should be managed to contribute to maintaining or achieving a preponderance of mid or late seral stages, similar to conditions that would have occurred under historic disturbance regimes.” The Proposed Action would help to facilitate movement of lynx throughout and between landscapes within the Amendment Area.

7. Other Risk Factors

a) Minerals (HU G12)

Over the snow access for oil and gas exploration and development should be restricted to designated routes. This direction could reduce the potential for disturbance to lynx and the potential for access into lynx habitat by competing predators. Under Alternative B (baseline), management direction is similar but is in the form of a standard.

b) Recreation – Developed (HU G10)

Within developed ski areas or when existing facilities may be expanded, lynx diurnal security habitat may be maintained and provided as well as some limited amount of foraging habitat. Habitat connectivity may be provided in new or expanded operations. As a result, lynx would be more likely to utilize portions of these areas as well as to move unimpeded throughout the landscape. Under the Alternative B (baseline), this management direction is similar but is in the form of a standard.

c) Roads and Highways (HU G6 - G 9)

Consideration of lynx habitat needs would be taken into account when actions relating to the upgrading of existing roads and the location and management of future roads are planned. This may reduce the effects of habitat fragmentation from roads and provide for the movement and dispersal of lynx throughout the SRLA area. Aquatic species may be affected if proposed road location or paving to reduce environmental concerns (sedimentation) were modified to meet lynx guidelines. These guidelines may not be followed in some cases if site-specific analysis determined there would be negative effects on aquatic resources. This management direction is the same as under Alternative B (baseline).

A summary of the relationship of those effects to the relevant management direction is compared in Table 12. Specific changes between the Alternative B (baseline) and Alternative F are displayed in a side-by-side comparison table in Appendix D.

Table 12. Comparison of alternatives in relation to LCAS risk factors.

Risk Factor Category	Rating ^a	
	Base-line (Alt B)	Proposed Action (Alt F)
<i>Risk factors relating to quantity and quality of foraging habitat</i>		
Includes management direction that limits amount of unsuitable habitat	Y	P
Includes management direction that limits amount of timber harvest that creates unsuitable habitat	Y	P
Includes management direction that limits precommercial thinning in foraging habitat	Y	P
Includes management direction that limits other vegetation projects in multi-storied stands that provide winter forage habitat	P	P
<i>Risk factors relating to denning habitat</i>		
Includes management direction which retains 10% denning habitat	Y	P
Includes management direction that defers management activities in potential denning habitat	Y	P
Includes management direction that limits salvage of small areas of dead and/or dying trees	Y	P
<i>Risk factors relating to human activities</i>		
Includes management direction for limiting human-induced snow compaction	Y P for WR	P
Includes management direction related to ski area development	Y	P
Includes management direction for mineral and energy development	Y	Y
Includes management direction for road management activities	Y	Y
<i>Risk factors relating to movement and connectivity</i>		
Includes management direction related to highways & forest roads	Y	Y
Includes management direction related to land acquisition	Y	Y
Includes management direction related to grazing management	Y	P
<i>Risk factors relating to grazing</i>		
Includes management direction related to grazing management	Y	P

^a N = None or very limited management direction

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

Y = Includes management, usually in the form of a standard, which limits or avoids effects caused by the risk factor.

Lynx – Summary of Effects of Proposed Action

Some lynx habitat within the WUI is likely to be converted to a condition that would be incompatible with lynx habitat needs because of exceptions for fuel treatments under vegetation treatment direction. Under these exceptions a maximum of up to 3% of lynx habitat within the

WUI in each administrative unit could be treated during the life of this amendment (approximately 15 years). However, based on the 5 year average of fuels treatments (2002-2006), approximately 121,500 acres (1.6%) of lynx habitat could be expected to be treated within the WUI over a fifteen year period (Table 11). The estimate does not include a consideration for the current condition of lynx habitat (suitable vs. unsuitable), or the spatial arrangement of lynx habitat over the landscape, so the effects to lynx over the life of this amendment (approximately fifteen years) are expected to be somewhat less.

Over the next fifteen years additional degradation of snowshoe hare habitat, estimated to be 25,650 acres (.3% of lynx habitat), would be the expected result due to the additional 1% PCT exception under VEG S5 (Table 10). It has been well documented through numerous studies (Ruggiero et al. 2000a, also see Appendix C), that thinning in hare habitat results in a corresponding decrease in the abundance of snowshoe hares. Losses of snowshoe hare habitat may have an adverse effect on lynx.

Alternative F –modified could have some negative impacts to individual lynx and possibly local lynx populations due to the fact that managing for retention of minimum amounts of denning habitat is not a requirement. However, as denning habitat is not currently a limiting factor, the guideline may be effective in maintaining a good distribution of denning structure and habitat.

D. Effects on T&E Species Other than Lynx

For all species other than lynx, the change in effects from those identified in existing Forest Plans would be minimal due to the relatively low number of acres potentially treated in relation to the SRLA area as a whole. About 25,650 acres of lynx habitat are expected to be thinned in the next 15 years as a result of exceptions to thinning and up to 227,315 acres of lynx habitat could be degraded within the WUI.

Effects displayed below are generally presented as changes relative to Alternative B, which represents the Environmental Baseline.

For some species, there may be both detrimental and beneficial effects. Beneficial and detrimental effects are likely to be discountable or insignificant due to the low amount of acreage potentially affected in lynx habitat.

Possible beneficial effects include:

- Retention of a greater amount of multi-storied stand structure which serves as important habitat for a number of species (from the addition of VEG S6)

Possible detrimental effects include:

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- Increase in disturbance, displacement and competition within the WUI, because activities such as precommercial thinning would be delayed in some areas and limited to 3% of lynx habitat in the WUI.

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- Reductions of young stand structure forests in the stand initiation phase (dense young stands of conifers) on approximately 7100 acres within lynx habitat within 10 years.
- 227,315 acres (3%) of lynx habitat within the WUI would be exempt from standards VEG S1, S2, S5 and S6. Some or all of these acres would be treated in various ways that are incompatible with lynx habitat needs. Of the total, an estimate of up to 121,500 acres of lynx habitat is likely to be treated over the next fifteen year period to reduce fuels.
- Grazing direction changed from standards in Alternative B to Guidelines in Alternative F, therefore the direction may not be as beneficial to riparian habitats.

Species: Bald Eagle (*Haliaeetus leucocephalus*) (Delisted, 2007)

Status: Federal - Threatened

Distribution/Habitat: Breeding bald eagles are rare in Colorado and southern Wyoming. Although some nesting does occur, most eagles migrate in summer to northern breeding grounds but return to lower latitudes during the winter. Winter habitat consists of roost trees along larger rivers and other large open bodies of ice-free waters that allow access to fish.

Determination: No effect. The bald eagle occurs primarily in lower elevations, outside of lynx habitats. Some individuals migrate through lynx habitat during fall migration, when high elevation lakes are ice-free.

Species: Mexican Spotted Owl (*Strix occidentalis lucida*)

Status: Federal - Threatened

Distribution/Habitat: Historic records include most of the Front Range and Southwest Colorado. The owl may be found in steep-sided canyons with old growth mixed conifer forests in southwestern Colorado. It may also be found in the shady, cool canyons of the piñon-juniper zone. All nests in Colorado found to date occur on cliff ledges or caves along canyon walls. The Pike-San Isabel National Forest is the only SRLA forest with known occurrences and Critical Habitat for the Mexican Spotted owl. The Critical Habitat is located outside of lynx habitat. The GMUG has known pairs in the vicinity of the National Forest, but no pairs have been documented on the National Forest. The San Juan has a documented pair on the National Forest.

Determination: No effect. Mexican spotted owl nests in lower elevations than lynx habitat, and most foraging occurs in non-lynx habitats.

Species: Southwestern Willow Flycatcher (*Empidonax trailii extimus*)

Status: Federal –Endangered

The current range as discussed in the draft Recovery Plan includes southern Colorado in portions of the Rio Grande National Forest, south of the Rio Grande River. It also may occur on the San Juan National Forest in some watersheds. Generally it is thought that the species occurs up to

approximately 8500 feet elevation. The habitat of the subspecies is willow, cottonwood, or tamarisk with slow moving water adjacent or nearby. This subspecies occurs primarily outside of lynx habitat, although there may be some overlap at the 8000-8500 foot elevations. In those areas, there would potentially be beneficial effects, as compared to the No Action alternative, due to the grazing standards and/or guidelines, but a potential for a reduction in riparian habitats under the Proposed Action.

Determination: May Effect, Not Likely to Adversely Affect. This determination is based on a potential negative effect to riparian habitat, due to the grazing standards being changed from standards to guidelines.

Species: Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*)

Status: Federal - Threatened

Distribution/Habitat: The Greenback cutthroat trout occurs in the well-oxygenated headwaters of mountain streams and lakes on the Pike-San Isabel and Arapaho-Roosevelt National Forests. Due to competition and hybridization with non-native trout, Greenbacks are restricted to only a few small drainages. There are efforts throughout the Greenbacks' range to increase the number of populations.

Determination: May Effect, not likely to adversely affect. This determination is based on a potential negative effect to riparian habitat, due to the grazing standards being changed from standards to guidelines.

Species: Uncompahgre Fritillary Butterfly (*Boloria acrocneuma*)

Status: Federal - Endangered

Distribution/Habitat: At present, this species is known to occur only above 12,500 feet on the Uncompahgre National Forest. Females lay their eggs on snow willow (*Salix nivalis*), and the adults can be found in late July. The USFWS species occurrence list shows this species as potentially occurring in several counties within central Colorado.

Determination: No effect. This species may occur within LAUs, but its habitat is in the alpine ecosystem, which is not considered lynx habitat.

Species: Penland alpine fen mustard (*Eutrema penlandii*)

Status: Federal - threatened

Distribution/Habitat: Penland alpine fen mustard occurs in wet areas in alpine tundra of the Mosquito Range in central Colorado, which isn't considered to be lynx habitat. No adverse effects are expected on Penland alpine fen mustard from proposed action.

Determination: No effect.

Species: Osterhout milkvetch (*Astragalus osterhoutii*)

Status: Federal -endangered

Distribution/Habitat: Occurs adjacent to NFS lands, and may occur on NFS lands. Osterhout milkvetch (*Astragalus osterhoutii*) occurs on moderate slopes in sagebrush habitats at 7,400-7,900 feet in central Grand County.

Determination: No Effect. No adverse effects are expected on Osterhout milkvetch, as it is found in lower elevations than typical lynx habitat.

Species: Gunnison prairie dog (*Cynomys gunnisoni*)

Status: Federal candidate

Distribution/Habitat: The montane portion of the Gunnison’s prairie dog occurs in the montane habitat found in central and south central Colorado and northwestern New Mexico and northern Arizona. The habitat consists primarily of higher elevation, cooler, moister plateaus, benches, and intermountain valleys with grass-shrub and mountain meadow habitats.

Determination: No Effect. The habitat inhabited by this species is considered “non-lynx habitat” as it is not forested. However, it may be adjacent to lynx habitat in some places. The proposed action standards and guidelines would have no adverse effects to the prairie dog.

Effects on TEP species that may result from the implementation of the LCAS standards and guidelines are summarized in Table 14, in the Determination Section.

E. ESA Cumulative Effects-State and Private within Geographic Area

Cumulative effects were evaluated for the amendment area and the SRMGA. These boundaries were used to evaluate the cumulative effects of this amendment in addition to other federal, state and private land actions which would cumulatively affect lynx within the entire SRMGA.

Table 13. Acres of Lynx Habitat on Federal Lands in SRMGA

National Forest	Total Lynx Habitat Acres (Federal lands)
Arapaho-Roosevelt	714,681 (24,599 NPS)
GMUG	1,641,664
Pike-San Isabel	852,459 (23,669 BLM)
Medicine Bow/Routt	1,192,501
Rio Grande	1,035,420
San Juan	1,048,713 (147 BLM)
White River	1,164,974 (22,180 BLM)

BLM stand alone LAU's	260,850
Total:	7,911,262

The cumulative effects of the indirect and direct activities on other federal, state, and private lands within LAUs are likely to reduce the suitability of areas for lynx to forage, reproduce, and rear young successfully within the Southern Rockies Geographic area. Spatial considerations of forage and denning habitat are generally not incorporated into project activities on private lands and may result in further reductions in habitat suitability on these lands and adjacent federal lands.

Programmatic Decisions

The following programmatic actions apply to different units within the SRMGA. The project file includes a table that shows how these programmatic decisions overlap with units included in the amendment area, as well as those within the SRMGA.

Roadless Area Conservation Strategy - In January 2001, the Forest Service issued a final rule and record of decision (Roadless Policy) pertaining to prohibitions on road construction, road reconstruction, and timber harvesting in inventoried roadless areas on National Forest System lands Federal Register (2001b). This decision prohibits road construction, road reconstruction, and or timber cutting, sale or removal in inventoried roadless areas except under certain circumstances. Subsequent litigation resulted in the District Court of Idaho issuing a preliminary injunction against implementation of the roadless rule in May of 2001. In May of 2003 the Ninth Circuit Court of Appeals reversed the District Court of Idaho's decision.

Since the Ninth Circuit Court of Appeals' ruling the administration has promulgated new rules, which would permit additional exceptions to the Roadless Policy. The Governor's of each state could request exemptions from provisions of the policy under certain conditions. It is likely that some secure areas for terrestrial and aquatic species may be provided under plans developed for individual roadless areas. Colorado's recommendation in 2005 recommended retaining all acres in inventoried roadless areas, with a few exceptions for temporary uses and ski areas.

Climate Change - Vegetation dynamics, disturbance, climate and their interactions are key elements in predicting the future condition of ecosystems and landscapes and the vulnerability of species and populations to climatic change. Climatic factors such as temperature, precipitation, and wind patterns are among the many factors that influence vegetative structure and composition, fire behavior and wildlife habitat, including lynx habitat. Lynx have a competitive advantage in deep snow habitats that are common throughout the Southern Rockies. Climate change, therefore, has potential to affect factors that influence lynx and their habitat in the Southern Rockies.

The paper *Climate change science – An analysis of some key questions* (Cicerone et al. 2001) completed under the auspices of the National Research Council and the *Technical Summary*

report of Working Group I of the Intergovernmental Panel on Climate Change (Albritton and Filho et al. 2001) elaborated on the topic of global warming. There is little scientific disagreement that global warming is occurring at an accelerating rate and that human activities (greenhouse gas emission increases, etc.) have contributed to this phenomenon. Some uncertainty exists as to the magnitude of these effects in relation to natural variation and the precise effects of how feedback mechanisms (increased water vapor, reduced snow cover) influence the extent and magnitude of global warming patterns and trends. More recently, the extensive *Arctic Climate Impact Assessment* (2004) has provided compelling evidence that among numerous other effects (1) arctic climate is now warming more rapidly than the rest of the earth, (2) much larger changes are projected in the future and (3) arctic warming and its consequences have worldwide implications.

Other indirect effects of global warming may have beneficial or detrimental effects on lynx. A recent study of the effect of climatic change on wildfire in the western U.S. (McKenzie et al. 2004) determined that with warming climate fire seasons will likely be extended and that total area burned is likely to increase. As a result, significant changes in the distribution and abundance of dominant plant species in some ecosystems may occur. Some species that are sensitive to fire may decline, whereas the distribution and abundance of species favored by fire may be enhanced. Stand replacing fires are a common occurrence throughout much of lynx habitat and often provide conditions conducive to producing good quality snowshoe hare habitat.

It appears likely that climate change may affect lynx over the long term by altering the extent of deep snow habitats preferred by lynx. Kerr and Packer (1998) used the general circulation model (GCM) developed at the Goddard Institute of Space Sciences for the Intergovernmental Panel on Climate Change to predict future mammal diversity patterns in Canada. Based upon their analysis they predicted that at least 25 mammal species, including Canada lynx, are limited by the Arctic Ocean in their ability to disperse northward and are likely to undergo significant losses of habitat (Keer and Packer 1998). Features of the snow may also influence lynx interaction with snowshoe hare. Stenseth et al. (2004) have shown that large-scale climatic fluctuations can mechanistically influence lynx population biological patterns. Since the effects of global warming are occurring over relatively long periods, the effects on lynx over the short term (10-15 years) are less clear. More focused research is needed on the effect of climate change on specific threatened and endangered species such as the Canada lynx, to more accurately predict specific effects of climate change in the Southern Rockies.

In summary, there is incomplete or unavailable information upon which to base any more detailed analysis of climate change risk factors for the lynx. The best available information does provide some evidence that climate change poses risks, but the exact nature of these risks remains uncertain.

Factors Considered When Determining Cumulative Effects

- The population of lynx within the SRMGA may be effectively isolated from the Northern Rockies Geographic Area, which makes it particularly vulnerable to extirpation, as there is likely no immigration from source populations (Ruggiero et al. 2000). The majority of lynx habitat within the SRMGA is on NFS lands. However, not all risk factors for lynx can be influenced by national forest management.
- Small, isolated populations have inherently high risk of extirpation due to random events, habitat alteration, competition, and/or other factors (Mace and Lande 1991, Soule 1987). Furthermore, lynx populations at the southern edge of their range have comparatively large home range sizes and low survival of kittens, reinforcing the importance of maintaining suitable habitat and prey populations through time (Ruediger et al. 2000). When a very small population size exists, small habitat degradations can lead to problems for long-term persistence. It is for this reason that a more conservative management approach is recommended in areas with low population levels. However, with small populations, random events/disturbances can still lead to extirpation, even with conservative management approaches.
- The current population status of lynx in the SRMGA is approximately 200 individuals. The lynx population in Colorado was believed to be at extremely low levels in the 1990's, which prompted the Colorado Division of Wildlife to translocate lynx from Alaska and Canada in 1999-2006. There have been 80 known mortalities from these translocated lynx (Shenk 2006).

F. Additional Factors Considered that are Outside Forest Service Authority

- Trapping and predator control are two potential lynx mortality factors for which the Forest Service has no management control. Trapping with leg-hold traps is illegal in Colorado, which reduces the accidental take of lynx by trapping in Colorado. Leg-hold trapping is not illegal in Wyoming; therefore, accidental trapping of lynx could occur. Predator control activities (trapping, shooting and poisoning) on NFS lands in lynx habitat are limited. Predator control activities within lynx habitat on NFS lands must be done in compliance with the Endangered Species Act.
- Incidental/illegal shooting mortality has occurred with the recently translocated lynx population in Colorado. Six lynx mortalities have been documented as definite shootings, and four additional lynx were "probably shot" (Shenk 2003). At low population levels or in situations where recruitment is low, this mortality can be additive and lead to population declines.
- Highway mortalities have resulted in six mortalities, possibly eight, in Colorado, since 1999. Providing permeability across highways can be influenced and managed by the Forest Service on NFS lands, but problem areas, at times, are outside of the National Forest jurisdiction.

The Proposed Action allows for more adverse impacts to individual lynx than the Baseline, Alternative B, but should maintain quality lynx habitat and connectivity well enough to maintain lynx populations across the SRLA long term.

VII. Determinations

A. Canada Lynx

The Proposed Action is a “**May Affect, Likely to Adversely Affect**” determination for Canada lynx due to the following rationale:

Rationale:

- 227,315 acres (3%) of lynx habitat within the WUI would be exempt from standards VEG S1, S2, S5 and S6 for fuels treatments. Some or all of these acres would be treated in various ways that are incompatible with lynx habitat needs.
- Up to 75,771 acres (1%) of lynx habitat would be exempt from VEG S5 in the 15 year planning period. (worst case scenario)
- Loss of some currently suitable lynx habitat is expected to occur as a result of exception #5 to VEG S5: precommercial thinning on an estimated 25,650 acres in the next 15 years. (Estimated based on budget limitations and historical levels, see Table 10).
- As the SRMGA may not be connected to the Northern Rockies due to large expanses of desert in between, maintenance of regional scale habitat connectivity is perhaps more important in this geographic area than any other. (Hickenbottom et al. 1999). The proposed action would help to facilitate movement of lynx throughout and between landscapes within the Amendment Area.
- Managing for retention of minimum amounts of denning habitat is not a requirement, and salvage of less than 5 acre disturbances (blowdowns, etc) would be allowed.
- Additional “adverse affect” projects could go forward after the plans are revised.

B. Other T&E Species

Table 14. Summary of determination of effects.

Species ^a	Determination of Effects	Rationale
Birds		
Bald eagle (T) (Delisted 2007) <i>Haliaeetus leucocephalus</i>	No effect	Suitable habitat unaffected.
Mexican Spotted owl (T)	No effect	Suitable habitat does not occur within lynx habitat.

Species ^a	Determination of Effects	Rationale
Southwestern Willow flycatcher (E)	Not likely to adversely effect	Based on a beneficial effect due to direction for management of willows.
Fish		
Greenback cutthroat trout(T)	Not likely to adversely affect	If road management direction (guidelines) for lynx is followed, minor increases in sedimentation may occur in some stream systems. Riparian condition should improve.
Invertebrates		
Uncompahgre fritillary (E)	No effect	Suitable habitat would be unaffected.
Plants		
Penland alpine fen mustard (T) <i>Eutrema penlandii</i>	No effect	Suitable habitat would be unaffected.
<i>Astragalus osterhoutii</i> (E)	No effect	Suitable habitat would be unaffected.
Mammals		
Gunnison prairie dog (C) <i>(Cynomys gunnisoni)</i>	No effect	Suitable habitat would be unaffected.

^a T = Threatened, E = Endangered, P = Proposed, C=Candidate

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VI. Signature Page

_____/s/ Julie S. Grode _____ 4-25-08 _____
Prepared by Date

Appendix A - Map of the Southern Rockies Lynx Amendment Area

INSERT MAP HERE

Appendix B – Proposed Action, (Alternative F-modified)

Southern Rockies Lynx Amendment – Management Direction

The following management direction applies to lynx habitat on the following National Forests in the Southern Rockies Lynx Amendment area:

Medicine-Bow Routt National Forests (two separate Plans),
Arapaho-Roosevelt National Forests,
Grand Mesa, Uncompahgre and Gunnison National Forests,
Pike-San Isabel National Forests,
Rio Grande National Forest,
San Juan National Forest, and
White River National Forest.

GOAL¹⁴

Conserve the Canada lynx.

ALL MANAGEMENT PRACTICES AND ACTIVITIES (ALL). The following objectives, standards, and guidelines apply to all management projects in lynx habitat in lynx analysis units (LAUs) in occupied habitat and in linkage areas, subject to valid existing rights. They do not apply to wildfire suppression, or to wildland fire use.

Objective³⁰ ALL O1

Maintain²⁶ or restore⁴⁰ lynx habitat²³ connectivity¹⁶ in and between LAUs²¹, and in linkage areas²².

Standard⁴⁴ ALL S1

New or expanded permanent developments³³ and vegetation management⁵⁰ projects³⁶ must maintain²⁶ habitat connectivity¹⁶ in an LAU²¹ and/or linkage area²².

Guideline¹⁵ ALL G1

Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways¹⁸ or forest highways¹² across federal land. Methods could include fencing, underpasses or overpasses.

Standard⁴⁴ LAU S1

Changes in LAU²¹ boundaries shall be based on site-specific habitat information and after review by the Forest Service Regional Office.

VEGETATION MANAGEMENT ACTIVITIES AND PRACTICES (VEG). The following objectives, standards, and guidelines apply to vegetation management projects³⁶ in lynx habitat within lynx analysis units (LAUs) in occupied habitat. With the exception of Objective VEG O3 that specifically concerns wildland fire use, the objectives, standards, and guidelines do not apply to wildfire suppression, wildland fire use, or removal of vegetation for permanent developments such as mineral operations, ski runs, roads, and the like. None of the objectives, standards, or guidelines apply to linkage areas.

Objective³⁰ VEG O1

Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.

Objective VEG O2

Provide a mosaic of habitat conditions through time that support dense horizontal cover¹⁹, and high densities of snowshoe hare. Provide winter snowshoe hare habitat⁵¹ in both the stand initiation structural stage and in mature, multi-story conifer vegetation.

Objective VEG O3

Conduct fire use¹¹ activities to restore⁴⁰ ecological processes and maintain or improve lynx habitat.

Objective VEG O4

Focus vegetation management⁵⁰ in areas that have potential to improve winter snowshoe hare habitat⁵² but presently have poorly developed understories that lack dense horizontal cover.

Standard⁴⁴ VEG S1

Where and to what this applies: Standard VEG S1 applies to all vegetation management⁵⁰ projects³⁶ that regenerate³⁸ forested stands, except for fuel treatment¹³ projects³⁶ within the wildland urban interface⁵¹ (WUI) as defined by HFRA¹⁷, subject to the following limitation:

Fuel treatment projects³⁶ within the WUI⁵¹ that do not meet Standards VEG S1, VEG S2, VEG S5, or VEG S6 shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forests). *In addition, fuel treatment projects may not result in more than three adjacent LAUs exceeding the standard.*

For fuel treatment projects³⁶ within the WUI⁵¹ see guideline VEG G10.

The standard: Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages⁴⁵ limit disturbance in each LAU as follows:

If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects³⁶.

Standard VEG S2

Where and to what this applies: Standard VEG S2 applies to all timber management⁴⁷ projects³⁶ that regenerate³⁸ forests, except for fuel treatment¹³ projects³⁶ within the wildland urban interface⁵¹ (WUI) as defined by HFRA¹⁷, subject to the following limitation:

Fuel treatment projects³⁶ within the WUI⁵¹ that do not meet Standards VEG S1, VEG S2, VEG S5, or VEG S6 shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forests).

For fuel treatment projects³⁶ within the WUI⁵¹ see guideline VEG G10.

The standard: Timber management⁴⁷ projects³⁶ shall not regenerate³⁸ more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period. This 15% includes the entire stand within an even-age regeneration area, and only the patch opening areas within group selections. Salvage harvest within stands killed by insect epidemics, wildfire, etc. does not add to the 15%, unless the harvest treatment would cause the lynx habitat to change to an unsuitable condition²⁴.

Standard VEG S5

Where and to what this applies: Standard VEG S5 applies to all precommercial thinning³⁵ projects, except for fuel treatment¹³ projects that use precommercial thinning as a tool within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation:

Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, or VEG S6 may occur on no more than three percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forests) for the life of this amendment.

For fuel treatment projects within the WUI see guideline VEG G10.

The Standard: Precommercial thinning practices and similar activities intended to reduce seedling/sapling density are subject to the following limitations from the

stand initiation structural stage⁴⁵ until the stands no longer provide winter snowshoe hare habitat.

Precommercial thinning may occur only:

1. Within 200 feet of administrative sites, dwellings, or outbuildings; or
2. For research studies³⁹ or genetic tree tests evaluating genetically improved reforestation stock; or
3. For conifer removal in aspen, or daylight thinning⁵ around individual aspen trees, where aspen is in decline; or
4. Based on new information that is peer reviewed and accepted by the regional/state levels of the Forest Service and FWS, where a written determination states:
 - a) That a project is not likely to adversely affect lynx; or
 - b) That a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat.
5. In addition to the above exceptions (and above and beyond the three percent limitation for fuels projects within the WUI⁵¹), precommercial thinning may occur provided that:
 - a) The additional precommercial thinning does not exceed one percent of the lynx habitat in any LAU for the life of this amendment, and the amount and distribution of winter snowshoe hare habitat within the LAU must be provided through appropriate site-specific analysis and consultation; and
 - b) Precommercial thinning in LAUs with more than 30 percent of the lynx habitat currently in the stand initiation structural stage⁴⁵ is limited to areas that do not yet provide winter snowshoe hare habitat⁵²; and
 - c) Projects are designed to maintain lynx habitat connectivity and provide hare habitat over the long term (see Note 2 below); and
 - d) Monitoring is used to determine snowshoe hare response.

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Note 1: This standard is intended to provide snowshoe hare habitat while permitting some thinning, to explore methods to sustain snowshoe hare habitat over time, reduce hazardous fuels, improve forest health, and increase timber production. Project design must ensure any precommercial thinning provides an appropriate amount and distribution of snowshoe hare habitat with each LAU over time, and maintains lynx habitat connectivity within and between LAUs. Project design should focus on creating irregular shapes for the thinning units,

creating mosaics of thinned and unthinned areas, and using variable density thinning, etc.

Standard VEG S6

Where and to what this applies: Standard VEG S6 applies to all vegetation management⁵⁰ practices within multi-story mature or late successional conifer forests²⁹, except for fuel treatment¹³ projects within the wildland urban interface (WUI) as defined by HFRA¹⁷, subject to the following limitation:

Fuel treatment projects³⁶ within the WUI⁵¹ that do not meet Standards VEG S1, VEG S2, VEG S5, or VEG S6 shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forests).

For fuel treatment projects³⁶ within the WUI⁵¹ see guideline VEG G10.

The Standard: Vegetation management projects³⁶ that reduce winter snowshoe hare habitat⁵² in multi-story mature or late successional conifer forests²⁹ may occur only:

1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or
2. For research studies³⁸ or genetic tree tests evaluating genetically improved reforestation stock; or
3. For incidental removal during salvage harvest⁴¹ (e.g. removal due to location of skid trails).
4. Where uneven-aged management (single tree and small group selection) practices are employed to maintain and encourage multi-story attributes as part of gap dynamics. Project design must be consistent with VEG O1, O2 and O4, except where impacts to areas of dense horizontal cover are incidental to activities under this exception (e.g., construction of skid trails).

Guideline VEG G1

Vegetation management⁵⁰ projects³⁶ should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage⁴⁶ stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat⁵² should be near denning habitat⁶.

Guideline VEG G4

Prescribed fire³⁴ activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.

Guideline VEG G5

Habitat for alternate prey species, primarily red squirrel³⁷, should be provided in each LAU.

Guideline VEG G10

Fuel treatment projects³⁶ within the WUI⁵¹ as defined by HFRA¹⁷ should be designed considering Standards VEG S1, S2, S5, and S6 to promote lynx conservation.

Guideline VEG G11

Denning habitat⁶ should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees ("jack-strawed" piles). If denning habitat appears to be lacking in the LAU, then projects³⁶ should be designed to retain some coarse woody debris⁴, piles, or residual trees to provide denning habitat⁶ in the future.

LIVESTOCK MANAGEMENT (GRAZ): The following objectives and guidelines apply to grazing projects in lynx habitat in lynx analysis units (LAUs) in occupied habitat. They do not apply to linkage areas.

Objective³⁰ GRAZ O1

Manage livestock grazing to be compatible with improving or maintaining²⁶ lynx habitat²³.

Guideline¹⁵ GRAZ G1

In fire- and harvest-created openings, livestock grazing should be managed so impacts do not prevent shrubs and trees from regenerating.

Guideline GRAZ G2

In aspen stands, livestock grazing should be managed to contribute to the long-term health and sustainability of aspen.

Guideline GRAZ G3

In riparian areas⁴¹ and willow carrs³, livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages²⁸, similar to conditions that would have occurred under historic disturbance regimes.

Guideline GRAZ G4

In shrub-steppe habitats⁴³, livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs²¹, to contribute to maintaining or achieving a

preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.

HUMAN USE PROJECTS (HU): The following objectives and guidelines apply to human use projects, such as special uses (other than grazing), recreation management, roads, highways, and mineral and energy development, in lynx habitat in lynx analysis units (LAUs) in occupied habitat, subject to valid existing rights. They do not apply to vegetation management projects or grazing projects directly. They do not apply to linkage areas.

Objective³⁰ HU O1

Maintain²⁶ the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat²³.

Objective HU O2

Manage recreational activities to maintain lynx habitat and connectivity¹⁶.

Objective HU O3

Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat.

Objective HU O4

Provide for lynx habitat needs and connectivity when developing new or expanding existing developed recreation⁹ sites or ski areas.

Objective HU O5

Manage human activities, such as special uses, mineral and oil and gas exploration and development, and placement of utility transmission corridors, to reduce impacts on lynx and lynx habitat.

Objective HU O6

Reduce adverse highway¹⁸ effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity¹⁶, and to reduce the potential for lynx mortality.

Guideline¹⁵ HU G1

When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris⁴, so winter snowshoe hare habitat⁵² is maintained.

Guideline HU G2

When developing or expanding ski areas, lynx foraging habitat should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.

Guideline HU G3

Recreation development and recreational operational uses should be planned to provide for lynx movement and to maintain the effectiveness of lynx habitat²³.

Guideline HU G4

Remote monitoring of mineral and energy development sites and facilities should be encouraged to reduce snow compaction.

Guideline HU G5

A reclamation plan should be developed (e.g. road reclamation and vegetation rehabilitation) for closed mineral and energy development sites and facilities that promote the restoration of lynx habitat.

Guideline HU G6

Methods to avoid or reduce effects to lynx habitat connectivity¹⁶ should be used when upgrading unpaved roads to maintenance levels 4 or 5²⁷, where the result would be increased traffic speeds and volumes, or contribute to development or increases in human activity.

Guideline HU G7

New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity¹⁶. New permanent roads and trails should be situated away from forested stringers.

Guideline HU G8

Cutting brush along low-speed, low-traffic-volume roads²⁵ should be done to the minimum level necessary to provide for public safety.

Guideline HU G9

If project level analysis determines that new roads adversely affect lynx, then public motorized use should be restricted. Upon project³⁶ completion, these roads should be reclaimed or decommissioned, if not needed for other management objectives.

Guideline HU G10

Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compaction¹, unless designation serves to consolidate use and improve lynx habitat. This may be calculated on an LAU basis, or on a combination of immediately adjacent LAUs.

This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to access regulated by Guideline HU G12.

Use the same analysis boundaries for all actions subject to this guideline.

Guideline HU G11

When developing or expanding ski areas and trails, consider locating access roads and lift termini to maintain and provide lynx security habitat¹⁰.

Guideline HU G12

Winter access for non-recreation special uses and mineral and energy exploration and development should be limited to designated routes⁸ or designated over-the-snow routes⁷.

LINKAGE AREAS (LINK): The following objective, standard, and guidelines apply to all projects within linkage areas in occupied habitat, subject to valid existing rights.

Objective³⁰ LINK O1

In areas of intermingled land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges, or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat.

Standard⁴⁴ LINK S1

When highway¹⁸ or forest highway¹² construction or reconstruction is proposed in linkage areas²², identify potential highway crossings.

Guideline¹⁵ LINK G1

National Forest System lands should be retained in public ownership.

Guideline LINK G2

Livestock grazing in shrub-steppe habitats⁴³ should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages²⁸, similar to conditions that would have occurred under historic disturbance regimes.

Required Monitoring

1. Maps of the location and intensity of snow compacting activities and designated and groomed routes that occurred inside LAUs during the period of 1998 to 2000 constitute baseline snow compaction. Changes in activities and routes are to be monitored every five years after the decision.
2. When project decisions are signed report the following.
 - a) Fuel treatments:

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- i) Acres of fuel treatment in lynx habitat by forest and LAU, and whether the treatment is within *or outside* the WUI as defined by HFRA.
- ii) Whether or not the fuel treatment met the vegetation standards or guidelines. If standard(s) are not met, report which standard(s) are not met, why they were not met, and how many acres were affected.
- iii) *Whether or not 2 adjacent LAUs exceed standard VEG S1 (30% in a stand initiation structural stage that is too short to provide winter snowshoe hare habitat⁵²), and what event(s) or action(s) caused the standard to be exceeded.*

b) Application of exception in Standard VEG S5:

- i) *For areas where any of the exceptions 1 through 5 listed in Standard VEG S5 were applied, report the type of activity, the number of acres, and the location (by unit, and LAU) and whether or not Standard VEG S1 was within the allowance.*

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c) Application of exceptions in Standard VEG S6:

- i) *For areas where any of the exceptions 1 through 4 listed in Standard VEG S6 were applied, report the type of activity, the number of acres, and the location (by unit, and LAU) and whether or not Standard VEG S1 was within the allowance.*

3. Application of guidelines

- a) *Summarize what guideline(s) was not followed and why.*
- b) *Document the rationale for deviations to guidelines.*

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Direction in italics were terms and conditions of the FWS Biological Opinion (USDI FWS 2007).

Glossary

¹ *Area of consistent snow compaction* – An area of consistent snow compaction is an area of land or water that during winter is generally covered with snow and gets enough human use that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after (within 48 hours) snowfall. These can be areas or linear routes, and are generally found in or near snowmobile or cross-country ski routes, in adjacent openings, parks and meadows, near ski huts or plowed roads, or in winter parking areas. Areas of consistent snow compaction will be determined based on the acreage or miles used during the period 1998 to 2000.

² *Broad scale assessment* – A broad scale assessment is a synthesis of current scientific knowledge, including a description of uncertainties and assumptions, to provide an understanding of past and present conditions and future trends, and a characterization of the ecological, social, and economic components of an area. (LCAS)

³ *Carr* – Deciduous woodland or shrub land occurring on permanently wet, organic soil. (LCAS)

⁴ *Coarse woody debris* – Any piece(s) of dead woody material, e.g., dead boles, limbs, and large root masses on the ground or in streams. (LCAS)

⁵ *Daylight thinning* – Daylight thinning is a form of precommercial thinning that removes the trees and brush inside a given radius around a tree.

⁶ *Denning habitat (lynx)* – Denning habitat is the environment lynx use when giving birth and rearing kittens until they are mobile. The most common component is large amounts of coarse woody debris to provide escape and thermal cover for kittens. Denning habitat must be within daily travel distance of winter snowshoe hare habitat – the typical maximum daily distance for females is about three to six miles. Denning habitat includes mature and old growth forests with plenty of coarse woody debris. It can also include young regenerating forests with piles of coarse woody debris, or areas where down trees are jack-strawed.

⁷ *Designated over-the-snow routes* – Designated over-the-snow routes are routes managed under permit or agreement or by the agency, where use is encouraged, either by on-the-ground marking or by publication in brochures, recreation opportunity guides or maps (other than travel maps), or in electronic media produced or approved by the agency. The routes identified in outfitter and guide permits are designated by definition; groomed routes also are designated by definition. The determination of baseline snow compaction will be based on the miles of designated over-the-snow routes authorized, promoted or encouraged during the period 1998 to 2000.

⁸ *Designated route* – A designated route is a road or trail that has been identified as open for specified travel use.

⁹ *Developed recreation* – Developed recreation requires facilities that result in concentrated use. For example, skiing requires lifts, parking lots, buildings, and roads; campgrounds require roads, picnic tables, and toilet facilities.

¹⁰ *Diurnal security habitat (lynx)* – Security habitat is places in lynx habitat that provide secure winter bedding sites for lynx in highly disturbed landscapes like ski areas. Security habitat gives lynx the ability to retreat from human disturbance. Forest structures that make human access difficult generally discourage human activity in security habitats. Security habitats are most effective if big enough to provide visual and acoustic insulation and to let lynx easily move away from any intrusion. They must be close to winter snowshoe hare habitat. (LCAS)

¹¹ *Fire use* – Fire use is the combination of wildland fire use and using prescribed fire to meet resource objectives. (NIFC) Wildland fire use is the management of naturally ignited wildland fires to accomplish resource management objectives in areas that have a fire management plan. The use of the term wildland fire use replaces the term prescribed natural fire. (Wildland and Prescribed Fire Management Policy, August 1998)

¹² *Forest highway* – A forest highway is a forest road under the jurisdiction of, and maintained by, a public authority and open to public travel (USC: Title 23, Section 101(a)), designated by an agreement with the FS, state transportation agency, and Federal Highway Administration.

¹³ *Fuel treatment* – A fuel treatment is a type of vegetation management action that reduces the threat of ignition, fire intensity, or rate of spread, or is used to restore fire-adapted ecosystems.

¹⁴ *Goal* – A goal is a broad description of what an agency is trying to achieve, found in a land management plan. (LCAS)

¹⁵ *Guideline* – A guideline is a particular management action that should be used to meet an objective found in a land management plan. The rationale for deviations may be documented, but amending the plan is not required. (LCAS modified)

¹⁶ *Habitat connectivity (lynx)* – Habitat connectivity consists of an adequate amount of vegetation cover arranged in a way that allows lynx to move around. Narrow forested mountain ridges or shrub-steppe plateaus may serve as a link between more extensive areas of lynx habitat; wooded riparian areas may provide travel cover across open valley floors. (LCAS)

¹⁷ *HFRA (Healthy Forests Restoration Act)* – Public Law 108-148, passed in December 2003. The HFRA provides statutory processes for hazardous fuel reduction projects on certain types of at-risk National Forest System and Bureau of Land Management lands. It also provides other authorities and direction to help reduce hazardous fuel and restore

healthy forest and rangeland conditions on lands of all ownerships. (Modified from Forest Service HFRA web site.)

¹⁸ *Highway* – The word highway includes all roads that are part of the National Highway System. (23 CFR 470.107(b))

¹⁹ *Horizontal cover* – Horizontal cover is the visual obscurity or cover provided by habitat structures that extend to the ground or snow surface primarily provided by tree stems and tree boughs, but also includes herbaceous vegetation, snow, and landscape topography.

²¹ *LAU (Lynx Analysis Unit)* – An LAU is an area of at least the size used by an individual lynx, from about 25 to 50 square miles (LCAS). An LAU is a unit for which the effects of a project would be analyzed; its boundaries should remain constant.

²² *Linkage area* – A linkage area provides connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas, where basins, valleys, or agricultural lands separate blocks of lynx habitat, or where lynx habitat naturally narrows between blocks. (LCAS updated definition approved by the Steering Committee 10/23/01)

²³ *Lynx habitat* – Lynx habitat occurs in mesic coniferous forest that experience cold, snowy winters and provide a prey base of snowshoe hare. In the southern Rocky Mountains, lynx habitat occurs between 8,000 and 11,700 feet in elevation. Primary vegetation consists of Engelmann spruce, subalpine fir, aspen-conifer mix and lodgepole pine on spruce-fir habitat types. On cool moist sites, Douglas-fir and aspen, when interspersed with subalpine forests, may also contribute to lynx habitat. Dry forest types (e.g., ponderosa pine, climax lodgepole pine) do not provide lynx habitat. (LCAS)

²⁴ *Lynx habitat in an unsuitable condition* – Lynx habitat in an unsuitable condition consists of lynx habitat in the stand initiation structural stage where the trees are generally less than ten to 30 years old and have not grown tall enough to protrude above the snow during winter. Stand replacing fire, insect epidemics or certain vegetation management projects can create unsuitable conditions. Vegetation management projects that can result in unsuitable habitat include clearcuts and seed tree harvest, and sometimes shelterwood cuts and commercial thinning depending on the resulting stand composition and structure. (LCAS)

²⁵ *Low-speed, low-traffic-volume road* – Low speed is less than 20 miles per hour; low volume is a seasonal average daily traffic load of less than 100 vehicles per day.

²⁶ *Maintain* – In the context of this decision, maintain means to provide enough lynx habitat to conserve lynx. It does not mean to keep the status quo.

²⁷ *Maintenance level* – Maintenance levels define the level of service provided by and maintenance required for a road. (FSH 7709.58, Sec 12.3) Maintenance level 4 is

assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most level 4 roads have double lanes and an aggregate surface. Some may be single lane; some may be paved or have dust abated. Maintenance level 5 is assigned to roads that provide a high degree of user comfort and convenience. Normally, level 5 roads are have double lanes and are paved, but some may be aggregate surfaced with the dust abated.

²⁸ *Mid-seral or later* – Mid-seral is the successional stage in a plant community that is the midpoint as it moves from bare ground to climax. For riparian areas, it means willows or other shrubs have become established. For shrub-steppe areas, it means shrubs associated with climax are present and increasing in density.

²⁹ *Multi-story mature or late successional forest* – This stage is similar to the *old multistory structural stage* (see below). However, trees are generally not as old, and decaying trees may be somewhat less abundant.

³⁰ *Objective* – An objective is a statement in a land management plan describing desired resource conditions and intended to promote achieving programmatic goals. (LCAS)

³¹ *Old multistory structural stage* – Many age classes and vegetation layers mark the old forest, multistoried stage. It usually contains large old trees. Decaying fallen trees may be present that leave a discontinuous overstory canopy. On cold or moist sites without frequent fires or other disturbance, multi-layer stands with large trees in the uppermost layer develop. (Oliver and Larson, 1996)

³² *Old growth* – Old growth forests generally contain trees that are large for their species and the site, and are sometimes decadent with broken tops. Old growth often contains a variety of tree sizes, large snags, and logs, and a developed and often patchy understory.

³³ *Permanent development* – A permanent development is any development that results in a loss of lynx habitat for at least 15 years. Ski trails, parking lots, new permanent roads, structures, campgrounds, and many special use developments would be considered permanent developments.

³⁴ *Prescribed fire* – A prescribed fire is any fire ignited as a management action to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements met, before ignition. The term prescribed fire replaces the term management ignited prescribed fire. (NWCG)

³⁵ *Precommercial thinning* – Precommercial thinning is mechanically removing trees to reduce stocking and concentrate growth on the remaining trees, and not resulting in immediate financial return. (Dictionary of Forestry)

³⁶ *Project* – All, or any part or number of the various activities analyzed in an Environmental Impact Statement, Environmental Analysis, or Decision Memo. For example, the vegetation management in some units or stands analyzed in an EIS could

be for fuel reduction, and therefore those units or stands would fall within the term *fuel treatment project* even if the remainder of the activities in the EIS are being conducted for other purposes, and the remainder of those units or stands have other activities prescribed in them. All units in an analysis do not necessarily need to be for fuel reduction purposes for certain units to be considered a *fuel reduction project*.

³⁷ *Red squirrel habitat* – Red squirrel habitat consists of coniferous forests of seed and cone-producing age that usually contain snags and downed woody debris, generally associated with mature or older forests.

³⁸ *Regeneration harvest* – The cutting of trees and creating an entire new age class; an even-age harvest. The major methods are clearcutting, seed tree, shelterwood, and group selective cuts. (Helms, 1998)

³⁹ *Research* – Research consists of studies conducted to increase scientific knowledge or technology. For the purposes of Standards VEG S5 and VEG S6, research applies to studies financed from the forest research budget (FSM 4040) and administrative studies financed from the NF budget.

⁴⁰ *Restore, restoration* – To restore is to return or re-establish ecosystems or habitats to their original structure and species composition. (Dictionary of Forestry)

⁴¹ *Riparian area* – An area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation. (LCAS)

⁴² *Salvage harvest* – Salvage harvest is a commercial timber sale of dead, damaged, or dying trees. It recovers economic value that would otherwise be lost. Collecting firewood for personal use is not considered salvage harvest.

⁴³ *Shrub steppe habitat* – Shrub steppe habitat consists of dry sites with shrubs and grasslands intermingled.

⁴⁴ *Standard* – A standard is a required action in a land management plan specifying how to achieve an objective or under what circumstances to refrain from taking action. A plan must be amended to deviate from a standard.

⁴⁵ *Stand initiation structural stage* – The stand initiation stage generally develops after a stand-replacing disturbance by fire, insects or regeneration timber harvest. A new single-story layer of shrubs, tree seedlings, and saplings establish and develop, reoccupying the site. Trees that need full sun are likely to dominate these even-aged stands. (Oliver and Larson, 1996)

⁴⁶ *Stem exclusion structural stage (Closed canopy structural stage)* – In the stem exclusion stage, trees initially grow fast and quickly occupy all of the growing space, creating a closed canopy. Because the trees are tall, little light reaches the forest floor so understory plants (including smaller trees) are shaded and grow more slowly. Species

that need full sunlight usually die; shrubs and herbs may become dormant. New trees are precluded by a lack of sunlight or moisture. (Oliver and Larson, 1996)

⁴⁷ *Timber management* – Timber management consists of growing, tending, commercially harvesting, and regenerating crops of trees.

⁴⁸ *Uneven-aged timber management* - Uneven-aged management develops a stand with trees of three or more distinct age classes, either intimately mixed or in small groups of 2 acres or less (based on *The Dictionary of Forestry* Helms1998). Group openings do not exceed 20% of the stand in a single entry, but individual tree selection can occur throughout an entire stand or between the groups.

⁴⁹ *Understory re-initiation structural stage* – In the understory re-initiation stage, a new age class of trees gets established after overstory trees begin to die, are removed, or no longer fully occupy their growing space after tall trees abrade each other in the wind. Understory seedlings then re-grow and the trees begin to stratify into vertical layers. A low to moderately dense uneven-aged overstory develops, with some small shade-tolerant trees in the understory. (Oliver and Larson, 1996)

⁵⁰ *Vegetation management* – Vegetation management changes the composition and structure of vegetation to meet specific objectives, using such means as prescribed fire or timber harvest. For the purposes of this decision, the term does not include removing vegetation for permanent developments like mineral operations, ski runs, roads and the like, and does not apply to fire suppression or to wildland fire use.

⁵¹ *Wildland urban interface (WUI)* – Use the definition of WUI found in the Healthy Forests Restoration Act. The full text can be found at HFRA § 101. Basically, the wildland urban interface is the area adjacent to an at-risk community that is identified in the community wildfire protection plan. If there is no community wildfire protection plan in place, the WUI is the area 0.5 mile from the boundary of an at-risk community; or within 1.5 miles of the boundary of an at-risk community if the terrain is steep, or there is a nearby road or ridgetop that could be incorporated into a fuel break, or the land is in condition class 3, or the area contains an emergency exit route needed for safe evacuations. (Condensed from HFRA. For full text see HFRA § 101.)

⁵² *Winter snowshoe hare habitat* – Winter snowshoe hare habitat consists of places where young trees or shrubs grow densely – thousands of woody stems per acre – and tall enough to protrude above the snow during winter, so snowshoe hare can browse on the bark and small twigs (LCAS). Winter snowshoe hare habitat develops primarily in the stand initiation, understory reinitiation and old forest multistoried structural stages.

Appendix C - Canada Lynx Research & Studies in the Contiguous United States

Appendix C

Canada Lynx Related Research & Studies in the Contiguous United States

Principal Investigator(s) & Affiliation	Focus of Research	Geographic Location	Method	Duration	Comments
<i>Completed Studies</i>					
K. Aubry - USFS, PNWRS, G. Koehler – WDFW & J. von Kienast – U. of Washington	<ul style="list-style-type: none"> ▪ Habitat relationships ▪ Relationships with prey & other predators ▪ Food habits 	Cascade Mountains (North-central Washington)	Snow tracking and hair snagging	Dec 2000 – Mar 2001 and Dec 2001 - Mar 2002	Investigate fine-scale habitat selection by lynx in a landscape composed of unharvested, recently harvested and recently burned forests.
D. Ausband – U. of Montana, R. Baty – Montana DNRC (2005)	<ul style="list-style-type: none"> ▪ Short term effects of precommercial thinning 	Southern Rocky Mtns. (Stillwater State Forest, Montana)	Pellet counts & track surveys	2001-2003	Examine short-term effects on snowshoe hares from various harvest retention prescriptions; publication in 2005 in Can. J. For. Res. 35:2006-2010.
S. Brainerd (1985, unpublished)	<ul style="list-style-type: none"> ▪ Demography & population dynamics ▪ Movements & dispersal 	Southern Rocky Mtns. (Western Montana)	Carcass examination & radio-telemetry	25 months	18 females w/mean litter size of 3.3; 2 lynx monitored
D. Britzell et al. (1989, unpublished) WDFW	<ul style="list-style-type: none"> ▪ Community interactions ▪ Demography & population dynamics ▪ Distribution & abundance ▪ Habitat relationships ▪ Movements & dispersal 	Cascade Mountains (North-central Washington)	Radio-telemetry	34 months	23 lynx monitored
J. Brocke et al (1991)	<ul style="list-style-type: none"> ▪ Human impacts 	Northeast (New York)	Radio-telemetry	24 months	83 lynx translocated from the Yukon; 16 road-killed
S. Buskirk & J. Zahratka – U. of Wyoming	<ul style="list-style-type: none"> ▪ Habitat relationships of snowshoe hares 	Southern Rocky Mountains (Colorado – Rio Grande and Gunnison NFs)	Mark & re-observation	2001-2002	M. S. thesis completed; manuscript submitted for publication.
A. Fuller (1999, unpublished)	<ul style="list-style-type: none"> ▪ Stand- and sub-stand habitat relationships of snowshoe hare 	Northeastern United States (North-central Maine)	Pellet counts, vegetation measurements	1997-1998	Compared density of snowshoe hare among mature, regenerating clear-cut, and partially harvested stands. Developed a model to predict density of

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Principal Investigator(s) & Affiliation	Focus of Research	Geographic Location	Method	Duration	Comments
					hares based on within-stand habitat variables.
A. Fuller (2006, PhD)	<ul style="list-style-type: none"> ▪ Multi-scalar responses of forest carnivores to habitat and spatial pattern: Case studies with Canada lynx and American martens including lynx movements and habitat use 	Northeastern United States (Northwestern Maine)	Snow tracking, radio telemetry	2002-2003	
J. Homyack, D. Harrison – U. of Maine W. Krohn – USGS Maine Cooperative Fish and Wildlife Research Unit	<ul style="list-style-type: none"> ▪ Determine the stand-level effects of precommercial thinning (PCT) on snowshoe hares, 1-11 years post-treatment ▪ Determine the effects of PCT on small mammals, 1-16 years post-treatment ▪ Develop predictive relationship of hare density in relation to over story, under story, and structural variables. 	Southern Maine	Mark-recapture of small mammals and snowshoe hare, pellet counts, red squirrel call counts, intensive and extensive habitat measurements.	2000-2002	<ul style="list-style-type: none"> ▪ Sampled hare pellet density on 30 herbicide-treated clear cuts (17 treated with PCT, 13 Control) ▪ Mark-recap of hares on subset of 8 stands ▪ Live-trap small mammals on 37 herbicide treated clear cuts (24 treated with PCT, 13 Control) ▪ Publications in <i>Forest Ecology and Manage.</i> (2004) and <i>Wildlife Society Bulletin</i> (2005).
C. Hoving, D. Harrison - U. of Maine W. Krohn – Maine Coop F&W Research Unit	<ul style="list-style-type: none"> ▪ Distribution & abundance (historical & current) ▪ Habitat relationships (broad-scale & meso-scale) ▪ Habitat relationships of snowshoe hare 	Northeastern U.S. and Maritime Canada (meso-scale analysis in NW Maine)	GIS modeling using museum & historical records, trapping data, and track surveys	1833-1999 for distribution 1987-1999 GIS models	Records of 1,150 lynx from 7 states and 3 provinces & predictive power of 94%, model driven by mean annual snowfall & deciduous forest. Lynx abundant in Maine before 1900. Select regenerating forest over mature forest in Maine. M. S. thesis; Publications in <i>Northeastern Naturalist</i> (2003,) <i>Wildlife Biology</i> (2004) and <i>J. Wildlife Manage.</i> (2005).
G. Koehler – WDFW, K. Hodges, S. Mills and C. Walker – U. of Montana (2005, M. S. thesis - C. Walker)	<ul style="list-style-type: none"> ▪ Habitat relationships of snowshoe hares 	Cascade Mountains (North-central Washington)	Mark-recapture of snowshoe hares and pellet counts	Summers of 2003 and 2004	Investigate habitat selection, densities and movement patterns of snowshoe hares at multiple spatial scales (study conducted in both lynx study areas in north-central WA); M. S. thesis completed

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Principal Investigator(s) & Affiliation	Focus of Research	Geographic Location	Method	Duration	Comments
G. Koehler – WDFW, K. Aubry – USFS, PNWRS, R. Weilgus and B. Maletzke – Wash. State U.	<ul style="list-style-type: none"> ▪ Habitat relationships ▪ Relationships with prey & other predators ▪ Food habits 	Cascade Mountains (North-central Washington)	Snow tracking	Dec 2002 – Mar 2003 and Dec 2003 – Mar 2004	Investigate coarse-scale habitat selection by lynx in a managed landscape (companion study to one by Aubry, Koehler and von Kienast conducted from 200-2002 but located in a different study area).
G. Koehler (1990) - WDFW	<ul style="list-style-type: none"> ▪ Demography & population dynamics ▪ Distribution & relative abundance ▪ Relationships with prey 	Cascade Mountains (North-central Washington)	Radio-telemetry	25 months	7 lynx monitored
G. Koehler et al (1979) - WDFW	<ul style="list-style-type: none"> ▪ Community interactions ▪ Habitat relationships 	Southern Rocky Mtns. (Western Montana)	Radio-telemetry	8 months	2 lynx; patterns of association with forest types
L. S. Mills – U. of Montana	<ul style="list-style-type: none"> ▪ Abundance of hares across time and space ▪ Evaluation of pellet counts as indices of abundance 	Seeley Lake and Talley Lake Regions of W. Montana	Mark-recapture and pellet counts	1998-2002	Hare pellets were evaluated as an index of density using 436 site-area-season combinations with both pellet counts and mark-recapture density estimates; published in J. Wildlife Manage (2005).
K. McKelvey, G. McDaniel – USFS, RMRS (2001)	<ul style="list-style-type: none"> ▪ Habitat relationships of snowshoe hares 	Southern Rocky Mtns. (Island park, Caribou-Targhee NF, Idaho)	Pellet counts, capture/recapture, winter track counts	2000-2001	Sampled different forest types, stand ages and thinned & unthinned stands
K. McKelvey et al. (2000) USFS, RMRS	<ul style="list-style-type: none"> ▪ Distribution & abundance ▪ Habitat relationships 	Contiguous United States	Museum & historical records, trapping data, track surveys, questionnaire	N/A	3,865 occurrence records & historical distribution
K. McKelvey et al. (2000) USFS, RMRS	<ul style="list-style-type: none"> ▪ Habitat relationships ▪ Human impacts 	Cascade Mountains (North-central Washington)	Radio-telemetry	76 months	Reanalyzed data from two previous studies (Brittell et al. 1989, Kohler 1990), 1981-1988. 22 lynx monitored; no road avoidance (non-winter)
L. S. Mills, K. Pilgrim,	<ul style="list-style-type: none"> ▪ Species identification of lynx 	Southern U. S.	MtDNA analysis of	1999-2001	Developed a thoroughly reliable,

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Principal Investigator(s) & Affiliation	Focus of Research	Geographic Location	Method	Duration	Comments
M. Schwartz – U. of Montana, K. McKelvey – USFS, RMRS (2000)	based upon hairs.		hair samples		validated diagnostic test to distinguish among the felids of Southern north America.
K. Murphy – Yellowstone NP	<ul style="list-style-type: none"> ▪ Lynx presence and distribution in Yellowstone National Park 	Yellowstone National Park	Snow tracking surveys, hair snare surveys	2001-2004	Final report completed and submitted for publication (<i>Northwest Science</i> , in press).
M. Schwartz & S. Mills – U. of Montana, K. McKelvey, L. Ruggiero & F. Allendorf – USFS, RMRS	<ul style="list-style-type: none"> ▪ Population dynamics 	Alaska, western Canada, NW Montana	DNA Analysis	1999-2001	Used micro satellite loci to estimate gene flow among lynx populations; implies persistence of lynx in contiguous U. S. depends upon dispersal from larger populations; connectivity between Southern & southern populations important; paper published in <i>Nature</i> (2002).
J. Shaw & J. Long, Utah State U. (2001)	<ul style="list-style-type: none"> ▪ Habitat relationships of snowshoe hares 	Southern Rocky Mtns. (N. Utah & S. Idaho – Ashley, Wasatch-Cache & Caribou-Targhee NFs)	Pellet counts & vegetative measurements	1999-2000	PhD dissertation compared snowshoe hare use in thinned and unthinned lodgepole pine stands; paper submitted to JWM for publication.
D. Smith (1984, unpublished)	<ul style="list-style-type: none"> ▪ Habitat relationships ▪ Movements & dispersal 	Southern Rocky Mtns. (Western Montana)	Radio-telemetry	23 months	5 lynx monitored
Ongoing Studies					
K. Bunnell – BYU./Utah State U., J. Flinders & J. Shirley – BYU, M. Wolfe – Utah State	<ul style="list-style-type: none"> ▪ Snow compaction effects on coyote distribution & feeding behavior ▪ Habitat relationships of snowshoe hares & red squirrels 	Southern Rocky Mtns.- Primary study area is the Uinta Mtns (Ashely NF, UT) with additional data collected in the Bear River Range (Utah), Island Park (Idaho) & Bighorn Mtns (Wyoming)	Aerial snow tracking, radio telemetry, ground tracking, scat analysis; Pellet counts (hares) and midden counts (red squirrels) to ass population densities to micro & macro	2001- 2004	Coyotes are accessing deep snow habitats via human induced snow compacted routes. Publication in Wildlife Society Bulletin 2006.

Appendix C

Canada Lynx Related Research & Studies in the Contiguous United States

Principal Investigator(s) & Affiliation	Focus of Research	Geographic Location	Method	Duration	Comments
			habitat conditions.		
A. Fuller & D. Harrison – U. of Maine	<ul style="list-style-type: none"> ▪ Habitat relationships ▪ Prey relationships ▪ Spatial use & movement patterns 	Northeastern United States (Northwestern Maine)	Snow tracking & vegetation measurements	Jan – Mar 2002 & 2003	Evaluate sub-stand scale habitat selection and develop a model to determine which habitat variables best predict habitat selection.
C. McLaughlin – Maine Dept. Inland Fisheries and Wildlife (MDIFW) J. Organ – USFWS G. Matula – MDIFW W. Jakubas – MDIFW C. Todd – MDIFW	<ul style="list-style-type: none"> ▪ Determine lynx population viability in NW Maine ▪ Document mortality factors on lynx in NW Maine ▪ Identify habitats used by lynx in NW Maine, including relationships with snowshoe hare distribution and abundance ▪ Investigate relationships between lynx and sympatric predators in NW Maine ▪ Test efficacy of survey methods to detect lynx 	Northeastern United States (Musquacook Lakes region, Northwestern Maine)	Radio-telemetry; vegetation surveys, pellet counts, winter track surveys, hair-pad surveys, camera surveys	1999-2003	42 lynx captured; 28 monitored (>2400 locations); 15 kittens handled in 8 litters; 8 den sites described; coyotes, fisher, red fox, bobcat monitored. Study is located on privately owned commercial forestland.
P. Griffin & L. S. Mills – U. of Montana	<ul style="list-style-type: none"> ▪ Model snowshoe hare population dynamics in a fragmented landscape 	Southern Rocky Mtns. (Seeley Lake, Montana)	Utilizing data collected from study listed above (Mills & Griffin)	1998 – 2003	Published in 2003 as article in <i>Species Conservation and Management: Case Studies</i> , Oxford University Press.
J. Kolbe, J. Squires et al. – USFS, RMRS	<ul style="list-style-type: none"> ▪ Human impacts (snow compacting activities) ▪ Interspecific predator relationships 	Southern Rocky Mtns. (Northwestern Montana)	Radio-telemetry	2001 - 2003	Coyotes were resident within lynx home ranges and foraged mainly on carrion publication in press in J. Wildlife Management.
L. S. Mills & K. Hodges – U. of Montana	<ul style="list-style-type: none"> ▪ Habitat relationships of snowshoe hares ▪ Sampling strategies (eg. Statistical power) for hare pellets ▪ Effects of precommercial thinning on snowshoe hares 	Southern Rocky Mtns. (Lolo and Flathead NFs)	Mark & recapture, pellet counts & trapping	2000-2006	Ongoing time series for 13 stands, including 2 sites experimentally thinned in Fall 2002.

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Canada Lynx Related Research & Studies in the Contiguous United States

Principal Investigator(s) & Affiliation	Focus of Research	Geographic Location	Method	Duration	Comments
L. S. Mills & K. Hodges – U. of Montana	<ul style="list-style-type: none"> ▪ Relative abundance across park ▪ Effect of 1988 burns on snowshoe hares 	Yellowstone National Park, WY and MT	Mark & recapture, pellet counts	2002-2007	Densities and distribution across time have been low. Currently evaluating levels of genetic variation using tissue and fecal samples.
L. S. Mills, K. Hodges & E. Cheng (PhD student) – U. of Montana	<ul style="list-style-type: none"> ▪ Distribution & abundance of acres ▪ Evaluate fecal genotyping as a method for abundance estimation 	Glacier National Park, MT	Live trapping, pellet counts, collection of ear punches and fecal pellets, genotyping at 10 microsatellite loci.	2005-2007	Mark-recapture, pellet counts, and pellet collection for genotyping all concurrently examined on several intensive plots; pellet sampling for genotyping across park with emphasis on examining hare responses to burns.
D. Murray – U. of Idaho	<ul style="list-style-type: none"> ▪ Methods of population estimation 	Southern Rocky Mtns. (Idaho Panhandle NFs)	Pellet counts	1999 – 2001	Estimate snowshoe hare densities among various vegetative stand conditions and elevation gradients
D. Murray – U. of Idaho	<ul style="list-style-type: none"> ▪ Movements & survival of snowshoe hares ▪ Snowshoe hare foraging relationships 	Southern Rocky Mtns. (Priest Lake RD, IPNF's)	Radio-telemetry	1999 - 2002	Compare natural foraging conditions to natural plus supplemental forage (pellets); nutritional and feeding requirements also assessed with snowshoe hares in controlled pens.
D. Murray – U. of Idaho	<ul style="list-style-type: none"> ▪ Habitat relationships of snowshoe hares 	Southern Rocky Mtns. (Idaho Panhandle NFs)	Pellet counts	2000-2005	Compare responses of snowshoe hares to different thinning prescriptions; may run up to 10 years depending upon funding.
T. Shenk – CDOW	<ul style="list-style-type: none"> ▪ Movements & dispersal ▪ Mortality assessments ▪ Prey relationships 	Southern Rocky Mountains (Colorado)	Radio-telemetry & snow tracking	Began in 1999 & is ongoing	Focused on lynx reintroduced from Alaska & Canada
K. Shick & J. Goodburn – U. of Montana	<ul style="list-style-type: none"> ▪ Habitat relationships of snowshoe hares 	Southern Rocky Mtns. (Flathead NF, Montana)	Pellet counts, vegetative sampling	2001	Investigate snowshoe hare densities stands of varying structural and phase categories; M.S. thesis
J. Squires – USFS, RMRS & others	<ul style="list-style-type: none"> ▪ Habitat use & movements ▪ Prey relationships 	Southern Rocky Mtns. (Pioneer Mtns. & other areas, Beaverhead-Deerlodge NFs)	Radio-telemetry, snow tracking	2000-2003	No lynx detected or trapped to date; potential prey species w/i area documented; also gathering information on wolverine occurrence

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Canada Lynx Related Research & Studies in the Contiguous United States

Principal Investigator(s) & Affiliation	Focus of Research	Geographic Location	Method	Duration	Comments
J. Squires et al. – USFS, RMRS	<ul style="list-style-type: none"> ▪ Demography & population dynamics ▪ Community interactions ▪ Habitat relationships ▪ Movements & dispersal ▪ Relationships with prey 	Southern Rocky Mtns. (Western Montana)	Radio-telemetry	Began in 1998 & is ongoing	Montana – 60+ lynx radioed (2002) ?
J. Squires – USFS, RMRS T. Laurion – WG&F	<ul style="list-style-type: none"> ▪ Demography & population dynamics ▪ Community interactions ▪ Habitat relationships ▪ Movements & dispersal ▪ Relationships with prey 	Southern Rocky Mtns. (Western Wyoming)	Radio-telemetry	Began in 1996 & is ongoing ?	Wyoming – 2 lynx radioed (1996-97)
M. Schwartz, J. Kolbe, K. McKelvey, L. Ruggiero, J. Squires, J. Copeland – USFS – RMRS	<ul style="list-style-type: none"> ▪ Habitat relationships ▪ Highway crossings ▪ Human impacts (snowmobiles/winter recreation) ▪ Interspecific predator competition ▪ Movements & dispersal ▪ Relationships with prey 	Southern Rocky Mtns. (Clearwater NF, Idaho; Lolo NF, Montana)	Radio-telemetry, snow tracking, highway mortality assessments	2001 – 2006	Includes gathering information on wolverines and other carnivores
Jennifer Vashon – Maine Dept. of Inland Fisheries & Wildlife (MDIFW)	<ul style="list-style-type: none"> ▪ Determine lynx population status in NW Maine ▪ Document recruitment and dispersal ▪ Document mortality factors on lynx in NW Maine ▪ Identify habitats used by lynx in NW Maine, including relationships with snowshoe hare distribution and abundance ▪ Investigate relationships between lynx and sympatric predators in NW Maine ▪ Test efficacy of survey methods 	Northeastern U. S. (Musquacook Lakes region, northwestern Maine)	Radio-telemetry, vegetation surveys, pellet counts, winter track surveys, hair pad surveys, camera stations	1999-2008	120 lynx captured; 41 monitored (>6000 locations; 84 kittens handled in 30 litters; habitat at 21 den sites described; coyotes, fisher, red fox and bobcat monitored (1999-2003). Sampled hare pellet density on 18 sites (2002-2004) and winter track counts of hare (2001-2004). Analysis of lynx home ranges and movements and stand-level habitat use selection in progress. Study area is located on privately owned commercial forestland.

Appendix C

Canada Lynx Related Research & Studies in the Contiguous United States

Principal Investigator(s) & Affiliation	Focus of Research	Geographic Location	Method	Duration	Comments
	to detect lynx				
J. Weaver	<ul style="list-style-type: none"> ▪ Habitat relationships of snowshoe hares 	Southern Rocky Mtns. (Kootenai NF, Montana)	Pellet counts	1996 - 2006	<ul style="list-style-type: none"> ▪ Evaluate abundance & trends of snowshoe hares in a range of stand types & structures ▪ Evaluate snowshoe hare abundance & trends in control & paired precommercially thinned stands under a variety of precommercial thinning prescriptions.

Appendix D – Comparison of BaseLine with Alternative F, Alternative F-Modified & Rationale for Changes

Table D-1. Comparison of Baseline, and Alternative F, Preferred Alternative in FEIS with Rationale

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
	ALL O1. Maintain or restore lynx habitat connectivity.	ALL O1. Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.	No change.
GL 1 Within key landscape linkage areas maintain or improve conditions that allow for lynx movement.	ALL S1. New or expanded permanent developments and vegetation management practices and activities must maintain habitat connectivity.	ALL S1. New or expanded permanent developments and vegetation management practices and activities must maintain habitat connectivity in an LAU and/or linkage area.	No change.
NA	NA	NA	
Goal & Objective 1 c. 8 Within 2 years of plan approval, map, identify, and prioritize site-specific locations where highway crossings are needed to reduce highway impacts on lynx. Work cooperatively with the Federal Highway Administration and Colorado Department of Transportation in the creation of the map and to continuously address lynx movement and habitat connectivity and to reduce the potential for lynx mortality related to highways.	ALL G1. Techniques to avoid or reduce effects on lynx should be used when constructing or reconstructing highways . Techniques could include underpasses or overpasses.	ALL G1. Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways or forest highways across federal land. Methods could include fencing, underpasses or overpasses.	No change.
Note: Standards and guidelines in the “Canada Lynx” section apply only to lands within the lynx habitat matrix. Lynx analysis unit	LAU S1. LAU boundaries would not be adjusted except through agreement with the US Fish and Wildlife Service, based on new lynx	LAU S1. Changes in LAU boundaries shall be based on site specific habitat information and after review by the Forest	Clarified standard and added a higher level review to provide for consistency.

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
(LAU) boundaries will not be adjusted for individual projects. Forestwide LAU changes will only be completed in coordination and concurrence with the US Fish and Wildlife Service.	habitat information.	Service Regional Office.	
Goal & Objective 1.c.5, 1.c. 6	VEG O1. Manage vegetation to be consistent with historical succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.	VEG O1. Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.	Clarified language.
Goal & Objective 1.c.5, 1.c. 6, Standard 6. In aspen stands, apply harvest prescriptions that favor regeneration of aspen.	VEG O2. Maintain or improve lynx habitat, with an emphasis on continued availability of high-quality foraging habitat in juxtaposition to denning habitat .	VEG O2. Provide a mosaic of habitat conditions through time that support dense horizontal cover, and high densities of snowshoe hare. Provide winter snowshoe hare habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation.	Changed to more specific language which provides needed detail to aid project planning.
Goal & Objective 1.c.5, 1.c. 6	VEG O3. Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.	(Same as Alternative B)	No change.
Standard 6. In aspen stands, apply harvest prescriptions that favor regeneration of aspen.	VEG O4. Design regeneration harvest , reforestation, and thinning to develop characteristics suitable for lynx and snowshoe hare habitat .	VEG O4. Focus vegetation management in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover.	Changed to more specific language which provides needed detail to aid project planning.

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
<p>Goal & Objective 1.c.5, 1.c.6, Standard 1: Limit disturbance within each lynx analysis unit (LAU) as follows: if more than 30 percent of lynx habitat within an LAU is currently in unsuitable condition, no further reduction of suitable conditions shall occur as a result of vegetation management by federal agencies.</p>	<p>VEG S1. Unless a broad scale assessment has been completed that substantiates different historical levels of unsuitable habitat, limit disturbance within each LAU as follows: if more than 30 percent of lynx habitat within a LAU on NFS lands is currently in unsuitable condition, no further reduction of suitable conditions shall occur as a result of vegetation management activities or practices.</p> <p>This standard does not apply to:</p> <ol style="list-style-type: none"> 1. Wildland Fire Use practices and activities that restore ecological processes, or maintain or improve lynx habitat. 2. Wildfire suppression. 	<p>VEG S1. Where and what this applies: Standard VEG S1 applies to all vegetation management practices and activities that regenerate forested stands, except for fuel treatment practices and activities within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI see guideline VEG G10.</p> <p>The Standard: VEG S1 Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages limit disturbance in each LAU as follows: If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage</p>	<p>Changed to provide some flexibility for fuels reduction projects.</p>

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
		<p>that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management practices and activities.</p> <p>(Note: Fuel treatment practices and activities that create stand initiation structural stage will be included in the 30 percent calculation – meaning that if a fuel treatment project w/in the WUI creates more than 30 percent, then other practices and activities designed to regenerate more acres would have to be modified or deferred until the standard can be met.)</p>	
<p>Standard 3. Management actions such as timber sales, salvage sales, and prescribed fires will not change more than 15 percent of lynx habitat within a LAU to unsuitable condition within a 10-year period. To determine whether the 15% criterion over a 10-year period standard is met, base activities on the 1-year period immediately prior to the initiation of the project in question.</p>	<p>VEG S2. Timber management practices, such as timber harvest and salvage sales, shall not change more than 15 percent of lynx habitat within a LAU to an unsuitable condition within a 10-year period.</p>	<p>VEG S2 Where and to what this applies: Standard VEG S2 applies to all timber management practices and activities that regenerate forested stands, except for fuel treatment projects within the WUI as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 3 percent (cumulatively) of lynx</p>	<p>Changed to provide some flexibility for fuels reduction projects.</p>

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
		<p>habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI see guideline VEG G10.</p> <p>The Standard: VEG S2. Timber management practices and activities shall not regenerate more than 15 percent of lynx habitat on NFS lands in an LAU in a ten-year period.</p>	
<p>Standard 2. Within a LAU, maintain denning habitat in patches larger than 5 acres, comprising at least 10 percent of lynx habitat. Where less than 10 percent denning habitat is currently present within a LAU, defer management actions in stands that have the highest potential for developing denning habitat structure in the future.</p>	<p>VEG S3. Maintain denning habitat within a LAU in patches generally larger than 5 acres comprising at least 10 percent of the lynx habitat. Where less than 10 percent denning habitat is present in a LAU, defer vegetation management practices and activities in stands that have the highest potential to develop denning-habitat.</p> <p>This standard does not apply to:</p> <ol style="list-style-type: none"> 1. Wildland Fire Use practices and activities that restore ecological processes. 2. Wildfire suppression. 	<p>See Guideline VEG G11</p>	<p>Changed because the current consensus by lynx researchers is that denning habitat, in most cases, is not limiting.</p>
<p>Standard 4. Following a disturbance such as blowdown, fire, insect or</p>	<p>VEG S4. Following a disturbance, such as blowdown, fires, insects, or</p>	<p>NA</p>	<p>Changed because the current consensus by lynx researchers is that denning</p>

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
<p>pathogen mortality that could contribute to lynx denning habitat, do not salvage harvest when the affected area is smaller than 5 acres. Exceptions to this include: (1) developed areas such as campgrounds, and (2) in LAUs where denning habitat has been mapped and field validated, salvage harvests may occur provided that at least 10 percent denning habitat is retained and is well distributed.</p> <p>Guideline 11. Use field verification to document denning habitat suitability, quantity, quality, and juxtaposition with other important habitat components, such as water and foraging habitats; design projects to avoid impacts at times suitable site may be occupied as natal or maternity dens.</p>	<p>pathogens mortality that could contribute to lynx denning habitat, salvage harvest may only occur when the affected area is smaller than 5 acres in the following situations:</p> <ol style="list-style-type: none"> 1. Developed recreation sites, administrative sites, or authorized special use structures or improvements; 2. Designated road and trail corridors where public safety or access has been or may be compromised; and 3. LAUs where denning habitat has been mapped and field validated, provided that at least 10 percent denning habitat is retained and is well distributed. 4. <i>Within the structure ignition zone</i> (200 feet of administrative sites, dwellings and/or associated outbuildings). 5. Wildfire suppression. 6. Removal of dead or down trees for personal use (i.e., firewood collection). 		<p>habitat, in most cases, is not limiting.</p>

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
<p>Standard 5. Allow silvicultural thinning treatments (such as pre-commercial thinning or weed-and- release treatments designed to reduce stocking in order to concentrate growth on the more desirable trees) only when stands no longer provide snowshoe hare habitat</p>	<p>VEG S5. Precommercial thinning may be allowed only when stands no longer provide snowshoe hare habitat (e.g., self-pruning processes or stand composition and/or stand structure do not provide snowshoe hare cover and forage availability during winter conditions with average snow pack).</p> <p>The following precommercial thinning activities may occur prior to the stands no longer providing snowshoe hare habitat:</p> <ol style="list-style-type: none"> 1. Conducted within the structure ignition zone (200 feet of administrative sites, dwellings and/or associated outbuildings). <p>This standard does not apply to:</p> <ol style="list-style-type: none"> 1. Wildfire suppression. 2. Wildland Fire Use. 3. Developed recreation sites, administrative sites, or authorized special use improvements including within permitted ski area boundaries. 	<p>VEG S5 Where and to what this applies: Standard VEG S5 applies to precommercial thinning practices and activities, except for fuel treatment projects that use precommercial thinning as a tool within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI see guideline VEG G10.</p> <p>The Standard: VEG S5 Precommercial thinning practices and activities that reduce snowshoe hare habitat, may occur from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat only:</p> <ol style="list-style-type: none"> 1. Within 200 feet of administrative sites, dwellings, or outbuildings; 	<p>Changed to provide some flexibility for fuels reduction projects.</p>

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
		<p>or</p> <p>2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or</p> <p>3. Based on new information that is peer reviewed and accepted by the regional/state levels of the Forest Service and FWS, where a written determination states:</p> <p>a. that a project is not likely to adversely affect lynx; or</p> <p>b. that a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat; or</p> <p>4. For conifer removal in aspen, or daylight thinning around individual aspen trees, where aspen is in decline.</p>	
~NA	<p>VEG S6. Management practices and activities in mature and late successional, multi-layered Engelmann spruce-subalpine fir stands shall provide for winter snowshoe hare habitat.</p> <p>This standard does not apply to:</p> <p>1. Designated road and trail corridors where public safety or access has been or may be</p>	<p>VEG S6</p> <p>Where and to what this applies:</p> <p>Standard VEG S6 applies to all vegetation management practices and activities that regenerate forested stands, except for fuel treatment practices and activities within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation:</p> <p>Fuel treatment projects</p>	<p>Changed to provide some flexibility for fuels reduction projects and to provide for limited flexibility in situations where the standard is not operationally practical to implement.</p>

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
	<p>compromised;</p> <p>2. Practices and activities conducted within the structure ignition zone (200 feet of administrative sites, dwellings and/or associated outbuildings).</p> <p>3. Wildfire suppression.</p> <p>4. Wildland Fire Use.</p> <p>5. Developed recreation sites, administrative sites, or authorized special use improvements including within permitted ski area boundaries.</p>	<p>within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5 and VEG S6 may occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI, see guideline VEG G10.</p> <p>The Standard: VEG S6 Vegetation management practices and activities that reduce snowshoe hare habitat in multi-story mature or late successional forests may occur only:</p> <ol style="list-style-type: none"> 1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or 2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or 3. For incidental removal during salvage harvest (e.g. removal due to location of skid trails). <p>(NOTE: Timber harvest is allowed in areas that have potential to improve winter</p>	

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
		snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover [e.g. uneven age management systems could be used to create openings where there is little understory so that new forage can grow]).	
<p>Guideline 2. Vegetation management activities to improve lynx foraging habitat should primarily provide for recruitment of a high density of small diameter conifers, hardwoods, and shrubs preferred by snowshoe hares.</p>	<p>VEG G1. Where little or no habitat for snowshoe hares is currently available, vegetation management practices should be planned to recruit a high density of conifers, hardwoods, and shrubs preferred by snowshoe hares. Preference should be given to mesic sites and mid-seral stage stands. Provide for continuing availability of lynx foraging habitat in proximity to denning habitat.</p>	<p>VEG G1 Vegetation management practices and activities should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat.</p>	<p>Changed to more specific language which provides needed detail to aid project planning.</p>
<p>Guideline 3. Retain standing dead trees and coarse woody debris during vegetation management activities to provide for adequate future denning habitat.</p>	<p>VEG G2. Where recruitment of additional denning habitat is desired, vegetation management practices should retain sufficient standing dead trees and coarse woody debris, consistent with the likely availability of such material under natural disturbance regimes. The juxtaposition of denning and foraging habitat should be</p>	<p>NA. See Guideline VEG G11</p>	<p>Changed because the current consensus by lynx researchers is that denning habitat, in most cases, is not limiting.</p>

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
	maintained or improved.		
Standard 2. Within a LAU, maintain denning habitat in patches larger than 5 acres, comprising at least 10 percent of lynx habitat. Where less than 10 percent denning habitat is currently present within a LAU, defer management actions in stands that have the highest potential for developing denning habitat structure in the future.	VEG G3. Vegetation management should provide for the retention or restoration of denning habitat on landscape settings with a low probability of loss from stand replacing fire events.	NA. See Guideline VEG G11	Changed because the current consensus by lynx researchers is that denning habitat, in most cases, is not limiting.
Guideline 9. When managing wildland fire, minimize creation of permanent travelways. Minimize construction of temporary roads and machine fire lines to the extent possible during fire suppression activities. (The WRNF does not create permanent fire breaks.)	VEG G4. Fire management activities should not create permanent travel routes that would facilitate snow compacting activities. Construction of permanent firebreaks on ridges or saddles should be avoided.	VEG G4 Prescribed fire activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.	Changed language to address specific issue with prescribed fire.
Goal & Objective 1.c.5	VEG G5. Habitat for alternate prey species (primarily red squirrel) should be provided in each LAU.	(Same as Alternative B)	No change.
~NA	(NA See VEG S6)	(See Standard VEG S6)	Added to provide direction to consider lynx habitat needs when planning fuel treatment projects.
Standard 3	(NA - See VEG S2.)	(See Standard VEG S2)	LIVESTOCK MANAGEMENT (GRAZ): <i>The following objectives and guidelines apply to</i>

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
			<i>grazing projects in lynx habitat in lynx analysis units (LAU). They do not apply to linkage areas.</i>
Standard 4	(NA - See VEG S4.)	(See Guideline VEG G11.)	No change.
		VEG G10 Fuel treatment practices and activities within the WUI as defined by HFRA should be designed considering standards VEG S1, S2, S5 and S6 to promote lynx conservation.	Changed to Guideline because the USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not identify grazing practices as a threat to lynx.
		VEG G11 - Denning habitat should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees ("jack-strawed" piles). If denning habitat appears to be lacking in the LAU, then projects should be designed to retain some coarse woody debris, piles, or residual trees to provide denning habitat in the future.	Changed to Guideline because the USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not identify grazing practices as a threat to lynx.
Goal & Objective 1.c. 6, Standard 7	GRAZ O1. Manage livestock grazing to be compatible with the improvement or maintenance of lynx habitat.	(Same as Alternative B)	Changed to Guideline because the USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not identify grazing practices as a threat to lynx.

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
Standard 8. Manage livestock use in post-fire and post-harvest created openings to assure successful regeneration of the shrub and tree components.	GRAZ S1. In fire- and harvest-created openings, manage livestock grazing to ensure impacts do not prevent successful regeneration of shrubs and trees.	(See GRAZ G1)	Changed to Guideline because the USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not identify grazing practices as a threat to lynx.
Guideline 4. Manage livestock grazing in aspen stands to ensure sprouting and sprout survival sufficient to perpetuate the long-term viability of the clones.	GRAZ S2. In aspen stands, manage livestock grazing to ensure impacts do not prevent or inhibit sprout survival sufficient to perpetuate the long-term viability of the clones.	(See GRAZ G2)	Standard was changed to Guideline because the USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not identify grazing practices as a threat to lynx.
Standard 7. Manage livestock grazing to maintain or achieve mid-seral or later conditions in shrub-steppe habitats, riparian areas, and willow carrs.	GRAZ S3. Manage livestock grazing in riparian areas, and willow carrs , to contribute to maintaining or achieving a preponderance of mid- or later-seral stages , similar to conditions that would have occurred under historic disturbance regimes.	(See GRAZ G3)	Standard was changed to Guideline because the USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not identify grazing practices as a threat to lynx.
Goal & Objective 1.c. 6	GRAZ S4. Manage livestock grazing in shrub steppe habitats, in the elevational ranges that encompass forested lynx habitat (within LAUs) to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar the conditions that would have occurred under historic disturbance regimes.	(See GRAZ G4)	Standard was changed to Guideline because the USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not identify grazing practices as a threat to lynx.
Standard 8	(NA – See GRAZ S1)	GRAZ G1. In fire- and harvest-created openings, livestock grazing should be	

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
		managed so impacts do not prevent shrubs and trees from regenerating.	
Guideline 4	(NA – See GRAZ S2)	GRAZ G2. In aspen stands, livestock grazing should be managed to contribute to the long-term viability of the aspen.	
Standard 7	(NA – See GRAZ S3)	GRAZ G3 In riparian areas and willow carrs, livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	
Goal & Objective 1.c.6	(NA – See GRAZ S4)	GRAZ G4 In shrub-steppe habitats, livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs, to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	
Goal & Objective 1.c. 6, 1.c.7, Guideline 12	HU O1. Maintain the lynx’s natural competitive advantage over other predators in deep-snow by discouraging the expansion of snow compaction activities in lynx habitat.	(Same as Alternative B)	No change.

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
Goal & Objective 1.c. 5, 1.c. 6, Guideline 1. Within key landscape linkage areas maintain or improve conditions that allow for lynx movement.	HU O2. Manage recreational activities to maintain lynx habitat and connectivity.	(Same as Alternative B)	No change.
Goal & Objective 1.c. 6	HU O3. Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat.	(Same as Alternative B)	No change.
Goal & Objective 1.c. 6	HU O4. Provide for lynx habitat needs and connectivity when developing or expanding developed recreation sites or ski areas.	(Same as Alternative B)	No change.
Goal & Objective 1.c. 6	HU O5. Manage human activities, such as special uses, mineral and oil and gas exploration and development, and placement of utility transmission corridors, to reduce impacts on lynx and lynx habitat.	(Same as Alternative B)	No change.
Goal & Objective 1.c.8	HU O6. Reduce adverse highway effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity, and to reduce the potential for lynx mortality.	(Same as Alternative B)	No change.
Guideline 12. On federal lands, allow no net increase in groomed or designated over-the-snow routes and snowmobile play areas by LAU, unless additional	HU S1. Allow no net increase in groomed or designated over-the-snow routes outside of baseline areas of consistent snow compaction , within the lynx	See Guideline HU G10	USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not consider packed snowtrails to be a threat to lynx at this time. Recent

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
<p>designations result in the consolidation of unregulated use, and improves lynx habitat through the net reduction of compacted snow areas within higher quality lynx habitat, and landscape linkages. This does not apply to permitted ski areas, winter logging, oil and gas exploration and development, access to private inholdings, and trail re-routes for public safety.</p>	<p>habitat matrix, by LAU unless the grooming or designation serves to consolidate use and improve lynx habitat.</p> <p>This does not apply within permitted ski area boundaries, to winter logging, reroutes that reduce public risks from avalanches, access to private in-holdings, roads and trails designed and managed for non-winter use, and to other access regulated by HU S3.</p> <p>Special Use Permits, authorizations, or agreements could be allowed to expand inside baseline routes and baseline areas of consistent snow compaction.</p> <p>Grooming could be allowed to expand in side baseline areas of consistent snow compaction, and on routes that have been designated but not groomed in the past.</p>		<p>published research in western Montana has provided evidence to support this contention (Kolbe 2005). Other unpublished research in Utah arrived at differing conclusions (Bunnell 2005). Both studies used different methodology.</p>
<p>MA 8.25 Standard 1. . When developing large winter recreation facilities, design new trails, roads and lift termini to protect lynx diurnal security habitats in and around proposed developments or expansions.</p>	<p>HU S2. When developing or expanding ski areas, locate trails, access roads and lift termini to maintain and provide lynx diurnal security habitat if it is identified as a need.</p>	<p>See HU G11.</p>	<p>No clear evidence to indicate this is limiting lynx use.</p>

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
Standard 9. Where over-snow access is required for activities such as non-recreation special use permits, oil and gas exploration and development, access to private in-holdings, or timber sales, restrict use to routes designated by the Forest Service.	HU S3. Winter access for non-recreation special uses, and mineral and energy exploration and development, shall be limited to designated routes or designated over-the-snow routes.	See Guideline HU G12	USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not consider packed snowtrails to be a threat to lynx at this time. Recent published research in western Montana has provided evidence to support this contention (Kolbe 2005). Other unpublished research in Utah arrived at differing conclusions (Bunnell 2005). Both studies used different methodology.
MA 8.25 Guideline 1 When designing ski area expansions, provide adequate sized coniferous inter-trail islands, including the retention of coarse woody material, to maintain snowshoe hare habitat	HU G1. When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris to maintain lynx foraging habitat.	(Same as Alternative B)	No change.
MA 8.25 Guideline 2. . Evaluate and adjust as necessary, ski operations in expanded to newly developed areas to provide nocturnal foraging opportunities for lynx in a manner consistent with operational needs, especially in landscapes where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.	HU G2. When developing or expanding ski areas, nocturnal foraging opportunities should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.	HU G2. When developing or expanding ski areas, lynx foraging habitat should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.	No change.
Goal & Objective 1.c. 6,	HU G3. Recreational	(Same as Alternative B)	No change

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
Guideline 1 Within key landscape linkage areas maintain or improve conditions that allow for lynx movement.	development and recreational operational uses should be planned to provide for lynx movement and to maintain effectiveness of lynx habitat.		
Guideline 10. Remote sensing of oil and gas drill sites and facilities should be required as the primary method of monitoring	HU G4. Remote monitoring of mineral and energy development sites and facilities should be encouraged to reduce snow compaction.	(Same as Alternative B)	No change
NA Regulations in Minerals CFR Part 228 Subpart A and Subpart B	HU G5. A reclamation plan should be developed (e.g. road reclamation and vegetation rehabilitation) for closed mineral and energy development sites and facilities that promote the restoration of lynx habitat.	(Same as Alternative B)	No change
Goal & Objective 1.c. 6	HU G6. Upgrading unpaved roads that would result in increased speeds and traffic volume or that would foreseeably contribute to development or increases in human activity in lynx habitat should be avoided. This applies to upgrading roads to higher maintenance levels (to maintenance levels 4 or 5) that would result in substantially increased speeds, traffic volume or potential future use.	(Same as Alternative B)	No change
Guideline 6 New trails and roads should be located away from forested stringers. & Guideline 8 Roads should not be built on ridgetops, saddles,	HU G7. New permanent roads should not be built on ridge tops and saddles or in areas identified as important for lynx habitat connectivity.	(Same as Alternative B)	No change

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
and other areas identified as important for lynx habitat connectivity	New permanent roads and trails should be situated away from forested stringers .		
Guideline 5 In order to provide snowshoe hare habitat, roadside brushing should be minimized while providing for public safety on low speed and low volume roads.	HU G8. Cutting brush along low-speed, low-volume roads should be done to the minimum level necessary to provide for public safety.	(Same as Alternative B)	No change
Standard 10 Close newly constructed roads built for project specific activities such as mineral exploration and development or timber sales to public motorized access during project activities. Upon project completion, reclaim or obliterate these roads if not needed for other objectives as documented in the appropriate NEPA document.	HU G9. On new roads built for project-specific activities, public motorized use should be restricted. Provide for an effective closure in the initial design of the road. Upon project completion, these roads should be reclaimed or decommissioned , if not needed for other management objectives.	HU G9 If project level analysis determines that new roads adversely affect lynx, then public motorized use should be restricted. Upon project completion, these roads should be reclaimed or decommissioned, if not needed for other management objectives.	No change
WRNF Term and Condition #2 from the Biological Opinion	(NA)	(NA)	
Guideline 12 On federal lands, allow no net increase in groomed or designated over-the-snow routes and snowmobile play areas by LAU, unless additional designations result in the consolidation of unregulated use, and improves lynx habitat through the net reduction of compacted snow	(NA – See HU S1)	HU G10 Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compaction, unless designation serves to consolidate use and improve lynx habitat. This may be calculated on an LAU basis, or on a combination of	Changed from Standard to Guideline because no clear evidence to indicate this is limiting lynx use.

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
<p>areas within higher quality lynx habitat, and landscape linkages. This does not apply to permitted ski areas, winter logging, oil and gas exploration and development, access to private inholdings, and trail re-routes for public safety.</p>		<p>immediately adjacent LAUs. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings or to access regulated by Guideline HU G12. Use the same analysis boundaries for all actions subject to this guideline.</p>	
<p>MA 8.25 Standard 1. . When developing large winter recreation facilities, design new trails, roads and lift termini to protect lynx diurnal security habitats in and around proposed developments or expansions.</p>	<p>(NA - See HU S2.)</p>	<p>When developing or expanding ski areas and trails, consider locating access roads and lift termini to maintain and provide lynx security habitat¹⁰.</p>	<p>Changed from Standard to Guideline. USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not consider packed snowtrails to be a threat to lynx at this time. Recent published research in western Montana has provided evidence to support this contention (Kolbe 2005). Other unpublished research in Utah arrived at differing conclusions (Bunnell 2005). Both studies used different methodology.</p>
	<p>NA</p>	<p>HU G12 Winter access for non-recreation special uses and mineral and energy exploration and development, should be limited to designated routes or designated over-the-snow routes.</p>	<p>Changed from Standard to Guideline. USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not consider packed snowtrails to be a threat to lynx at this time. Recent published research</p>

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
			in western Montana has provided evidence to support this contention (Kolbe 2005). Other unpublished research in Utah arrived at differing conclusions (Bunnell 2005). Both studies used different methodology.
Goal & Objective 1c.9	LINK O1. In areas of intermixed land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges, or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat.	(Same as Alternative B)	No change
Goal & Objective 1c.8	LINK S1. When highway construction or reconstruction is proposed in linkage areas , identify potential highway crossings	(Same as Alternative B)	No change
Standard 7	LINK S2. Manage livestock grazing in shrub steppe habitats to contribute to maintaining or achieving a preponderance of mid- or late-seral stages , similar to conditions that would have occurred under historic disturbance regimes.	<u>Guideline LINK G2</u> Livestock grazing in shrub-steppe habitats ⁴² should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages ²⁸ , similar to conditions that would have occurred under historic disturbance regimes.	Standard was changed to Guideline because the USFWS Remand Notice (Federal Register Vol. 69, No. 128, July 3, 2003) did not identify grazing practices as a threat to lynx.
Goal & Objective 1c.9, SRNF FP under Real Estate p. 2-38 Standard 1 and p. 2-40 Guideline 4	LINK G1. National Forest System lands should be retained in public ownership.	(Same as Alternative B)	No change.

WRNF NoAction	ALTERNATIVE B	ALTERNATIVE F	Rationale for Change
<p>Guideline 13. Design new winter use activities to minimize effects on habitat needs for Canada lynx. Options include, but are not limited to:</p> <ul style="list-style-type: none"> • Move the activity • Place seasonal or daily restrictions on the activity. • Modify the activity 	Not in Alt. B	(Same as Alt. B)	No change

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WRNF No Action	ALTERNATIVE B	ALTERNATIVE F	
<p>Goal & Objective 1c.7 Term and Condition #3 from Biological Opinion Mapping of snow compaction (B1/C2/D4)</p>	<p>1. Map the location and intensity of snow compacting activities and designated and groomed routes that occurred inside LAUs during the period of 1998-2000 within one year and monitor every five years.</p>	<p>Map the location and intensity of snow compacting activities and designated and groomed routes that occurred inside LAUs during the period of 1998 to 2000. The mapping is to be completed within one year of this decision, and changes in activities and routes are to be monitored every five years after the decision.</p>	<p>Clarified language.</p>
		<p>Annually report the number of acres where any of the exemptions 1 through 4 listed in Standard VEG S5 were applied. Report the type of activity, the number of acres, and the location (by unit, and LAU).</p>	<p>Additional monitoring item needed.</p>

Table D-2. Comparison of Alternative F and Alternative F-Modified

Alternative F –Preferred Alternative in FEIS	Alternative F-modified : new Proposed Action	Rationale for Change
<p>ALL S1. New or expanded permanent developments and vegetation management practices and activities must maintain habitat connectivity in an LAU and/or linkage area.</p>	<p>ALL S1. New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.</p>	<p>Consistency with Northern Rockies lynx amendment (NRLA) language.</p>
<p>VEG S1. <i>Where and to what this applies:</i> Standard VEG S1 applies to all vegetation management practices and activities that regenerate forested stands, except for fuel treatment projects within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest).</p> <p>For fuel treatment projects within the WUI see guideline VEG G10.</p> <p>The Standard: Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages limit disturbance in each LAU as follows: If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.</p> <p>Note: Fuel treatment projects that create stand initiation structural stage will be included in the 30 percent calculation – meaning that if a fuel treatment project w/in the WUI creates more than 30 percent, then other management practices and</p>	<p>VEG S1. <i>Where and to what this applies:</i> Standard VEG S1 applies to all vegetation management projects that regenerate forested stands, except for fuel treatment projects within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest or administratively combined National Forests). <i>In addition, fuel treatment projects may not result in more than three adjacent LAUs exceeding the standard.</i></p> <p>For fuel treatment projects within the WUI see guideline VEG G10.</p> <p>The Standard: Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages limit disturbance in each LAU on NFS lands as follows: If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.</p>	<p>Consistency with NRLA</p> <p>Clarification of administrative unit Term and Condition from 2007Biological Opinion</p>

Alternative F –Preferred Alternative in FEIS	Alternative F-modified : new Proposed Action	Rationale for Change
activities designed to regenerate more acres would have to be modified or deferred until the standard can be met.)		
<p>VEG S2 <i>Where and to what this applies:</i> Standard VEG S2 applies to all timber management practices and activities that regenerate forested stands, except for fuel treatment projects within the WUI as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI see guideline VEG G10.</p> <p>The Standard: Timber management practices and activities shall not regenerate more than 15 percent of lynx habitat on NFS lands in an LAU in a ten-year period.</p>	<p>VEG S2 <i>Where and to what this applies:</i> Standard VEG S2 applies to all timber management projects that regenerate forests, except for fuel treatment projects within the WUI as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest or administratively combined National Forests). For fuel treatment projects within the WUI see guideline VEG G10.</p> <p>The Standard: Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands in an LAU in a ten-year period. . This 15% includes the entire stand within an even-age regeneration area, and only the patch opening areas within group selections. Salvage harvest within stands killed by insect epidemics, wildfire, etc. does not add to the 15%, unless the harvest treatment would cause the lynx habitat to change to an unsuitable condition²⁴.</p>	<p>Consistency with NRLA</p> <p>Clarification</p> <p>Clarification</p>
<p><u>Standard VEG S5</u> Where and to what this applies: Standard VEG S5 applies to precommercial thinning practices and activities, except for fuel treatment projects that use precommercial thinning as a tool within the wildland urban interface (WUI) as defined by HFRA, subject to the following</p>	<p><u>Standard VEG S5</u> Where and to what this applies: Standard VEG S5 applies to all precommercial thinning³⁵ projects, except for fuel treatment¹³ projects that use precommercial thinning as a tool within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation:</p>	

Alternative F –Preferred Alternative in FEIS	Alternative F-modified : new Proposed Action	Rationale for Change
<p>limitation: Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI see guideline VEG G10.</p> <p>The Standard: VEG S5 Precommercial thinning practices and activities that reduce snowshoe hare habitat, may occur from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat only: 1. Within 200 feet of administrative sites, dwellings, or outbuildings; or 2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or 3. Based on new information that is peer reviewed and accepted by the regional/state levels of the Forest Service and FWS, where a written determination states: a. that a project is not likely to adversely affect lynx; or b. that a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat; or 4. For conifer removal in aspen, or daylight thinning around individual aspen trees, where aspen is in decline.</p>	<p>Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, or VEG S6 may occur on no more than three percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forests) for the life of this amendment.</p> <p>For fuel treatment projects within the WUI see guideline VEG G10</p> <p>The Standard: Precommercial thinning practices and similar activities intended to reduce seedling/sapling density are subject to the following limitations from the stand initiation structural stage⁴⁵ until the stands no longer provide winter snowshoe hare habitat. Precommercial thinning may occur only: 4. Within 200 feet of administrative sites, dwellings, or outbuildings; or 5. For research studies³⁹ or genetic tree tests evaluating genetically improved reforestation stock; or 6. For conifer removal in aspen, or daylight thinning⁵ around individual aspen trees, where aspen is in decline; or 4. Based on new information that is peer reviewed and accepted by the regional/state levels of the Forest Service and FWS, where a written determination states: c) That a project is not likely to adversely affect lynx; or lynx or its habitat, but would result in long-term benefits to d) That a project is likely to have short term adverse effects on lynx</p>	<p>Clarification</p> <p>Clarification</p>

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Alternative F –Preferred Alternative in FEIS	Alternative F-modified : new Proposed Action	Rationale for Change
	<p>and its habitat.</p> <p>5. In addition to the above exceptions (and above and beyond the three percent limitation for fuels projects within the WUI), precommercial thinning may occur provided that:</p> <ul style="list-style-type: none"> a) The additional precommercial thinning does not exceed one percent of the lynx habitat in any LAU for the life of this amendment, and the amount and distribution of snowshoe hare habitat within the LAU must be provided through appropriate site-specific analysis and consultation; and b) Precommercial thinning in LAUs with more than 30 percent of the lynx habitat currently in the stand initiation structural stage⁴⁵ is limited to areas that do not yet provide winter snowshoe hare habitat⁵¹; and c) Projects are designed to maintain lynx habitat connectivity and provide hare habitat over the long term (see Note 1 below); and d) Monitoring is used to determine snowshoe hare response. <p>Note 1: This standard is intended to provide snowshoe hare habitat while permitting some thinning, to explore methods to sustain snowshoe hare habitat over time, reduce hazardous fuels, improve forest health, and increase timber production. Project design must ensure any precommercial thinning provides an appropriate amount and distribution of</p>	<p>In response to concerns regarding the mountain pine beetle epidemic which has recently changed conditions on the landscape, this modification will provide some flexibility for silvicultural management in some areas.</p>

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Alternative F –Preferred Alternative in FEIS	Alternative F-modified : new Proposed Action	Rationale for Change
	<p>snowshoe hare habitat with each LAU over time, and maintains lynx habitat connectivity within and between LAUs. Project design should focus on creating irregular shapes for the thinning units, creating mosaics of thinned and unthinned areas, and using variable density thinning, etc.</p>	
<p>VEG S6 Where and to what this applies: Standard VEG S6 applies to all vegetation management practices and activities that regenerate forested stands, except for fuel treatment practices and activities within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5 and VEG S6 may occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI, see guideline VEG G10.</p> <p>The Standard: VEG S6 Vegetation management practices and activities that reduce snowshoe hare habitat in multi-story mature or late successional forests may occur only:</p> <ol style="list-style-type: none"> 1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or 2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or 3. For incidental removal during salvage harvest 	<p>Standard VEG S6 Where and to what this applies: Standard VEG S6 applies to all vegetation management⁴⁸ practices within multi-story mature or late successional conifer forests²⁹, except for fuel treatment¹³ projects within the wildland urban interface (WUI) as defined by HFRA¹⁷, subject to the following limitation: Fuel treatment projects³⁶ within the WUI⁵⁰ that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 3 percent (cumulatively) of lynx habitat on each administrative unit (a National Forest or administratively combined National Forests).</p> <p>For fuel treatment projects³⁶ within the WUI⁵⁰ see guideline VEG G10.</p> <p>The Standard: Vegetation management projects³⁶ that reduce snowshoe hare habitat in multi-story mature or late successional conifer forests²⁹ may occur only:</p> <ol style="list-style-type: none"> 1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or 2. For research studies³⁸ or genetic tree tests evaluating genetically improved reforestation stock; or 	<p>Clarification</p>

Alternative F –Preferred Alternative in FEIS	Alternative F-modified : new Proposed Action	Rationale for Change
<p>(e.g. removal due to location of skid trails). (NOTE: Timber harvest is allowed in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover [e.g. uneven age management systems could be used to create openings where there is little understory so that new forage can grow]).</p>	<p>3.For incidental removal during salvage harvest⁴¹ (e.g. removal due to location of skid trails).</p> <p>4.Where uneven-aged management (single tree and small group selection) practices are employed to maintain and encourage multi-story attributes as part of gap dynamics. Project design must be consistent with VEG O1, O2 and O4, except where impacts to areas of dense horizontal cover are incidental to activities under this exemption (e.g., construction of skid trails).</p>	<p>Clarification of the intent of the standard.</p>
	<p>Required Monitoring</p> <p>1. Maps of the location and intensity of snow compacting activities and designated and groomed routes that occurred inside LAUs during the period of 1998 to 2000 constitute baseline snow compaction. Changes in activities and routes are to be monitored every five years after the decision.</p> <p>2. When project decisions are signed report the following.</p> <p>d) Fuel treatments:</p> <p>iv) Acres of fuel treatment in lynx habitat by forest and LAU, and whether the treatment is within <i>or outside</i> the WUI as defined by HFRA.</p> <p>v) Whether or not the fuel treatment met the vegetation standards or guidelines. If standard(s) are not met, report which standard(s) are not met, why they were not met, and how many acres were affected.</p> <p>vi) Whether or not 2 adjacent LAUs exceed standard VEG S1 (30% in a stand initiation structural stage that is too short to provide winter snowshoe</p>	<p>Added as Terms and Conditions from 2007 Biological Opinion.</p>

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Alternative F –Preferred Alternative in FEIS	Alternative F-modified : new Proposed Action	Rationale for Change
	<p><i>hare habitat), and what event(s) or action(s) caused the standard to be exceeded.</i></p> <p>e) Application of exception in Standard VEG S5: ii) For areas where any of the exemptions 1 through 5 listed in Standard VEG S5 were applied, report the type of activity, the number of acres, and the location (by unit, and LAU) and whether or not Standard VEG S1 was within the allowance.</p> <p>f) Application of exceptions in Standard VEG S6: j) For areas where any of the exemptions 1 through 4 listed in Standard VEG S6 were applied, report the type of activity, the number of acres, and the location (by unit, and LAU) and whether or not Standard VEG S1 was within the allowance.</p> <p>3. Application of guidelines a) Summarize what guideline(s) was not followed and why. b) Document the rationale for deviations to guidelines.</p> <p>Direction in italics were terms and conditions of the FWS Biological Opinion (USDI FWS 2008).</p>	

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APPENDIX E
LYNX LOCATIONS

Lynx locations from ARGOS

