Appendices

Appendix A – Crosswalk from the LCAS; to the scoping proposed action; the DEIS Proposed Action, Alternative B; and the FEIS Preferred Alternative, Alternative F Developing the scoping proposed action

The scoping proposed action was developed in September 2001 based on the recommendations in the Lynx Conservation Assessment and Strategy (LCAS). The recommendations were fine tuned to include only those items that are truly plan decisions, to reduce redundancy, and to provide clarity.

1) Plan decisions
Plan decisions guide or limit selection of projects. The following criteria were used to determine if direction in the LCAS was a plan decision:

Objectives
- Does it describe resources outcomes to achieve? If so, include.
- Does it describe how to map lynx habitat? If so, do not include, because how to map lynx habitat is an inventory process not a plan decision.
- Does it describe an analysis or planning process that should be conducted? Analysis processes are generally not plan decisions in that they do not set the framework for desired conditions, or sideboards for project implementation. However, include as a standard if the process is a prerequisite for a type of project.

Standards and Guidelines
- Does it set sideboards for project implementation? If so, include.

Some word changes were made to reflect plan decisions instead of a conservation strategy. For example, "conservation measures" were changed to "management direction."

2) Redundancy
Each recommendation was evaluated to see if it was already addressed by another recommendation, already addressed by manual or handbook direction, or could be combined. This occurred frequently because of the way the LCAS was organized.

3) Clarity
Some of the wording was changed to provide clearer direction based on the experience of using the LCAS over the last few years.

Developing the DEIS Proposed Action, Alternative B

During scoping, both the public and agency employees raised questions about the clarity of objectives, standards, and guidelines in the initial proposed action. The ID team found ways to reword them to make them clearer, without changing the intent or effects.

Some of the guidelines were rewritten to state them more clearly as guidelines; those actions that "should" be done a certain way, versus "must" be done that way. Others were added because they had been inadvertently omitted from the

original proposed action, or were modified in the LCAS after September 2001.

Developing the FEIS Preferred Alternative, Alternative F

Alternative F was developed for the Final Environmental Statement (FEIS) based on comments received from people and agencies who reviewed the DEIS. They suggested different objectives, standards, and guidelines, or different combinations of them, or they had concerns about the impacts the standards or guidelines might have (see *Response to Comments*, FEIS, Vol. 2). The FS considered these comments on the alternatives. We used these comments to revise and rearrange the standards and guidelines to create Alternative F. Along with the other alternatives, the effects of Alternative F are analyzed in full in Chapter 3 of the FEIS.

Table A-1. Crosswalk from the LCAS, to the scoping proposed action; the DEIS Proposed Action, Alternative B; and the FEIS Preferred Alternative, Alternative F

LCAS Recommendations	Scoping Proposed Action	DEIS Proposed Action, Alt B	FEIS Preferred Alternative F
		All Programs	
Programmatic objectives for all			
1. Design vegetation management strategies that are consistent with historical succession and disturbance regimes. The broad-scale strategy should be based on a comparison of historical and current ecological processes and landscape patterns, such as age-class distributions and patch size characteristics. It may be necessary to moderate the timing, intensity, and extent of treatments to maintain all required habitat components in lynx habitat, to reduce human influences on mortality risk and interspecies competition, and to be responsive to current social and ecological constraints relevant to lynx habitat.	**Vege O3**. Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat. **Vege O1**. Maintain suitable acres and juxtaposition of lynx habitat through time, with an emphasis on continued availability of high quality foraging habitat in proximity to denning habitat. **Vege O5.** Design regeneration harvest, planting, and thinning to maintain or enhance dense horizontal cover of conifers for snowshoe hare habitat. In aspen stands intermixed with spruce-fir forests, particularly in southern Idaho, southern Montana, Wyoming, and Utah, treatments should result in dense regeneration of aspen.	**VEG O1.** Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **VEG O2.** Maintain or improve lynx habitat, emphasizing high-quality winter snowshoe hare habitat near denning habitat. **VEG O4.** Design regeneration harvest, reforestation and thinning to develop characteristics suitable for winter snowshoe hare habitat.	**VEG O1.** Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **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. **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.
Programmatic standards for all			
1. Conservation measures will generally apply only to the lynx habitat on federal lands within LAUs.	**All Programs S1.** Management direction applies only to lynx habitat within LAUs, or, where specified for some measures, applies where needed to address connectivity between LAUs. Management direction only applies to	Objectives, standards, and guidelines apply to the lynx habitat within LAUs as described in Features common to all alternatives.	Objectives, standards, and guidelines apply to the lynx habitat within LAUs as described in Features common to all alternatives.

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	management of federal lands. Note some management direction may require analysis beyond National Forest or BLM lands; however management constraints will only be applied to National Forest or BLM lands. LAU boundaries will not be adjusted except through agreement with the US Fish and Wildlife Service, based on new information on the presence or absence of lynx habitat within an LAU.		
2. Lynx habitat will be mapped using criteria specific for each geographic area to identify appropriate vegetation and environmental conditions. Primary vegetation includes those types necessary to support lynx reproduction and survival. It is recognized that other vegetation types that are intermixed with the primary vegetation will be used by lynx, but are considered to contributed to lynx habitat only where associated with the primary vegetation. Refer to glossary and descriptions for each geographic area.	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*
3. To facilitate project planning, delineate LAUs. To allow for the assessment of potential effects of the project on an individual lynx, LAUs should be at least the size of area used by a resident lynx and contain sufficient year-round habitat.	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*
4. To be effective for the intended purposes of planning and monitoring,	**All Programs S1.** Management direction applies only to lynx habitat	**LAU S1.** LAU boundaries will not be adjusted except through	**LAU S1.** Changes in LAU boundaries shall be based on site

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LAU boundaries will not be adjusted for individual projects, but must remain constant.	within LAUs, or, where specified for some measures, applies where needed to address connectivity between LAUs. Management direction only applies to management of federal lands. Note some management direction may require analysis beyond National Forest or BLM lands, however management constraints will only be applied to National Forest or BLM lands. LAU boundaries will not be adjusted except through agreement with the US Fish and Wildlife Service, based on new information on the presence or absence of lynx habitat within an LAU.	agreement with the US Fish and Wildlife Service, based on new information about lynx habitat.	specific habitat information and after review by the Forest Service Regional Office.
5. Prepare a broad-scale assessment of landscape patterns that compares historical and current ecological processes and vegetative patterns, such as age-class distributions and patch size characteristics. In the absence of guidance developed from such an assessment, limit disturbance within each LAU as follows: if no 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 activities by federal agencies.	**Vege S1.** Unless a broad scale assessment has been completed that substantiates different historical levels suitable habitat, limit disturbance within each 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 activities on National Forest or BLM lands.	**VEG S1.** Unless a broad scale assessment has been completed that substantiates different historic levels of unsuitable habitat, limit disturbance in each LAU as follows: If more than 30 percent of the lynx habitat in an LAU is currently in unsuitable condition, no additional habitat may be made unsuitable because of vegetation management projects.	**VEG S1. Where and how this Standard applies:** Standard VEG S1 applies to all vegetation management projects that regenerate forests, 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 that 6 percent (cumulatively) of the lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI see guideline VEG G10. **The Standard:** Unless a broad scale assessment has been completed

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			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.
Programmatic guidelines for all			
1. The size of LAUs should generally be 6,500-10,000ha (16,000-25,000 acres or 25-50 square miles) in contiguous habitat, and likely should be larger in less contiguous, poorer quality, or naturally fragmented habitat. Larger units should be identified in the Southern Rocky Mountain Geographic Area. In the west it is recommended using watersheds, (e.g., 6th code hydrologic unit codes (HUCs) in more northerly portions of geographic areas, and 5th code HUCs in more southerly portions). Coordinate delineation of LAUs with adjacent administrative units and state wildlife management agencies, where appropriate.	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*
2. LAUs with only insignificant amounts of lynx habitat may be discarded, or lynx habitat within the unit incorporated into neighboring LAUs. Based on studies at the southern part of lynx range in the	Not included. *The identification of the LAUs is completed (see Appendix B).*	Not included. *The identification of the LAUs is completed (see Appendix B).*	Not included. *The identification of the LAUs is completed (see Appendix B).*

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western U.S., it appears that at least 10 square miles of primary vegetation should be presented within each LAU to support survival and reproduction. The distribution of habitat across the LAU should consider daily movement distances of resident females (typically up to 3-6 miles).			
3. After LAUs are identified, their spatial arrangement should be evaluated. Determine the number and arrangement of contiguous LAUs needed to maintain lynx habitat well distributed across the planning area.	Not included. *The identification of the LAUs is completed (see Appendix B).*	Not included. *The identification of the LAUs is completed (see Appendix B).*	Not included. *The identification of the LAUs is completed (see Appendix B).*
Project standards for all			
1. Within each LAU, map lynx habitat. Identify potential denning habitat and foraging habitat (primarily snowshoe hare habitat, and also habitat for important alternate prey such as red squirrels), and topographic features that may be important for lynx movement (major ridge systems, prominent saddles, and riparian corridors). Also identify non-forested vegetation (meadows, shrub-grassland communities, etc.) adjacent to and intermixed with forest lynx habitat that may provide habitat for alternate lynx prey species.	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. Identification of denning and forage habitat is implied in standards specific to those components* .	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. Identification of denning and forage habitat is implied in standards specific to those components.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. Identification of denning and forage habitat is implied in standards and guidelines specific to those components.*
2. Within an LAU, maintain denning habitat in patches generally larger	**Vege S2.** Within an LAU, maintain at least 10 percent of the LAU in	**VEG S3**. Maintain at least ten percent of the lynx habitat in an LAU	**VEG G11.** Denning habitat should be distributed in each LAU in the

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than 5 acres, comprising at least 10 percent of lynx habitat. Where less than 10 percent denning habitat is currently present within an LAU, defer any management action that would delay development of denning habitat structure.	lynx denning habitat. Denning habitat patches generally should be larger than 5 acres in size. Where less than 10 percent denning habitat is currently present within an LAU, defer vegetative management practices in stands that have the highest potential for developing denning habitat structure in the future. NOTE: the intent is not to defer management actions where the denning habitat doesn't exist or won't exist in the near (20-30 yr future), but to defer in those stands that would provide denning in the near future (0-20 years).	as denning habitat in patches generally larger than five acres. Where less than ten percent denning habitat is present in an LAU, defer vegetation management projects in stands that have the highest potential to develop denning habitat.	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.
3. Maintain habitat connectivity within and between LAUs.	**All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas. **ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas. **ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.
Timber management			
Programmatic objectives for timber management			
1. Evaluate historical conditions and landscape patterns to determine historical vegetation mosaics across landscapes through time. For example, large infrequent disturbance events may have been more characteristic of lynx habitat than small frequent disturbances.	Not included. *Evaluation of landscape patterns is in implied in vegetation standards.*	Not included. *Evaluation of landscape patterns is in implied in vegetation standards and guidelines.*	Not included. *Evaluation of landscape patterns is in implied in vegetation standards and guidelines.*

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2. Maintain suitable acres and juxtaposition of lynx habitat through time. Design vegetation treatments to approximate historical landscape patterns and disturbance processes.	**Vege O1.** Maintain suitable acres and juxtaposition of lynx habitat through time, with an emphasis on continued availability of high quality foraging habitat in proximity to denning habitat. **Vege O3.** Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat.	**VEG O1**. Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **VEG O2.** Maintain or improve lynx habitat, emphasizing high-quality winter snowshoe hare habitat near denning habitat.	**VEG O1.** Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **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.
3. If the landscape has been fragmented by past management activities that reduced the quality of lynx habitat, adjust management practices to produce forest composition, structure and patterns more similar to those that would have occurred under historical disturbance regimes.	**Vege O3.** Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat.	**VEG O1.** Manage vegetation to be more similar to historic 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.
Project objectives for timber management			
1. Design regeneration harvest, planting, and thinning to develop characteristics suitable for lynx and snowshoe hare habitat.	**Vege O5.** Design regeneration harvest, planting, and thinning to maintain or enhance dense horizontal cover of conifers for snowshoe hare habitat. In aspen stands intermixed with spruce-fir forests, particularly in southern Idaho, southern Montana, Wyoming, and Utah, treatments should result in dense regeneration of aspen.	**VEG O4.** Design regeneration harvest, reforestation and thinning to develop characteristics suitable for winter 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.
2. Design projects to retain/enhance existing habitat condition for important alternative	**Vege O6.** Design vegetative management practices to develop characteristics suitable for lynx and	**VEG G5.** Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.	**VEG G5.** Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.

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prey (particularly red squirrel).	snowshoe hare habitat while also considering the habitat needs of important alternate prey, especially red squirrels.	*(Note: Habitat needs for red squirrel would be evaluated under VEG 01.)* **VEG O1.** Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.	*(Note: Habitat needs for red squirrel would be evaluated under VEG 01.)* **VEG O1.** Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.
Project standards for timber management			
1. Management actions (e.g., timber sales, salvage sales) shall not change more than 15 percent of lynx habitat within an LAU to unsuitable condition within a 10-year period.	**Vege S3.** Vegetative management practices shall not change more than 15 percent of lynx habitat within an LAU to an unsuitable condition within a 10-year period.	**VEG S2.** Timber management projects shall not change more than 15 percent of lynx habitat on NFS or BLM lands in an LAU to an unsuitable condition in a ten-year period.	**VEG S2. Where and how this Standard applies:** Standard VEG S2 applies to all timber management projects that regenerate forests, 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 that 6 percent (cumulatively) of the lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI see guideline VEG G10. **The Standard:** Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period.
2. Following a disturbance such as blow down, fires, insects/pathogens mortality that could contribute to lynx denning habitat, do not salvage	**Vege S4.** In the event of a large wildfire, conduct a post-disturbance assessment before salvage harvest to evaluate potential for lynx denning	**VEG S4.** After a disturbance kills trees in areas five acres or smaller that could contribute to lynx denning habitat, salvage harvest may	**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

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harvest when the affected area is smaller than 5 acres. Exceptions to this include: 1) Areas such as developed campgrounds; 2) LAUs where denning habitat has been mapped and field validated (not simply modeled or estimated), and denning habitat comprises more than 10% of lynx habitat within an LAU; in these cases, salvage harvest may occur, provided that at least the minimum amount is maintained in a well-distributed pattern (see glossary).	and foraging habitat. **Vege S5.** Following a disturbance, such as blow down, fires, insects/pathogens mortality that could contribute to lynx denning habitat, do not salvage harvest when the affected areas are smaller than 5 acres. Exceptions to this include (a) developed recreation sites or other areas of high human concentration; (b) in LAUs where denning habitat has been mapped and field validated, salvage harvest may occur, provided that a minimum of 10 percent of the area is retained and is well distributed within an LAU.	occur only: 1) In developed recreation sites, administrative sites, or authorized special use structures or improvements; or 2) In designated road or trail corridors where public safety or access has been or may be compromised; or 3) In LAUs where denning habitat has been mapped and field-validated, provided at least ten percent is retained and well distributed.	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.
3. In lynx habitat, pre-commercial thinning will be allowed only when stands no longer provide snowshoe hare habitat (e.g., self-pruning processes have eliminate snowshoe hare cover and forage availability during winter conditions with average snow pack).	**Vege S6.** In lynx habitat, pre-commercial thinning will be allowed only when stands no longer provide snowshoe hare habitat (e.g., self-pruning processes have eliminated snowshoe hare cover and forage availability during winter conditions with average snow pack).	**VEG S5**. Precommercial thinning projects that reduce winter snowshoe hare habitat during the stand initiation structural stage may occur only: 1) Within 200 feet of administrative sites, dwellings or outbuildings. **VEG S6.** Precommercial thinning projects that reduce winter snowshoe hare habitat during the understory-reinitiation or old-multistory structural stages may occur only: 1) Within 200 feet of administrative sites, dwellings or outbuildings.	**VEG S5. Where and how this Standard applies:** Standard VEG S5 applies to all precommercial thinning projects, 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 that 6 percent (cumulatively) of the lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI see guideline VEG G10. **The Standard:** Precommercial

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			thinning projects that reduce snowshoe hare habitat may occur from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat only: 1. Within 200 feet of administrative sites, dwellings, 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 level of the Forest Service, and the state level of the FWS, where a written determination states: (a) that a project is not likely to adversely affect lynx; or (b) that a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat; or 4. For conifer removal in aspen, or daylight thinning around individual aspen trees, where aspen is in decline; or 5. For daylight thinning of planted rust-resistant white pine where 80 % of the winter snowshoe hare habitat is retained; or 6. To restore whitebark pine.
4. In aspen stands within lynx habitat, in the Southern and Northern Rocky Mountains	**Vege S7.** In aspen stands within lynx habitat, harvest prescriptions must favor regeneration of aspen.	**VEG O4.** Design regeneration harvest, reforestation and thinning to develop characteristics suitable	**VEG O4.** Focus vegetation management in areas that have potential to improve winter

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Geographic Area, apply harvest prescriptions that favor regeneration of aspen.	Note: An aspen stand is a group of aspen occupying a specific area and sufficiently uniform in composition, age, spatial arrangement, and conditions as to be distinguishable from the vegetation on adjoining lands.	for winter snowshoe hare habitat. **VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining. *Specific direction for aspen was not included because it is implied in VEG G1 and VEG 04. Regardless of what species is there, projects should be developed to provide winter snowshoe hare foraging habitat where it is lacking.*	snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover. **VEG S5. Where and how this Standard applies:** Standard VEG S5 applies to all precommercial thinning projects, 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 that 6 percent (cumulatively) of the lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI see guideline VEG G10. **The Standard (in pertinent part reads):** Precommercial thinning projects that reduce snowshoe hare habitat may occur from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat only: … 4. For conifer removal in aspen, or daylight thinning around individual aspen trees, where aspen is in decline;… **VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hard-woods, and shrubs where such habi-

LCAS Recommendations	Scoping Proposed Action	DEIS Proposed Action, Alt B	FEIS Preferred Alternative F
			tat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat.
Project guidelines for timber management			
1. Plan regeneration harvest in lynx habitat where little or no habitat for snowshoe hares is currently available, to recruit a high density of confers, hardwoods and shrubs preferred by hares. Consider the following: Design regeneration prescriptions to mimic historical fire (or other natural disturbance) events, including retention of fire-killed dead trees and coarse woody debris; Design harvest units to mimic the pattern and scale of natural disturbances and retain natural connectivity across the landscape. Evaluate the potential of riparian zones, ridges, and saddles to provide connectivity; and Provide for continuing availability of foraging habitat in proximity to denning habitat.	**Vege G1.** Plan regeneration harvests in lynx habitat where little or no habitat for snowshoe hares is currently available, to recruit a high density of conifers, hardwoods and shrubs preferred by hares. Consider the following: 1) Design regeneration prescriptions to mimic historical fire (or other natural disturbance) events, including retention of fire-killed dead trees and coarse woody debris; 2) Design harvest units to mimic the pattern and scale of natural disturbances and retain natural connectivity across the landscape. Evaluate the potential of riparian zones, ridges, and saddles to provide connectivity; and 3) Provide for continuing availability of foraging habitat in proximity to denning habitat.	**VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining. **VEG G2.** Where more denning habitat is desired, leave standing trees and coarse woody debris in amounts similar to what would be there naturally. Denning habitat should be near winter snowshoe hare habitat. **ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity. **VEG G4.** Fire use activities should not create permanent travel routes that facilitate snow compaction.	**VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hard-woods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat. **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. **ALL S1.** New or expanded

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		Constructing permanent firebreaks on ridges or saddles should be avoided. **HU G7.** New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.	permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area. **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. **HU G7.** New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.
2. In areas where recruitment of additional denning habitat is desired, or to extend the production of snowshoe hare foraging habitat where forage quality and quantity is declining due to plant succession, consider improvement harvests (commercial thinning, selection, etc). Improvement harvests should be designed to: Retain and recruit understories of small diameter conifers and shrubs preferred by hares: Retain and recruit coarse woody debris, consistent with the likely availability of such material under natural disturbance regimes: and Maintain or improve juxtaposition of denning and foraging habitat	**Vege G2.** In areas where recruitment of additional denning habitat is desired, or to extend the production of snowshoe hare foraging habitat where forage quality and quantity is declining due to plant succession, consider improvement harvests (commercial thinning, selection, etc). Improvement harvests should be designed to: 4) Retain and recruit the understory of small diameter conifers and shrubs preferred by hares; 5) Retain and recruit coarse woody debris, consistent with the likely availability of such material under natural disturbance regimes; and	**VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining. **VEG G2.** Where more denning habitat is desired, leave standing trees and coarse woody debris in amounts similar to what would be there naturally. Denning habitat should be near winter snowshoe hare habitat.	**VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). **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

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	6) Maintain or improve the juxtaposition of denning and foraging habitat.	**VEG G3.** Vegetation management projects designed to retain or restore denning habitat should be located where there is a low probability of stand-replacing fire. (*NOTE: Alternative B placed forage and denning habitat direction into separate guidelines, instead of blending them together.)*	should be designed to retain some coarse woody debris, piles, or residual trees to provide denning habitat in the future.
Wildland fire management			
Programmatic objectives for wildland fire management			
1. Restore fire as an ecological process. Evaluate whether fire suppression, forest type conversion, and other forest management practices have altered fire regimes and the function of ecosystems	**Vege O2.** Restore fire as an ecological process, and use fire as a tool to maintain or restore lynx habitat where appropriate.	**VEG O3.** Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.	**VEG O3.** Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.
2. Revise or develop fire management plans to integrate lynx habitat management objectives. Prepare plans for areas large enough to encompass large historical fire events.	Not included. *Forest Service Manual 5141.1 (June 1999) describes the requirements for considering fire use plans, in the forest planning process; therefore, it is already a requirement under existing policies.*	Not included. *Forest Service Manual 5141.11 (June 1999) describes the requirements for considering fire use plans, in the forest planning process; therefore, it is already a requirement under existing policies.*	Not included. *Forest Service Manual 5141.11 (June 1999) describes the requirements for considering fire use plans, in the forest planning process; therefore, it is already a requirement under existing policies.*
3. Use fire to move toward landscape patterns consistent with native succession and disturbance regimes. Consider use of mechanical pre-treatment and management ignitions if needed to restore fire as an ecological process.	**Vege O2.** Restore fire as an ecological process, and use fire as a tool to maintain or restore lynx habitat, where appropriate.	**VEG O1.** Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **VEG O3.** Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.	**VEG O1.** Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **VEG O3.** Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.
4. Adjust management practices where needed to produce forest composition, structure, and patterns	**Vege O3.** Design vegetation management practices, to the extent practicable, to be consistent with	**VEG O1.** Manage vegetation more similar to historic succession and disturbance processes while	**VEG O1.** Manage vegetation to mimic or approximate natural succession and disturbance

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more similar to those that would have occurred under historical succession and disturbance regimes.	historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat.	maintaining habitat components necessary for the conservation of lynx. **VEG G3.** Vegetation management projects designed to retain or restore denning habitat should be located where there is a low probability of stand-replacing fire.	processes while maintaining habitat components necessary for the conservation of 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.
5. Design vegetation and fire management activities to retain or restore denning habitat on landscapes with the highest probability of escaping stand-replacing fire events. Evaluate current distribution, amount, and arrangement of lynx habitat in relation to fire disturbance patterns.	**Vege O4.** Design vegetation and fire management activities to retain or restore denning habitat on landscape with the lowest probability of stand replacing fire events. **Vege O3.** Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat.	**VEG O1.** Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **VEG G3.** Vegetation management projects designed to retain or restore denning habitat should be located where there is a low probability of stand-replacing fire.	**VEG O1.** Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of 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.
Project objectives for wildland fire management			
1. Use fire as a tool to maintain or restore lynx habitat.	**Vege O2.** Restore fire as an ecological process, and use fire as a	**VEG O3.** Conduct fire use activities to restore ecological	**VEG O3.** Conduct fire use activities to restore ecological

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	tool to maintain or restore lynx habitat, where appropriate.	processes and maintain or improve lynx habitat.	processes and maintain or improve lynx habitat.
2. When managing wildland fire, minimize creation of permanent travel ways that could facilitate increased access by competitors.	**Vege O7.** When managing wildland fire, minimize creation of permanent travel ways that could facilitate increased access by competitors.	**VEG G4.** Fire use activities should not create permanent travel routes that facilitate snow-compaction. Constructing 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.
Project standards for wildland fire management			
1. In the event of a large wildfire, conduct a post-disturbance assessment before salvage harvest, particularly in stands that were formerly in late successional stages, to evaluate potential for lynx denning and foraging habitat.	**Vege S4.** In the event of a large wildfire, conduct a post-disturbance assessment before salvage harvest to evaluate potential for lynx denning and foraging habitat.	Not included. *If a project to salvage harvest in lynx habitat was proposed, then the NEPA document would describe the existing condition and effects on lynx habitat. Standards VEG S1 through S4 would apply.*	Not included. *If a project to salvage harvest in lynx habitat was proposed, then the NEPA document would describe the existing condition and effects on lynx habitat. Standards VEG S1and S2, and Guideline VEG G11 would apply.*
2. Design burn prescriptions to regenerate or create snowshoe hare habitat (e, g., regeneration of aspen and lodgepole pine).	**Vege S8.** Burn prescriptions in aspen and lodgepole pine stands will be designed to regenerate or create snowshoe hare habitat.	**VEG O3.** Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat. **VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining.	**VEG O3.** Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat. **VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hard-woods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands).
Project guidelines for wildland fire management			
1. Design burn prescriptions to promote response by shrub and tree species that are favored by snowshoe hare.	Not included. *Already an objective Vege O6 and standard Vege S8.* **Vege O6.** Design vegetative	**VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such	**VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hard-woods, and shrubs where such

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	management practices to develop characteristics suitable for lynx and snowshoe hare habitat while also considering the habitat needs of important alternate prey, especially red squirrels. **Vege S8.** Burn prescriptions in aspen and lodgepole pine stands will be designed to regenerate or create snowshoe hare habitat	habitat is scarce or not available. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining.	habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands).
2. Design burn prescriptions to retain or encourage tree species composition and structure that will provide habitat for red squirrels or other alternate prey species.	Not included. *Already part of Objective Vege O6* **Vege O6.** Design vegetative management practices to develop characteristics suitable for lynx and snowshoe hare habitat while also considering the habitat needs of important alternate prey, especially red squirrels.	**VEG G5.** Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.	**VEG G5.** Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.
3. Consider the need for pre-treatment of fuels before conducting management ignitions.	**Vege G3.** Consider the need for pre-treatment of fuels before conducting management ignitions.	Not included. *Standard procedures.*	Not included. *Standard procedures.*
4. Avoid construction of permanent firebreaks on ridges or saddles in lynx habitat.	**Vege G4.** Avoid construction permanent firebreaks on ridges or saddles in lynx habitat.	**VEG G4.** Fire use activities should not create permanent travel routes that facilitate snow compaction. Constructing 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.
5. Minimize construction of temporary roads and machine fire lines to the extent possible during fire suppression activities.	Not included. *Already an objective – Vege 07* **Vege O7.** When managing wildland fire, minimize creation of permanent travel ways that could facilitate increased access by competitors.	**VEG G4.** Fire use activities should not create permanent travel routes that facilitate snow-compaction. Constructing 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.

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6. Design burn prescriptions and, where feasible, conduct fire suppression action in a manner that maintains adequate lynx denning habitat (10% of lynx habitat per LAU).	**Vege G5.** Design burn prescriptions and, where feasible, conduct fire suppression action in a manner that maintains adequate lynx denning habitat (10% of lynx habitat per LAU).	**VEG S3.** Maintain at least ten percent of the lynx habitat in an LAU as denning habitat in patches generally larger than five acres. Where less than ten percent denning habitat is present in an LAU, defer vegetation management projects in stands that have the highest potential to develop denning habitat.	**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.
Recreation management			
Programmatic objectives for recreation management			
1. Plan for and manage recreational activities to protect the integrity of lynx habitat, considering as a minimum the following: Minimize snow compaction in lynx habitat. Concentrate recreational activities within existing developed areas, rather than developing new recreational areas in lynx habitat On federal lands, ensure that development or expansion of developed recreation sites or ski areas and adjacent lands address landscape connectivity and lynx habitat needs.	**HUD O1.** Maintain the natural competitive advantage of lynx in deep snow conditions. Minimize snow compaction in lynx habitat. **HUD O2.** Concentrate activities within existing developed areas, rather than developing new areas in lynx habitat. **HUD O3.** On National Forest lands, ensure that development or expansion of developed recreation sites or ski areas and adjacent lands provides for landscape connectivity and lynx habitat needs.	**HU O1.** Maintain the lynx's natural competitive advantage over other predators in deep snow by discouraging the expansion of snow-compacting activities in lynx habitat. **HU O2.** Manage recreational activities to maintain lynx habitat and connectivity. **HU O3.** Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat. **HU O4.** Provide for lynx habitat needs and connectivity, when developing new or expanding existing developed recreation sites or ski areas.	**HU O1.** Maintain the lynx's natural competitive advantage over other predators in deep snow by discouraging the expansion of snow-compacting activities in lynx habitat. **HU O2.** Manage recreational activities to maintain lynx habitat and connectivity. **HU O3.** Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat. **HU O4.** Provide for lynx habitat needs and connectivity, when developing new or expanding existing developed recreation sites or ski areas.
Programmatic standards for recreation management			
1. On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and snowmobile play areas by LAU	**Dispersed Rec S1.** On National Forest and BLM lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play	**HU S1.** Allow no net increase in groomed or designated over-the-snow routes or play areas by LAU, unless the grooming or designation serves to consolidate use and	**HU G11.** Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compact-tion, unless designation serves to

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[1]*unless the designation serves to consolidate unregulated use and improves lynx habitat.* ~~This is intended to apply to dispersed recreation, rather than existing~~ NOTE: *This standard does not apply to* ski areas.	areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply to permitted ski areas, winter logging or trail re-routes necessary for public safety.	improve lynx habitat. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to other access regulated by HU S3.	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 inholding, or to access regulated by HU G12. Use the same analysis boundaries for all actions subject to this guideline.
2. Map and monitor the location and intensity of snow compacting activities (for example, snowmobiling, snow shoeing, cross-country skiing, dog sledding, etc.) that coincide with lynx habitat, to facilitate future evaluation of effects on lynx as information become available.	**Monitoring Item 1.** Map and monitor the location and intensity of snow compacting activities (for example, snowmobiling, snow shoeing, cross-country skiing, dog sledding, etc.) that coincide with lynx habitat, to facilitate future evaluation of effects on lynx as information become available.	**Monitoring.** Map the location and amount of snow-compacting use that coincided with lynx habitat in LAUs during the 1998-2000 seasons, for designated over-the-snow and groomed routes and areas, and routes of consistent snow compaction. Such activities include snowmobiling, snowshoeing, cross-country skiing, dog sledding, etc.	**Monitoring.** 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.
Programmatic guidelines for recreation management			
1. Provide a landscape with interconnected blocks of foraging habitat where snowmobile, cross-country skiing, snow-shoeing, or other snow compacting activities are minimized or discouraged.	**HUD O2.** Concentrate activities within existing developed areas, rather than developing new areas in lynx habitat. **Dispersed Rec S1.** On National Forest and BLM lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity. **HU S1.** Allow no net increase in groomed or designated over-the-snow routes or play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply inside permitted ski area boundaries, to winter	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area. **HU G11.** Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compact-tion, unless designation serves to consolidate use and improve lynx habitat. This may be calculated on

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	does not apply to permitted ski areas, winter logging or trail re-routes necessary for public safety. *Incorporation of the objectives and standards should result in meeting this guideline; therefore it is not specifically included.*	logging, to rerouting trails for public safety, to accessing private inholdings, or to other access regulated by HU S3. *Incorporating the objectives and standards should result in meeting this guideline; therefore, it is not specifically included.*	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 HU G12. Use the same analysis boundaries for all actions subject to this guideline.
2. As information becomes available on the impacts of snow-compacting activities and disturbance on lynx, limit or discourage activities that result in snow compaction in areas where it is shown to compromise lynx habitat. Such actions should be undertaken on a priority basis considering habitat function and importance.	Not included. *It is an existing requirement under NEPA to review and utilize, as appropriate, any new information. New information may result in a need to amend existing management direction and special use permits.*	Not included. *It is an existing requirement to review and utilize, as appropriate, any new information. New information may result in a need to amend existing management direction.*	Not included. *It is an existing requirement to review and utilize, as appropriate, any new information. New information may result in a need to amend existing management direction.*
Project standards – Developed recreation			
1. In lynx habitat, ensure that federal actions do not degrade or compromise landscape connectivity when planning and operation new or expanded recreation developments.	**Dev Rec S2.** In lynx habitat, ensure that federal actions do not degrade or compromise landscape connectivity when planning and operation new or expanded recreation developments.	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity.	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.
2. Design trails, roads, and lift termini to direct winter use away from diurnal security habitat.	**Developed Rec S1.** Design trails, roads, and lift termini to direct winter use away from diurnal security habitat. This standard only applies to developed ski areas.	**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's been identified as a need.	**HU G10.** When developing or expanding ski areas and trails, consider locating access roads and lift termini to maintain and provide lynx security habitat if it has been identified as a need.
Project standards – Dispersed recreation			
1. To protect the integrity of lynx habitat, evaluate (as new information becomes available) and amend as	**Dispersed Rec S2.** To protect the integrity of lynx habitat, evaluate (as new information becomes available)	Not included. *It is an existing requirement to review and utilize, as appropriate, any new*	Not included. *It is an existing requirement to review and utilize, as appropriate, any new*

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needed, winter recreational special use permits (outside of permitted ski areas) that promote snow compacting activities in lynx habitat.	and amend as needed, winter recreational special use permits (outside of permitted ski areas) that promote snow compacting activities in lynx habitat.	*information. New information may result in a need to amend existing management direction and special use permits.*	*information. New information may result in a need to amend existing management direction and special use permits.*
Project guidelines – Developed recreation			
1. Identify and protect potential security habitats in around proposed developments or expansions.	**Developed Rec G1.** Identify and protect potential security habitats in around proposed developments or expansions.	**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's been identified as a need. **HU G1.** When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat is maintained. **HU G3.** Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.	**HU G10.** When developing or expanding ski areas and trails, consider locating access roads and lift termini to maintain and provide lynx security habitat if it has been identified as a need. **HU G1.** When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat is maintained. **HU G3.** Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.
2. When designing ski area expansions, provide adequately sized coniferous inter-trail islands, including the retention of coarse woody material, to maintain snowshoe hare habitat.	**Developed Rec G2.** When designing ski area expansions, provide adequately 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, so winter snowshoe hare habitat is maintained.	**HU G1.** When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat is maintained.
3. Evaluate, and adjust as necessary, ski operations in expanded or newly developed areas to provide nocturnal foraging opportunities for lynx in a manner consistent with operational needs, especially in	**Developed Rec G3.** Evaluate, and adjust as necessary, ski operations in expanded or newly developed areas to provide nocturnal foraging opportunities for lynx in a manner consistent with operational needs,	**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	**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

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landscapes where lynx habitat occurs as narrow bands of coniferous forest across the mountain slopes.	especially in landscapes where lynx habitat occurs as narrow bands of coniferous forest across the mountain slopes.	bands of coniferous forest across mountain slopes.	of coniferous forest across mountain slopes.
	Forest backcountry roads & trails		
Programmatic objectives for backcountry roads & trails			
1. Maintain the natural competitive advantage of lynx in deep snow conditions.	**HUD O1.** Maintain the natural competitive advantage of lynx in deep snow conditions.	**HU O1.** Maintain the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat.	**HU O1.** Maintain the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat.
Programmatic standards for backcountry roads & trails			
1. On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and snowmobile play areas by LAU[1] *unless the designation serves to consolidate unregulated use and improves lynx habitat.* Winter logging activity is not subject to this restriction.	**Dispersed Rec S1**. On National Forest and BLM lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply to permitted ski areas, winter logging or trail re-routes necessary for public safety.	**HU S1.** Allow no net increase in groomed or designated over-the-snow routes or play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to other access regulated by HU S3.	**HU G11.** Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compaction, unless designation serves to consolidate use and improve lynx habitat. This may be calculated on an LAU basis, or on a combination of immediately adjacent LAUs. 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.
Programmatic guidelines for backcountry roads & trails			
1. Determine where high total road densities (greater than 2 miles per square mile) coincide with lynx	**Highway G7**. Determine where high total road densities (greater than 2 miles per square mile)	Not included. *It is a requirement to evaluate the road system. 36 CFR 212.5(b)(2) requires*	Not included. *It is a requirement to evaluate the road system. 36 CFR 212.5(b)(2) requires*

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habitat, and prioritize roads for seasonal restrictions or reclamation in those areas.	coincide with lynx habitat, and prioritize roads for seasonal restrictions or reclamation in those areas.	*that the "Responsible officials must review the road system on each National Forest and Grassland and identify the roads on lands under Forest Service jurisdiction that are no longer needed to meet resource objectives, and that, therefore should be decommissioned or considered for other uses, such as for trails".*	*that the "Responsible Officials must review the road system on each National Forest and Grassland and identify the roads on lands under Forest Service jurisdiction that are no longer needed to meet resource objectives, and that, therefore should be decommissioned or considered for other uses, such as for trails".*
2. Minimize roadside brushing in order to provide snowshoe hare habitat.	**Highway G4**. Conduct roadside brushing on low-speed and low-volume roads at the minimum level necessary to provide for public safety.	**HU G8.** Cutting brush along low-speed, low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.	**HU G8.** Cutting brush along low-speed, low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.
3. Locate trails and roads away from forested stringers.	**Highway G5.** Locate trails and roads away from forested stringers.	**HU G7.** New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.	**HU G7.** New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.
4. Limit public use on temporary roads constructed for timber sales. Design new roads, especially the entrance, for effective closure upon completion of sale activities.	**Highway G6.** New roads constructed for project specific activities in lynx habitat, such as timber sales and mineral exploration, should be closed to public use. Provide for the ability to implement an effective closure in the initial design of the road. Upon project completion reclaim or obliterate these roads if not needed for other management objectives.	**HU G9.** On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.	**HU G9.** On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.
5. Minimize building of roads directly on ridge-tops or areas identified as important for lynx	**Highway G2.** Minimize building of roads directly on ridge-tops or areas identified as important for lynx	**HU G7**. New permanent roads should not be built on ridge-tops and saddles or in areas identified as	**HU G7**. New permanent roads should not be built on ridge-tops and saddles or in areas identified as

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habitat connectivity.	habitat connectivity.	important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.	important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.
		Livestock grazing	
Programmatic objectives for livestock grazing			
1. In lynx habitat and adjacent shrub-steppe habitats, manage grazing to maintain the composition and structure of native plant communities.	**Grazing O2**. In lynx habitat and adjacent shrub-steppe habitats, manage grazing to maintain the composition and structure of native plant communities.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat.
Project objectives for livestock grazing			
1. Manage livestock grazing within riparian areas and willow carrs in lynx habitat to provide conditions for lynx and lynx prey.	**Grazing O1.** Within lynx habitat, manage livestock grazing in riparian areas and willow carrs to maintain and achieve mid seral or higher condition to provide cover and forage for lynx and prey species.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat.
2. Maintain or move towards native composition and structure of herbaceous and shrub plant communities.	**Vege O3.** Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat.
3. Ensure that ungulate grazing does not impede the development of snowshoe hare habitat in natural or created openings within lynx habitat.	Not included. *Duplicates Grazing S1* **Grazing S1.** Do not allow livestock use in openings created by fire or timber harvest that would delay successful regeneration of the shrub and tree components.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat.
Project standards for livestock grazing			
1. Do not allow livestock use in openings created by fire or timber harvest that would delay successful	**Grazing S1.** Do not allow livestock use in openings created by fire or timber harvest that would	**GRAZ S1.** In fire- and harvest-created openings, manage livestock grazing to ensure impacts do not	**GRAZ G1.** In fire- and harvest-created openings, livestock grazing should be managed so impacts do

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regeneration of the shrub and tree components. [2] ~~Delay livestock use in post-fire and post-harvest created openings until successful regeneration of the shrub and tree components occurs.~~	delay successful regeneration of the shrub and tree components.	prevent successful regeneration of shrubs and trees.	not prevent shrubs and trees from regenerating.
2. Manage grazing in aspen stands to ensure sprouting and sprout survival sufficient to perpetuate the long-term viability of the clones.	**Grazing S2**. Manage 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 contribute to their long-term health and sustainability.	**GRAZ G2.** In aspen stands, livestock grazing should be managed to contribute to the long-term health and sustainability of aspen.
3. Within the elevational ranges that encompass forested lynx habitat, shrub-steppe habitats should be considered as integral to the lynx habitat matrix and should be managed to maintain or achieve mid-seral or higher condition.	**Grazing S3.** Shrub-steppe habitats interspersed with or immediately adjacent to lynx habitat are integral to the lynx habitat and must be managed to maintain or achieve mid seral or higher condition.	**GRAZ S4.** In shrub-steppe habitats, manage livestock grazing 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. **LINK G2.** Livestock grazing in shrub-steppe habitats should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	**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. **LINK G2.** Livestock grazing in shrub-steppe habitats should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.
4. Within lynx habitat, mange livestock grazing in riparian areas and willow carrs to maintain or achieve mid-seral or later condition to provide cover and forage for lynx prey species.	**Grazing O1.** Within lynx habitat, manage livestock grazing in riparian areas and willow carrs to maintain and achieve mid seral or higher condition to provide cover and forage for lynx and prey species.	**GRAZ S3.** In riparian areas, and willow carrs, manage livestock grazing 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.	**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.

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Other human developments: Oil & gas leasing, mines, reservoirs & agriculture			
Programmatic objectives for other human developments			
1. Design developments to minimize impacts on lynx habitat.	**HUD O4**. Manage human activities such as special uses, oil and gas leasing, mining and utility transmission corridors to minimize impacts to lynx and lynx habitat.	**HU O3**. Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat. **HU O5.** Manage human activities – such as exploring and developing minerals and oil and gas, placing utility corridors and permitting special uses – to reduce impacts on lynx and lynx habitat.	**HU O3**. Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat. **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.
Programmatic guidelines for other human developments			
1. Map oil and gas production and transmission facilities, mining activities and facilities, dams, and agricultural lands on public lands and adjacent private lands, in order to address cumulative effects.	Not included. *Mapping and cumulative effects are addressed through NEPA analysis requirements, where applicable.*	Not included. *Mapping and cumulative effects are addressed through NEPA analysis requirements, where applicable.*	Not included. *Mapping and cumulative effects are addressed through NEPA analysis requirements, where applicable.*
Project standards for other human developments			
1. On projects where over-snow access is required, restrict use to designated routes.	**Other DevelopS1.** On projects where over-snow access is required, restrict use to designated routes.	**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.	**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.
Project guidelines for other human developments			
1. If activities are proposed in lynx habitat, develop stipulations for limitations on the timing of activities and surface use and occupancy at the leasing stage.	**Other human uses G1.** If activities are proposed in lynx habitat, develop stipulations for limitations on the timing of activities and surface use and occupancy at the leasing stage.	Not specifically included. *The objectives, standards, and guidelines would become part of plans. As such, the direction can be applied to projects at the permit to drill stage.*	Not specifically included. *The objectives, standards, and guidelines would become part of plans. As such, the direction can be applied to projects at the permit to drill stage.*
2. Minimize snow compaction when authorizing and monitoring developments. Encourage remote	**Other human uses G2.** Minimize snow compaction when authorizing and monitoring developments. En-	**HU G4.** For mineral and energy development sites and facilities, remote monitoring should be	**HU G4.** For mineral and energy development sites and facilities, remote monitoring should be

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monitoring of sites that are located in lynx habitat, so that they do not have to be visited daily.	courage remote monitoring of sites that are located in lynx habitat, so that they do not have to be visited daily.	encouraged to reduce snow compaction.	encouraged to reduce snow compaction.
3. Develop a reclamation plan (e.g., road reclamation and vegetation rehabilitation) for abandoned well sites and closed mines to restore suitable habitat for lynx.	**Other human uses G3.** Develop a reclamation plan (e.g., road reclamation and vegetation rehabilitation) for abandoned well sites and closed mines to restore suitable habitat for lynx.	**HU G5.** For mineral and energy development sites and facilities that are closed, a reclamation plan that improves lynx habitat should be developed.	**HU G5.** For mineral and energy development sites and facilities that are closed, a reclamation plan that restores lynx habitat should be developed.
4. Close newly constructed roads (built to access mines or leases) in lynx habitat to public access during project activities. Upon project completion, reclaim or obliterate these roads.	**Other human uses G4.** Close newly constructed roads (built to access mines or leases) in lynx habitat to public access during project activities. Upon project completion, reclaim or obliterate these roads.	**HU G9.** On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.	**HU G9.** On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.
MORTALITY RISK FACTORS			
Trapping			
Programmatic objectives for trapping			
1. Reduce incidental harm or capture of lynx during regulated and unregulated trapping activity, and ensure retention of an adequate prey base.	Not included.	*Regulated by states therefore not addressed.*	*Regulated by states therefore not addressed.*
Programmatic guidelines for trapping			
1. Federal agencies should work cooperatively with States and Tribes to reduce incidental take of lynx related to trapping.	Not included.	*Regulated by states therefore not addressed.*	*Regulated by states therefore not addressed.*
Predator control			
Programmatic objectives for predator control			
1. Reduce incidental harm or capture of lynx during predator control activities, and ensure	Not included.	*Responsibility of APHIS.*	*Responsibility of APHIS.*

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retention of adequate prey base.			
Programmatic standards for predator control			
1. Predator control activities, including trapping or poisoning on domestic livestock allotments on federal lands within lynx habitat, will be conducted by Wildlife Services personnel in accordance with FWS recommendations established through a formal Section 7 consultation process.	Not included.	*Responsibility of APHIS.*	*Responsibility of APHIS.*
Shooting			
Programmatic objectives for shooting			
1. Reduce lynx mortalities related to mistaken identification or illegal shooting.	Not included.	*Regulated by states therefore not addressed.*	*Regulated by states therefore not addressed.*
Programmatic guidelines for shooting			
1. Initiate interagency information and education efforts throughout the range of lynx in the contiguous states. Utilize trailhead posters, magazine articles, news releases, state hunting and trapping regulation booklets, etc., to inform the public of the possible presence of lynx, field identification, and their status.	Not included.	*Regulated by states therefore not addressed.*	*Regulated by states therefore not addressed.*
2. Federal agencies should work cooperatively with States and Tribes to ensure that important lynx prey are conserved.	Not included	*Not plan direction. Working with states and tribes can and does occur without specific plan direction to do so.*	*Not plan direction. Working with states and tribes can and does occur without specific plan direction to do so.*
Competition & predation – Human activities as mortality risk factors			
Programmatic objectives for competition & predation			
1. Maintain the natural competitive advantage of lynx in deep snow	**HUD O1.** Maintain the natural competitive advantage of lynx in	**HU O1.** Maintain the lynx's natural competitive advantage over other	**HU O1.** Maintain the lynx's natural competitive advantage over other

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conditions.	deep snow conditions.	predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat.	predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat.
Programmatic standards for competition & predation			
1. On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and snowmobile play areas by LAU. This is intended to apply to dispersed recreation, rather than existing ski areas.	**Dispersed Rec S1.** On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply to permitted ski areas, winter logging or trail re-routes necessary for public safety.	**HU S1**. Allow no net increase in groomed or designated over-the-snow routes or play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to other access regulated by HU S3.	**HU G11.** Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compact-tion, 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.
Highways			
Programmatic objectives for highways as mortality risk factors			
1. Reduce the potential for lynx mortality related to highways.	**HUD O5.** Reduce the potential for lynx mortality related to highways on National Forest lands.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas. **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.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas. **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.
Programmatic standards for highways as mortality risk factors			
1. Within lynx habitat, identify key linkage areas and potential highway crossing areas	**Linkage S2.** Within lynx habitat, identify key linkage areas and potential highway crossing areas.	**LINK S1.** When highway or forest highway construction or reconstruc-tion is proposed in linkage areas,	**LINK S1.** When highway or forest highway construction or reconstruc-tion is proposed in linkage areas,

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		identify potential highway crossings. *(NOTE: In accord with the Conservation Agreement, linkage areas have been mapped; see Appendix B).*	identify potential highway crossings. *(NOTE: In accord with the Conservation Agreement, linkage areas have been mapped; see Appendix B).*
Programmatic guidelines for highways as mortality risk factors			
1. Where needed, develop measures such as wildlife fencing and associated underpasses to reduce mortality risk.	**Highways and roads G3.** Where needed, develop measures such as wildlife fencing and associated underpasses to reduce mortality risk.	**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.	**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.
MOVEMENT & DISPERSAL RISK FACTORS			
Programmatic objectives for movement & dispersal			
1. Maintain and, where necessary and feasible, restore habitat connectivity across forested landscapes.	**All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.
Programmatic standards for movement & dispersal			
1. Identify key linkage areas that may be important in providing landscape connectivity within and between geographic areas, across all ownerships.	Not included. *In accord with the Conservation Agreement linkage areas have been mapped (see Appendix B).*	Not included. *In accord with the Conservation Agreement linkage areas have been mapped (see Appendix B).*	Not included. *In accord with the Conservation Agreement linkage areas have been mapped (see Appendix B).*
2. Develop and implement a plan to protect key linkage areas on federal lands from activities that would create barriers to movement. Barriers could result from an accumulation of incremental projects, as opposed to any one project.	Not specifically included. *The linkage objectives and standards identify ways to protect linkage areas.*	Not specifically included. *The linkage objectives and standards identify ways to protect linkage areas. See Link O1, S1, S2, G1, and ALL O1 below.*	Not specifically included. *The linkage objectives and standards identify ways to protect linkage areas. See Link O1, S1, S2, G1, and ALL O1 below.*
3. Evaluate the potential importance of shrub-steppe habitats in providing landscape connectivity between blocks of lynx habitat. Livestock	**Grazing O2.** In lynx habitat and adjacent shrub-steppe habitats, manage grazing to maintain the composition and structure of native	**LINK S2.** Manage livestock grazing in shrub-steppe habitats to contribute to maintaining or achieving a preponderance of mid-	**LINK G2.** Livestock grazing in shrub-steppe habitats should be managed to contribute to maintaining or achieving a

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grazing within shrub-steppe habitats in such areas should be managed to maintain or achieve mid seral or higher condition, to maximize cover and prey availability. Such areas that are currently in late seral condition should not be degraded.	plant communities	or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.
Programmatic guidelines for movement & dispersal			
1. Where feasible, maintain or enhance native plant communities and patterns, and habitat for potential lynx prey, within identified key linkage areas. Pursue opportunities for cooperative management with other landowners.	**All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs.	**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. **ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.	**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. **ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.
Highways			
Programmatic objectives for highways as movement & dispersal risk factors			
1. Ensure that connectivity is maintained across highway rights-of-ways.	**HUD O6**. Ensure that connectivity is maintained across highway rights-of-way on National Forest and BLM lands.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.
Programmatic standards for highways as movement & dispersal risk factors			
1. Federal land management agencies will work cooperatively with the Federal Highway Administration and State Departments of Transportation to address the following with lynx geographic areas: Identify land corridors necessary to maintain connectivity of lynx habitat	**Linkage S2.** Within lynx habitat, identify key linkage areas and potential highway crossings. **Other Dev S2.** Identify, map and prioritize site-specific locations, using topographic and vegetation features, to determine where highway crossings are needed to reduce highway impacts on lynx.	**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. **LINK S1.** When highway or forest	**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. **LINK S1.** When highway or forest

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Map the location of "key linkage areas" where highway crossings may be needed to provide habitat connectivity and reduce mortality of lynx (and other wildlife).		highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings. **LINK G1.** National Forest System and BLM lands should be retained in public ownership. *In accord with the Conservation Agreement linkage areas have been mapped (see Appendix B).*	highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings. **LINK G1.** National Forest System lands should be retained in public ownership. *In accord with the Conservation Agreement linkage areas have been mapped (see Appendix B).*
Programmatic guidelines for highways as movement & dispersal risk factors			
1. Evaluate whether land ownership and management practices are compatible with maintaining lynx highway crossings in key linkage areas. On public lands, management practices will be compatible with providing habitat connectivity. On private lands, agencies will strive to work with landowners to develop conservation easements, exchanges, or other solutions.	**All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs. **Linkage O2**. Retain lands in key linkage areas in public ownership. **Linkage S2.** Within lynx habitat, identify key linkage areas and potential highway crossing areas. **Linkage S3.** Evaluate proposed land exchanges, land sales, and special use permits for effects on key linkage areas.	**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. **ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas. **ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity. **LINK G1.** National Forest System and BLM lands should be retained in public ownership. **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.	**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. **ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas. **ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area. **LINK G1.** National Forest System lands should be retained in public ownership. **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,

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			underpasses, or overpasses.
Project standards for highways as movement & dispersal risk factors			
1. Identify, map, and prioritize site-specific locations, using topographic and vegetation features, to determine where highway crossings are needed to reduce highway impacts on lynx and other wildlife.	**Other Dev S2**. Identify, map, and prioritize site-specific locations, using topographic and vegetation features, to determine where highway crossings are needed to reduce highway impacts on lynx and other wildlife.	**LINK S1.** When highway or forest highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings. **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.	**LINK S1.** When highway or forest highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings. **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.
2. Within the range of lynx, complete a biological assessment of all proposed highway projects of federal lands. A land management agency biologist will review and coordinate with highway departments on development of the biological assessment.	Not included. *Already a requirement under FSM 2671.44 and 16 U.S.C. 1536(c).*	Not included. *Already a requirement under FSM 2671.44 and 16 U.S.C. 1536(c).*	Not included. *Already a requirement under FSM 2671.44 and 16 U.S.C. 1536(c).*
Project guidelines for highways as movement & dispersal risk factors			
1. Dirt and gravel roads traversing lynx habitat (particularly those that could become highways) should not be paved or otherwise upgraded (e.g. straightening of curves, widening of roadway, etc.) in a manner that is likely to lead to significant increases in traffic volumes, traffic speeds, increased width of the cleared ROW, or would foreseeably contribute to development of in-creases in human activity in lynx habitat. Such projects	**Highway G1.** Dirt and gravel roads traversing lynx habitat (particularly those that could become highways) should not be paved or otherwise upgraded (e.g. straightening of curves, widening of roadway, etc.) in a manner that is likely to lead to significant increases in traffic volumes, traffic speeds, increased width of the cleared ROW, or would foreseeably contribute to development of	**HU G6.** Upgrading unpaved roads to maintenance levels 4 and 5 should be avoided in lynx habitat, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.	**HU G6.** Methods to avoid or reduce effects on lynx should be used in lynx habitat when upgrading unpaved roads to maintenance levels 4 or 5, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.

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may increase habitat fragmentation, create a barrier to movements, increase mortality risks due to vehicle collisions, and generate secondary adverse effects inducing, facilitating, or exacerbating development and human activity in lynx habitat. Whenever rural dirt and gravel roads traversing lynx habitat are proposed for such upgrades, a thorough analysis should be con-ducted on the potential direct and indirect effects to lynx and lynx habitat.	increases in human activity in lynx habitat. Whenever rural dirt and gravel roads traversing lynx habitat are proposed for an upgrade a thorough analysis should be conducted on the potential direct and indirect effects on lynx and lynx habitat.		
Land ownership as a movement & dispersal risk factor			
Programmatic objectives for land ownership			
1. Retain lands in key linkage areas in public ownership.	**Linkage O2.** Retain lands in key linkage areas in public ownership.	**LINK G1.** National Forest System and BLM lands should be retained in public ownership.	**LINK G1.** National Forest System lands should be retained in public ownership.
Programmatic standards for land ownership			
1. Identify key linkage areas by management jurisdiction(s) in management plans and prescriptions.	Not included. *In accord with the Conservation Agreement linkage areas have been mapped (see Appendix B).*	Not included. *In accord with the Conservation Agreement linkage areas have been mapped (see Appendix B).*	Not included. *In accord with the Conservation Agreement linkage areas have been mapped (see Appendix B).*
Programmatic guidelines for land ownership			
1. In land adjustment programs, identify key linkage areas. Work toward unified management direction via habitat conservation plans, conservation easements or agreements, and land acquisition.	**Linkage O2.** Retain lands in key linkage areas in public ownership. **Linkage S2.** Within lynx habitat, identify key linkage areas and potential highway crossing areas. **Linkage S3.** Evaluate proposed land exchanges, land sales, and special use permits for effects on key linkage areas.	**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. **LINK G1.** National Forest System and BLM lands should be retained in public ownership. *In accord with the Conservation*	**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. **LINK G1.** National Forest System lands should be retained in public ownership. *In accord with the Conservation*

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		Agreement linkage areas have been mapped (see Appendix B).	*Agreement linkage areas have been mapped (see Appendix B)*
Project standards for land ownership			
1. Develop and implement specific management prescriptions to protect/enhance key linkage areas.	Not specifically included. *The linkage objectives and standards identify ways to protect linkage areas.*	Not specifically included. *The linkage objectives, standards, and guidelines identify ways to protect linkage areas.*	Not specifically included. *The linkage objectives, standards, and guidelines identify ways to protect linkage areas.*
2. Evaluate proposed land exchanges, land sales, and special use permits for effect on key linkage areas.	**Linkage S3.** Evaluate proposed land exchanges, land sales, and special use permits for effect on key linkage areas.	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity. **LINK G1.** National Forest System and BLM lands should be retained in public ownership. *An effects analysis on linkage areas is implied in the standards and guidelines.*	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area. **LINK G1.** National Forest System lands should be retained in public ownership. *An effects analysis on linkage areas is implied in the standards and guidelines.*
Ski areas & large resorts as movement & dispersal risk factors Programmatic objectives for ski areas & large resorts			
1. When conducting landscape level planning of Federal lands, allocate land uses such that landscape connectivity is maintained.	**Linkage O1**. Within identified key linkage areas, provide for landscape connectivity. **All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs. **Linkage S1**. When planning new or expanding recreational developments, maintain connectivity within key linkage areas.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.

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Programmatic standards for ski areas & large resorts			
1. Within identified key linkage areas, provide for landscape connectivity.	**Linkage O1**. Within identified key linkage areas, provide for landscape connectivity. **All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs. **Linkage S1.** When planning new or expanding recreational developments, maintain connectivity within key linkage areas.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.
Project standards for ski areas & large resorts			
1. When planning new or expanding recreation developments, ensure that ~~key~~ *connectivity within* linkage areas are *maintained* ~~protected~~.[2]	**Linkage S1.** When planning new or expanding recreational developments, maintain connectivity within key linkage areas.	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity.	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.
Project guidelines for ski areas & large resorts			
1. Plan recreational development, and manage recreational and operational uses to provide for lynx movement and to maintain effectiveness of lynx habitat.	**Dev Rec G4.** Plan recreational development, and manage recreational and operational uses to provide for lynx movement and to maintain effectiveness of lynx habitat.	**HU G3.** Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.	**HU G3.** Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.

[1] Changes to the LCAS were approved by the Lynx Steering Committee in a letter dated August 28, 2003. See Project Record, LCAS section

[2] Changes to the LCAS were approved by the Lynx Steering Committee in a meeting October 23-24, 2001. See Project Record, LCAS section

Appendix B – Lynx steering committee habitat and linkage area mapping process

INTERAGENCY LYNX AND WOLVERINE STEERING COMMITTEE CHARTER

I. BACKGROUND: In March, 1998, an interagency lynx coordination effort was initiated in response to the emerging awareness of the uncertain status of lynx populations and habitat in the conterminous United States. On July 8, 1998, the U.S. Fish and Wildlife Service (FWS) published a proposed rule to list the Canada lynx in the conterminous United States as a threatened species under the Endangered Species Act of 1973, as amended. On March 24, 2000, the FWS issued a final rule determining that the contiguous U.S. Distinct Population Segment (DPS) of the lynx is threatened. The Interagency Lynx Steering Committee (hereafter, the Committee) was formed in 1999 to provide interagency oversight and coordination of lynx conservation. At the October 26-27, 2000 Committee meeting, it was decided that another carnivore species, wolverine, would be added to the Committee's oversight due to concern for wolverine population and habitat status.

II. ROLE: The Committee provides oversight and direction in the preparation and implementation of management strategies and recovery/conservation efforts for forest carnivores such as Canada lynx and wolverine. Through the Research Subcommittee (see Section IX, page 2), the Committee ensures coordination with the Rocky Mountain Research Station (RMRS) and the broader scientific community, as appropriate, in the preparation and implementation of research and administrative studies.

III. MEMBERSHIP: The membership includes Forest Service Wildlife Directors and Planning Directors from Regions 1, 2, 3, 4, 5, 6, and 9 and a Forest Supervisor; Bureau of Land Management; US Fish and Wildlife Service Regions 1, 3, 5, and 6; National Park Service and invitations for participation to state and wildlife agencies and Indian tribes.

IV. COMMITTEE CHAIR: The Committee Chair is the Deputy Regional Forester, Northern Region Forest Service.

V. ADVISOR(S)

Research Subcommittee
Science Teams
Biology Teams
Planning Teams
Communications Team

VI. INVITEES: The state wildlife agencies and Indian tribes within the historic range of Canada lynx and wolverine in the lower 48 states are invited to become members of the Committee.

VII. MEETINGS: Meetings are held every 6 months as agreed by the U.S. Forest Service and U.S. Fish and Wildlife Service in the "Canada Lynx Conservation Agreement" (February 7, 2000). Additional meetings are scheduled as necessary.
VIII. CONFERENCE CALLS: Conference calls shall be scheduled monthly or as needed.
IX. SUBCOMMITTEES (there is only one at this time)

A. RESEARCH SUBCOMMITTEE

Membership
Chair: Dr. Len Ruggiero, RMRS, Missoula, MT
Dr. Kevin McKelvey, RMRS, Missoula, MT
Dr. Kieth Aubry, Pacific Northwest Research Station, Portland, OR
Dr. John Squires, RMRS, Missoula, MT
US Geological Survey
Academia
State Wildlife Agency

Italicized agencies are memberships that were added at the Committee Meeting on April 30-May 1, 2001. The Chair and existing subcommittee members are responsible for selecting the additional subcommittee members.

Subcommittee Responsibilities
1. Coordinate with land managers to identify and propose needed research programs to the Committee based upon conservation strategy and recovery plan elements.

2. Ensure that technically adequate study plans are in place for all Committee sponsored studies.

3. Establish ad hoc task forces to examine and report on special topics as requested by the Committee.

4. Review research findings and reports for scientific validity and make recommendations to the Committee on their adequacy or relevance for assisting management decisions. Circulate these reports for peer review when necessary.

X. OPERATIONS

A. RESOLUTION OF ISSUES

The Committee operates by consensus, whenever possible. Where the Committee cannot agree on a course of action or policy, the Committee Chair will make the decision. The Chair will take into consideration all points of view, and when appropriate, further consult with agency leaders prior to making the decision.

B. PROCEDURES TO AMEND CONSERVATION STRATEGIES

Purpose

Conservation strategies such as the Lynx Conservation Assessment and Strategy (LCAS) August, 2000 may be amended when research results or other relevant information indicate there is a valid, scientific documentation to improve conservation efforts by revising any aspect of the conservation strategy including the conservation program or management recommendations.

Process

1. The proponent of a proposal to amend a conservation strategy shall submit a written request for consideration to the Committee Chair. This proposal shall include all scientific evidence, reports, scientific publications or other documentation that support the proposed change. The Committee shall determine the best course of action and assign the review of the proposal to the appropriate teams.

2. The Research Subcommittee or Science Team shall facilitate the technical review and assess the scientific validity of the proposal. This review shall include a written recommendation regarding acceptance of the proposed modification. Allow a minimum of 60 days for this review.

3. The Biology Team shall review the proposal after receiving the Research Committee/Science team technical report and make a written recommendation to the Committee regarding acceptance of the proposed modification. Allow a minimum of 60 days for this review.

4. Forward the proposal and written recommendation(s) to the Committee for action.

5. When a proposed amendment to a conservation strategy is approved it shall receive a sequential number and be officially attached to the conservation strategy. The amendment shall specify which language in a conservation strategy is modified and the precise area of geographic application.

6. When a conservation strategy is amended, the Committee member agencies shall apply this new information in their operations as appropriate.

Definitions

Biology Team – Interagency wildlife biologists that apply scientific data and management principles to develop an assessment of risks to a particular species or group of species, thereby formulating the basis for management guidance that conserves species and habitats described in the conservation strategy. The team advises the Steering Committee on the merits of proposals to amend conservation and management strategies based upon scientific analysis provided by science teams or the Research Subcommittee.

Science Team – Scientists that review and interpret data to provide a scientific basis for management and conservation of species. The team advises the Steering Committee on the merits and scientific basis of proposals to amend conservation strategies.

Planning Team – Land and resource land management planning and resource specialists that advise the Steering Committee on strategies and approaches to amend or revise federal land and resource management plans to consider the new information in conservation strategies.

April, 2002

United States Department of Agriculture Forest Service	United States Department of Interior Bureau of Land Management	United States Department of Interior Fish and Wildlife Service

File Code: 2670 **Date:** August 22, 2000

Subject: Lynx Habitat Mapping Direction

To: Regional Foresters and Forest Supervisors (Regions 1, 2, 4, 6 & 9)

Bureau of Land Management State Offices and Districts (MT, OR, ID, WA, WY, UT & CO)

U.S. Fish and Wildlife Service (Regions 1, 3, 5 & 6)

Since implementation of the Lynx Conservation Assessment and Strategy (LCAS), questions have arisen from the field regarding mapping of lynx habitat. At the request of the Lynx Steering Committee, the Lynx Biology Team met on July 11-12, 2000, to respond to the questions. Several members of the Lynx Science Team and U.S. Fish and Wildlife Service consultation biologists from Idaho, Oregon, and Washington joined the Lynx Biology Team.

The Biology Team presented their recommendations to the Steering Committee on July 18; the recommendations were accepted, and the Steering Committee is providing the following direction to field units on mapping criteria and procedures (direction for mapping lynx habitat is enclosed). Please review your existing lynx habitat maps to ensure they are consistent with the following criteria:

1. Begin using the outer boundary as described in figures 8.20 (for the western U.S. – note: modifications have been made for the Blue Mountains and Southern Colorado areas), figure 8.22 (for the Great Lakes), and figure 8.23 (for the Northeast). These figures are found in Chapter 8, History and Distribution of Lynx in the Contiguous United States, in the Ecology and Conservation of Lynx in the United States. If you would like an electronic copy of the above maps, contact a Lynx Biology Team member from your Geographic Area.
2. In the western U.S., areas below 4,000 feet usually should be excluded.
3. Within the boundaries defined by Steps 1 and 2, map vegetation that can contribute to lynx habitat as described in the enclosure for each Geographic Area. These vegetation descriptions are being incorporated into the updated LCAS, which will be available and posted in August 2000.

4. Delineate Lynx Analysis Units (LAUs) around the habitat defined above.

Conservation Measures listed in the LCAS apply only within lynx habitat in the LAUs, except for those specific to connectivity.

Units involved in the national lynx monitoring effort should continue to participate until lynx presence or absence is established.

If you have questions about the mapping procedures, contact your agency's Lynx Biology Team representative.

/s/ KATHLEEN A. McALLISTER /s/ TERRY SEXSON (for) /s/ CHRIS JAUHOLA

KATHLEEN A. MCALLISTER Deputy Regional Forester Northern Region, FS	RALPH MORGENWECK Region 6 Director, FWS	CHRIS JAUHOLA Group Manager, Fish, Wildlife, & Forests, BLM

Enclosure

cc: Lynx Steering Committee, Biology Team, Science Team

To: Lynx Steering Committee

From: Lynx Biology Team

Date: 2/23/2007

Re: Recommendations - Lynx Habitat Mapping

At the Lynx Steering Committee conference call on May 23, 2000, several questions about habitat mapping were raised. The Lynx Biology Team met on July 11 and 12, 2000, to discuss and resolve these issues. Five members of the Science Team participated on July 11 in an advisory capacity, and three FWS consultation biologists from Washington, Oregon, and Idaho attended both days.

A set of mapping criteria and procedures was developed to guide and clarify the mapping process. The consequences of applying these criteria were also assessed.

Criteria and Procedures for Lynx Habitat Mapping

4) Information contained in the Science Team Report (Ruggiero et al. 2000a) provides the starting point for lynx habitat mapping. The outer boundary that should be used for each geographic area is shown in Chapter 8 (McKelvey et al. 2000): Figs 8.20 for western U.S., Fig. 8.22 for the Great Lakes, and Fig. 8.23 for the Northeast (these are combined into the insert map entitled "Vegetation Types and Elevation Zones Associated with Lynx Occurrences"), with the following exceptions.

In southern Colorado and northeastern Oregon and southeastern Washington, the Rocky Mountain Conifer Forest type as depicted in Fig. 8.19 should be added to the outer boundary. These areas were lost in the transition to Fig. 8.20 due to vagaries of the Kuchler delineations of vegetation subtypes, rather than lack of historical occurrences (K. McKelvey, pers. comm. 2000).

1) In the western U.S., lynx occurrences generally are found only above 4,000 ft. elevation (McKelvey et al. 2000). Areas below 4,000 ft. usually should be excluded. Note that elevation ranges are specified in the geographic area descriptions in the Lynx Conservation Assessment and Strategy.
2) Within the boundaries defined by the first two steps, map vegetation that could contribute to lynx habitat, as described for each geographic area in the Lynx Conservation Assessment and Strategy, using the finest-scale vegetation information that is available. The following clarifies primary and secondary vegetation for the western U.S.
    a) Mesic subalpine fir forests in the western U.S. are extensions of boreal forests. Subalpine fir habitat types dominated by cover types of spruce/fir, Douglas-fir, and seral lodgepole pine should be mapped as primary vegetation. These types must be present to support foraging, denning and rearing of young.

b) Other cool, moist habitat types (e.g., some Douglas-fir, grand fir) may contribute to lynx habitat where intermingled with and immediately adjacent to primary vegetation. These types are described as secondary vegetation.

c) Lynx do not appear to be associated with dry forest habitat types (e.g., ponderosa pine, dry Douglas-fir, and dry or climax lodgepole pine) except to move among mesic stands (Ruggiero et al. 2000b). These dry types should not be included as vegetation contributing to lynx habitat.

3) The next steps are to identify lynx habitat within a Lynx Analysis Unit (LAU), which involves consideration of several additional factors:

a) Determine whether the amount and spatial arrangement of vegetation is sufficient to warrant delineating a LAU (amount, patch size, inter-patch distance).

b) Evaluate land ownership pattern (to assess feasibility of achieving lynx conservation objectives on federally administered lands, to determine appropriate size and configuration of the LAU, etc.).

c) Review occurrence records of all types to assess validity of identifying the area as lynx habitat – location, pattern, consistency, year in relation to Canadian population cycles. Evaluate the records as described in Chapter 8 (McKelvey et al. 2000). Lack of records in an area does not necessarily indicate lack of habitat; conversely, detections do not necessarily indicate lynx habitat. Independently, occurrence records indicate only occurrence. Collectively, as a data set, occurrences can reveal habitats that likely are important to lynx.

Snow depth information may be useful to exclude ungulate winter ranges and areas that do not retain adequate snow cover during the winter.

Note: *Once identified as "lynx habitat," there is no longer a distinction between primary and secondary vegetation. Conservation measures of the Lynx Conservation Assessment and Strategy (LCAS) apply to lynx habitat.*

Consequences of Applying the Criteria

The lynx Biology Team reviewed methods used to date in each geographic area, to determine whether mapping was consistent with the above set of criteria. The team also indicated whether changes might be needed in LCAS Appendix A, "List of Administrative Units Involved in Conferencing/Consultation for Lynx."

Northeast and Great Lakes Geographic Areas

Mapping is believed to be consistent with these criteria and process. Two units (Green Mountain and Chequamegon-Nicolet National Forests) should be deleted from Appendix A (concurrence already received from FWS).

Southern Rockies Geographic Area

Mapping is believed to be consistent with these criteria and process (with the addition of the southern Colorado Kuchler type). No changes are needed in Appendix A.

Northern Rockies Geographic Area

Montana - Mapping is believed to be consistent with these criteria and process. No changes are needed for the list of units included in Appendix A.

Wyoming - Mapping is believed to be consistent with these criteria and process, although it was uncertain whether slope had been used to screen out areas (not supported by the Biology Team). The Biology Team was asked to review the Bighorns, and recommended that they continue to be included. Therefore no changes to Appendix A are anticipated.

Idaho - Mapping is believed to be consistent with these criteria and process, except that in central Idaho, moist Douglas-fir has been mapped as primary vegetation. In this region, Douglas-fir differs ecologically from other areas, occurring at higher elevations and on cooler sites, and provides high-quality snowshoe hare habitat. Mapping within the isolated mountain ranges of southeastern Idaho had been put on hold, and will be completed with consideration of the amount and spatial arrangement of vegetation. No changes to Appendix A are anticipated at this time.

Utah - Mapping is believed to be consistent with these criteria and process. Although there are comparatively few occurrence records in Utah, their distribution is very clumped, which suggests persistence of a local population. No changes to Appendix A are anticipated.

SE Washington and NE Oregon - Mapping is believed to be consistent (with the addition of the Rocky Mountain Conifer Kuchler type from Fig. 8.19). No changes to Appendix A are anticipated.

Cascade Mountains Geographic Area

Discussion centered on whether the Pacific silver fir and mountain hemlock Kuchler types should be considered as primary vegetation. Both the Rocky Mountain Conifer Forest (RMC) and Pacific Northwest Conifer Forest (PNC) are included in Fig. 8.19, while Fig. 8.20 narrows this down to the Douglas-fir and western spruce/fir subtypes of the RMC type, and the fir/hemlock subtype of the PNC type. Lynx are absent or uncommon in dense, wet forests along the Pacific coast (Aubry et al. 2000). In the western U.S., Rocky Mountain Conifer Forest contained 83% of all lynx records, but only 27% of the area, suggesting a strong association between lynx occurrences and this type. The Pacific Northwest Conifer had the second highest point frequency, but this represented only 7% of occurrences within about 7% of the area, indicating a weaker association. The Pacific Northwest Conifer type extends west of the Cascade Range to the coast and southward into northern California, although lynx occurrences were located only in areas adjacent to Rocky Mountain Conifer Forest. In addition, the snowshoe hare prey base appears to decline from north to south within the Cascades. There is little evidence to suggest that the silver fir/hemlock subtype actually supports lynx.

The historical occurrence record for Oregon is significantly smaller than for Washington. McKelvey et al. (2000) documented 134 verified occurrences (78 museum specimens) in Washington, compared with 12 verified occurrences in Oregon (9 museum specimens). There are a total of 765 records from Washington plus 200 trapping records, compared with a total of 72 records from Oregon. Unlike the clustering of occurrences seen in Washington and Utah, for example, which are suggestive of resident populations, lynx occurrences in Oregon are much more scattered and include several from anomalous habitats.

The Bio Team recommends the following for Washington and Oregon

4) Map vegetation using Fig. 8.20 as the outer boundary as described above.
5) Because of the uncertainty as to whether Pacific silver fir/mountain hemlock constitutes primary vegetation, do not identify these vegetation types as lynx habitat. Also, do not delineate LAUs or apply the LCAS west of the crest of the Cascades unless subalpine fir vegetation types occur in amounts and distribution great enough to establish an LAU. Lynx surveys and/or snowshoe hare information should continue to be collected through cooperative efforts of the Forest Service and the U.S. Fish and Wildlife Service.
6) On the east side of the Cascades, continue mapping with subalpine fir habitat types as primary vegetation. Identify lynx habitat and delineate LAUs using the process and criteria described above.
7) The results of the mapping will indicate whether any administrative units should be removed from Appendix A of the LCAS due to insufficient amounts or arrangement of lynx habitat.

References

Aubry, K. B., G. Koehler, and J. R. Squires. 2000. Ecology of Canada lynx in southern boreal forests. Pages 373-396 *In* Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. (Tech. Eds.) Ecology and conservation of lynx in the United States. Univ. Press of Colorado. Boulder, CO. 480 pp.

McKelvey, K.S., K. B. Aubry, and Y. K. Ortega. 2000. History and distribution of lynx in the contiguous United States. Pages 207-264 *In* Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. (Tech. Eds.) Ecology and conservation of lynx in the United States. Univ. Press of Colorado. Boulder, CO. 480 pp.

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Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 2000*b*. The scientific basis for lynx conservation: qualified insights. Pages 443-454 *In* Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. (Tech. Eds.) Ecology and Conservation of Lynx in the United States. Univ. Press of Colorado. Boulder, CO. 480 pp

United States Department of Agriculture **Forest Service** **Region One**

200 East Broadway
P.O. Box 7669
Missoula, MT 59807

File Code: 2670
Date: June 24, 2002

Dear :

Interagency/intergovernmental meetings were held recently to identify and recommend lynx linkage habitat locations within and adjacent to the states of Idaho, Montana, Utah and Wyoming. The identification of lynx linkage areas was a task identified in the *Canada Lynx Conservation Agreements* jointly signed by the Bureau of Land Management and the U.S. Forest Service and the U.S. Fish and Wildlife Service in August and February 2000, respectively. The U.S. Forest Service's Northern Regional Office Wildlife Staff in Missoula assisted in setting up and facilitating these meetings as well as digitizing the Draft map. The meetings were held in the following locations:

Missoula, MT - July 11, 2001
Boise, ID - November 28, 2001
Salt Lake City, Utah - April 17, 2002
Cody, WY - April 16, 2002
Cheyenne, WY - April 18, 2002

Participants included staff from the Bureau of Land Management, Fish and Wildlife Staff from the U. S. Forest Service's Northern Region Regional Office, U. S. Forest Service, State Fish and Wildlife Agencies, National Park Service, Native American Tribes, State and Federal Highway Departments, and the U. S. Fish and Wildlife Service.

The product of these meetings is a digitized map for your staff review. A map with lynx linkage areas identified for the state of Montana was sent out for review in February 2000 to state and federal agencies and Native American tribes in Montana for review. The current version of the map includes lynx linkage habitat in all four states. The linkage map is available on the following site

ftp://ftp.fs.fed.us/incoming/r1/ro/lynx_linkage.pdf

Additional instructions for viewing and/or printing the map are attached. If you do not have a plotter to print this map please contact Tim Bertram of the U.S. Forest Service Northern Regional Office at (406) 329-3611 and we will send you a hard copy of the map. I would appreciate any comments you may have by no later than **July 23, 2002**.

The revised definition of lynx linkage areas as approved by the Lynx and Wolverine Steering Committee (Oct 2001) is: **Areas that provide landscape connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas where blocks of lynx habitat are separated by intervening areas of non-lynx habitat such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between two blocks.**
Criteria that were considered in recommending lynx linkage areas are:

1) High density human developments (town sites, high density homes)
2) Linkages between blocks of lynx habitat including shrub/steppe habitats which link forested blocks of lynx habitat
3) Willow riparian habitat across valley bottoms
4) High percentage of public lands within the area
5) Known information concerning animal crossing locations

Other criteria that should be considered in relation to roads and highways are:

1) High traffic volume highways (may be two or four lane)
2) Presence of four lane highways
3) Highways which parallel railroad routes
4) Presence of numerous physical impediments (Jersey and Texas rail type barriers)
5) Where plans exist to upgrade or improve a highway (e.g. widening, barrier installation)
6) Expected or planned growth along or nearby existing road

The recommended linkage areas will be provided to the Lynx and Wolverine Steering Committee for review, concurrence and distribution for reference in land management and highway planning efforts, and for consideration in the Endangered Species Act Section 7 consultation process.

If you have any further questions regarding the mapping of lynx linkage areas please contact Tim Bertram (406-329-3611) at the U.S. Forest Service Northern Regional Office.

/s/ Kathleen A. McAllister

KATHLEEN A. MCALLISTER
LYNX/WOLVERINE STEERING COMMITTEE CHAIRPERSON AND
DEPUTY REGIONAL FORESTER

United States Department of Agriculture **Forest Service** **Region One** **200 East Broadway P.O. Box 7669 Missoula, MT 59807**

File Code: 2670 **Date:** November 13, 2003
Route To:

Subject: Lynx Linkage Areas

To: Marc Bosch, Forest Supervisors (1, 2, 4, 6, 9), Bureau of Land Management State Offices and Districts (CO, ID, MT, UT, WA, WY), U.S. Fish and Wildlife Service (Regions 1, 3, 5, 6), Directors of Fish & Wildlife Agencies: Montana, Idaho, Wyoming, Utah, Oregon, Washington, Colorado, Minnesota, Michigan, Wisconsin, New Hampshire and Vermont,

In the *Canada Lynx Conservation Agreements* signed by the U.S. Forest Service and the Bureau of Land Management with the U.S. Fish and Wildlife Service in February and August of 2000, respectively, the agencies agreed to identify lynx linkage areas. Lynx linkage areas are intended to maintain connectivity and allow for movement of animals between blocks of habitat that are otherwise separated by intervening non-habitat areas such as basins, valleys and agricultural lands, or where habitat naturally narrows due to topographic features. Interagency/intergovernmental meetings were held in the states of Idaho, Montana, Utah, Wyoming, and Colorado during 2001 and 2002 to identify and recommend the general locations of lynx linkage areas. Participants in these meetings included representatives from state wildlife agencies and state departments of forestry and transportation, and federal agencies including Federal Highway Administration, Bureau of Land Management, National Park Service, USDA Forest Service, tribal governments, private conservation groups, and others.

The U.S. Forest Service's Regional Offices in Missoula, MT, Ogden, UT, and Lakewood, CO assisted in setting up and facilitating these meetings, as well as digitizing the maps. Draft maps were sent out for review by affected agencies during June-July of 2002 for the Northern Rockies Geographic Area, and during October-November of 2002 for the Southern Rockies Geographic Area. The Lynx/Wolverine Steering Committee reviewed the maps at their October, 2002 meeting and gave their final approved at their November, 2003 meeting. The maps are now available for your consideration in land management and highway planning efforts, and in Endangered Species Act Section 7 consultations.

The maps are available on the U.S. Forest Service Forest Carnivore website:
http://www.fs.fed.us/r1/wildlife/carnivore/

The lynx linkage areas are coarsely mapped at a broad scale, and these maps should be considered a beginning point only. We expect to further refine their locations as more information becomes available, and as projects are proposed in these areas.

If you have any further questions, please contact Jim Claar (406-329-3664) or Tim Bertram (406-329-3611) in the Northern Regional Office in Missoula, or Nancy Warren (303-275-5064) in the Rocky Mountain Regional Office in Lakewood.

/s/ Kathleen A. McAllister
KATHLEEN A. MCALLISTER

Chairperson Lynx & Wolverine Steering
Committee□□Deputy Regional Forester

Appendix C – Acres of lynx habitat

Table C-1. Acres of lynx habitat by unit and acres of occupied and unoccupied habitat

	Unit size - acres	Lynx habitat - acres	Lynx habitat - Percent	Occupied lynx habitat acres	Unoccupied lynx habitat acres
NATIONAL FOREST					
Idaho					
Clearwater	1,825,397	930,000	51%	930,000	0
Idaho Panhandle	2,498,234	1,170,000	47%	1,170,000	0
Nez Perce	2,224,230	810,000	36%	0	810,000
Salmon-Challis	4,350,827	1,800,000	41%	0	1,800,000
Targhee	1,810,854	1,050,000	58%	1,050,000	0
Montana					
Beaverhead-Deerlodge	3,360,825	2,060,000	61%	0	2,060,000
Bitterroot	1,580,948	640,000	40%	0	640,000
Custer	1,187,621	230,000	19%	200,000	30,000
Flathead	2,355,592	1,730,000	73%	1,730,000	0
Gallatin	1,806,565	870,000	48%	770,000	100,000
Helena	975,387	440,000	45%	330,000	110,000
Kootenai	2,242,486s	1,010,000	45%	1,010,000	0
Lewis and Clark	1,862,289	970,000	52%	380,000	590,000
Lolo	2,082,784	1,110,000	53%	1,110,000	0
Utah					
Ashley	1,384,136	700,000	51%	0	700,000
Wyoming					
Bighorn	1,107,671	310,000	28%	0	310,000
Bridger-Teton	3,437,527	2,000,000	58%	2,000,000	0
Shoshone	2,436,850	640,000	26%	640,000	0
TOTAL	38,530,223	18,470,000	48%	11,320,000	7,150,000

Unit size acres are from the Forest Service website, at www.fs.fed.us/land/staff/lar/.
Lynx habitat acres are estimates from computerized map modeling.
Acres of occupied and unoccupied lynx habitat come from the map associated with the Occupied mapped lynx habitat amendment to the Canada Lynx Conservation Agreement (USDA FS, USDI FWS 2006) (FEIS Figure 1-1)

Appendix D – Schedule for revising plans

Table D-1. Schedule for revising NF plans in the Northern Rockies Geographic Area

	Year revision initiated	Year revision complete or expected
Region 1		
Beaverhead-Deerlodge	2001	2006
Bitterroot	2003	2007
Clearwater	2003	2007
Custer		
Flathead	2001	2006
Gallatin		
Helena		
Idaho Panhandle	2001	2007
Kootenai	1996	2007
Lewis & Clark		
Lolo	2002	2007
Nez Perce	2003	2007
Region 2		
Bighorn	1999	2005
Shoshone	2004	2007
Region 4		
Ashley	2004	2007
Boise	*1998*	*2003*
Bridger-Teton	2005	2008
Targhee		1997
Payette	*1998*	*2003*
Salmon-Challis		
Sawtooth	*1999*	*2003*
Uinta	*1999*	*2003*
Wasatch-Cache	*1998*	*2003*
Region 6		
Colville	*2003*	*2007*
Malheur	*2004*	*2007*
Ochoco		
Umatilla	*2004*	*2007*
Wallowa-Whitman	*2004*	*2007*

NFs in italics are not part of the Northern Rockies lynx amendment
From September 26, 2006 schedule www.fs.fed.us/emc/nfma/includes/LRMPschedule.pdf

Appendix E – Management area categories

Non-developmental = Categories 1-3

1. Natural, unmodified environments

In *natural, unmodified environments*, ecological processes such as fire, insects, and disease operate relatively free from human intervention. Diversity resulting from natural succession and disturbance predominate and non-native vegetation is rare.

Users must be self-reliant and expect little contact with others. Few if any structural improvements exist; travel is usually non-motorized.

Natural, unmodified environments are usually Designated Wilderness, Wilderness Study Areas, Research Natural Areas, backcountry lands, or rivers that are designated, suitable, or eligible for classification as Wild Rivers.

2. Special natural areas

In *special natural areas*, representative or rare, narrowly distributed ecological settings or components are conserved, helping to make sure the pieces and functions are saved to provide for the overall sustainability of larger landscapes.

The influences of humans on the ecosystem are sometimes evident. Human uses vary but generally are non-intensive. Travel is generally non-motorized.

Some of these areas serve as a "natural" reference for areas that are heavily managed for particular objectives.

Special natural areas are often formally designated. They include some Research Natural Areas, most Areas of Critical Environmental Concern, many old growth reserves, rivers that are designated, suitable, or eligible for classification as Scenic Rivers outside of Wilderness, and some other areas.

3. Essentially unmodified forested and grassland ecosystems

In *essentially unmodified forested and grassland ecosystems*, although characterized by natural appearing landscapes, an array of management tools may be used to restore or maintain ecological processes, resulting in some evidence of human activities. Normally, natural processes and patterns predominate.

Ecological values are in balance with human occupancy, and consideration is given to both. Users may expect to experience some challenge and risk. Restrictions on motorized travel vary from area to area and season to season.

Essentially unmodified forested and grassland ecosystems include lands unsuitable for timber production that have no planned harvest, special-status species habitat areas, and areas designated for and occupied by wild horses or burros.

Developmental = Categories 4-8

4. Natural appearing, but modified for human use and occupancy

In areas that are *natural appearing, but modified for human use and occupancy,* ecological values are managed to provide recreational use, but maintained well within levels necessary to maintain

ecological systems. Resource use is not emphasized and has little impact.

Sights and sounds of humans can be expected. Motorized transportation is common.

Such lands include environmental education sites, rivers that are designated, suitable or eligible for classification as recreational, non-linear recreation sites and areas, and all other Areas of Critical Environmental Concern not included in special natural areas.

5. Modified forest ecosystems
Modified forest ecosystems are primarily forested ecosystems managed to meet a variety of needs. Ecologic conditions will be maintained with an emphasis on selected structures and compositions within the range of natural variability.

These lands often display high levels of forest management investment, use or activity, evidence of vegetative manipulation, and many facilities.

Users expect to see other humans and the evidence of human activities. Motorized transportation is common.

6. Modified grassland
Modified grasslands are grasslands but include many woodland ecosystems, managed to meet a variety of needs. Ecologic objectives are likely to emphasize selected structures and compositions within the range of natural variability.

These lands often display high levels of forest management investment, use or activity, evidence of vegetative manipulation, and many facilities. A wide variety of structure and composition is present.

Users expect to see other humans and the evidence of human activities. Motorized transportation is common.

7. Areas modified by human occupation and activities
In *areas modified by human occupation and activities,* public lands are intermingled with private lands to the point that public landowners cannot effectively manage for ecological values without the support and cooperation of the private sector.

Human activities have altered the natural appearances in most of these areas. The sight and sound of humans predominates. Private land use is often intensive agriculture, industrial, or residential.

Resource use may not be planned on a sustainable basis but may occur in concert with surrounding private land values. Motorized transportation is common.

8. Modified non-sustainable areas
In *modified non-sustainable areas,* ecological conditions and processes likely are or have been permanently altered by humans beyond the point where natural appearing landscapes and ecological processes can be maintained. The areas are generally small; they may include mines or other concentrated uses.

Ecological values are protected where they affect the heath and welfare of humans. Human activities are generally commercial, directly or indirectly providing jobs and income. Motorized transportation is common.

Appendix F - Lynx research in the contiguous United States

Table F-1. Lynx research in the contiguous United States

Principal investigators	Focus	Location	Methods	Duration	Comments
Completed					
K. Aubry USFS, PNWRS, G. Koehler WDFW & J. von Kienast U. of Washington	- Habitat relationships - Relationships with prey & other predators - Food habits	Cascade Mountains (North-central Washington)	Snow tracking and hair snagging	Dec 2000 - Mar 2001; Mar 2001 - Dec 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	Short term effects of precommercial thinning	Northern Rockies (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)	- Demography & population dynamics - Movements & dispersal	Northern Rockies (western Montana)	Carcass examination & radio-telemetry	25 months	18 females w/mean litter size of 3.3 2 lynx monitored
D. Brittell, et al. (1989, unpublished) WDFW	- Community interactions - Demography & population dynamics - Distribution & abundance - Habitat relationships - Movements & dispersal	Cascade Mountains (north-central Washington)	Radio-telemetry	34 months	23 lynx monitored
S. Buskirk & J. Zahratka U. of Wyoming	- Habitat relationships of - snowshoe hares	Southern Rockies (Colorado - Rio Grande and Gunnison NFs)	Mark & re-observation	2001-2002	M.S. Thesis completed; manuscript submitted for publication

Principal investigators	Focus	Location	Methods	Duration	Comments
J. Brocke, et al (1991)	Human impacts	Northeast (New York)	Radio-telemetry	24 months	83 lynx translocated from the Yukon 16 road-killed
A. Fuller (1999, unpublished)	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 clearcut, and partially harvested stands. Developed a model to predict density of hares based on within-stand habitat variables.
A. Fuller (2006, Ph.D.)	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 (NW Maine)	Snow tracking, radio telemetry	2002-2003	
J. Homyack, D. Harrison U. of Maine, W. Krohn USGS Maine Cooperative Fish and Wildlife Research Unit	- 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 relation to overstory, understory & structural variables.	Northern Maine	Mark-recapture of small mammals and snowshoe hare, pellet counts, red squirrel call counts, intensive and extensive habitat measurements.	2000 - 2002	Sampled hare pellet density on 30 herbicide-treated clearcuts (17 treated with PCT, 13 control) Mark-recap of hares on subset of 8 stands Live-trap small mammals on 37 herbicide treated clearcuts (24 treated with PCT, 13 control) Publications in *Forest Ecology and Manage.* (2004) and *Wildlife Society Bulletin* (2005)

Principal investigators	Focus	Location	Methods	Duration	Comments
C. Hoving, D. Harrison U. of Maine, W. Krohn Maine Coop F&W Research Unit	- 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 *Northeastern Naturalist* (2003), *Wildlife Biology* (2004) and *J. Wildlife Manage.* (2005)
G. Koehler – WDFW, K. Hodges, L.S. Mills and C.Walker (U of Montana (2005, M.S. Thesis – C. Walker)	- Habitat relationships of snowshoe hares	Cascade Mountains (North-central Washington)	Mark-recapture, telemetry and pellet counts of snowshoe hares	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
G. Koehler – WDFW, K. Aubry USFS, PNWRS, R. Weilgus and B. Maletzke – WA State University	- Habitat relationships - Relationships with prey and other predators - Food habits	Cascade Mountains (North-central Washington)	Snow tracking	Dec 2002 March 2003 Dec 2003 Mar 2004	Investigate coarse-scale habitat selection by lynx in managed landscape (companion study to one by Aubry, Koehler and von Kienast conducted from 2000-2002 but located in different study area)
G. Koehler (1990) WDFW	- 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	- Community interactions - Habitat relationships	Northern Rockies (Western Montana)	Radio-telemetry	8 months	2 lynx; patterns of association with forest types

Principal investigators	Focus	Location	Methods	Duration	Comments
K. McKelvey, G. McDaniel (2001) USFS, RMRS	- Habitat relationships of snowshoe hares	Northern Rockies (Island park, 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	- Distribution & abundance - Habitat relationships	Contiguous U.S.	Museum & historical records, trapping data, track surveys, questionnaire	n/a	3,865 occurrence records & historical distribution
K. McKelvey, et al. (2000) USFS, RMRS	- Habitat relationships - Human impacts	Cascade Mountains (North-central Washington)	Radio-telemetry	76 months	Reanalyzed data from two previous studies (Brittell et al. 1989, Koehler 1990), 1981-1988 22 lynx monitored No road avoidance (non-winter)
L.S. Mills – U of Montana	- Abundance of hares across time and space - Evaluation of pellet counts as indices of abundance	Seeley and Talley Lake regions of NW 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)
L.S. Mills, K. Pilgrim, M. Schwartz U. of Montana, K. McKelvey USFS, RMRS (2000)	- Species identification of lynx based upon hairs.	Northern U.S.	MtDNA analysis of hair samples	1999 - 2001	Developed a thoroughly reliable, validated diagnostic test to distinguish among the felids of northern north America.
L.S. Mills & P. Griffin - U. of Montana	- Snowshoe hare fecundity, mortality, survival and movements	Northern Rockies (Seeley Lake, Montana)	Radio-telemetry, trapping, ultrasound	1998 - 2002	Assessed effects of precommercial thinning on hares. Publication in press *J. Wildlife Management*. Finished Ph.D. dissertation in 2003
K. Murphy Yellowstone NP	- Lynx presence and distribution in Yellowstone National Park	Yellowstone National Park	Snow tracking surveys, hare snare surveys	2001-2004	Final report completed and publication in press (*Northwest Science*)

Principal investigators	Focus	Location	Methods	Duration	Comments
M. Schwartz & S. Mills U. of Montana, K. McKelvey, L. Ruggiero & F. Allendorf USFS, RMRS	- 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 northern & southern populations important Paper published in *Nature* (2002)
J. Shaw & J. Long, (2001) Utah State U.	- Habitat relationships of snowshoe hares	Northern Rockies (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 unthinnned lodgepole pine stands; Paper submitted to JWM for publication.
D. Smith (1984, unpublished)	- Habitat relationships - Movements & dispersal	Northern Rockies (Western Montana)	Radio-telemetry	23 months	5 lynx monitored
		Ongoing			
K. Bunnell Brigham Young Univ.	Snow compaction effects on coyote distribution & feeding behavior Habitat relationships of snowshoe hares and red squirrels	Northern Rockies Primary study is the Uintah Mountains (Ashely NF, UT) w/additional data collected in the Bear River Range (UT), Island Park (ID) & Bighorn Mts (WY)	Aerial snow tracking, radio telemetry, ground tracking, scat analysis Pellet counts (hares) and midden counts (red squirrels) to assess population densities to micro & macro habitat conditions	2002 – 2004	Coyotes are accessing deep snow habitat via human induced snow compacted routes. Publication in Wildlife Society Bulletin 2006.
A. Fuller & D. Harrison U. of Maine	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.

Principal investigators	Focus	Location	Methods	Duration	Comments
C. McLaughlin Maine Dept. Inland Fisheries and Wildlife (MDIFW), J. Organ USFWS, G. Matula MDIFW, W. Jakubas MDIFW, C. Todd MDIFW	- Determine lynx population viability - 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	- Model snowshoe hare population dynamics in a fragmented landscape	Northern Rockies (Seeley Lake, Montana)	Utilizing data collected from study listed above (Mills & Griffin)	1998 - 2003	Published in 2003 as article in *Species Conservation and Management*: Case Studies, Oxford University Press.
J. Koble, J. Squires et al. USFS, RMRS	- Human impacts (snow compacting activities) - Interspecific predator relationships	Northern Rockies (Northwestern Montana)	Radio-telemetry	2001 - 2003	Coyotes were resident within lynx home ranges and foraged mainly on carrion. Publication in press *J. Wildlife Management*
L.S. Mills & K. Hodges U. of Montana	- Habitat relationships of snowshoe hares - Sampling strategies for hare pellets - Effects of precommercial thinning on snowshoe hares	Northern Rockies (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.
L.S. Mills, K. Hodges, & E. Cheng (PhD student) U of Montana	- Relative abundance across park - Effect of 1988 burns on snowshoe hares	Yellowstone National Park, WY and MT	Mark and recapture, pellet counts	2002-2007	Densities and distribution across time have been low. Currently evaluating levels of genetic variation using tissue and fecal samples.

Principal investigators	Focus	Location	Methods	Duration	Comments
L.S. Mills & K. Hodges, U of Montana	- Distribution and 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 micro-satellite locations	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	- Methods of population estimation	Northern Rockies (Idaho Panhandle NFs)	Pellet counts	1999 - 2001	Estimate snowshoe hare densities among various vegetative stand conditions and elevation gradients
D. Murray U. of Idaho	- Movements & survival of snowshoe hares - Snowshoe hare foraging relationships	Northern Rockies (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	- Habitat relationships of snowshoe hares	Northern Rockies (Idaho Panhandle NFs)	Pellet counts	2000 - 2005	Compare responses of snowshoe hares to different thinning prescriptions. May run up to 10 years
T. Shenk CDOW	- Movements & dispersal Mortality assessments Prey relationships	Southern Rockies (Colorado)	Radio-telemetry & snow tracking	Began in 1999 & is ongoing	Focused on lynx reintroduced from Alaska & Canada
K. Shick & J. Goodburn U. of Montana	- Habitat relationships of snowshoe hares	Northern Rockies (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	- Habitat use & movements Prey relationships	Northern Rockies (Pioneer Mtns. & Beaverhead-Deerlodge NFs)	Radio-telemetry, snow tracking	2000 - 2003	No lynx detected or trapped to date. Potential prey species w/in area documented. Also gathering information on wolverine occurrence
J. Squires et al. USFS, RMRS,	- Demography & population dynamics - Community interactions - Habitat relationships - Movements & dispersal - Relationships with prey	Northern Rockies (Western Montana)	Radio-telemetry	Began in 1998 and is ongoing	Montana – 60+ lynx radioed (2002)

Principal investigators	Focus	Location	Methods	Duration	Comments
J. Squires et al. USFS, RMRS, T. Laurion –WG&F	- Demography & population dynamics - Community interactions - Habitat relationships - Movements & dispersal - Relationships with prey	Northern Rockies (Western Wyoming)	Radio-telemetry	Began in 1996 and is ongoing	Wyoming – 2 lynx radioed (1996-97)
M. Schwartz, J. Kolbe, K. McKelvey, L. Ruggiero, J. Squires USFS -RMRS J. Copeland IDFG	- Habitat relationships - Highway crossings - Human impacts (snowmobiles/winter recreation) - Interspecific predator competition - Movements & dispersal - Relationships with prey	Northern Rockies (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 Main Dept of Inland Fisheries and Wildlife	- Determine lynx population status in NW Maine - Document recruitment and dispersal - Document mortality factors on lynx - Identify habitats used by lynx - Investigate relationships between lynx and sympatric predators - Test efficacy of survey methods to detect lynx	Northeastern U.S. (Musquacook Lakes region, NW Maine	Radio-telemetry, vegetation surveys, pellet counts, winter track surveys, hair pad surveys, camera stations	1999-2008	120 lynx captured; 41 monitored (>6,000 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 forest land.
J. Weaver	- Habitat relationships of snowshoe hares	Northern Rockies (Kootenai NF, Montana)	Pellet counts	1996 - 2006	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 PCT prescriptions.