

Updating Lynx Habitat Mapping

Clarification and Guidance

Introduction

In the Biological Opinion for the Southern Rockies Lynx Amendment (SRLA), the U.S. Fish and Wildlife Service identified five conservation recommendations. Among those recommendations is one that states: “The Forest Service and the U.S. Fish and Wildlife Service should continue to jointly update lynx habitat maps within the Southern Rockies Lynx Amendment area.” The Record of Decision for SRLA (page 19) states that: “Updating lynx habitat maps will continue to be done as needed, in coordination with the U.S. Fish and Wildlife Service.”

The Glossary for the SRLA Management Direction (Attachment 1-12) defines lynx habitat.

“Lynx habitat occurs in mesic coniferous forest that experience cold, snowy winters and provide a prey base of snowshoe hare. In the southern Rocky Mountains, lynx habitat generally occurs between 8,000 and 12,000 feet in elevation. Primary vegetation consists of Engelmann spruce, subalpine fir, aspen-conifer mix and lodgepole pine on spruce-fir habitat types. On cool moist sites, Douglas-fir and aspen, when interspersed with subalpine forests, may also contribute to lynx habitat. Dry forest types (e.g., ponderosa pine, climax lodgepole pine) do not provide lynx habitat.”

For purposes of this SRLA Implementation Guide, the phrase “re-mapping of lynx habitat” will refer to the process of remodeling lynx habitat at the broad scale which updates that Forest’s lynx habitat map. It does not refer to the changes in habitat conditions within the previously mapped lynx habitat that occur due to vegetation management, fire, insects, disease, etc.

At the end of this portion of the Guide is an example of the process that the Medicine Bow-Routt National Forests are currently using to better identify lynx habitat as they update their lynx habitat mapping. This process is currently ongoing and includes the involvement of the R2 Regional Office and the FWS. Although the specific forest cover types, elevation breaks and percentages of spruce-fir tree components provided in this example may not be appropriate for mapping lynx habitat on other Forests within the SRLA area, the methodology and rationales used may be useful to other Forests that are undertaking an update to their lynx habitat maps.

Background

In an August 22, 2000, letter the Lynx Steering Committee provided direction to all federal agencies with lynx conservation responsibilities, to address lynx habitat mapping as follows:

Criteria and Procedures for Lynx Habitat Mapping

- 1) *“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).

- 2) 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.*
- 3) 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.*
- 4) 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.

- d) 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.”

On August 15-16, 2007, a meeting among RO renewable resources staff, Forest biologists and silviculturists, ecologists, and GIS specialists took place to facilitate discussion and clarification of lynx habitat mapping direction issues. The following are the clarifying points pertaining to lynx habitat mapping derived from that meeting:

- 1) Continue to follow the Aug. 22, 2000 memo from the Lynx Steering Committee for mapping or updating existing maps of lynx habitat. Items 2-5 are some discussion points and clarification specific to Region 2.*
- 2) Identify primary and secondary vegetation. (Secondary vegetation may contribute to lynx habitat when intermingled with and immediately adjacent to primary vegetation.) Then delineate the LAU, meeting the criterion of providing at least 10 mi² of primary vegetation. Use existing polygons to define the LAU boundaries to the extent possible. Once the LAU is delineated, all the primary and secondary vegetation is considered lynx habitat, and there is no longer a distinction made between them. Maps should be updated as needed to reflect field verification, in coordination with U.S. Fish and Wildlife Service.*

Dry forest such as ponderosa pine and climax lodgepole pine are not lynx habitat. Climax vs. seral lodgepole pine can be differentiated using habitat type maps, CVU (or R2Veg) stand data ($\geq 5\%$ presence of spruce/fir can be used to infer subalpine fir habitat type), or understory indicator plant species. Elevation may be one other metric used to differentiate habitat types

Primary Vegetation

Spruce-fir cover type

Seral lodgepole pine cover type on subalpine fir habitat types

Note: In addition to the lodgepole pine cover type, other moist conifer cover types such as Douglas-fir, white fir or blue spruce that currently dominate subalpine fir habitat type sites, should also be included as primary vegetation. This situation is what differentiates these cover types from those situations listed below where they would be considered secondary vegetation.

Aspen mix

Note: Since this meeting was held, “aspen mix” is currently described as any aspen cover type with a $\geq 5\%$ spruce-fir tree component.

Secondary Vegetation

Pure aspen

Note: Since this meeting was held, “pure aspen” is currently described as any aspen cover type with a $< 5\%$ conifer tree component.

Moist Douglas-fir

Note: This may also include other cool, moist conifer cover types that do not occur on subalpine fir habitat sites, such as white fir or blue spruce.

Riparian willow

Sagebrush

3) *Buffer only secondary vegetation.*

Note: Buffering 300 meters in to secondary habitat from primary, based upon Miller snowshoe hare data and R2 biologists’ discussions (Ft Collins, 2008). This buffer distance was derived from a “nearest neighbor” distance analysis performed on snowshoe hare pellet data collected from Miller, 2005.

4) *Mountain shrub and sagebrush*

Note: Mountain shrub was included as secondary habitat in the initial mapping on some Forests. Based on lynx habitat use data from the Colorado Division of Wildlife, it has subsequently been determined that mountain shrubland receives little use and should be excluded from secondary vegetation (Randy Ghormley, pers. comm. 11/26/07).

Notes on LAU Size and Delineation:

The LCAS provided some general guidance on delineating LAUs within mapped lynx habitat. The size of a LAU was to approximate the home range size of a female lynx and should include at least 10 square miles (6,400 acres) of primary vegetation (lynx habitat). Within the SRLA area, the range of home range sizes needed to provide this amount of primary vegetation and support a reproductive female lynx has not been clearly established. However, Shenk (2008; pers. comm., K. Broderdorp 2009) reported the average home range of reproductive female lynx in southern Colorado at approximately 75.2 km^2 (18,582 acres), with a range of approximately $45.7 - 235.7 \text{ km}^2$ (12,000 - 60,000 acres). Current information on female home range size in northern Colorado and southern Wyoming is lacking. When evaluating the size of LAUs, particular attention should be paid to: 1) the amount of primary vegetation within the LAU, 2) the quality and productivity of the primary vegetation in terms of producing and sustaining high quality snowshoe hare habitat over time, 3) the overall ecology of the area in terms of disturbance frequencies, amounts and patterns. It is important to delineate LAUs that contain sufficient amounts of high quality primary vegetation to function properly for a reproductive female (not too small). It is equally important to delineate LAUs that are not so large as to mask vegetation management practices that may adversely impact one or more lynx home range conditions. Throughout the southern Rockies,

watershed boundaries have been the primary source for delineating LAUs. These watersheds can vary considerably in size. This may lead to some LAUs consisting of multiple smaller watersheds or some larger watersheds containing multiple LAUs. Additionally, attention needs to be given to highways with high traffic volumes which may create a man-made home range (LAU) boundary (e.g. I-70, Highways 9, 40, 50, 550, 160, etc.).

Questions and Answers: Habitat Mapping

1. *Will there be a FWS review of adjustments to LAU boundaries?*

Answer: Yes, there will be FWS review of adjustments to LAU boundaries. Also, those Forests that are updating their lynx habitat maps will coordinate those efforts with the FWS. The Regional Office will have the final approval.

2. *Define/quantify climax versus seral lodgepole.*

Answer: First, some clarifying definitions of ecological terms:

- Sere = a sequence of seral stages that plant communities pass through from a very early seral to climax condition.
- Seral = one of many successional stages plant communities may pass through, e.g. very early, early, early mid, mid, late (upper) mid, late and climax.
- Climax = the last seral stage in the Sere.
- Forest Cover Type = a descriptive term used to group stands of similar characteristics and species composition (due to given ecological factors) by which they may be differentiated from other groups of stands. In practice, forest cover type refers to the dominant overstory tree species (e.g. lodgepole pine) or combination of species where none dominates over the other (e.g. mixed conifer).

In lodgepole pine “cover types” where lodgepole pine is the dominant overstory tree species and is the dominant, self-reproducing tree species in the understory, it would be classified as the climax tree species for the site. Where lodgepole pine is NOT the dominant tree species self-reproducing in the understory, or is not self-reproducing at all, it would be classified a seral species.

Situations may occur where the lodgepole pine “cover type” has Subalpine fir, Engelmann spruce, Bristlecone pine or Limber pine the dominant reproducing understory tree species. In these cases, lodgepole pine would be a seral species, rather than reflect the expected climax forest type.

3. *We need a clear remap of young stands that defines them as snowshoe hare habitat in relation to denning proximity. We can't have every patch of ground with regen called snowshoe hare habitat especially if there is no denning nearby. Who will be responsible for the remapping efforts?*

Answer: Each Forest will be responsible for remapping habitat on their Forest using the new remapping guidelines. The need for snowshoe hare habitat to be proximate to available denning habitat is not a criterion for updating mapped lynx habitat.

4. *If your map says you're in lynx habitat and ground-truthing says it's not, what recourse do we have? Can we revise that digital map? Who can make the on the ground decision (only biologists)? What would be the criteria?*

Answer: Assuming that the appropriate mapping direction was followed and your lynx map displays primary and secondary vegetation (lynx habitat), wholesale adjustments will likely be unnecessary. However, the accuracy of the data used to update a Forest's lynx habitat map may not be specific enough to identify all stands capable of supporting lynx habitat accurately. It is important for biologists and silviculturalists to complete a field review of those stands that may be questionable, particularly those that are in the early to mid structural stages. Identifying and distinguishing primary vegetation will require an understanding of the successional pathways for a particular area. Even though existing conditions may not reflect the site potential for a stand to become a spruce-fir habitat type, it may still be lynx habitat. Seral conditions may be present with little evidence of what the stand will develop in to. If you ground truth and determine that the mapping criteria for a particular stand or area were incorrect, then it may be appropriate to consult with your silviculturist and then make the appropriate changes. Substantial changes in mapping should be coordinated with the USFS Region 2 Regional Office and the FWS.

5. *Does lynx habitat include all mature stands that meet lynx criteria, any stand that will someday meet the lynx criteria and also any stand that does and could some day provide forage to a snowshoe hare? What are the limits to these broad criteria?*

Answer: There are a wide variety of forest, shrub and non-forest conditions that provide forage for snowshoe hare. Snowshoe hare densities can vary considerably within these habitats depending on the quantity, quality and distribution of forage and its availability throughout the year. Landscape conditions which constitute available lynx habitat will be those which have the capability of supporting relatively high densities of snowshoe hare year round. It is expected that lynx habitat is dynamic and may or may not support snowshoe hares at a given point in time.

6. *What happens when we remap lynx habitat and have a (likely) reduction in mapped lynx habitat – how will the exemptions and exceptions be revised?*

Answer: The 3% exemption and 1.5% exception will still apply, but with the likelihood that total acres of habitat will be lowered, that actual number of treatable acres will likely be lower than shown in the current SRLA BO. Revising the acres allowed under the exemptions and exceptions will be part of the process used to update a Forest's identified lynx habitat and will include involvement by the FWS and the Regional Office.

7. *Habitat definitions from the 2004 Draft SRLA were specific and helpful - they are not in the final - can they come back? (e.g. lynx habitat, denning habitat, trees/acre, specific measures for multi-storied stands, average understory height, tons/acre CWD, CWD height).*

Answer: Habitat definitions are present in the ROD. If there are specific habitat definitions that are still appropriate to the southern Rockies and currently not present in the SRLA, they should be identified. The decision is more general to allow specific criteria to be adjusted as new information becomes available.

8. *What happens when a project that already has NEPA and section 7 completed has the lynx habitat remapped and results in changes in the number of acres and exemption percentages?*

Answer: A letter to FWS explaining and updating the changes and document any change in the effects of the action as appropriate. Remember to adjust your accounting when generating any future reports. If the changes result in a Forest exceeding their allocation under an exemption or exceptions, then section 7 consultation may need to be reinitiated for the amendment (i.e. effects of the action (amendment) not previously considered).

9. *What correlation (ie cvu coefficients (hss?)) is going to be made to assign the specific structural stage to a particular stand in cvu?*

Answer: Common Vegetation Unit (CVU) data is used in the R2Veg data tables, which provide the Habitat Structural Stages (HSS) for each stand. HSS are generally not used in the SRLA, however there may be a correlation between some SRLA terms and some HSS in R2Veg. HSS 1T and 2T would likely represent the stand initiation phase used in VEG S1. HSS 4B, 4C, and 5 with multiple layers would likely represent multi-story mature or late successional forests used in VEG S6.

10. *Confusion about “re-mapping”. Difference between updating your current maps based on changed conditions (e.g. timber harvest, fires, fuels treatments, insect/disease effects) versus RE-MODELING lynx habitat to refine/exclude dry habitats (e.g. dry lodgepole). Forests need to actively re-map/track changes to habitat conditions. Forests should consider whether or not they need a new model.*

Answer: Recommendation #5, under the Consideration of Conservation Recommendations section (identified by the USFWS) in the Record of Decision states that the FS and FWS should jointly update lynx habitat maps within the SRLA area. The Regional Forester’s response to this recommendation states that updating lynx habitat maps will continue as needed in coordination with the FWS. These and other statements in the SRLA relevant to “updating” lynx habitat maps refer to the on-going process of defining and maintaining lynx habitat maps. Some Forests are currently evaluating approaches to more accurately differentiate the drier lodgepole pine cover types from those that are capable of producing primary vegetation for lynx habitat.

11. *Define dry lodgepole pine. What % of other species may be present? Stand characteristics, including growth rates, densities, crown height and retention, etc., vary greatly between cover types collectively considered as lynx or snowshoe hare habitat (spruce-fir and lodgepole pine being the key types, but also including aspen and cool-moist mixed conifer). Clarification of the above should take into account these varying characteristics, either allowing broad ranges (or descriptions) across all types, or more specific ranges per cover type.*

Answer: The lodgepole pine cover type occurs on a broad range of sites in the southern Rockies, from very dry sites where it may be considered “climax” to high elevation moist sites where it currently intermingles with spruce and fir and will eventually develop into a spruce-fir habitat type. Even though some of the drier lodgepole pine sites exhibit a scattering of the plant species that may indicate that the stands are “seral” to spruce-fir, their ability to develop into a spruce-fir habitat type may be limited. Within the full spectrum of sites on which the lodgepole pine cover type occurs, it becomes necessary to distinguish those that are capable of producing quality snowshoe hare habitat in a reasonable time frame. The historical disturbance return interval may be an approach to identifying the reasonable time frame portion of

this equation. It will be up to each individual Forest, working with the Regional Office and their FWS counterparts, to provide rationale for the mapping criteria used to update their lynx habitat maps.

Example - Updating Lynx Habitat on the Medicine Bow-Routt National Forests

Lynx habitat mapping criteria currently being investigated for identifying the primary vegetation on the MBR uses the following:

1. All spruce-fir cover types; regardless of tree size;
2. All lodgepole pine cover types above a specific elevation (8800 feet)* with a spruce-fir tree component of $\geq 10\%$ *; and
3. All aspen stand with a $\geq 5\%$ * spruce-fir tree component, regardless of elevation.

(*Investigative studies on snowshoe hare occurrences on these Forests (Miller, 2005) indicate some correlation between consistent hare occurrence and lodgepole pine stands with a 10-15% spruce-fir tree component above 8800 feet, and with aspen conifer mix stands regardless of elevation. Additionally, field review of stands in several areas on the MBR indicate that lodgepole pine stands with a spruce-fir tree component of $< 10\%$ generally do not exhibit the capability of producing quality snowshoe hare habitat in a reasonable amount of time. Representatives of the MBR, R2 Regional Office of the USFS, and the FWS met several times in 2009 to discuss these mapping criteria and generally agreed that these may more accurately reflect lynx habitat at the broad Forest-wide scale.)