

LINKAGE AREAS AND HABITAT CONNECTIVITY

The section of the Guide is organized into three parts: 1) SRLA Guidance on Linkage areas, 2) Discussion and Clarification for Linkage Areas, and 3) Questions and Answers for Linkage Areas.

[**NOTE:** The June 9, 2009, clarification letter to the Southern Rockies National Forests concerning SRLA direction relative to ski areas, including application of ALL O1 and ALL S1 and several SRLA Human Use objectives and guidelines, is housed in Section 4 of this Implementation Guide.]

Part 1. SRLA Guidance on Linkage Areas

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

Objective ALL O1

Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.

Standard ALL S1

New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.

Guideline 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.

Standard LAU S1

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

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

Objective 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.

Standard LINK S1

When highway or forest highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings.

Guideline LINK G1

National Forest System lands should be retained in public ownership.

Guideline 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.

Additional SRLA management direction is also provided in the following objectives, standards, and guidelines:

Recreation Projects

- HU O2: Manage recreational activities to maintain lynx habitat and connectivity
- HU O4: Provide for lynx habitat needs and connectivity when developing new or expanded existing developed recreation sites or ski areas
- HU G3: Recreation development and recreational operational uses should be planned to provide for lynx movement and to maintain the effectiveness of lynx habitat
- 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.

Forest Roads and Highway Projects

- 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

Part 2. Discussion and Clarification for Linkage Areas and Habitat Connectivity

The intent of the SRLA guidance to maintain habitat connectivity is to maintain suitable lynx habitat across a Landscape Analysis Unit (LAU) and between LAUs. The SRLA does not provide a specified measure or amount to quantify adequate habitat connectivity. Biologist should use baseline information, any connected actions, and effects of the proposed action to determine if the proposed project would impede lynx movement within an LAU or between LAUs.

To ensure consistency with ALL S1, biologists should consider incorporating additional relevant Objectives, Standards, and Guidelines. ALL S1 is related to several other in the SRLA decision: ALL G1, LINK O1, LINK S1, LINK G1, LINK G2, HU O2, HU O4, HU O6, HU G3, HU G6, and HU G7.

Forest Vegetation Management/Condition and Habitat Connectivity

Refer to the relevant definitions in the ROD Glossary (Attachment 1) and especially the following definitions (pages 1-11 and 1-12):

Lynx habitat connectivity: Cover (vegetation) should occur in sufficient quantity and arrangement to allow for the movement of lynx. Narrow forested mountain ridges or shrub-steppe plateaus may serve as a link between more extensive areas of lynx habitat; wooded riparian communities may provide cover across open valley floors.

Linkage area: Provides 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, or agricultural lands, or where lynx habitat naturally narrows between blocks.

To correctly interpret and apply ALL S1, local habitat conditions and context as well as the type of lynx movement to be provided must first be identified. The characteristics of lynx daily, within-home range movements differ significantly from long-distance dispersal movements.

Movements of >100km (60 mi) are thought to represent long-distance dispersals. Dispersing lynx have been documented to travel up to 1,100 km (660 mi). Dispersal is most commonly observed in the spring by juveniles, and in the taiga, during the winter-spring period in low years of the snowshoe hare cycle (Mowat et al. 2000). In southern boreal forests, lynx have been documented making exploratory movements of 20-30km during the summer months (Aubry et al. 2000; Squires et al. 2000). Dispersing lynx do not restrict their movements to forest cover and have been documented to crossing large areas of grassland, desert, agricultural lands, large rivers and lakes, and other unsuitable habitats. Anecdotal evidence indicates that lynx making exploratory movements may utilize forest cover when available (Squires et al. 2000).

In contrast, lynx moving within their home ranges are generally searching for food, and are strongly associated with forest cover (Brand et al. 1976). Preliminary winter habitat-use data from Colorado (Shenk 2006) indicate that percent canopy cover of overstory trees used by lynx for long beds, kill sites, travel, and den sites exceeded 40%. In Montana, Squires et al. (2006) indicated that lynx preferentially foraged in large-diameter spruce-fir forests with

high horizontal cover, and tended to avoid sparse, open forests in winter. Squires and his collaborators found seasonal differences in habitat use, with lynx expanding their summer habitat use to include younger, more open forests with a dense deciduous and shrub component that provided summer foraging habitat and maintained adequate concealment cover. This deciduous component associated with the Northern Rockies forests in summer is unlikely in the Southern Rockies forests (Squires pers. comm. with Kurt Broderdorp, May 2009), suggesting the seasonal changes and expansion in habitat use is also unlikely in the forests here. The Southern Rockies National Forests in planning vegetation management and tree-cutting projects, or otherwise attempting to understand changes in Forest cover relative to connectivity, should evaluate whether reduction of forest canopy cover below approximately 40% will continue to provide for lynx movement and represent functional habitat.

Connectivity of Habitats: Connectivity of habitats should be managed both within and between LAUs.

1. **Within a LAU**, maintain suitable lynx habitat within an LAU. (Winter foraging habitat and Summer foraging habitat)

Winter Foraging Habitat: Winter is a limiting season for lynx as well as other wildlife species. Winter foraging areas are those that have the structural characteristics that provide cover and food for snowshoe hares in the deep snow conditions of winter (USFWS 2008). These areas also provide yearlong habitat for hares. The following list describes winter foraging habitat characteristics found in the Southern Rockies:

- Mature multi-story Engelmann spruce-subalpine fir stands that support snowshoe hare
- Lodgepole pine mix stands that support snowshoe hare
- Snow should not be compacted by human activities.

Summer Foraging Habitat: In the summer months snowshoe hares shift their diet to a higher proportion of grasses, forbs, and herbaceous portions (new growth) of shrubby species that are not available in winter. As a result, additional areas may be occupied in the summer. The following list describes summer foraging habitat characteristics found in the Southern Rockies:

- Riparian areas
- Engelmann spruce/subalpine fir stands that support snowshoe hare
- Regenerating lodgepole pine stands
- Lodgepole pine mix stands that support snowshoe hare

2. **Between LAUs**, maintain suitable habitat connectivity between LAUs and through designated linkage areas or other areas containing important habitat connectivity.

Federal agencies consider the following cumulative effects of private land development and expansion of recreational facilities in and adjacent to lynx habitat that may reduce the ability of lynx to move throughout their home range or interact with other individuals in the larger subpopulation (Ruediger et al. 2000).

- Maintain habitat connectivity within linkage areas
- Design projects to allow for movement through a linkage area (i.e. wildlife bridges)
- Identify and maintain public land areas that could provide important connectivity points, particularly in areas with adjacent private land development

Additional impacts to movement corridors may include the following:

- Winter dispersed and developed recreation
- Oil and gas developments
- Highway development and expansion
- Land exchanges

Part 3. Questions and Answers for Linkage Areas and Habitat Connectivity

1. Will lynx linkage areas be managed using the same standards as lynx habitat?

Answer: In Linkage areas that are not in LAUs, only LINK objectives, standards, and guidelines apply. In linkage areas that are in LAUs, all direction applies.