

United States. The final rule also explained that fire suppression in the Northern Rocky Mountains/Cascades and Southern Rocky Mountains during the past 50 years has likely had little impact on lynx, because most forests where lynx habitat occurs have natural fire return intervals that are longer than the period of time of human fire suppression or because fires that do occur in lynx habitat are large, high-intensity fires that are difficult to suppress. Where fire suppression does occur in lynx habitat, it can reduce the quality of habitat by reducing the amount of younger forests or by changing the species composition and structure of forests.

Because of the many large forest fires in the West since 2000, there is increased national interest in reducing the risk of fire by reducing fuel loads on both Federal and non-Federal lands (U.S. Department of Agriculture and U.S. Department of the Interior 2001). Such efforts can affect lynx habitat if they reduce the amount of understory vegetation. Understory removal may affect the capability of stands to support snowshoe hares. At this time, few of these fire suppression efforts have been implemented, so it is impossible to analyze their effects on lynx. The LCAS recommends that on Federal lands fire be restored as an ecological process. The U.S. Forest Service and BLM use the LCAS in determining the effects of their actions on lynx (see Factor D).

As in the final rule, we conclude that past fire suppression has had limited impact in lynx habitat in the Northern Rocky Mountains/Cascades and Southern Rocky Mountains; however, it may affect lynx habitat quality at some local scales, particularly on non-Federal lands. Although increased interest in fire suppression and reduction of heavy fuels has the potential to affect snowshoe hare habitat, we conclude the threat to lynx in the Northern Rocky Mountains/Cascades and Southern Rocky Mountains as a result of the current effects of fire suppression is currently low.

#### Northeast

In the Northeast, lynx habitat is supported almost entirely on a non-Federal land base (private, State, or county), predominantly commercial forest lands, as was recognized in the final rule. The final rule discussed activities that may affect lynx in the Northeast Region. It described the history of logging and forest management through the 1800s and 1900s and the effects on lynx habitat in this region.

Since the final rule, our understanding of forest conditions in Maine, which is the core of the lynx range in the Northeast, has improved. Historically, large-scale natural disturbances (wind, ice, and insect epidemics) and traditional forestry practices (including some level of clear-cutting) created the early successional forest stages where snowshoe hares generally are most abundant. In response to insect outbreaks in the 1970s and 1980s, extensive clear-cutting to salvage diseased trees and subsequent herbicide use to promote regrowth of conifers created the current forest conditions that are optimal for snowshoe hares and lynx (Hoving 2001; Homyack 2003; Krohn 2003; G. Matula, in litt. 2003). Currently, large amounts of the forest are in a stage of regeneration that supports high snowshoe hare densities (Homyack 2003). As a result, lynx numbers also are high (see "Maine" discussion, above).

At its peak in the late 1990s, 20 to 25 percent of the Maine forest was in an early regeneration stage (Gadzick *et al.* 1998), which is unnaturally high and out of proportion to historic conditions when only 3 to 7 percent of the forest was in this stage of regeneration (Krohn 2003). Nonetheless, this created exceptional snowshoe hare and lynx habitat.

Passage of the Maine Forest Practices Act has in 1989 limited the amount of clear cutting. As a result, forest landowners have changed their harvest practices to extensive use of pre-commercial thinning and partial harvesting rather than clear cutting (Gadzick *et al.* 1998, Homyack 2003; Krohn 2003). These techniques result in forest stands with sparse understories that support low snowshoe hare densities (Homyack 2003). If harvest practices cease to provide early successional forest with dense understories or stand-replacing disturbances (such as provided by large clear-cut) in proportions similar to historic conditions, habitat conditions for snowshoe hare and lynx will be diminished.

The quantity of lynx habitat in Maine is expected to decline as stands in late regeneration created by clear cutting in the 1970s and 1980s succeed to mature forest. Snowshoe hare populations begin to decline in stands about 30 years after clear cutting when the forest canopy closes, shading increases at ground level, and the dense understory that supports high populations of snowshoe hares is greatly reduced. Over 95 percent of cutting that occurs now is partial harvesting (selective cutting, patch cuts). This new cutting regime

supports lower populations of snowshoe hares (Fuller 1999, Homyack 2003) and will not provide the large patches of regenerating forest that support the more numerous lynx populations observed at the present time.

As explained in the final rule, in Northeast forests fire return intervals are very long as a result of the moist maritime influence. Thus, fire did not historically play a significant role in creating early successional habitats. While current fire suppression may have localized minor effects, it is not likely affecting lynx habitat overall in the Northeast.

As recognized in the final rule, timber harvest and associated activities on non-Federal lands exert the most influence on lynx habitat in the Northeast and have created the optimal conditions that currently exist for lynx and snowshoe hares in northern Maine. At this time, we do not know if future timber harvest practices will continue to provide forest conditions that are capable of supporting snowshoe hare densities that can, in turn, support a resident lynx population. We conclude the threat to lynx in the Northeast because of timber harvest and associated activities is moderate, although it may have more severe impacts if a natural mosaic of forest stand ages and structure that can support snowshoe hares and lynx is not maintained.

#### Great Lakes

The final rule described habitat conditions for lynx in the Great Lake Region. It described the history of logging and forest management through the 1800s and 1900s that was similar to the history in the Northeast.

We know that the estimate of lynx habitat provided in 1999 (U.S. Forest Service and Bureau of Land Management 1999) substantially overestimated the amount of lynx habitat in the Great Lakes because of the coarse-scale vegetation map on which the estimate for the Great Lakes was based (see "Great Lakes" discussion above). By using more accurate maps we now know that the majority of lynx habitat in the Great Lakes is on Federal lands, primarily National Forest lands, contrary to the information used in the final rule that incorrectly portrayed a high proportion of lynx habitat on non-Federal lands (Great Lakes Ecological Assessment no date, Mladenoff no date; Minnesota Department Natural Resources, in litt. 2003; Wisconsin Department Natural Resources, in litt. 2003). In the Great Lakes Region, approximately 18,000 km<sup>2</sup> (7,000 mi<sup>2</sup>) of lynx habitat are currently mapped on National Forest lands (Table 1).