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IUCN - CAT CONSERVATION PLAN

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Canadian lynx (Lynx canadensis)

A. Current Status

1. Distribution:

The Canadian lynx inhabits the taiga zone of North America. It is found throughout most of Alaska and Canada with their range extending south into northeastern Utah and central Colorado at elevations above 2,700 meters and in the northern Cascade Mountains of Washington above 1,400 meters elevation. Lynx also occur in low numbers in northern Minnesota, Wisconsin, Michigan, New York, New Hampshire, and Maine with occasional reports (probably representing dispersing individuals) in Iowa, South Dakota, Nebraska, and West Virginia. Although the CITES reference to mammalian nomenclature lists the Canadian lynx as Lynx canadensis, it is sometimes listed as the subspecies Felis lynx canadensis of North America, with the subspecies F. l. lynx occurring in boreal Europe, F. l. pardina on the Iberian peninsula, F. l. isabellina in central and eastern Asia, F. l. subsolanus in Newfoundland, F. l. sardiniae in Sardinia, and F. l. kozlovi and F. l. stroganovi in the U.S.S.R. (McCord and Cardoza 1982).

2. Population:

Lynx numbers at northern latitudes fluctuate approximately every decade in response to fluctuations in numbers of their principal prey, snowshoe hares (Elton and Nicholson 1942, Keith and Windberg 1978). Densities of lynx in Alberta ranged from 2.3/100km<sup>2</sup> when snowshoe hare number were low to 8 to 10 animals/100km<sup>2</sup> when snowshoe hare numbers were high (Brand et al. 1976) and the numbers of lynx harvested have shown a 10 fold difference between high and low numbers during the 5 years between prey abundance and scarcity (Elton and Nicholson 1942). While lynx numbers fluctuate at northern latitudes they are likely present in low densities among the isolated habitats in western and eastern United States (Mech 1980, Koehler, In Press).

3. Habitat:

Because lynx prey almost exclusively on snowshoe hares (Saunders 1963b, van Zyll de Jong 1966, Nellis and Keith 1968, Nellis et al. 1972, Brand et al. 1976, More 1976, Koehler, In Press), habitats used by lynx coincide with habitats where snowshoe hare are most abundant (Koehler et al. 1979, Parker 1980, Bailey et al. 1986). Lynx use early successional fire-dependent forests (Saunders 1963a, Koehler et al. 1979, Parker et al. 1983, Bailey et al. 1986) where snowshoe hares are most plentiful (Litvaitis et al. 1985, Koehler, In Press).

X Although lynx use early successional forest communities as foraging habitat they use mature forests as denning sites. Denning habitats are characterized as mature stands greater than 250 years old, occurring on N-NE aspects, where down-fall logs and stumps provide cover for kittens (Koehler, In Press). In Alaska, Berrie (1973) also found that blown-down trees and stumps were used by lynx for denning. Apparently mature forests provided the cover needed for denning, a feature lacking in early successional forests.

Because of their dependence on snowshoe hares, lynx home ranges sizes, population density, reproductive rates, and survival rates for kittens are dependent on the abundance of this single source of prey. Radio-telemetry studies show lynx to use home range areas from 7.9 to 243 km<sup>2</sup> in size (Berrie 1973, Mech 1980, Carbyn and Patriquin 1983, Parker et al. 1983, Brainerd 1985, Stephenson 1985, Bailey et al. 1986). As demonstrated by a three-fold increase in the home range sizes of lynx during a decline in snowshoe hares numbers in the Yukon (Ward and Krebs 1985), Mech (1980) suggested that low prey abundance may have contributed to the large sized home ranges of lynx colonizing Minnesota.

Densities of lynx may vary from 2.3 lynx/100 km<sup>2</sup> (as reported in Alberta when snowshoe hare numbers were low, Brand et al. 1976) to 20 animals/100 km<sup>2</sup> in Alaska (Bailey et al. 1986) and Nova Scotia (Parker et al. 1982) when snowshoe hares were plentiful. Low densities may be characteristic for populations in marginal habitats or at the southern edge of the species range (Koehler, In Press) and in areas where harvest pressure is intense (Bailey et al. 1986).

The reproductive success of lynx is lower during periods of prey scarcity, with less than 10% of the juveniles breeding compared to 40 to 79% when prey is abundant (Brand and Keith 1979, Parker et al. 1983,

O'Conner 1986). The percent of adult females breeding may decrease from 73 - 88% to 33 - 37% (Brand and Keith 1979, O'Conner 1986). Periods of prey scarcity are also marked by higher mortality rates for kittens (65, 95, and 88%, Brand and Keith 1979), while mortality for kittens may be only 20% when prey is abundant (Brand and Keith 1979, Quinn and Thompson 1987). During times of prey scarcity when mortality rates for kittens are higher, fewer kittens show in the harvest (only 2 to 3%) compared to 29 to 40% when prey is abundant (Berrie 1973, Parker et al. 1983, O'Conner 1986). In Alberta, the mean age of animals harvested was 3.6 years when prey was scarce and 1.6 years when prey was plentiful (Brand and Keith 1979).

Fire suppression in the past 5 decades has limited the amount of early successional forests which provides habitat favorable for hares (Fox 1978) and lynx. Also, because snowshoe hare numbers may not cycle at southern latitudes as they do further north (Chitty 1950, Dolbeer and Clark 1975, Wolff 1980, Sievert and Keith 1985) lynx at southern latitudes may have a relatively low productive rate and their populations may be relatively stable and of low density (Koehler, In Press). However, periodic immigration of lynx from Canada (Mech 1980) may supplement populations in these peripheral regions of the contiguous United States.

#### 4. Principal Threats:

While wild fires and logging may benefit lynx by creating the early successional forests needed for prey, the immediate effects of these activities will result in losses of security cover for lynx and habitat for prey. The principal threat to lynx, however, is from trapping; which has intensified in recent years as prices for pelts have escalated (to more than US \$500.00) and as road access for trappers has increased with mining, oil, and logging development.

Although harvest may have little negative impact on numbers of lynx when prey is abundant and production of kittens is high (Quinn and Thompson 1987), harvest may negatively affect lynx populations during periods of prey scarcity when kitten survival is low (Brand and Keith 1979, Carbyn and Patriquin 1983, Parker et al. 1983, Bailey et al. 1986). During times of prey scarcity, recruitment is low and may not compensate for losses created by harvest (Brand and Keith 1979).

The significance of trapping as a mortality factor is shown by the 50 to 90% mortality rate among exploited populations (Mech 1980, Carbyn and Patriquin 1983,

Parker et al. 1983, Ward and Krebs 1985, Bailey et al. 1986). During periods of prey scarcity, lynx may become increasingly vulnerable to exploitation as they abandon home range areas in search of prey (Ward and Krebs 1985).

For areas where trapping pressure is high, large sized refugia are important for maintaining lynx populations during periods when recruitment is low (Carbyn and Patriquin 1983, Ward and Krebs 1985, Bailey et al. 1986). In areas where habitat is limited and immigration from unexploited populations minimal, harvest must be strictly controlled (Parker et al. 1983) and populations closely monitored. As recommended for lynx populations in Nova Scotia (Parker et al. 1983), Alberta (Brand and Keith 1979), and Alaska (Bailey et al. 1986), controlled harvest levels should be limited to years of high population recruitment.

Population monitoring is important for the management of lynx. While harvest data can be useful to help monitor population trends, snow-tracking surveys during winter may provide more reliable data for management of lynx populations. As demonstrated during periods of snowshoe hare decline when lynx disperse from established home range areas, lynx become increasingly vulnerable to trapping (Ward and Krebs 1985) and changes in trapper success may not accurately reflect changes in the population level. Therefore, harvest data must be interpreted with caution. Harvest data must be supplemented with field data.

LANDSAT based inventories of lynx habitats would permit more reliable regional estimates of lynx numbers. These would also be useful for identifying areas for managing habitat to favor lynx and to minimize impacts of forest pest management, logging, and road construction. Opportunities exist to enhance conditions for snowshoe hares and lynx using natural or prescribed fires and timber harvesting (Brocke 1975, Fox 1978, Conroy et al. 1979, Parker et al. 1983, Monthey 1986, Koehler, In Press). Although the immediate and short-term effects of timber harvesting would reduce security cover for lynx and snowshoe hares, the successional forests resulting from fires or timber harvesting would benefit hares (Parker et al. 1983, Koehler, In Press) and lynx. However, to benefit lynx mature forests must also be protected as habitat for denning (Koehler, In Press).

## 5. Conservation Measures Taken:

Lynx were listed on Appendix II of CITES in 1977 as a species for which export trade must be regulated so as not to be detrimental to the species. This listing was amended for 1983-84 and subsequent exports to include it for reasons of its similar appearance to other species of felids which may be threatened by export (Fed. Register 49(3):590-594). The lynx is not listed in the IUCN Red Data Book or on the U.S. Endangered Species List.

Legal harvest for lynx is permitted in Canada and the states of Alaska, Washington, Idaho, and Montana. Lynx are managed as "threatened", "endangered", or "protected" in New Brunswick, Colorado, Maine, Michigan, Minnesota, New Hampshire, New York, Utah, Wisconsin, and Wyoming.

### a. Canada:

(1) Legislation and enforcement: Signed CITES in 1975 (McMahan 1986); Appendix II status.

(2) Occurrence in protected areas: Present in many of the Game and Wildlife Sanctuaries, Refuges and National Parks. Lynx in ~~the smaller the~~ National Parks like the 2,944 km<sup>2</sup> Riding Mountain National Park in Manitoba may be vulnerable to exploitation from outside the park (Carbyn and Partriquin 1983).

(3) Occurrence in secure habitats outside protected areas: Lynx are present in the boreal forests throughout most the Canadian provinces. They are rare or absent on Prince Edward Island and the southern portions of the prairie and eastern provinces.

(4) Regulation of harvesting: The use of registered traplines limits the number of trappers in Canada. In recent years, however, high pelt prices and increased trapper pressures, together with the cyclic decline in lynx numbers has resulted in lower than expected numbers of lynx harvested (Todd 1985, Hatler 1988). As a result, more restrictive harvest measures were implemented with shortened seasons for British Columbia and Quebec, shortened seasons and a trapline quota for Manitoba and northern Alberta, and season closures for Saskatchewan, Nova Scotia, Island of Newfoundland and southern Alberta. Harvest regulations are expected to be relaxed as lynx begin to increase in numbers.

Total net legal trade: 1979: 27,349 skins, 252 garments; 1980: 40,937 skins, 1,073 garments (McMahan 1986).

X (5) Research: Considerable research has been conducted in Canada on lynx and snowshoe hares. Studies in Alberta (Brand et al. 1976), Manitoba (Carbyn and Patriquin 1983), Newfoundland (Saunders 1963a), Nova Scotia (Parker et al. 1983), and the Yukon (Ward and Krebs 1985) have helped to define the ecological requirements of lynx. Numerous food habits studies have also been conducted (More 1976, Saunders 1963b, van Zyll de Jong 1966). In addition harvest data has been analyzed (Elton and Nicholson 1942, Quinn and Thompson 1987) and has provided insights into the effects of harvesting lynx populations. Besides studies of lynx, numerous studies have been conducted on the biology and ecology of snowshoe hares.

*ev. ergänzen mit laufenden Untersuchungen*

b. United States:

*Alaska: Bailey et al.  
N.W.T. K. Poole  
Yukon: Stouffer & Howat*

(1) Legislation and enforcement: Signed CITES in 1975; Appendix II.

(2) Occurrence in protected areas: Present in the National Parks in Alaska and likely occurs in low numbers in the larger Parks of the western United States. Reintroduced to Adirondacks in New York.

(3) Occurrence in secure habitats outside protected areas: No information

(4) Regulation of harvesting: Harvest for lynx is permitted in Alaska, Idaho, Montana, and Washington. Although lynx are managed as a "protected species" in Minnesota and harvest may be permitted under this listing, the harvest of lynx was curtailed in 1984. In response to the cyclic declines in lynx numbers and concerns of over-exploitation of lynx in recent years, the length of harvest seasons have been shortened (varies from 1 to 5 months for different management units) with complete closures in some units in Alaska. Montana allows a quota of 55 lynx to be harvested with a limit of 1 lynx to be harvested per licensed trapper during a 2 1/2 month season. Washington allows 3 permits and a 1 month harvest season and Idaho has a 1 month season and no additional restrictions.

Total net legal trade in 1979: 5,162 skins; 1980: 3,899 skins (McMahan 1986); 1984: 4,038 skins (CITES Annual Report, 1986)

(5) Research: Radio telemetry studies of lynx have been conducted in Alaska (Berrie 1973, Bailey et al. 1986, Stephenson 1986) to obtain information on lynx behavior and ecology and harvested specimens have been analyzed for information on reproduction and age structures (O'Conner 1986). Data is also collected on lynx and snowshoe hare numbers from trapper questionnaires. Fewer studies have been conducted in the contiguous United States. Mech (1980) reported on lynx movements in Minnesota and Koehler et al. (1979), and Brainerd (1985) reported on lynx use of habitats and space in Montana. Brittell (unpublished report) and Koehler (In Press) have studied lynx use of space, habitats, and prey in north central Washington and have presented recommendations for managing habitats for lynx. Numerous studies have been conducted on snowshoe hares in Alaska and in the contiguous United States.

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Fig. 1. The distribution of lynx in North America (adapted from McCord and Cardoza 1982)

