

U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Lynx canadensis*

COMMON NAME: Canada lynx (within the State of New Mexico)

LEAD REGION: Region 6

INFORMATION CURRENT AS OF: April 2010

STATUS/ACTION:

Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status

New candidate

Continuing candidate

Non-petitioned

Petitioned - Date petition received: **August 1, 2007**

90-day positive - FR date: **December 18, 2008.**

12-month warranted but precluded - FR date: **December 17, 2009**

Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

- a) Is listing warranted (if yes, see summary of threats below)? **Yes**
- b) To date, has publication of a proposal to list been precluded by other higher priority listing actions? **Yes**
- c) Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for the species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The "Progress on Revising the Lists" section of the current CNOR (<http://endangered.fws.gov/>) provides information on listing actions taken during the last 12 months.

Listing priority change

Former LP:

New LP:

Date when the species first became a Candidate (as currently defined): _____

Candidate removal: Former LPN:

A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

U – Taxon not subject to the degree of threats sufficient to warrant issuance of a

proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

- F – Range is no longer a U.S. territory.
- I – Insufficient information exists on biological vulnerability and threats to support listing.
- M – Taxon mistakenly included in past notice of review.
- N – Taxon does not meet the Endangered Species Act’s definition of “species.”
- X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Mammals; Family Felidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Did not occur in New Mexico

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: New Mexico

LAND OWNERSHIP: Lynx habitat in New Mexico is marginal and patchy and is not likely able to support lynx establishment. What habitat that does occur there is primarily Federally owned. Ninety percent of lynx habitat in New Mexico is administered by the U.S. Forest Service, while the remaining 10% is a mix of private and state lands.

LEAD REGION CONTACT: Justin Shoemaker, 303-326-4214

LEAD FIELD OFFICE CONTACT: Shawn Sartorius, 406-449-5225, ext. 208

BIOLOGICAL INFORMATION

Species Description

Canada lynx (*Lynx canadensis*) are medium-sized cats, generally measuring 30 to 35 inches (75 to 90 centimeters) long and weighing 18 to 23 pounds (8 to 10.5 kilograms) (Quinn and Parker 1987). They have large, well-furred feet and long legs for traversing snow; tufts on the ears; and short, black-tipped tails. Canada lynx are similar to bobcats (*Lynx rufus*) and are differentiated from them by larger feet, longer legs, and overall lighter build.

Taxonomy

In accordance with Wilson and Reeder (1993), we currently recognize the lynx in North America as *Lynx canadensis*. We previously used the latin name *L. lynx canadensis* for the lynx (Jones et al. 1992). Other scientific names still in use include *Felis lynx* or *F. lynx canadensis* (Jones et al. 1986; Tumlison 1987).

Habitat/Life History

Lynx are highly specialized predators of snowshoe hare (*Lepus americanus*) (McCord and

Cardoza 1982, p. 744; Quinn and Parker 1987, pp. 684-685; Aubry et al. 2000, pp. 375-378). Lynx and snowshoe hares are strongly associated with what is broadly described as boreal forest (Bittner and Rongstad 1982, p. 154; McCord and Cardoza 1982, p. 743; Quinn and Parker 1987, p. 684; Agee 2000, p. 39; Aubry et al. 2000, pp. 378-382; Hodges 2000a, pp. 136-140 and 2000b, pp. 183-191; McKelvey et al. 2000b, pp. 211-232). The predominant vegetation of boreal forest is conifer trees, primarily species of spruce (*Picea* spp.) and fir (*Abies* spp.) (Elliot-Fisk 1988, pp. 34-35, 37-42). In the contiguous United States, the boreal forest types transition to deciduous temperate forest in the Northeast and Great Lakes and to subalpine forest in the west (Agee 2000, pp. 40-41). Lynx habitat can generally be described as moist boreal forests that have cold, snowy winters and a snowshoe hare prey base (Quinn and Parker 1987, p. 684-685; Agee 2000, pp. 39-47; Aubry et al. 2000, pp. 373-375; Buskirk et al. 2000b, pp. 397-405; Ruggiero et al. 2000, pp. 445-447). In mountainous areas, the boreal forests that lynx use are characterized by scattered moist forest types with high hare densities in a matrix of other habitats (e.g., hardwoods, dry forest, non-forest) with low hare densities. In these areas, lynx incorporate the matrix habitat (non-boreal forest habitat elements) into their home ranges and use it for traveling between patches of boreal forest that support high hare densities where most foraging occurs.

Snow conditions also determine the distribution of lynx (Ruggiero et al. 2000, pp. 445-449). Lynx are morphologically and physiologically adapted for hunting snowshoe hares and surviving in areas that have cold winters with deep, fluffy snow for extended periods. These adaptations provide lynx a competitive advantage over potential competitors, such as bobcats (*Lynx rufus*) or coyotes (*Canis latrans*) (McCord and Cardoza 1982, p. 748; Buskirk et al. 2000a, pp. 86-95; Ruediger et al. 2000, p. 1-11; Ruggiero et al. 2000, pp. 445, 450). Bobcats and coyotes have a higher foot load (more weight per surface area of foot), which causes them to sink into the snow more than lynx. Therefore, bobcats and coyotes cannot efficiently hunt in fluffy or deep snow and are at a competitive disadvantage to lynx. Long-term snow conditions presumably limit the winter distribution of potential lynx competitors such as bobcats (McCord and Cardoza 1982, p. 748) or coyotes.

Lynx habitat needs are understood in the general sense that lynx only persist in areas that have high landscape-scale densities of snowshoe hares. These areas tend to have boreal forest attributes such as high density conifer forest and winters characterized by deep snow coverage. We do not know exactly what snowshoe hare densities will promote lynx persistence. Therefore, we use evidence of lynx use and reproduction in an area to inform decisions about what areas may consistently provide for the needs of lynx and allow populations to become established. Because of the patchiness and temporal nature of high-quality snowshoe hare habitat, lynx populations require large boreal forest landscapes to ensure that sufficient high quality snowshoe hare habitat is available and to ensure that lynx may move freely among patches of suitable habitat and among subpopulations of lynx. Populations that are composed of a number of discrete subpopulations, connected by dispersal, are called metapopulations (McKelvey et al. 2000c, p. 25). Individual lynx maintain large home ranges (reported as generally ranging between 12 to 83 square miles (mi²) (31 to 216 square kilometers (km²)) (Koehler 1990, p. 847; Aubry et al. 2000, pp. 382-386; Squires and Laurion 2000, pp. 342-347; Squires et al. 2004b, pp. 13-16, Table 6; Vashon et al. 2005a, pp. 7-11). The size of lynx home ranges varies depending on abundance of prey, the animal's gender and age, the season, and the density of

lynx populations (Koehler 1990, p. 849; Poole 1994, pp. 612-616; Slough and Mowat 1996, pp. 951, 956; Aubry et al. 2000, pp. 382-386; Mowat et al. 2000, pp. 276-280; Vashon et al. 2005a, pp. 9-10). When densities of snowshoe hares decline, for example, lynx enlarge their home ranges to obtain sufficient amounts of food to survive and reproduce.

In the contiguous United States, the boreal forest landscape is naturally patchy and transitional because it is the southern edge of the boreal forest range. This generally limits snowshoe hare populations in the contiguous United States from achieving densities similar to those of the expansive northern boreal forest in Canada (Wolff 1980, pp. 123-128; Buehler and Keith 1982, pp. 24, 28; Koehler 1990, p. 849; Koehler and Aubry 1994, p. 84). Additionally, the presence of more snowshoe hare predators and competitors at southern latitudes may inhibit the potential for high-density hare populations (Wolff 1980, p. 128). As a result, lynx generally occur at relatively low densities in the contiguous United States compared to the high lynx densities that occur in the northern boreal forest of Canada (Aubry et al. 2000, pp. 375, 393-394) or the densities of species such as the bobcat, which is a habitat and prey generalist.

Lynx are highly mobile and generally move long distances (greater than 60 mi (100 km)) (Aubry et al. 2000, pp. 386-387; Mowat et al. 2000, pp. 290-294). Lynx disperse primarily when snowshoe hare populations decline (Ward and Krebs 1985, pp. 2821-2823; O'Donoghue et al. 1997, pp. 156, 159; Poole 1997, pp. 499-503). Subadult lynx disperse even when prey is abundant (Poole 1997, pp. 502-503), presumably to establish new home ranges. Lynx also make exploratory movements outside their home ranges (Aubry et al. 2000, p. 386; Squires et al. 2001, pp. 18-26).

The boreal forest landscape is naturally dynamic. Forest stands within the landscape change as they undergo succession after natural or human-caused disturbances such as fire, insect epidemics, wind, ice, disease, and forest management (Elliot-Fisk 1988, pp. 47-48; Agee 2000, pp. 47-69). As a result, lynx habitat within the boreal forest landscape is typically patchy because the boreal forest contains stands of differing ages and conditions, some of which are suitable as lynx foraging or denning habitat (or will become suitable in the future due to forest succession) and some of which serve as travel routes for lynx moving between foraging and denning habitat (McKelvey et al. 2000a, pp. 427-434; Hoving et al. 2004, pp. 290-292).

Snowshoe hares comprise a majority of the lynx diet (Nellis et al. 1972, pp. 323-325; Brand et al. 1976, pp. 422-425; Koehler 1990, p. 848; Apps 2000, pp. 358-359, 363; Aubry et al. 2000, pp. 375-378; Mowat et al. 2000, pp. 267-268; von Kienast 2003, pp. 37-38; Squires et al. 2004b, p. 15, Table 8). When snowshoe hare populations are low, female lynx produce few or no kittens that survive to independence (Nellis et al. 1972, pp. 326-328; Brand et al. 1976, pp. 420, 427; Brand and Keith 1979, pp. 837-838, 847; Poole 1994, pp. 612-616; Slough and Mowat 1996, pp. 953-958; O'Donoghue et al. 1997, pp. 158-159; Aubry et al. 2000, pp. 388-389; Mowat et al. 2000, pp. 285-287). Lynx prey opportunistically on other small mammals and birds, particularly during lows in snowshoe hare populations, but alternate prey species may not sufficiently compensate for low availability of snowshoe hares, resulting in reduced lynx populations (Brand et al. 1976, pp. 422-425; Brand and Keith 1979, pp. 833-834; Koehler 1990, pp. 848-849; Mowat et al. 2000, pp. 267-268).

In northern Canada, lynx populations fluctuate in response to the cycling of snowshoe hare populations (Hodges 2000a, pp. 118-123; Mowat et al. 2000, pp. 270-272). Although snowshoe hare populations in the northern portion of their range show strong, regular population cycles, these fluctuations are generally much less pronounced in the southern portion of their range in the contiguous United States (Hodges 2000b, pp. 165-173). In the contiguous United States, the degree to which regional lynx population fluctuations are influenced by local snowshoe hare population dynamics is unclear. However, it is anticipated that because of natural fluctuations in snowshoe hare populations, there will be periods when lynx densities are extremely low.

Because lynx population dynamics, survival, and reproduction are closely tied to snowshoe hare availability, snowshoe hare habitat is a component of lynx habitat. Lynx generally concentrate their foraging and hunting activities in areas where snowshoe hare populations are high (Koehler et al. 1979, p. 442; Ward and Krebs 1985, pp. 2821-2823; Murray et al. 1994, p. 1450; O'Donoghue et al. 1997, pp. 155, 159-160 and 1998, pp. 178-181). Snowshoe hares are most abundant in forests with dense understories that provide forage, cover to escape from predators, and protection during extreme weather (Wolfe et al. 1982, pp. 665-669; Litvaitis et al. 1985, pp. 869-872; Hodges 2000a, pp. 136-140 and 2000b, pp. 183-195). Generally, hare densities are higher in regenerating, earlier successional forest stages because they have greater understory structure than mature forests (Buehler and Keith 1982, p. 24; Wolfe et al. 1982, pp. 665-669; Koehler 1990, pp. 847-848; Hodges 2000b, pp. 183-195; Homyack 2003, pp. 63, 141; Griffin 2004, pp. 84-88). However, snowshoe hares can be abundant in mature forests with dense understories (Griffin 2004, pp. 53-54).

Historical Range/Distribution

Lynx were listed in 2000 within what was determined to be the contiguous United States Distinct Population Segment (DPS), which included the known current (2000) and historical range of the lynx (68 FR 40080). This range included portions of the States of Colorado, Idaho, Maine, Minnesota, Montana, Washington, and Wyoming, and also areas that could support dispersers – portions of the above States along with portions of Michigan, New Hampshire, New York, Oregon, Utah, Vermont, and Wisconsin (68 FR 40099). Other areas outside of boreal forest, where dispersing lynx had only been sporadically documented in the past, were not considered to be within the range of the lynx, because they were deemed currently incapable of supporting dispersing lynx. These areas included Connecticut, Indiana, Iowa, Massachusetts, Nebraska,

Nevada, North Dakota, Ohio, Pennsylvania, South Dakota, and Virginia (68 FR 40099). New Mexico was not included in this list of states because no lynx occurred there, and we had no information to indicate that lynx had ever been documented there, even sporadically.

Current Range/Distribution

The current range of lynx includes all of the historic range. Lynx currently exist as reproducing populations in the North Cascades of Washington, Northern Rockies of Montana and Idaho, the Greater Yellowstone Area of Wyoming, Montana and Idaho, northeastern Minnesota, and northern Maine. Lynx also exist as a reintroduced population in the southern Rocky Mountains

of Colorado and have moved from Colorado into adjacent states including New Mexico.

Based on the historic lack of evidence of lynx occurrence in New Mexico (McKelvey et al. 2000a, Table 8.1) and the recent evidence of lynx dispersal attempts into northern New Mexico (Shenk 2007, pp. 29-31), we determined that lynx in New Mexico represent attempted dispersers, rather than lynx establishing residency in suitable habitat as defined in our clarification of findings (68 FR 40076, p. 40077). We also believe that the habitat in New Mexico is a population “sink,” in that it is unlikely to support lynx reproduction to the extent that recruitment will ever be able to offset population mortality, even absent any human-caused mortality. However, as we stated in 2003, at the time of listing we considered lynx found in population sinks such as New Mexico to be dispersers but we included these areas within the range of lynx (68 FR 40076, p. 40080).

Habitat in New Mexico that may support all or a portion of lynx life-history needs is limited to the San Juan and Sangre de Cristo mountains in the northern part of the State. Both of these ranges are contiguous with mountains in Colorado where reintroduced lynx are residing and have reproduced. Both of these mountain ranges have snowshoe hares (Malaney and Frey 2006, p. 879); however, densities at the landscape scale (i.e., the scale of a lynx home range) are low (0.32 hares per acre (ac)) (0.13 hares per hectare (ha)) before seasonal recruitment) and are likely not high enough to support resident lynx (Malaney 2003, pp. 65, 87, 90).

Most of the habitat in question is managed by the Carson and Santa Fe National Forests of the U.S. Forest Service (USFS). Approximately 596,000 ac (241,193 ha) of spruce-fir forest types lie within this area, 440,000 ac of which are on National Forest system lands (USFS 2009, pp. 5-6). On the Carson and Santa Fe National Forests, approximately 536,400 ac (217,073 ha) have characteristics of potential lynx habitat (spruce fir and other cold, wet conifer forest types), about 45% of which occurs in designated wilderness (USFS 2009, p. 7). As a reference, in the reintroduced Colorado lynx population the average lynx home range size is 108,109 ac (43,750 ha) (calculated from data in Shenk 2007, p. 11). Other small patches of isolated spruce-fir and mixed conifer habitats occur in northern New Mexico, but due to their small size, they are not considered to have any value as lynx habitats (USFS 2009, p. 7).

Population Estimates/Status

We have no information that lynx currently reside in New Mexico year-round or have established home ranges or reproduced. Between September 1999 and March 2007, 60 individual lynx (37 females, 23 males) were observed to cross into New Mexico during monitoring for the Colorado Division of Wildlife reintroduction program (Shenk 2007, p. 10). Many of these lynx passed back into Colorado after short forays into New Mexico, 14 mortalities occurred in New Mexico, and some lynx may have resided in New Mexico year-round, although that has not been documented (Shenk 2009c, pp. 15). From September 1999 through August 2009, CDOW found no evidence that any of the 37 female lynx that have moved into New Mexico reproduced or attempted to reproduce (Shenk 2009c, p. 15). However, CDOW does not monitor lynx that leave the State of Colorado as intensively as it does in Colorado. Based on this information we conclude that New Mexico is likely to host lynx that attempt to disperse out of the Colorado reintroduction area, but that these lynx are best considered transient to the area and are not expected to reside in New Mexico permanently due to naturally marginal habitat conditions. Therefore, the lack of an established population in New Mexico is not considered to be of conservation concern.

THREATS

In our finding of December 17, 2009 (74 FR 66937), we determined that lynx in New Mexico were warranted for listing due to their presence in the state as a result of the Colorado reintroduction effort. We did not analyze threats in that finding because threat information had no bearing on the finding, rather the finding was that the 2000 rule listing lynx should be corrected to include the state of New Mexico because lynx crossing the border into New Mexico would lose ESA protections. Therefore, we find that it is not appropriate to analyze threats information for the Candidate Notice of Review as well.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

There are no conservation measures for lynx, either planned or implemented in New Mexico.

RECOMMENDED CONSERVATION MEASURES

- Promulgate State regulations that would prohibit the trapping or otherwise deliberate taking of Canada lynx in New Mexico.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

RATIONALE FOR LISTING PRIORITY NUMBER

We are assigning a listing priority number (LPN) of 12 to amending the listing of lynx to include New Mexico in the listed DPS. We assign an LPN of 1 to 12 (higher number being of lower priority), depending on the magnitude of threats (high vs. moderate to low), immediacy of threats (imminent or nonimminent), and taxonomic status of the species (in order of priority: monotypic genus (a species that is the sole member of a genus); species; or part of a species (subspecies, DPS, or significant portion of the range)). We are assigning an LPN of 12 based on nonimminent threats of a low magnitude to the lynx DPS occurring from human-caused mortality to lynx dispersing to New Mexico and the lack of protection under the Act for these lynx. Human-caused mortality is a factor affecting lynx in New Mexico; however, this impact does not occur at a level such that it creates a significant threat to lynx in the contiguous United States and to the DPS as a whole. The magnitude of threats to the lynx DPS, inclusive of those lynx in New Mexico, is low. The threats occur infrequently and are nonimminent. We do not consider lynx in New Mexico to be essential to the survival or recovery of the DPS. Furthermore, as described above, the amount of suitable habitat for lynx in New Mexico is considered negligible relative to the amount of habitat within the listed range. Potential impacts to the habitat have not been documented to threaten lynx, either in New Mexico or outside of it. The areas outside the currently listed area are not essential to the conservation of the species. The majority of lynx and its habitats within the DPS are already protected by the Act. Because lynx in the lower 48 are listed as a DPS, the appropriate LPN for this level of magnitude and immediacy of threats is 12.

YES Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? NO. Because we have determined that lynx occurring outside the currently listed DPS area are not essential for the conservation of the species, and threats identified to lynx in New Mexico are determined to be nonimminent and of low magnitude for the species in the lower 48 (DPS) as a whole, the Secretary has determined not to exercise his discretion to invoke the provisions to immediately put the protections of the Act in place for the Canada lynx in New Mexico.

DESCRIPTION OF MONITORING

No formal Monitoring is conducted for this species in New Mexico.

COORDINATION WITH STATES

Indicate which state(s) (within the range of the species) provided information or comments on the species or latest species assessment: New Mexico, Colorado.

Indicate which state(s) did not provide any information or comments: None.

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: *Mark E Walsh* 5/26/10
Deputy Regional Director, Fish and Wildlife Service Date

Concur: *Royan W Gould* Date: October 22, 2010
ACTING
Director, Fish and Wildlife Service

Do not concur: _____
Director, Fish and Wildlife Service Date _____