Environmental Assessment

Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx

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1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The U.S. Fish and Wildlife Service (Service) is proposing to re-designate critical habitat for the contiguous United States distinct population segment of the Canada lynx (*Lynx canadensis*) (hereafter referred to as lynx). Lynx were listed as threatened under the Endangered Species Act of 1973, as amended (ESA) on March 24, 2000. Critical habitat designation is required by the ESA for listed species. The purpose of the ESA is to conserve the ecosystems upon which threatened and endangered species depend. Critical habitat designation identifies areas that contain the physical and biological features essential to the conservation of lynx and that may require special management or protection. The U.S. District Court for the District of Columbia instructed the Service to propose critical habitat by November 1, 2005, and issue a final rule for critical habitat by November 1, 2006. The Service published the Proposed Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx on November 9, 2005 (70 FR 68294). A clarification of the proposal and reopening of the public comment period was published on February 16, 2006 (71 FR 8258). The final rule designating critical habitat for lynx published in the Federal Register on November 9, 2006 (71 FR 66007). On July 20, 2007, the Service announced that we would review the November 9, 2006 final rule after questions were raised about the integrity of scientific information used and whether the decision made was consistent with the appropriate legal standards. Based on our review of the previous final critical habitat designation, we have determined that it is necessary to revise critical habitat, and this rule proposes those revisions. On January 15, 2008, the U.S. District Court for the District of Columbia issued an order stating the Service's deadlines for a proposed rule for revised critical habitat by February 15, 2008, and a final rule for revised critical habitat by February 15, 2009.

This Environmental Assessment (EA) presents the purpose of and need for critical habitat designation, the proposed action and alternatives, and an evaluation of the direct, indirect, and cumulative effects of the alternatives pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA) as implemented by the Council on Environmental regulations (40 CFR 1500, et seq.) and according to the U.S. Department of Interior (USDI) NEPA procedures. This EA was used by the Service to decide whether critical habitat would be designated as proposed, if the Proposed Action required refinement, or if further analyses was needed through preparation of an Environmental Impact Statement (EIS). The Proposed Action was selected as described, with minimal changes, and no further environmental analyses is needed; a Finding of No Significant Impact (FONSI) is the appropriate conclusion of this process.

1.1 Introduction

1.1.1 Purpose of the Action

The purpose of this proposed action is to re-designate critical habitat for the lynx. A primary purpose of the ESA is to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved and

endangered species depend" (section 2(b)). Critical habitat designation identifies areas that contain the physical and biological features essential to the conservation of lynx and that may require special management considerations or protection (section 3(5)(A)). The designation also describes the physical and biological features essential to the conservation of lynx known as the Primary Constituent Element (PCE).

1.1.2 Need for the Action

The need for this action is to comply with section 4 of the ESA, which requires that critical habitat be designated for endangered and threatened species unless such designation is not prudent. The Service published the final rule listing the contiguous United States distinct population segment of the Canada lynx as threatened on March 24, 2000 (65 FR 16052). The lynx is listed in portions of 14 States--Colorado, Idaho, Maine, Michigan, Minnesota, Montana, New Hampshire, New York, Oregon, Utah, Vermont, Washington, Wisconsin, and Wyoming.

The final listing rule for the lynx indicated that designation of critical habitat for the lynx was prudent. On January 15, 2004, the U.S. District Court for the District of Columbia ordered the Service to propose critical habitat by November 1, 2005, and issue a final critical habitat rule by November 1, 2006. The final rule designating critical habitat for lynx published in the Federal Register on November 9, 2006 (71 FR 66007). On July 20, 2007, the Service announced that we would review the November 9, 2006 final rule after questions were raised about the integrity of scientific information used and whether the decision made was consistent with the appropriate legal standards. Based on our review of the previous final critical habitat designation, we have determined that it is necessary to revise critical habitat, and this rule proposes those revisions. On January 15, 2008, the U.S. District Court for the District of Columbia issued an order stating the Service's deadlines for a proposed rule for revised critical habitat by February 15, 2008, and a final rule for revised critical habitat by February 15, 2009.

Critical habitat is one of several provisions of the ESA that aid in protecting the habitat of listed species until populations have recovered and threats have been addressed so that the species can be removed from the list of threatened and endangered species. Critical habitat designation is intended to assist in achieving long-term protection and recovery of lynx and the ecosystems upon which they depend. Section 7(a)(2) of the ESA requires consultation for Federal actions that may affect critical habitat to avoid destruction or adverse modification of this habitat. Further explanation of critical habitat and its implementation is provided below. Under section 4(b)(2) of the ESA, the Secretary shall designate critical habitat on the basis of the best scientific data available and after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species.

1.2 Background

1.2.1 Canada Lynx

Canada lynx are medium-sized cats, generally measuring 75-90 centimeters (30-35 inches) long and weighing 8-10.5 kilograms (18-23 pounds) (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.

Lynx are highly specialized predators of snowshoe hare (*Lepus americanus*) (McCord and Cardoza 1982; Quinn and Parker 1987; Aubry et al. 2000). Lynx and snowshoe hares are strongly associated with what is broadly described as boreal forest (Bittner and Rongstad 1982; McCord and Cardoza 1982; Quinn and Parker 1987; Agee 2000; Aubry et al. 2000; Hodges 2000a, b; McKelvey et al. 2000b). The predominant vegetation of boreal forest is conifer trees, primarily species of spruce (*Picea* spp.) and fir (*Abies* spp.) (Elliot-Fisk 1988). In the contiguous United States, the boreal forest types transition to deciduous temperate forest in the Northeast and Great Lakes and subalpine forest in the west (Agee 2000). 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; Agee 2000; Aubry et al. 2000; Buskirk et al. 2000b; Ruggiero et al. 2000).

Snow conditions also determine the distribution of lynx (Ruggiero et al. 2000). 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; Buskirk et al 2000a; Ruediger et al. 2000; Ruggiero et al. 2000). 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) or coyotes.

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 at any point in time 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). Individual lynx maintain large home ranges (reported as generally ranging between 31-216 km^2 [12-83 mi^2]) (Koehler 1990; Aubry et al. 2000; Squires and Laurion 2000; Squires et al. 2004; Vashon et al. 2005). The size of lynx home ranges varies depending on abundance of prey, the animal's gender and age, season, and the density of lynx populations (Koehler 1990; Poole 1994; Slough and Mowat 1996; Aubry et al. 2000; Mowat et al. 2000; Vashon et al. 2005). 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; Buehler and Keith 1982; Koehler 1990; Koehler and Aubry 1994). Additionally, the presence of more snowshoe hare predators and competitors at southern latitudes may inhibit the potential for high-density hare populations (Wolff 1980). 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) or the densities of a species such as the bobcat, which is a habitat and prey generalist.

Lynx are highly mobile; long-distance movements (greater than 100 km (60 mi)) are characteristic (Aubry et al. 2000; Mowat et al. 2000). Lynx disperse primarily when snowshoe hare populations decline (Ward and Krebs 1985; O'Donoghue et al. 1997; Poole 1997). Subadult lynx also disperse even when prey is abundant (Poole 1997), presumably to establish new home ranges. Lynx also make exploratory movements outside their home ranges (Aubry et al. 2000; Squires et al. 2001).

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;Agee 2000). As a result, lynx habitat within the boreal forest landscape is naturally patchy because the boreal forest contains stands of differing ages and conditions, only some of which are suitable as lynx foraging or denning habitat at any point in time (McKelvey et al. 2000a; Hoving et al. 2004).

Snowshoe hares comprise a majority of the lynx diet (Nellis et al. 1972; Brand et al. 1976; Koehler 1990; Apps 2000; Aubry et al. 2000; Mowat et al. 2000; von Kienast 2003; Squires et al. 2004). When snowshoe hare populations are low, female lynx produce few or no kittens that survive to independence (Nellis et al. 1972; Brand et al. 1976; Brand and Keith 1979; Poole 1994; Slough and Mowat 1996; O'Donoghue et al. 1997, Aubry et al. 2000; Mowat et al. 2000). Lynx prey opportunistically on other small mammals and birds, particularly during lows in the snowshoe hare population, but alternate prey species may not sufficiently compensate for low availability of snowshoe hares, resulting in reduced lynx populations (Brand et al. 1976; Brand and Keith 1979; Koehler 1990; Mowat et al. 2000).

In northern Canada, lynx populations fluctuate in response to the cycling of snowshoe hare populations (Hodges 2000a; Mowat et al. 2000). 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 the range in the contiguous United States (Hodges 2000b). In the contiguous United States, the degree to which regional local 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 recruitment 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; Ward and Krebs 1985; Murray et al. 1994; O'Donoghue et al. 1997, 1998). 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; Litvaitis et al. 1985; Hodges 2000a, b). Generally, hare densities are higher in regenerating, earlier successional forest stages because they have greater understory structure than mature forests (Buehler and Keith 1982; Wolfe et al. 1982; Koehler 1990; Hodges 2000b; Homyack 2003; Griffin 2004). However, snowshoe hares can be abundant in mature forests with dense understories (Griffin 2004).

Within the boreal forest, lynx den sites are located where coarse woody debris, such as downed logs and windfalls, provides security and thermal cover for lynx kittens (McCord and Cardoza 1982; Koehler 1990; Slough 1999; Squires and Laurion 2000; J. Organ, Service, in litt. 2001). The amount of structure (e.g., downed, large woody debris) appears to be more important than the age of the forest stand for lynx denning habitat (Mowat et al. 2000).

Additional information on the biology and status of the lynx can be found in the final listing rule published in the *Federal Register* on March 24, 2000 (65 FR 16052) and the clarification of findings published in the *Federal Register* on July 3, 2003 (68 FR 40076).

1.2.2 Previous Federal Actions

On July 8, 1998, the Service published a proposed rule to list the lynx as threatened (63 FR 36994). The Service published a final rule listing the lynx as threatened on March 24, 2000, and found that the designation of critical habitat for the lynx was prudent (65 FR 16052). As a result of an order from the U.S. District Court for the District of Columbia (Court) the Service again determined the lynx was threatened in a clarification of findings published on July 3, 2003 (68 FR 40076). The Court ordered the Service to propose critical habitat by November 1, 2005, and issue a final critical habitat rule by November 1, 2006. The final rule designating critical habitat for lynx published in the Federal Register on November 9, 2006 (71 FR 66007). On July 20, 2007, the Service announced that we would review the November 9, 2006 final rule after questions were raised about the integrity of scientific information used and whether the decision made was consistent with the appropriate legal standards. Based on our review of the previous final critical habitat designation, we have determined that it is necessary to revise critical habitat, and this rule proposes those revisions. On January 15, 2008, the U.S. District Court for the District of Columbia issued an order stating the Service's deadlines for a proposed rule for revised critical habitat by February 15, 2008, and a final rule for revised critical habitat by February 15, 2009.

1.3 Critical Habitat

Section 4(a)(3) of the ESA states that critical habitat shall be designated to the maximum extent prudent and determinable and that such designation may be revised periodically, as appropriate. Section 4(b)(2) of the ESA requires that critical habitat designation be based on the best scientific information available and that economic and other impacts must be considered. Areas may be excluded from critical habitat designation if it is determined that the benefits of excluding them outweigh the benefits of their inclusion, unless failure to designate such areas will result in the extinction of the species.

Critical habitat is defined in section 3(5)(A) of the ESA as: (i) the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the ESA, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Section 3(5)(C) also states that critical habitat "shall not include the entire geographical area which can be occupied by the threatened or endangered species" except when the Secretary of DOI determines that the areas are essential for the conservation of the species.

The term "conservation" as defined in section 3(3) of the ESA means "to use and the use of all methods and procedures which are necessary to bring an endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary."

Within the geographic area occupied by the species, the Service will designate only areas currently known to support the physical and biological features essential to the conservation of the species. If information available at the time of designation does not show an area provides features essential for the conservation of the species or that the area may require special management considerations or protection, then the area should not be included in the critical habitat designation.

Habitat is often dynamic, and species may move from one area to another over time. Furthermore, we recognize designation of critical habitat may not include all habitat eventually determined as necessary to recover the species. For these reasons, areas outside the critical habitat designation will continue to be subject to conservation actions that may be implemented under section 7(a)(1) and the regulatory protections afforded by section 7(a)(2) jeopardy standard and the section 9 take prohibition, as determined on the basis of the best available information at the time of the action. We specifically anticipate that federally funded or assisted projects affecting listed species

outside their designated critical habitat areas may still result in jeopardy findings in some cases. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans, or other species conservation planning efforts if new information available to planning efforts calls for a different outcome. Critical habitat contributes to the recovery strategy but does not by itself achieve recovery plan goals.

1.3.1 Consequences of Designation, the Section 7 Consultation Process

Section 7(a)(2) of the ESA requires every Federal agency, in consultation with and with the assistance of the Secretary, to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. In fulfilling these requirements, each agency is to use the best scientific and commercial data available. This section of the ESA sets out the consultation process, which is further implemented by regulation (50 CFR Part 402).

Each Federal agency is to review its actions at the earliest possible time to determine whether any action may affect listed species or critical habitat. If the action may affect a listed species or critical habitat, consultation with the Service is needed. Informal consultation is an optional process that includes all discussions and correspondence between the Service and a Federal agency or designated non-Federal representative, designed to assist the Federal agency in determining whether formal consultation or a conference is required. If during consultation it is determined by the Federal agency, with the written concurrence of the Service, that the action is not likely to adversely affect listed species or critical habitat, the consultation process is terminated, and no further action is necessary.

During informal consultation, the Service may suggest modifications to the action that the Federal agency and any applicant could implement to avoid the likelihood of adverse effects to listed species or critical habitat. If the proposed action is likely to adversely affect a listed species or designated critical habitat, formal consultation with the Service is required. Formal consultation is a process between the Service and a Federal agency or applicant that--(1) determines whether a proposed Federal action is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat; (2) begins with a Federal agency's request and submittal of a complete initiation package; and (3) concludes with the issuance of a biological opinion and incidental take statement by the Service.

With the request to initiate formal consultation, the Federal agency is to include--(1) a description of the proposed action, (2) a description of the area that may be affected, (3) a description of any listed species or critical habitat that may be affected, (4) a description of the manner in which the listed species or critical habitat may be affected and an analysis of cumulative effects, (5) relevant reports including any environmental

impact statement, environmental assessment, or biological assessment, and (6) any other relevant and available information.

Unless an extension is provided, formal consultation concludes 90 days after its initiation. Within 45 days after concluding formal consultation, the Service is to deliver a biological opinion to the Federal agency and any applicant. The biological opinion will include the Service's opinion on whether the action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. If the action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat, the biological opinion will include a reasonable and prudent alternative, if any exist. A reasonable and prudent alternative is a recommended alternative action that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, that is economically and technologically feasible, and that would avoid the likelihood of jeopardizing the continued existence of the listed species or the destruction or adverse modification of designated critical habitat.

Additionally, in those cases where the Service concludes that an action (or the implementation of any reasonable and prudent alternatives) and the resultant incidental take of listed species will not violate section 7(a)(2), the Service will provide with the biological opinion a statement concerning incidental take that--(1) specifies the impact of the take on the species, (2) specifies the reasonable and prudent measures to minimize the impact, (3) sets forth terms and conditions that must be complied with by the Federal agency or any applicant to implement the reasonable and prudent measures, and (4) specifies procedures to handle any individuals actually taken. Reasonable and prudent measures, along with the terms and conditions that implement them, cannot alter the basic design, location, scope, duration, or timing of the actions and may involve only minor changes. Any taking covered in the incidental take statement and in compliance with the terms and conditions of the statement is not prohibited taking under the ESA and no other authorization or permit under the ESA is required.

1.3.2 Proposed Primary Constituent Element

In accordance with sections 3(5)(A) and 4(b)(2) of the ESA and regulations at 50 CFR 424.12, in determining which areas to propose as critical habitat, the Service is required to base critical habitat determinations on the best scientific data available to identify the physical and biological features that are essential to the conservation of the species and that may require special management considerations or protection. These features include, but are not limited to--(1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing (or development) of offspring; and (5) habitats protected from disturbance or that are representative of the historic geographical and ecological distributions of a species.

Generally, lynx habitat is broadly described as the boreal forest landscape. In the contiguous United States, the boreal forest is more transitional rather than true boreal

forest of northern Canada and Alaska (Agee 2000). This difference is because the boreal forest is at its southern limits in the contiguous United States, where it transitions to deciduous temperate forest in the Northeast and Great Lakes and subalpine forest in the west (Agee 2000). The Service uses the term "boreal forest" because it generally encompasses most of the vegetative descriptions of the transitional forest types that comprise lynx habitat in the contiguous United States (Agee 2000).

The specific biological and physical features, otherwise known as the PCE, essential to the conservation of the lynx are:

Boreal forest landscapes supporting a mosaic of differing successional forest stages and containing:

a) Presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees or shrubs tall enough to protrude above the snow; and mature multistoried stands with conifer boughs touching the snow surface
b) Winter snow conditions that are generally deep and fluffy for extended periods of time; and
c) Sites for denning having abundant coarse woody debris, such as downed trees and root wads.
d) Matrix habitat that allows lynx to access patches of boreal forest where that habitat is not uniformely distributed.

1.3.3 Criteria for Defining Essential Habitat

The criteria for defining essential habitat are described in the proposal to designate critical habitat for the lynx (February 28, 2008; 73 FR 10860).

2 DESCRIPTION OF ALTERNATIVES

This section describes the proposal for critical habitat for the lynx. Alternatives are different ways of meeting the purposed and need for critical habitat designation as described in Chapter One, which can be summarized as to provide protection of habitat that is essential to the conservation of listed species.

Alternative A - No Action Alternative

Alternative A, the No Action alternative is defined as no designation of critical habitat for Canada lynx. An analysis of a No Action alternative is required by NEPA, and it provides a baseline for analyzing effects of action alternatives.

Alternative B – Proposed Action

Alternative B, the proposed action, would designate critical habitat in portions of northern Maine (Unit 1), northeastern Minnesota (Unit 2), the Northern Rocky Mountains, (northwestern Montana and northeastern Idaho) (Unit 3), north-central Washington (Unit 4), and the Greater Yellowstone Area (Unit 5). The approximate size of the proposed CHUs under Alternative B is shown in Table 1. Table 2 shows the land ownership of the areas proposed for critical habitat designation under Alternative B.

TABLE 1. Alternative B: Approximate Area of Five CHUs Proposed for Lynx.

CRITICAL HABITAT UNIT	Miles^2	Kilometers^2
1. Maine	9,497.2	24,597.5
2. Minnesota	8,065.1	20,888.4
3. Northern Rocky Mountains (Idaho/Montana)	10,101.6	26,162.9
4. Northern Cascades (Washington)	1,835.9	4,755.0
5. Greater Yellowstone Area	9,500.5	24,606.1
Total[1]	**39,000.3**	**101,009.9**

TABLE 2. Alternative B: Critical Habitat Proposed for Canada Lynx by Land Ownership and State (mi^2).

STATE	Federal	State	Private	Tribal	Other
Idaho	51	0	0	0	0
Maine	13	755	8,705	0	23
Minnesota	3,843	2,225	1,966	0	31
Montana	11,383	322	1,074	0	419
Washington	1,830	0	5	0	0
Wyoming	6,635	7	53	0	19
Total	**23,755**	**3,309**	**11,803**	**3**	**125**
% Total Lands Proposed for Designation	**60.9**	**8.5**	**30.3**	**0**	**0.3**

[1] Due to differences in rounding precision, the total miles^2 presented in Table 1 are slightly less than the total in Table 2.

Each of these Units in Alternative B is considered to have been occupied by lynx at the time of listing or since. Each Unit contains the physical and biological features (PCE) that are essential to the conservation of lynx: boreal forest landscapes supporting a mosaic of differing successional forest stages and containing--(a) presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees or shrubs tall enough to protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface; (b) winter snow conditions that are generally deep and fluffy for extended periods of time; (c) sites for denning that have abundant coarse woody debris, such as downed trees and root wads; and (d) matrix habitat that does not provide habitat for snowshoe hares or lynx breeding sites, but is used by lynx as they travel between foraging areas and foraging and breeding areas. As a

result, each Unit contains habitat to provide space for individual and population growth and for normal behavior; food; cover or shelter; sites for denning and rearing of offspring; and conditions that complement the physiological adaptations of lynx for hunting in snow. The Units proposed for designation in Alternative B provide boreal forest habitat for breeding, non-breeding, and dispersing lynx in metapopulations across the species' range in the contiguous United States.

Areas may be excluded from the final critical habitat designation after consideration of economic impact or any other relevant impact if the Secretary determines that the benefits of such exclusion outweigh the benefits of specifying such areas as part of the critical habitat.

2.1 Alternatives Considered but Not Fully Evaluated

2.1.1 Designation of All Areas Within the Geographic Range of the Lynx in the Contiguous United States

The lynx was listed in the 14 States that supported both boreal forest habitat types and verified records of lynx. Designating critical habitat in every area considered within the geographic range of lynx was not carried forward as an alternative because the ESA specifies that except in those circumstances determined by the Secretary, critical habitat shall not include the entire geographic area which can be occupied by the species. Furthermore, many of the areas within the geographic range do not meet the criteria for critical habitat in that they do not have evidence of supporting breeding populations of lynx.

2.1.2 Designation of Recovery Areas As Described Within the Recovery Outline for the Lynx

In 2005, the Service completed a recovery outline for the lynx. Recovery outlines are brief, internally-developed documents intended as preliminary strategies for conservation of listed species until a formal recovery plan is completed. The lynx recovery outline was prepared by Service staff experienced in lynx conservation and/or recovery planning under the ESA and two lynx experts from the U.S. Forest Service (USFS). The lynx recovery outline presents current understandings of historical and current lynx distribution, ecology, and population dynamics. The outline introduces concepts regarding the relative importance of different geographic areas to the persistence of lynx in the contiguous United States, identifying areas as either core, provisional core, secondary, or peripheral based primarily on lynx records over time and evidence of reproduction. Additionally, the outline describes preliminary recovery objectives and actions. The Recovery outline was not analyzed as an alternative since it did not meet the criteria for critical habitat in the proposed rule (as described in the rule itself) and was not rigorously developed to satisfy the needs of this critical habitat designation. While the recovery outline provides important information that was used in

the critical habitat designation process, it was not sufficient to be carried forward as an alternative.

2.2 Comparison of Alternatives

The following Table 5 summarizes the potential effects of the alternative critical habitat designations. Potential effects on resources are summarized from the analyses presented in Chapter 4.

TABLE 5. Comparison of Potential Effects of Lynx Critical Habitat Designation Alternatives by Resource Category.

Resource Category	Alternative A No Action Alternative	Alternative B
Total miles^2	0	39,000.3 miles^2
Number of CHUs	0	5

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The areas designated as lynx critical habitat are rural, forested lands. Uses and activities are primarily related to forest management, wildland fire management, and recreation. Private, county, State, and Federal lands are included in the proposed action except in the case of lands that have been excluded under Section 4(b)(2) of the Act and Tribal lands which were excluded under Secretarial Order 3206. Lands excluded under Section 4(b)(2) of the Act include lands enrolled in the Maine Healthy Forest Reserve Program and lands managed by the Washington Department Natural Resources Conservation.

The designation of critical habitat directly affects only Federal agencies. The ESA requires Federal agencies to ensure that actions they fund, authorize, or carry out do not destroy or adversely modify critical habitat to the extent that the action appreciably diminishes the value of the critical habitat for the survival and recovery of the species. Individuals, organizations, States, local and Tribal governments, and other non-Federal entities are only affected by the designation of critical habitat if their actions occur on Federal lands, require a Federal permit, license, or other authorization, or involve Federal funding (for example, section 404 Clean Water Act permits from the U.S. Army Corps of Engineers or funding of activities by the Natural Resource Conservation Service).

For purposes of this discussion, proposed action area refers to the area described under Alternative B and in the Final Rule. In the Draft Economic Analysis (Industrial Economics, Inc 2008) the proposed action area is referred to as the study area.

Physical Environment

The areas considered for designation as lynx critical habitat are generally described as boreal or cold temperate forest having cold winters with deep snow and providing a snowshoe hare prey base (Quinn and Parker 1987, McKelvey et al. 2000b, Mowat et al. 2000) (see chapter 1.1.1, above). The predominant vegetation of this forest is conifer trees, primarily species of spruce (*Picea* spp.) and fir (*Abies* spp.) (Elliot-Fisk 1988). In the contiguous United States, the boreal forest types transition to deciduous temperate forest in the Northeast and Great Lakes and subalpine forest in the west (Agee 2000).

Counties within the proposed action area, Alternative B, are:

1) Idaho (Unit 3) - Boundary

2) Maine (Unit 1) - Aroostook, Franklin, Penobscot, Piscataquis and Somerset

3) Minnesota (Unit 2) - Cook, Koochiching, Lake, and St. Louis

4) Montana (Unit 3) - Flathead, Glacier, Granite, Lake, Lewis and Clark, Lincoln, Missoula, Pondera, Powell, Teton, Gallatin, Park, Sweetgrass, Stillwater, and Carbon

5) Washington (Unit 4) - Chelan and Okanogan

6) Wyoming (Unit 5) – Fremont, Lincoln, Park, Sublette, and Teton

3.1 Fish, Wildlife and Plants

3.1.1 Threatened and Endangered Species

As lynx has already been discussed in previous sections, it will not be discussed in detail in this section. The following is a list and a summary of effects for all the threatened, endangered and proposed wildlife species which may be found in lynx habitat and lynx linkage areas. Plant species will be summarized in the plant section of this chapter.

Federally listed species that could occur in the proposed action area, in addition to lynx (See Section 1.1.1), are listed in Table 7. Additionally, many species of non-listed birds, mammals, fish, reptiles, and amphibians also use boreal forest habitat within the proposed action area, Alternative B.

Table 7 includes fish listed as threatened or endangered. Much of the lynx habitat is at relatively high elevation where streams are generally small and of low productivity and lake fisheries are often cold water, low productivity, and generally stocked to sustain recreational angling.

TABLE 7. Federally Listed Species That Could Occur in the Proposed Action Area, Alternative B.

COMMON NAME	SCIENTIFIC NAME	ESA STATUS
MAMMALS		
Gray wolf	*Canis lupus*	E/T/XN
Grizzly bear	*Ursus arctos horribilis*	T
Woodland caribou	*Rangifer tarandus caribou*	E
BIRDS		
Northern spotted owl	*Strix occidentalis caurina*	T
FISH		
Kootenai River white sturgeon	*Acipenser transmontanus*	E
Spring Chinook salmon	*Onchoryhnchus tshawytscha*	E
Steelhead trout	*Onchoryhnchus mykiss*	T
Bull trout	*Salvelinus confluentus*	T
PLANTS		
Furbish's lousewort	*Pedicularis furbishiae*	E
Easterm prairie fringed orchid	*Platanthera leucophaea*	T
Water howellia	*Howellia aquatilis*	T

E = Endangered
T = Threatened
XN = Experimental population, not essential for species survival

3.1.2 Threatened and Endangered Plant Species

NORTHERN ROCKY MOUNTAINS

No threatened or endangered plant species occur in the proposed action area outside of the Northern Rocky Mountains. There are 216 Threatened, Endangered, and Sensitive (TES) plant species that may occur in the Northern Rocky Mountains (USFS 2004a). They include 1 federally listed species, 1 candidate for listing, and 214 USFS sensitive (USFS 1999 a, b) or BLM special status plant species (BLM 2001, 2002).

These plants occur infrequently and are generally found in specific habitats. Many are found in wetlands or riparian areas. Some are found in older stands of lodgepole pine, grand fir or subalpine fir. A few are associated with young regenerating stands, and some require periodic disturbance to maintain their populations.

3.2 Forest Resources

MAINE

Maine's forest stands generally are diverse and more closely resemble "natural" forests than more intensively managed forests in other parts of the world. The composition of Maine's forests is heavily influenced by three factors: extensive areas of thin, rocky, and poorly drained soils, intermixed with scattered areas of deeper, better-drained soils; a cool climate and abundant precipitation; and recurrent insect outbreaks (Maine Land Use Regulation Commission 2006). A mixture of hardwoods and softwoods comprise the forest, changing in composition as one moves to higher elevations. North and east the principal softwoods found in Maine are spruce, fir, white pine, cedar, tamarack, and hemlock; the principal hardwoods are maple, birch, beech, oak, ash, and aspen.

MINNESOTA

The composition of Minnesota's forests in the proposed action area includes boreal, coniferous, and mixed coniferous/deciduous vegetation types dominated by pine, balsam fir, black and white spruce, northern white cedar, tamarack, aspen, paper birch, conifer bogs and shrub swamps (USFS 2004c).

NORTHERN ROCKY MOUNTAINS

Wildfire plays a major role in determining forest structure, composition, and landscape patterns in the northern Rocky Mountains (USFS 2004a). Fire history data from the Interior Columbia Basin region shows extensive fire activity at least every decade or two between the mid-1500s and the early 1900s (Barrett et al. 1997). An estimated 12 million acres burned in the northern Rockies between 1908 and 1947 (Lotan et al. 1985).

Wildfire plays a major disturbance role in the higher elevations (Ruediger et al. 2000). Although lynx habitat typically has mixed severity to stand-replacing fire regimes, some fires are low intensity, which allow some tree species to survive fire.

Species such as western larch, lodgepole pine, ponderosa pine, quaking aspen, western white pine, and whitebark pine have adapted to fire as a major disturbance agent (Fischer and Bradley 1987; Smith and Fischer 1997).

Logging has changed the landscape in some places. Extensive salvage logging took place after mountain pine beetles killed many trees during the 1960s through the 1980s in large areas in the southern and eastern parts of the northern Rocky Mountains. The cedar-hemlock zone in north Idaho and the larch-lodgepole forests of western Montana, also have a history of logging on the more accessible terrain. Timber harvest in these areas has contributed to the quantity of young regenerating forests, although fire has had a much greater impact.

Western White Pine

Western white pine (*Pinus monticola)* grows in the moist forests in northern Idaho and western Montana. This tree has been in major decline over the past 60 years. The proportion of western white pine declined from 44% in 1941 to 5% in 1979 (Graham 1990). Since the 1930s, more than 95% of western white pine cover types have converted to grand fir, Douglas fir, or western red cedar/western hemlock (USFS 1998). Only about 90,000 acres in north Idaho and western Montana still exist in the western white pine cover type.

Western white pine blister rust (*Cronartium ribicola*) spread to the Pacific Northwest from Europe by the 1920s (Graham et al. 1993) and killed many trees in northern Idaho. Naturally occurring rust-resistant wild trees were discovered in the 1940s; genetic resistance is carried in a low percentage of the population. It is the intent of selection to increase the frequency of resistant genes in western white pine planting stock (Byler et al. 1993). As such, rust-resistant trees are an important part of the genetic resource program.

Fire suppression and logging changed the distribution of western white pine. In presettlement times, low- and intermediate-intensity burns produced an irregular, patchy mosaic of vegetation. Fires frequently shortened how long the dense stem-exclusion stages lasted by thinning them and breaking holes in uniform canopies (Zack and Morgan 1994).

Western white pine is well adapted to mixed-severity fire regimes. In fact, it depends on the disturbance that fire or timber harvest provides to remove competing conifers and allow it to become established (Graham 1990). It's relatively thin bark and moderately flammable foliage make it intermediate in fire resistance (Graham 1990). In the past, fire removed competing conifer species, favoring western white pine (Graham 1990).

Whitebark Pine

Whitebark pine (*Pinus albicaulis*) is a hardy subalpine conifer that tolerates poor soils, steep slopes, and windy exposures. It grows at higher elevations across much of the northern Rockies. Currently, whitebark pine is found mainly at the timberline. It is a component of many habitat types and is distributed across a variety of site conditions in the Northern Rockies area.

In lynx habitat, whitebark pine is found in productive places where it grows densely with western white pine, spruce, and fir. It also grows in sparse clusters in exposed, rocky sites in the upper subalpine zone. The harsh conditions at whitebark pine sites do not support stem densities capable of supporting hare populations and are not considered lynx habitat.

Whitebark pine is hardier than other conifers and can become established on dry, cold subalpine sites. It is a relatively slow growing tree and can be out-competed for growing space by conifers that are more shade tolerant. Where it competes with other species that need full sun, whitebark pine is often able to maintain its presence (Tomback et al. 2001).

Historically, whitebark pine accounted for ten to 15% of the forest cover in the northern Rocky Mountains (Arno and Weaver 1990); now it amounts to only about 5%. In the Northern Rockies area, about 1.5 million acres are in the whitebark pine cover type. Blister rust and fire suppression have substantially reduced its presence. Epidemics of mountain pine beetles have further reduced isolated populations.

Historically, mixed severity fires maintained whitebark pine at high elevations by removing competing species. Without fire, whitebark pine is eventually replaced by subalpine fir and spruce. The long-term consequence of keeping fire out is changing the fire regime from mixed severity to stand-replacing (Arno and Hoff 1990; Keanne et al. 2002).

Quaking Aspen

Quaking aspen *(Populus tremuloides)* is a species that needs full sun and commonly grows in even-aged forests. Aspen is distributed throughout the northern Rockies in small, isolated areas. It is more abundant east of the Continental Divide in Montana and in the southern half of the Northern Rockies area in Wyoming and Utah (Mueggler 1985).

Some single-storied aspen forests have two distinct generations, consisting of a more or less substantial scattering of old veterans that stand among younger, more slender trees. The older trees usually are the survivors of fire a decade or more previously that killed much of the stand and gave rise to the younger trees. Many of the younger trees grow as tall as the older ones, and with them, form a closed canopy (Jones and DeByle 1985).

Conifers growing beneath aspen are generally younger than the aspen because aspen regenerates so quickly from existing roots (Sheppard and Jones 1985). Many aspen forests are threatened with invasion by shade-tolerant conifers. From 50-70% of the quaking aspen in USFS Region 1 has been lost because of fire suppression and grazing (USFS 1998). Grass, forbs, shrubs, or conifers may replace aspen in the absence of fire (Jones and DeByle 1985).

Fire has been the most important disturbance factor in aspen, changing structural stages and composition and minimizing competition by conifers. If fire takes place infrequently (every 50 years or so) and is intense enough to kill most or all of the aspen trees and the competing conifers, aspen is retained (Jones and DeByle 1985).

Mixed-severity fires where aspen grow at mid- and high elevations historically regenerated aspen and maintained the balance between aspen and conifers. Severe or repeated burns may reduce site quality, resulting in reduced growth rates.

Western Larch

Western larch *(Larix occidentalis)* is found in northern Idaho and western Montana. Larch grows in diverse habitats, ranging from moist Douglas fir and grand fir, western red cedar and western hemlock, to cooler subalpine fir sites. Larch is the conifer species that most needs full sun in the northern Rockies. It regenerates in full sunlight and large openings after major disturbance. To survive, larch must maintain a dominant position in the stand. If overtopped by other trees, larch growth will slow and the trees usually die (Fielder and Lloyd 1995). Larch is extremely well adapted to fire. Mature larch have bark that is often more than 6 inches thick, containing little resin, with branches far above the ground and foliage of low flammability.

Larch is able to tolerate crown scorch and defoliation, producing new foliage and rebranching on the trunk. At least some of the old larch usually survives even intense fires, at least long enough to produce a seed crop to regenerate receptive seedbeds (Schmidt and Shearer 1995). Even young larch wounded at the base of the stem in a surface fire, heal and continue to grow for centuries. On burned seedbeds, larch seedlings generally outgrow their competitors (Arno and Fischer 1995).

Historically, fire maintained larch (Schmidt and Shearer 1995). Stand-replacing fires burned moist larch sites at mean intervals of from 120-350 years. Low- to intermediate-intensity fires favored larch by thinning out much of the competition (Arno and Fischer 1995; Carlson et al. 1995).

After fire, a residual cover of 20% or fewer large trees was common historically (Quigley et al. 1996). This structure of large residual trees, occurring singly or in small groups, has declined in many areas. The big larch has been logged out in many places. In moist places lacking fire or thinning, trees that are more shade-tolerant can replace larch in 90-140 years. With fire or thinning, larch can maintain dominance for 200 years or more.

Western larch has declined in the northern Rockies because of fire suppression and logging (USFS 1998). Tree species composition has shifted to shade-tolerant Douglas fir, grand fir, and lodgepole pine. Because of the shift, current fire-return intervals are longer than 100 years and fire behavior is more extreme, rather than the combination of fires that favored larch (USFS 1998).

Ponderosa Pine

Ponderosa pine *(Pinus ponderosa)* is not significantly represented in lynx habitat in the northern Rockies. Generally, it grows in places too dry to support snowshoe hare

and lynx; however, it is represented in lynx habitat in the warm, moist cedar forests of northern Idaho and western Montana.

Fire has played a major role in cedar forests with ponderosa pine. The diverse species and structures indicate pre-settlement fire patterns were highly variable. Shorter fire-return intervals likely favored ponderosa pine. Most cedar forests experienced mixed-severity fire. The ponderosa pines were able to survive some stand-replacing fires (Smith and Fischer 1997).

In most of lynx habitat, shade-tolerant trees out-compete ponderosa pine without some disturbance that reduces stem densities. Even if fire were returned to these ecosystems, the younger ponderosa pine would need to be thinned out for them to grow large enough to be able to endure fire. In many places, timber harvest has removed the large pines. In other places, the big trees are so stressed from high understory stem densities that needle diseases and bark beetles are killing them at high rates.

Historically, ponderosa pine forests developed because frequent low-intensity surface fires killed the competing conifers and prepared a seedbed for the pine (Steele 1987). Low-intensity fires helped maintain them because sapling and larger ponderosa pine are more fire resistant than most other species (Oliver and Ryker 1990; Saveland and Bunting 1987).

Lodgepole Pine

Lodgepole pine *(Pinus contorta)* is the main cover type on a large portion of the Northern Rockies affected environment. Extensive landscapes of near-pure lodgepole or lodgepole/spruce/fir are common in the eastern and southern half of the Northern Rockies area. Lodgepole pine grows larger and mixes readily with western larch, grand fir, and western white pine on moister sites in the northern and western portion of the Northern Rockies area.

Lodgepole is a short-lived tree in western Montana and northern Idaho, and long-lived in eastern Montana and the central Rocky Mountains. Lodgepole is fire-adapted, establishing itself on burned areas (Lotan et al. 1985). Stocking can be as high as 10,000-40,000 stems per acre. Most lodgepole forests in the Rocky Mountains were established because of fire.

Historically, fire burned more frequently in lodgepole pine than previously believed. It used to be considered that lodgepole forests were merely the result of stand-replacing fires, but research has shown fire-free intervals of only 22-50 years in many lodgepole-dominated forests (Lotan et al. 1985), suggesting fire reduced stand densities. This indicates fire plays a role in both establishing and perpetuating lodgepole pine.

The effects of low-intensity fires in lodgepole forests depend on the availability of seed and amount of duff removed. These low-intensity fires removed some trees,

allowing others to grow into large trees. Without some disturbance, lodgepole forests become quite dense with small-diameter stems, small crowns and little diversity.

Except for extensive timber harvests in eastern Montana in the 1950s and 1960s, and mountain-pine-beetle salvage harvests in the southeast part of the Northern Rockies area in the 1970s and 1980s, fire suppression has resulted in extensive areas of mature lodgepole.

Much of it is susceptible to infestation by mountain pine beetles – large-scale infestations result in conditions favorable to stand-replacing wildfires or succession to shade-tolerant species (USFS 1998).

NORTH CASCADES

Approximately 1,174,986 acres of timberlands (12% of timberland in the State) are included in the designated action area in Washington. Of timberlands in the eastern Washington region, where the proposed action area is located, the majority are National Forest lands (38%), while other public ownership makes up 12%, forest industry ownership 14%, and other private (primarily Tribal) ownership 36%. In 2003, National forests contributed 8% of regional timber harvest, private lands 59%, Tribal lands 21%, and State and other public lands contributed 12%.

GREATER YELLOWSTONE AREA

Approximately 6,080,275 acres in southwest Montana and Northwest Wyoming are designated critical habitat in the Greater Yellowstone Area. Of the area proposed, 96.9% is Federally owned. Most of this land is currently managed under the direction of the Northern Rockies Lynx Amendment to National Forest plans, the Lynx Conservation Assessment and Strategy or to similar standards of habitat protection.

3.3 Fuels, Fire and Fire Ecology

3.3.1 Background

Natural disturbances such as fire, wind, and insects and diseases, help shape forests. In the Rocky Mountain region, periodic fire is the dominant disturbance process that changes forests.

While fire is widespread, it's seldom uniform. Every forest has its own characteristic pattern of fire intensity, frequency and size. **Fire regime** and **condition class** are used to characterize fire.

FIRE REGIME

The fire regime describes the historic pattern of fire: how often (frequency); how hot (intensity); and how big (scale). Ecologists often describe three fire regimes for Western forests – **understory, mixed severity** and **stand replacing** (Agee 1993; Brown and Smith 2000; Fischer and Bradley 1987; Hessburg and Agee 2003; Keane et al. 2002; Smith and Fisher 1997).

- **Understory** – Understory fires burn frequently, from once a year, to about once every 35 years, as low-intensity surface fires that consume forest litter and kill small trees in small patches. Understory fires generally do not kill large, fire-resistant trees or substantially change the structure of the forest.
- **Mixed Severity** – Mixed-severity fires burn about every 35-100 years, as a mixture of understory and stand-replacing fires, or as intermediate-intensity fires that kill fire-susceptible trees while the fire-tolerant trees survive. Mixed-severity fires produce a diverse forest in terms of both structure and species composition. The fires are medium sized.
- **Stand Replacing** – Stand-replacing fires are infrequent, burning about every 100-200 years. Stand-replacing fires are large and high-intensity, killing most trees. They make way for a new forest.

Historically, fires at lower elevations tended to be understory and fires at higher elevations stand-replacing, although substantial variability has always existed.

CONDITION CLASS

Condition class describes the departure from historic conditions based on the number of missed fire cycles and the amount of change in forest structure and species composition (Schmidt et al. 2002).

- **Condition Class 1** – Fires have burned as often as they did historically; the risk of losing key ecosystem components is low. Vegetation composition and structure is intact and functioning.
- **Condition Class 2** – Fires have not burned as often as they did historically, missing one or more cycles. The risk of losing ecosystem components is moderate, with moderate changes in fire size, intensity, landscape patterns or vegetation.
- **Condition Class 3** – Fires have significantly departed from their historic frequency by missing multiple cycles. The risk of losing ecosystem components is high, with dramatic changes to fire size, intensity, landscape patterns or vegetation.

Lynx habitat occurs in three kinds of forests in the proposed action area:

- Mixed conifer, which includes Douglas fir, western larch, grand fir and western red cedar
- Spruce/fir, which includes Engelmann spruce, subalpine fir, alpine larch, hemlock, and whitebark pine
- Lodgepole pine

3.3.2 Policy

After 1910, when wildfires burned 3 million acres and killed 85 people in northern Idaho and western Montana, the USFS began to direct serious efforts toward suppressing wildfires. Severe fires occurred again in 1919, 1924, 1925, and 1934. In 1935, the agency adopted the "10 am policy," which said all fires were to be controlled by 10 am the day following their discovery. The policy was repealed in 1973 as the agency shifted from simply controlling fire to managing it and using it as a tool on Federal lands.

Fire suppression for the last 80 years, along with grazing and logging, has changed the way fires burn and changed the age, species and structure of some forests (Quigley et al. 1996). Further, as people have built more homes in the woods, the ability to allow fire has decreased even as the fire risk has increased.

The results of excluding fire became increasingly apparent during the last decade of the 20th century. The Federal government reexamined wildland fire policies. In 1995, the *Federal Wildland Fire Management Policy* was written to recognize the essential and inevitable role of fire, and the need to return, not eliminate, fire from forests.

Other recent documents set goals for wildland fire policy:

- *Managing the Impact of Wildfires on Communities and the Environment - the National Fire Plan* (USFS and DOI 2000).
- *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment – 10-Year Comprehensive Strategy* (USFS 2001).

They set goals to:

- Improve fire prevention and suppression
- Promote community assistance
- Restore fire-adapted ecosystems (rehabilitate the land after fire)
- Reduce hazardous fuels

Another recent document, *The Development of a Collaborative Fuel Treatment Program* (USFS et al. 2003), describes criteria for selecting fuel treatment projects. The multi-party MOU (memorandum of understanding) defines high-priority areas as the Wildland Urban Interface (WUI) and Condition Classes 2 and 3 outside the WUI.

MINNESOTA

In Minnesota, the short interval fire-adapted species like red and white pine had an average fire return interval of 22 years in Itasca State Park. (USFS 2004c). In the Boundary Waters Canoe Area Wilderness, a natural fire rotation of 50-100 years was documented by Heinselman, with more frequent, low intensity surface fires in the red and white pine (25 years), and less frequent, high-intensity surface and crown fires occurring in jack pine and spruce/fir types (50-80 years) (Heinselman 1973).

Changes in the historical fire regimes in these ecosystems today have produced live and dead fuel buildups in the understory of the red and white pine. In addition, little natural regeneration is occurring in these stands due to lack of disturbance. Jack pine in the Boundary Waters Canoe Area Wilderness is expected to decline as well without fire. At the same time, increases in the spruce/fir type has led to increased frequency of spruce budworm epidemics which, in turn, produces an increased fuel hazard from the bug-killed trees (Stocks, 1985). Effects of lack of fire on wildlife also are of concern. Probably one of the most dramatic examples is the decline of sharptail grouse as a result of fire exclusion from the grassland-brushland ecosystems of the Minnesota, as documented by Berg (1979).

The northern and eastern part of the Superior, including the Boundary Waters Canoe Area Wilderness, tend to have drier, more shallow soils, and can have a significant summer fire season if rainfall is below average. Vegetation in this area tends to be more boreal with a higher component of spruce/fir. Reoccurring spruce budworm outbreaks help create large amounts of dead woody fuel, which is compounded by windthrow from thunderstorm microbursts on a regular basis. This fuel complex has helped produce several large, high intensity wildfires in the last few years (Superior National Forest 1996). Timber harvest, followed by post sale prescribed burning, has been useful in treating this fuel complex outside the Boundary Waters Canoe Area Wilderness. Within the Boundary Waters Canoe Area Wilderness, prescribed natural fire is just beginning to help breakup the somewhat homogenous age class and vegetation types which have been conducive to spruce budworm outbreaks.

The net effect of the alteration of historic fire return intervals has increased fuel accumulations above historic levels over large, continuous areas. The possible consequences include:

- Increased risk of large, severe fires
- Increased risk of losing key components that define ecosystems
- Increased risk of serious injury or loss of life to firefighters and the general public
- Increased risk of health effects due to smoke and visibility impairment
- Increased risk of property loss and damage to landscapes that have economic value to people
- Increased fire suppression costs

Fire Management is an appropriate issue for revision because changes in national fire management policy, based on advances in the field of ecology, directs that "fire, as a critical natural process, will be integrated in land and resource management plans and activities on a landscape scale" (U.S. Department of Agriculture [USDA] and USDI 1995).

NORTHERN ROCKY MOUNTAINS

In mid-elevation mixed conifer forests, fires range from understory to stand replacing (USFS 2004a). Fire suppression has limited how often fires burn. Some places have missed one or more fire cycles and fall into Condition Classes 2 or 3. Others are closer to historic conditions, in Condition Class 1. An example, Table 8 describes the fire regimes and condition classes of the three kinds of forests that constitute lynx habitat in Montana.

Today, mixed conifer forests are generally denser and contain fewer fire tolerant species like western larch and ponderosa pine than when low- to intermediate-intensity fires kept parts of the forest thinned out (Quigley et al. 1996). Forest conditions today contribute to greater numbers of large high-intensity fires.

In high-elevation spruce/fir and lodgepole pine forests, infrequent, severe fires are the norm. Because fires burn only about every 100-200 ears in these cold, moist, high-elevation forests, fire suppression has had less of an effect than in other fire regimes. These naturally dense forests are close to historic conditions, generally in Condition Class I.

Excluding fire also has reduced the role played by low- and intermediate-intensity fires. At higher elevations, such fires kill competing fir and spruce trees so whitebark pine can grow and some lodgepole pine can develop old growth characteristics.

Fire suppression has changed the natural age distribution of forests at the landscape level. Stand-replacing fires used to create a mosaic of even-aged forests across the landscape. Today there are proportionately fewer young even-aged forests and more, older forests (Hessburg et al. 1999; Hillis et al. 2003; Losensky 2002). Excluding fire has resulted in a more homogenous landscape with an increased potential for larger stand-replacing fires.

In dry, warm low-elevation forests, frequent low-intensity fires are the norm, maintaining stands of large, widely spaced trees. Fire suppression has resulted in making many of these forests unnaturally dense, and the species composition has shifted away from ponderosa pine to Douglas fir. These forests are where the greatest detrimental effects of excluding fire can be seen. These forests are in Condition Classes 2 and 3; these forests are **not** lynx habitat.

TABLE 8. Lynx Habitat by Forest Type, Fire Regime and Condition Class in Montana.

FOREST TYPE	FIRE REGIME	CONDITION CLASS	ESTIMATED % LYNX HABITAT
Mixed conifer	Mostly mixed severity	1, 2, or 3	26
Spruce/fir	Mostly stand replacing with some mixed severity	1	40
Lodepole pine	Mostly stand replacing with some mixed severity	1	34

Fuels Program

Congress annually sets goals, program size and emphasis through its appropriations (USFS 2004a). Table 9 summarizes the annual USFS fuels program projected for Montana based on these priorities. In Montana, about 70% of the fuel treatments would occur inside the WUI. Inside the WUI, fuel treatments most likely would be within a mile of structures and designed to reduce the intensity and spread of fire to communities. Many treatments would occur in the dry, low- to mid-elevation forests that have missed one or more fire cycles and are in Condition Classes 2 and 3.

TABLE 9. Projected Annual Fuels Program in Montana.

	INSIDE WUI (acres)	OUTSIDE WUI (acres)	TOTAL
Fuels program	**38,000**	**16,000**	**54,000**
Forested, not wilderness	**3,578,000**	**8,335,000**	**11,913,000**

At current funding levels, about 38,000 acres or 1% of the WUI would be treated annually. The other 30% would occur outside the WUI. Outside the WUI, fuel treatments most likely would be designed to restore or maintain a semblance of the forest structure historically produced by fire. Generally, restoration would occur on lands in Condition Classes 2 or 3, and maintenance in Condition Class 1 lands.

Annually about 16,000 acres would be restored or maintained by using prescribed fires and removing vegetation, generally in areas that have missed one or more fire cycles. Vegetation may be removed to reduce fire intensity before burning or as the sole method of treatment.

Each year where wildland fire use is allowed, some acres would be restored or maintained by lightning fires. In Montana, wildland fire use is allowed on about 3 million acres, which includes most wilderness areas and some nonwilderness land. At current funding levels, less than 1% of the area outside the WUI could be treated annually.

3.3.3 Livestock Grazing Management

MAINE AND MINNESOTA

Little to no grazing occurs in the proposed action areas in Maine or Minnesota.

NORTHERN ROCKY MOUNTAINS

An active grazing allotment is a place where a term grazing permit is in effect and where livestock grazing is expected to occur most years. Depending on how the allotment is classified and the language in the term grazing permit, this may consist of either cattle or sheep, or occasionally both. In general, the season of use extends from early June to late September, although this varies depending on elevation, plant communities, and management requirements. The Northern Rockies area contains 3,751 Federal grazing allotments. Of these, 1,765 or 47% contain habitat suitable for lynx, and 1,633 of these are active.

NORTH CASCADES

There are seven grazing allotments on Loomis State Forest, and two on the Loup Loup block. Currently, grazing occurs on 101,027 acres (over 96%) of State lands in the proposed action area. These areas annually support 13,570 AUMs on the Loomis State forest, and 4,851 AUMs on the Loup Loup block. The WADNR draft lynx management plan does not place any additional restrictions on grazing leases beyond compliance with current State regulations. Resource Management Plans are developed on a site-specific basis, and are deigned to maintain native plant communities and plant species diversity, but not to address the specific needs of individual species such as lynx and snowshoe hare. The entire Loomis State Forest has been excluded from the final designation.

GREATER YELLOWSTONE AREA

There are 399 grazing allotments on National Forest land and 3 allotments on Bureau of Land Management land in unit 5. National Forest allotments are managed under the NRLA and BLM allotments are managed under the LCAS.

3.4 Recreation

3.4.1 Definitions

Designated over-the-snow routes are routes managed under permit, agreement, or by the agency, where use is to some extent encouraged either by on-the-ground markings or by publication in brochures, recreation opportunity guides or maps (other than travel maps), or in electronic media produced or approved by the agency. Routes may be

marked on the ground with blue or orange diamonds, bamboo wands, blazes, or difficulty markers. Both groomed routes and the routes identified in outfitter and guide permits are designated by definition.

Groomed routes are designated over-the-snow routes on which the snow surface is packed, leveled, or scarified (with or without set tracks) by equipment towed behind a snowmobile or snow-cat. Businesses and groups do most of the grooming. Snowmobile or cross-country ski clubs often obtain permission through permits or agreements to groom certain winter trails. Snow roads maintained by permitted snow-cat tours are considered groomed routes.

Designated play areas are places specifically identified for winter recreation, such as tubing or snowmobiling, but not including developed ski areas.

Routes and areas open, but not designated, many of which are identified on travel maps, are open for winter use, but their use is not encouraged in any way. The routes are not marked on the ground; they are not identified in brochures or other media, except the travel plan map; they are not groomed; they are not under permit or agreement. Some of these routes and areas are routinely used; others are never accessed. This does not apply to routes and areas open to winter use but not designated.

Areas of consistent snow compaction are places generally covered with snow during winter that are used enough to compact the snow so that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after snowfall. Such places can be areas or linear routes. Compaction may be caused by any human activity. Areas are generally found near snowmobile or cross-country ski routes; in the nearby openings, parks, and meadows; or near ski huts, plowed roads, or winter parking areas.

Examples include:

- Some of the consistently used routes that are open for public use, but not groomed or designated;
- Sledding or snow play areas close to plowed roads;
- Helicopter landing sites regularly used for heli-skiing;
- Ends of the snow roads used for snow-cat tours; and
- Small lakes with little wind scour where people go ice fishing regularly.

MAINE

Snowmobiling in Maine occurs primarily on private and State lands (Industrial Economics, Inc 2008). Snowmobile registrations have grown steadily since the mid 1990s, totaling over 100,000 machines in 2004-2005. Snowmobiling in Maine occurs primarily in the "tourist belt" that reaches from Maine's northern coast and then west towards less populated areas. The western trails are wider and longer and attract more snowmobilers. While there have been few changes to the extent of Maine's snowmobile trails, trail routes change within existing road networks from year to year in response to

private landowners' logging activities and other requirements. Some increase in groomed trails for cross-country skiing is expected but as the sport is not as formally organized as other winter sports, little information is available.

MINNESOTA

Snowmobiling in Minnesota is focused in the northeast region of the State which experiences high quality snow over a long winter season (Industrial Economics, Inc. 2008). There are 20,000 miles of trails Statewide, and over 277,000 snowmobiles were registered in the State in 2004. Portions of four State trails fall within the proposed action area. The North Shore trail experiences the most use.

Local trails also cross a combination of Federal, State, and county lands, as well as corporate timber and paper company lands, and private lands within the proposed action area. Some corporate lands are being closed to snowmobile recreation due to changes in management or that selling for development or hunting leases is more profitable. No such closures are presently planned in the proposed action area, but may limit trails in the future. The demand for snowmobile trails is expected to remain flat with the majority of trail work currently related to maintenance and not construction of new trails.

Some increase in groomed trails for cross-country skiing is expected but as the sport is not as formally organized as other winter sports, little information is available.

NORTHERN ROCKY MOUNTAINS

The Northern Rockies has some of the most pristine and scenic wild lands in the United States (USFS 2004a). The area receives several million visitors in all seasons of the year because of its beauty and uncrowded backcountry (USFS 1998). This section focuses on winter recreational activities which have the most effect on lynx habitat. Recreational facilities designed for summer use have very little effect on lynx (Ruediger et al. 2000a, p. 2-9).

Travel Plans

Management direction on National Forest lands for winter recreation comes from existing Forest Management plans. Generally, they identify where motorized and non-motorized use may occur during what seasons, and they distribute lands into various allocations limiting and directing how those areas can be used. Motorized use is not allowed in the more than 5 million wilderness-area acres of lynx habitat. Motorized winter recreation may be allowed in some roadless areas or wilderness study areas.

Over-the-snow Recreation

Nationally, snowmobile use grew 34% from 1988 to 1995 (USDA Forest Service 1997), much faster than the overall population. Snowmobiling is the second most popular winter sport (Cordell 1999). Increased use has led to increased demands for

expanded routes. Table 13 shows the trend in the number of registered snowmobiles in Northern Rockies area States. This information is useful in gauging the popularity of snowmobiling, an outdoor activity for which precise estimates of use over time are difficult to obtain. Snowmobile technology has changed rapidly in recent years, making larger, more powerful, and quieter machines available. These new machines let people access previously inaccessible backcountry.

TABLE 13. Growth in Number of Snowmobiles Registered by State.

	REGISTERED SNOWMOBILES		AVERAGE GROWTH	
STATE	1989 – 1991	2000 – 2001	Registered Snowmobiles	State Population
Idaho	21,532 in 1991	38,158 in 2001	2.3%	2.5%
Montana	15,100 in 1991	24,600 in 2001	5.0%	1.2%

Data from Idaho Department of Parks and Recreation (2004); Montana Department of Fish, Wildlife and Parks (Walker 2002).

Routes and Areas

People use snowmobiles, snow cats, snowshoes, cross-country skis, and dog sleds on winter trails. In the year 2000, about 3,500 miles of snowmobile trails were groomed in Idaho and Montana. This includes routes outside Federal lands. Which routes are groomed changes from year to year depending on snow conditions and funding. In National Forests, money to pay for grooming snowmobile trails comes from State snowmobile registration funds and a small percentage of gasoline taxes.

Outfitter Permits

A total of 359 permits or agreements authorize winter recreation in the Northern Rockies area, but not all are within the proposed action area (see Table 14). Within the proposed action area the Idaho Panhandle Forests in Idaho and the Lewis and Clark, and Lolo National Forests in Montana have the most permits and agreements authorizing winter recreation in lynx habitat. The BLM has none. Winter outfitters and guides provide a service to people who lack the skills or equipment to participate in winter activities, such as snowmobiling, cross-country or helicopter skiing, and late winter/early spring big game hunting. They provide jobs and income to many small rural western communities. The number of outfitter and guide permits, and their level of use has remained relatively steady over the past decade. Generally, new permits or increases in service-days have been issued only when existing permits terminate, or when other outfitters decrease their permitted service-days. A decade ago there was very little outfitted use during winter. Traditionally outfitters in the Northern Region offered hunting trips. Over the past 5-10 years, public demands for family-oriented vacations have increased and the availability of game animals has decreased. Outfitters have responded by diversifying their businesses and changing the season-of-use in their permits. This has caused an increase in outfitted snowmobiling, cross-country skiing, etc., during the last decade. However, the change in season-of-use has not resulted in major increases in overall outfitter-guide use.

TABLE 14. Number of Recreation Special-use Permits and Agreements.

	USFS LANDS		
	Idaho	**Montana**	**TOTALS**
All recreation permits & agreements	735	1,114	1849
Winter recreation permits & agreements	86	121	207
Winter recreation permits & agreements in lynx habitat	77	115	192

NORTH CASCADES

Snowmobiling occurs on Federal, State, and private lands within the proposed action area in Washington State (Industrial Economics, Inc 2008). There are a total of 3,000-3,500 miles of groomed trails in Washington State, of which only 29 miles are in the proposed action area. A 43% increase in the number of people participating in snowmobiling by 2013 is predicted for the State. Snowmobiling occurs on the Loup Loup block area and on Loomis State Forest trails that are connected to the Okanogan-Wenatchee National Forest trail network. The area is remote, and most snowmobile riding in the Loomis area is on ungroomed trails. Creation of new snowmobile trails are precluded in the Washington Department of Natural resources draft lynx management plan and there is no encouragement for additional use of existing trails.

Some increase in groomed trails for cross-country skiing is expected but as the sport is not as formally organized as other winter sports, little information is available. All of the Loomis State Forest lands have been excluded from the final designation.

Greater Yellowstone Area

There are no snowmobile trails in Yellowstone National Park that overlap with the study area. A majority of the snowmobile trails in Wyoming occur in the western half of the State, on USFS lands (Industrial Economics, Inc 2008).

Ski Areas - Rocky Mountains

Due to a variety of factors, the Rocky Mountain region is uniquely well suited to the development of ski areas (USFS 2004a, 2004b). Due to its continental climate and relatively high elevations, this area experiences long, cold winters accompanied by reliable snow that is relatively dry and remains soft due to the infrequency of freeze-thaw and rain events. Additionally, due to their expanse, these mountains contain numerous sites that posses the terrain features, such as slope, aspect, and vertical relief that make them well suited for ski area development. Historic settlement patterns have created the basic infrastructure and population base to support the development and successful operation of ski based resorts.

In 1997, the USFS conducted a nation-wide survey that found downhill ski visits increased by 58%, an increase even more dramatic than snowmobiling (USDA 1997).

Snowboarding, the improvements in skis, and success in the 2002 winter Olympics, have all contributed to the expanding popularity of skiing. Increased use results in increased demand for more and larger ski areas.

There is considerable diversity in the ski areas and resorts in the Rocky Mountain region. Some are purely ski areas operating only in the late fall winter and early spring while others are four season resorts that operate most of the year.

Ski areas and resorts include developments such as ski trails, tramways, and ancillary facilities such as restaurants, maintenance buildings, snow making ponds, and parking lots. Ski areas that operated only during the ski season are generally of smaller scale than four season resorts and development of private land at or adjacent to their base areas is less common and extensive.

Four season resorts are usually more highly developed with skiing and snowboarding occurring in the winter and spring and hiking and mountain biking occurring in the summer. These resorts also are associated with development on private land at or adjacent to their base areas. These developments frequently include commercial and private lodging, restaurants, bars, retail shops, golf courses, other recreational amenities, and an associated road network.

The northern Rocky Mountain region contains 53 downhill and cross-country ski areas; 29 are in lynx habitat. Downhill ski areas usually are highly developed recreation areas. Cross-country ski areas are usually less developed.

Minerals

A wide variety of mineral and energy resources occur on lands with lynx habitat. Because some of the area analyzed for possible designation as critical habitat includes public and private lands subject to mining, the following descriptions focus on those lands.

3.4.2 Definitions

Surface-disturbing activities associated with mineral and energy resources typically include (USFS 2004a):

- **Prospecting -** Prospecting is identifying an area with potential for mineral development. It involves limited surface disturbance, such as geologic mapping, or soil or water sampling. Prospecting for oil and gas often involves collecting seismic data.
- **Exploration -** Exploration is physically searching for minerals. It often includes building roads, drill pads, underground workings, and trenching.
- **Development -** Development is the work required to prepare a mineral deposit for production. It may include driving underground workings, stripping the overburden from deposits that will be open-pit or strip mined, building waste dumps, and constructing milling and transporting facilities. Oil and gas

development includes drilling a series of production wells and building access roads.

- **Production -** Production is removing a mineral from the ground and making it available for final processing and consumption.
- **Reclamation -** Reclamation is restoring the areas disturbed during exploration, development, and production.

3.4.3 Management Constraints

The status of the land affects the legal authorities that apply to management and disposal of minerals. Land is in one of the following status categories:

- Lands reserved from the public domain;
- Acquired lands;
- Lands with outstanding or reserved rights; or
- Private land with federally owned minerals

Mineral resources may be classified into three categories:

- Mineral materials;
- Locatable minerals; or
- Leasable minerals

The combination of land status and the type of mineral resource define a land management agency's management authority.

MAINE

All active mining operations in the proposed action area are small-scale crushed stone quarries and sand and gravel pits (Industrial Economics, Inc 2008). Most sites are on private, dry land that has been cleared expressly for the intent of mining operations. Most of the expected new mining operations will take place outside the proposed action area.

MINNESOTA

Iron ore production makes up the majority of Minnesota's non-fuel mineral production at 79% (Industrial Economics, Inc 2006). Minnesota is ranked first for iron ore production in the United States. Taconite, a low-grade iron ore used in steel production, is the primary extraction. All current taconite mining and exploration in the State occurs in the Mesabi Range, a portion of which is located within and adjacent to the proposed action area. The increased global demand for construction steel is expected to lead to the development of new steel production plants in the Great Lakes area and thus an increased demand for taconite.

Additionally, small sand and gravel operations are actively producing in the proposed action area. One peat operation is currently active. Although the State leases 11,750 acres within the proposed action area for mineral development, no mines are active and none are expected to be active in the near future.

NORTHERN ROCKY MOUNTAINS

Mineral Materials

Mineral materials are common minerals such as stone, gravel, clay, cinders, and decorative rock, whose disposal is authorized under the Materials Act of 1947. This act provides for disposing of mineral materials on public lands through bidding, negotiated contracts, or free use. The USFS and BLM have full authority to make decisions about disposing of mineral materials on lands of all status categories.

The USFS and BLM use mineral materials from their lands for building and surfacing system roads and may sell these mineral materials, or issue free-use permits to State and county governments for public projects such as highway construction and maintenance. All contracts contain requirements for reclaiming sites to pre-mining conditions as much as possible.

There are about 2,600 active mineral-material sites on National Forest lands where lynx habitat is located. In Fiscal Year 2000, about 800,000 tons of mineral materials worth more than $2.8 million were removed from these lands. Demand for mineral materials is expected to grow as demand increases for public and private infrastructure. The largest increases have been for the very small, free-use permits issued to private individuals for a ton of material or less (a pick-up load). These free-use permit sites rarely result in a pit or need more than minor reclamation.

Excavation, temporary storage, and transport are associated with removing mineral materials at some sites. Typically, sites are small, less than five acres. Most are near or next to roads and do not require substantial amounts of new road. The small, free use permits are almost all next to existing roads.

Mineral material sites seldom overlap the high-elevation, remote places where lynx habitat occurs. Only 2-3% of mineral-materials sites permitted in the last 15 years were in lynx habitat. Presently, only one mineral-material site in lynx habitat has winter operations. It is anticipated that this proportion will continue in the future.

Locatable Minerals

Locatable minerals, such as gold, silver, copper, and other metals, are subject to the General Mining Law of 1872 as amended. This law grants a statutory right to explore for and develop these minerals, unless the land has been formally withdrawn from mineral entry. The USFS authority is directed at using the surface of National Forest lands (30 U.S.C. 21-54). The USFS may not deny proposed operations or make them

impossible by imposing unreasonably restrictive management requirements or conditions. However, the USFS may require mitigation and list requirements to minimize adverse impacts.

Both BLM and USFS regulations say mining operations should minimize adverse environmental impacts to surface resources. The BLM regulations say they are to prevent "unnecessary and undue degradation" and to avoid adverse effects on threatened and endangered species. The USFS regulations include "taking all practicable measures" to maintain and protect wildlife habitat, and to reclaim surface disturbances including rehabilitating wildlife habitat. The USFS regulations also require that roads be built and maintained to minimize or eliminate damage to other resources including wildlife. Unless otherwise authorized, roads that are no longer needed are to be closed, bridges and culverts removed, and the road surface shaped to a natural contour and stabilized.

Current Situation

The area where lynx habitat occurs has a long history of locatable hard-rock minerals activity, mostly exploring and mining for lode gold, silver, copper, and other metals. Today, this usually takes place in historic mining areas, or where more recent interpretations of the geology lead to the discovery and production of economically valuable deposits.

Mining has waned since the late 1800s. Only a fraction of the historic sites operate today, and those that continue, do so with much more stringent environmental protection measures. Most recent activity involves maintaining existing facilities; however, there are few new exploration and production sites. Typically, motorized vehicles use established routes for access. New access requires project-specific analysis and approval.

The majority of surface disturbances are less than 20 acres. Presently there are five larger locatable operations ranging from 100-600 acres on National Forest lands in lynx habitat, all in Montana. Only two are operating; the other three are in the care-and-maintenance or reclamation phases.

Future locatable mineral activity is likely to occur in areas of existing operations and where the geology is favorable for economically viable mines. Significant increases in the level of future exploration or development are not expected; the potential for future large mineral discoveries is considered low but possible.

Leasable Minerals

Leasable materials are federally owned fossil fuels (oil, gas, coal, oil shale, etc.), geothermal resources, sulfur, and phosphates that are subject to exploration and development under leases, permits, or licenses issued by the Secretary of DOI, with USFS input on National Forest System lands. The 1920 Mineral Leasing Act, as amended, together with the 1987 Federal Onshore Oil and Gas Leasing Reform Act,

provide the authority and management direction for Federal leasable minerals on Federal lands. In 1970, the Geothermal Steam Act added steam to the list of minerals that could be leased on National Forest System lands.

Regulations at 36 CFR 228.108 require oil and gas operators to comply with ESA during operations. They require roads and surface disturbances to be reshaped and revegetated when closed or abandoned. Mining operators also are obliged to post reclamation bonds to make sure reclamation takes place. Most existing plans include standards and guidelines for reclaiming mining operations.

Acquired Lands (hard-rock minerals)

Hard-rock minerals described as locatable on public-domain lands are described as leasable on lands acquired by USFS or BLM after 1891. On lands where the agencies acquired mineral as well as surface rights, BLM issues the prospecting permits and leases for hard-rock minerals. On National Forest acquired lands, BLM must first obtain the consent of USFS.

Oil, Gas, Coal, or Geothermal

The BLM issues oil and gas, coal, and geothermal leases. The most common leases in this area are oil and gas leases which are issued for 10-year terms. Leasing decisions and development decisions are made in two stages:

- First, the USFS makes a lease decision about which lands will be open for leasing, based on an analysis of the known impacts of exploration and development. This decision identifies which areas will be open to development subject to standard lease terms, which areas will be open to development subject to constraints, called lease stipulations, and which will be closed to leasing. The USFS informs BLM of the results and BLM is responsible for issuing the lease.
- Then, after a lease is issued, the lessee has legal rights to explore and develop, subject to the terms of the lease and other applicable State and Federal laws. The lessee must obtain approval from BLM and USFS for post-lease activities. This is when site-specific resource protection measures are developed and are applied as conditions of approval for the surface-use plan of operations. Such measures must be within the scope of the rights granted under the terms of the lease.

Solid Nonenergy Leasable Materials

The BLM also issues 10-year term leases for solid nonenergy leasable materials, such as phosphate or sodium. The USFS has no consent authority, but BLM generally accepts USFS recommendations.

Current Situation

The oil and gas industry has been stable during the past decade, but is projected to grow. Currently in the Northern Rockies area, about 820,000 acres are under lease for oil

and gas, with more acres pending. Transmission pipelines are an integral part of the infrastructure associated with oil and gas production. Presently, there are no pipelines in lynx habitat.

All leases say that before any disturbance may occur, surveys or studies may be needed to determine the extent of impacts on resources and whether mitigation would be required. Leases also say that if threatened or endangered species are observed during operations, the lessee shall stop doing anything that would result in the destruction of the species.

Lands with Outstanding or Reserved Rights

Private parties own some of the minerals on National Forest lands. Most of the National Forest lands in the northern Rockies were reserved from the public domain under the Forest Reserve Act of 1891. Since then, other lands have been acquired. The titles to some of these lands are encumbered with reservations, that is, in some cases the previous owner reserved the mineral rights. In other cases, mineral rights were separated from the surface estate before the Federal government acquired the surface. These mineral rights are outstanding to third parties. A very small percentage of lands in the areas with lynx habitat have reserved or outstanding rights. These reserved and outstanding rights represent property interests in the land. Although the Federal government owns and administers the surface, the mineral owner has certain rights as well. The most important of these is the right to access and develop the minerals. Other rights may be spelled out in individual deeds. The USFS must consider these property interests during planning and implementation.

NORTH CASCADES

No active mining operations were identified within the North-Cascades section of the proposed action area.

GREATER YELLOWSTONE AREA

Although these industries constitute a significant portion of the regional economy, the level of activity within the Unit 5 boundary is relatively small. Only two active mines exist in Unit 5: the East Boulder Mine in Sweetgrass County, Montana and Stillwater Mine in Stillwater County, Montana. Both mines are operated by the Stillwater Mining Company and produce palladium, platinum, and rhodium.

Stillwater Mining Company is the only primary producer of platinum group metals (PGMs) in the western hemisphere.238 PGMs are considered to be strategic minerals that play a role in the country's national and economic security. Among other things, they are used in fuel cells, electronics, hydrogen purification, and medicine.239 The company is one of top five employers in Montana (approximately 1,625 employees at the end of 2007) and Stillwater County enjoys one of the highest per-capita incomes in the State. The company's property covers a 27 square-mile parcel that encompasses both

the Stillwater and East Boulder mines and the underlying ore body. Their revenue exceeded $619 million in 2007. Given the strategic importance of the PGMs, it is likely that Stillwater Mining Company will be in operation in the long-term (Industrial Economics, Inc. 2008).

According to Wyoming's Oil and Gas Conservation Commission, there are eight natural gas wells are in operation and eight other natural gas wells and one oil well that have been "shut-in". Of the eight active natural gas wells, seven are owned by Exxon Mobil Corporation in the southern portion of Bridger National Forest in Sublette County. The other well is owned by Fidelity Exploration and Production Company and lies just east of Yellowstone National Park in the North Absaroka Wilderness. The "shut-in" wells are owned by various companies including, True Oil LLC., Black Diamond Energy of Delaware Inc., Cimarex Energy Co., Exxon Mobil Corp., and Humble Oil and Refining (Industrial Economics, Inc. 2008).

3.5 Transportation

ROCKY MOUNTAIN REGION

Transportation activities affecting lynx or its habitat include bridge construction, repair, or replacement, and road construction, repair, widening, or improvements (Industrial Economics, Inc., 2008). These activities reduce connectivity within the boreal forest landscape and increase the species' vulnerability to vehicle collision. Lynx are highly mobile and frequently cross roads during dispersal, exploratory movements, or travel within home ranges. Highway projects also may directly affect the amount of feeding and denning habitat for the species by converting natural forests into road surface, rights-of-ways, or associated facilities such as maintenance areas or gravel pits.

Highways can alter landscapes by fragmenting large tracts of land (USFS 2004a). As the standard of road increases from gravel to two-lane highway, traffic volume increases. According to the LCAS, lynx may become intimidated by traffic and may not cross highways when the volume reaches from 2,000-4,000 vehicles per day, particularly if traffic continues during the night. Parts of various highways traverse lynx linkage areas.

The degree of impact increases as highways are upgraded from two lanes to four. Four-lane highways commonly have fences on each side, service roads, paralleling railroads and other impediments such as 'Jersey barriers' that make crossing even more difficult. The States of Idaho and Montana are evaluating ways to provide wildlife crossings and implementing their findings in their highway reconstruction plans.

The Federal Land Management agencies, including the Service are part of the steering team that produced the document entitled *Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects* (USDOT, April 2006). It embodies the intent and principles of the NEPA and Executive Order 13352 on Facilitation of Cooperative

Conservation, and offers a framework for achieving greater interagency cooperative conservation. *Eco-Logical* provides a nonprescriptive approach that enables Federal, State, Tribal, and local partners involved in infrastructure planning, design, review, and construction to work together to make infrastructure more sensitive to wildlife and their ecosystems. It recognizes open public and stakeholder involvement as the cornerstone for cooperative conservation.

MAINE

Three projects requiring formal consultation for Canada lynx impacts are expected to occur in Maine over the next 20 years (Industrial Economics, Inc 2008).

MINNESOTA

The Northeast Minnesota Long Range Plan outlines Minnesota Department of Transportation (MN DOT) transportation projects from 2008 to 2030. Assuming full funding to meet MN DOT performance based measures by 2030, 15 separate projects are planned to increase safety along the Trunk Highway 61 corridor from Two Harbors to Grand Marais (Industrial Economics, Inc 2008).

NORTH CASCADES AND GYA

In Units 4 and 5, forecast projects are based on frequency and location of past consultations. As a result, this analysis anticipates 25 informal consultations in Unit 4, and 15 informal and 10 formal consultations in Unit 5, over the next 20 years. None of these consultations is expected to result in project modification for the lynx (Industrial Economics, Inc 2008).

3.6 Historical and Cultural Resources

Conservation of sensitive, threatened, or endangered species habitat, and reintroduction of endemic or native species into their historical habitats in ways that do not involve surface disturbance, does not have the potential to affect historic properties. Specific projects to protect critical habitat will describe affected resources and analyze effects to historical and cultural resources.

3.7 Social and Economic

A draft economic analysis of critical habitat designation for lynx has been developed (Industrial Economics, Inc., 2008) The analysis assesses the economic costs incurred since the species was listed as well as costs that would be incurred with designation. The scope of the economic analysis includes those areas included in the proposed designation (Service 2008). The contents of this analysis are incorporated by reference.

3.8 Tribal Lands

Tribal lands occur within the geographic range of the Alternative B (see Table 7). For the Proposed Action, in accordance with Secretarial Order 3206, "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act" (June 5, 1997); the President's memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951); Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments;" and the relevant provision of the Departmental Manual of DOI (512 DM 2), the Service believes that fish, wildlife, and other natural resources on Tribal lands are better managed under Tribal authorities, policies, and programs than through Federal regulation wherever possible and practicable. For this reason, we have excluded Tribal lands from the final designation.

TABLE 22. Tribal Lands Excluded from Final Designation as Critical Habitat.

PROPOSED CRITICAL HABITAT AREA	TRIBAL ENTITY
Maine	Houlton Band of Maliseet Indians
	Aroostook Band of Micmac Indians
	Passamaquoddy Tribe
	Penobscot Indian Nation
Minnesota	Grand Portage Indian Reservation
	Vermillion Lake Indian Reservation
Northern Rocky Mountains	Flathead Indian Reservation
North Cascades	None
Greater Yellowstone Area	None

4 ENVIRONMENTAL CONSEQUENCES

Designation of critical habitat does not have any direct effects on the environment, except through the section 7 consultation process. This is because critical habitat designation does not impose broad rules or restrictions on land use, nor does it automatically prohibit any land use activity. Each Federal action that could potentially affect designated critical habitat is analyzed individually during the section 7 consultation process. Individuals, organizations, local government, Tribes, States, and other non-Federal agencies are potentially affected by the designation of critical habitat only if their actions occur on Federal lands, require a Federal permit or license, or involve Federal funding (e.g., section 404 Clean Water Act permits from the U.S. Army Corps of Engineers or funding of activities by the Natural Resource Conservation Service).

Under section 7, Federal agencies are required to consult with the Service when their actions could affect critical habitat. For many listed species, critical habitat designation would not be expected to materially affect the number or nature of consultations. For instance, when critical habitat and the areas occupied by the species

are equivalent, an action that would affect designated critical habitat also would affect the species and a consultation would be required regardless of critical habitat designation.

In the case of the lynx, Federal actions that are likely to destroy or adversely modify critical habitat may also result in jeopardy to the species. Federal agencies have been required to ensure that their actions do not jeopardize the continued existence of the lynx since its listing in 2000. In practice, the outcome of section 7 consultation is often similar whether or not critical habitat is designated. Adverse effects on PCEs or portions of critical habitat generally would not result in an adverse modification determination unless that loss, when added to the environmental baseline, is likely to appreciably diminish the capability of the critical habitat designation to satisfy essential requirements of the species. In other words, activities that may destroy or adversely modify critical habitat include those that alter the PCE to an extent that the value of critical habitat for conservation of the species is appreciably reduced.

Actions that would be expected to both jeopardize the continued existence of the lynx and destroy or adversely modify its critical habitat would include those that significantly and detrimentally alter its habitat over an area large enough that the likelihood of its survival and recovery is significantly reduced. Note that the scale of actions would be a crucial factor in determining whether they would directly or indirectly alter critical habitat to the extent that the value of the critical habitat for the survival and recovery of lynx would be appreciably diminished. Thus, the likelihood of an adverse modification or jeopardy determination would depend on the baseline condition of the species and the critical habitat.

Potential environmental consequences that may result from implementation of the No Action and Action Alternatives are discussed below. All impacts are expected to be indirect, as critical habitat designation does not in itself directly result in any alteration of the environment.

4.1 Physical Environment

None of the alternatives would impact the physical environment such as soils, water and air.

4.2 Fish, Wildlife and Plants

Alternative A, the No Action alternative, would have no significant impacts on fish, wildlife, or plants beyond those protections already in place as a result of listing of the lynx in 2000 and associated requirements of section 7 of the ESA.

The Proposed Action would have similar effects on fish, wildlife, and plants, in that there may be minimal additional impacts or benefits beyond those already considered in section 7 consultations since the 2000 listing. Fish, wildlife, and plants may indirectly benefit as a result of ecosystem protections provided through conservation of the lynx

and the associated requirements of section 7(a)(2) of the ESA. As a result of critical habitat designation, Federal agencies may be able to prioritize landowner incentive programs such as the Healthy Forest Reserve Program, and private landowner agreements that benefit the lynx, as well as other fish, wildlife, and plant species. Critical habitat designation also may assist States in prioritizing their conservation and land-managing programs.

4.3 Human Environment

As discussed above, individuals, organizations, States, local governments, and other non-Federal entities are only affected by the designation of critical habitat if their actions occur on Federal lands, require a Federal permit, license, or authorization, or involve Federal funding. Since 2000, Federal agencies have been required to consider the effects of their actions on lynx and consult with the Service as appropriate. While a similar process is required for critical habitat, analysis of effects to critical habitat is not expected to cause large increases in the number or complexity of consultations. This is because no unoccupied habitat has been proposed for designation as critical habitat.

The Service recognizes a perception may exist within some segments of the public that any of the action alternatives designating critical habitat would severely limit property rights; however, critical habitat designation has no effect on private actions on private land that do not involve Federal approval or action. We recognize that there are private actions on private lands that involve Federal actions; however, there should already be section 7 consultations taking place in these situations.

Differentiating between consultations that result from the listing of the lynx and consultations that result from the presence of critical habitat is difficult. The following discussion will disclose the potential impacts associated with all future section 7 consultation in or near critical habitat units that are attributable to the listing of lynx in 2000, as provided in the Economic Analysis and will describe separately the costs attributable to critical habitat designation (Industrial Economics, Incorporated 2008).

4.4 Timber Management-Related Activities

Timber management-related activities are the dominant land use in the areas proposed for critical habitat. Actions that would reduce or remove understory vegetation within boreal forest stands could significantly reduce the quality of snowshoe hare habitat such that the landscape's ability to produce adequate densities of snowshoe hares to support persistent lynx populations is at least temporarily diminished. Such activities could include, but are not limited to, pre-commercial thinning.

Trends in timber harvest volumes, cut volumes and silvicultural techniques would not change with Alternative A, No Action alternative, beyond that already resulting from the 2000 listing of the lynx and the associated requirements of section 7 of the ESA. Section 7 consultation on the effects of Federal timber projects on the lynx under the jeopardy standard would still be required.

For Alternative B, critical habitat designation would require re-initiation of some Section 7 consutlations for timber management. New and ongoing Federal timber management-related projects within designated critical habitat areas would be analyzed under the section 7 consultation process for potential effects to PCEs as well as effects to the species. While habitat is already considered in consultations on effects to the species, the consultations would have to address PCEs. Pre-commercial thinning may be precluded depending on the habitat in the project area, and timber projects may be modified by changing their timing, modifying road access and requiring that a lynx management plan be developed. For projects where there is no Federal nexus, critical habitat designation does not impose rules or restrictions on land use so there would be no changes under the action Alternatives.

4.5 Wildland Fire Management

Fuels treatment projects that would reduce or remove understory vegetation within boreal forest stands could significantly reduce the quality of snowshoe hare habitat such that the landscape's ability to produce adequate densities of snowshoe hares to support persistent lynx populations is at least temporarily diminished.

Wildland fire management would not change with Alternative A, the No Action alternative, beyond that already resulting from the 2000 listing of the lynx and the associated requirements of section 7 of the ESA. Section 7 consultation on the effects of Federal fire management projects on the lynx under the jeopardy standard would still be required.

For Alternative B, critical habitat designation would require re-initiation of some Section 7 consultations for wildland fire management. New and ongoing Federal fire management-related projects within designated critical habitat areas would be analyzed under the section 7 consultation process for potential effects to PCEs as well as effects to the species. While habitat is already considered during the consultation process, the consultations would have to address PCEs. The number of projects analyzed would likely not change since habitat is already considered in consultations on effects to the species. Critical habitat designation could require project modifications or restrictions compared to the existing condition. For projects where there is no Federal nexus, critical habitat designation does not impose rules or restrictions on land use so there would be no changes under the Action Alternatives.

4.6 Recreation

Recreational activities that have the potential to affect lynx and its habitat include those that are related to winter activities that involve over-the-snow trails such as for snowmobiling and cross-country skiing. Theoretically, lynx or its habitat could be impacted by packed over-the-snow trails that enable potential competitors, such as coyotes or bobcat, to access lynx winter habitat. However, in the northern Rocky Mountains, Kolbe et al. (2007) found that coyotes did not preferentially use compacted snow trails to enter and occupy lynx habitat, and those coyotes that did use lynx habitat

were primarily scavengers, with snowshoe hare kills comprising only 3% of their feed sites.

Recreation management would likely not change with Alternative A. No Action alternative, beyond that already resulting from the 2000 listing of the lynx and the associated requirements of section 7 of the ESA. Section 7 consultation on the effects of Federal recreation related projects on the lynx under the jeopardy standard would still be required.

For Alternative B, critical habitat designation would require re-initiation of some Section 7 consultations for recreational projects. New and ongoing recreation-related projects within designated critical habitat areas would be analyzed under the section 7 consultation process for potential effects to PCEs as well as effects to the species. While habitat is already considered during the consultation process, the consultations would have to address PCEs. For projects where there is no Federal nexus, critical habitat designation does not impose rules or restrictions on land use so there would be no changes under Alternative B.

4.7 Commerical and Residential Development/Oil and Gas Leasing/Mines

Actions that would cause permanent loss or conversion of the boreal forest would eliminate and fragment lynx and snowshoe hare habitat. Such activities could include, but are not limited to, commercial, residential or recreational area developments; certain types of mining activities and associated developments.

Development-related projects would not change with Alternative A, the No Action alternative, beyond that already resulting from the 2000 listing of the lynx and the associated requirements of section 7 of the ESA. Section 7 consultation on the effects of Federal fire management projects on the lynx under the jeopardy standard would still be required.

For Alternative B, critical habitat designation would require re-initiation of some Section 7 consultations for oil and gas, mining and development-related projects. New and ongoing Federal development-related projects within designated critical habitat areas would be analyzed under the section 7 consultation process for potential effects to PCEs as well as effects to the species. While habitat is already considered in consultations on effects to the species, consultations will need to evaluate PCEs. For projects where there is no Federal nexus, critical habitat designation does not impose rules or restrictions on land use, so there would be no changes under the Alternative B.

4.8 Transportation/Highways

Actions that would increase traffic volume and speed on roads that divide lynx critical habitat could reduce connectivity within the boreal forest landscape for lynx and could result in increased mortality of lynx within the critical habitat units as lynx are

highly mobile and frequently cross roads during dispersal, exploratory movements or travel within their home ranges.

Transportation-related projects would not change with Alternative A, the No Action alternative, beyond that already resulting from the 2000 listing of the lynx and the associated requirements of section 7 of the ESA. Section 7 consultation on the effects of Federal fire management projects on the lynx under the jeopardy standard would still be required.

Under Alternative B, existing Section 7 consultations may need to be re-initiated to address critical habitat. New and ongoing Federal transportation-related projects within the designation would be analyzed under the section 7 consultation process for potential effects to PCEs as well as effects to the species. Conservation efforts for lynx might include remote monitoring, construction of habitat continuity structures (overcrossings and/or underpasses), bridge lengthening, fencing and development of databases to track key habitat linkages. While habitat is already considered in consultations on effects to the species, consultation will need to evaluate PCEs. For projects where there is no Federal nexus, critical habitat designation does not impose restrictions on land use; there would be no changes associated with Alternative B.

Actions that would cause permanent loss or conversion of the boreal forest would eliminate and fragment lynx and snowshoe hare habitat. Such activities could include grazing since it changes the structure or composition of native plant communities, thus changing their ability to support lynx and their prey, snowshoe hare.

Grazing practices would not change with Alternative A, the No Action alternative, beyond that already resulting from the 2000 listing of the lynx and the associated requirements of section 7 of the ESA. Section 7 consultation on the effects of grazing on the lynx under the jeopardy standard would still be required.

For Alternative B, critical habitat designation would require re-initiation of some Section 7 consultations for grazing. New and ongoing grazing authorizations within designated critical habitat areas would be analyzed under the section 7 consultation process for potential effects to PCEs as well as effects to the species. Consultation may require management of sheep and cows to prevent grazing concentration in areas that might contain lynx and snowshoe hare habitat and foraging habitats, using fencing instead of wood debris as a more permanent boundary between grazing areas and lynx/hare habitat, and monitoring and reporting on foraging conditions. While habitat is already considered in consultations on effects to the species, consultations will need to evaluate PCEs. For projects where there is no Federal nexus, critical habitat designation does not impose rules or restrictions on land use so there would be no changes under the Alternative B.

4.9 Environmental Justice

Federal agencies are required to "identify and address disproportionately high and adverse human health or environmental effects" of their programs and actions on minority populations and low-income populations, as directed by Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations). The areas under consideration for this assessment are rural. This assessment has not identified any adverse or beneficial effects unique to minority or low-income human populations in the affected areas.

4.10 Tribal Lands

Under Alternative A, any impacts to Tribal lands would not change, as the Section 7 process would only be initiated for "may affect" determinations for lynx. The number of potential consultations would continue to be about the same as under current conditions.

Under Alternative B, Tribal lands have been excluded from the designation in the final rule, so impacts would be the same as for Alternative A.

4.11 Cumulative Impact

Designation of critical habitat for the lynx will add incremental impacts when added to other past, present, and reasonably foreseeable future actions. Actions that could have cumulative impacts would include: 1) the section 7 consultation outcomes and subsequent effects on other species; 2) the effects of designated critical habitat for other species; and 3) the effects of land management plans. The Service expects the impacts to be relatively minimal since they would primarily involve re-initiation of section 7 consultations, initiation of additional section 7

There are no Department of Defense lands located within the proposed critical habitat designation, so there will be no impacts to national security. No health and safety issues are anticipated from the proposed designation.

TABLE 23. Summary of Environmental Consequences by Alternative.

ALTERNATIVES		
Impacts	**Alternative A No Action Alternative**	**Alternative B Selected Alternative**
Physical environment	No change to existing situation	No change to existing situation
Fish, wildlife & plants	No change to existing situation	No negative impacts, possible beneficial
Human environment		
Timber Management	No change to existing situation	Timber management may be altered due to critical habitat
Wildland fire management	No change to existing situation	Wildland fire management may be altered due to critical habitat

Recreation	No change to existing situation	Critical Habitat may require restrictions or changes to recreational management
Transportation/highways	No change to existing situation	Transportation projects may require lynx conservation measures
Development/oil & gas/mining	No change to existing situation	Development projects may require lynx conservation measures
Archaeological/Cultural	No change to existing situation	No Impacts
Environmental justice	No change to existing situation	No impacts

5 COMPLIANCE, CONSULTATION AND COORDINATION WITH OTHERS

5.1 Compliance With Other Laws and Regulations

The Proposed Rule for critical habitat designation describes numerous laws and policies that are considered during the rulemaking process.

5.2 Environmental Justice

Environmental justice is achieved when everyone, regardless of race, culture or income, enjoys the same degree of protection from environmental and health hazards and equal access to a healthy environment. None of the alternatives would have an impact upon women, minority groups, or civil rights of any citizen of the United States (Executive Order 12898). No Native American Tribal resources would be negatively affected by the alternatives (Secretarial Order 3206).

5.3 Public Review and Comment

The proposed rule for designation of lynx critical habitat was published February 28, 2008, in the *Federal Register* (73 FR 10860) with a 90-day comment period. The Service provided a draft of this EA to the public for review and comment for a period of 30 days. The Service provided written and/or electronic notice of the availability of this draft EA to interested individuals including Native American Tribes, private landowners, county commissioners, congressional and State representatives, State and Federal agencies, and other potentially interested parties. This draft EA was also posted on the Service's website.

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