3.3.4 Threatened and Endangered Species

3.3.4.1 Canada Lynx (Indicator 15)

(Threatened Species)

Evaluation of Canada Lynx is based primarily on:

- forested prey habitat for snowshoe hare (upland and lowland forest in sapling and mature and older forest),
- red squirrel habitat (conifer forest with trees of cone bearing ages),
- habitat connectivity, and
- potential for human disturbances associated with human access (trails and roads).

The draft Biological Assessment (USFS 2004c) provides more detailed evaluations.

Lynx use habitat types, amounts, and distributions that are also required by several other species occurring in the boreal forest and in the boreal forest transition zone. As an indicator, lynx can highlight differences among alternatives because each alternative provides varying amounts of habitat quality and quantity beneficial to lynx. Lynx is also a species of management concern because it is listed as threatened; National Forest management potentially impacts this species and its habitat; opportunities exist to enhance recovery efforts (FSM 2621.1); there is high public concern; and it is not adequately addressed by Indicators 1-13. The Superior and Chippewa National Forests provide important habitat in the Lake States geographic area.

3.3.4.1.a Affected Environment for Canada Lynx (Indicator 15)

The Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et. al 2000) is the guiding document that directs lynx conservation in the United States. The LCAS builds upon the latest science and identifies the risks to the species that may occur as a result of federal land management. It recommends conservation measures that could be taken to remove or minimize the identified risks. It was developed to provide a consistent and effective approach to lynx conservation on federal lands in the contiguous United States. The LCAS has been adapted to the Minnesota situation (planning record) and has been considered in developing management guidance for all alternatives included in this FEIS and Revised Plans.

As yet, the FWS has designated no critical habitat and no recovery plan has been developed.

Habitat

Relatively little is known about lynx in the Great Lakes States. However, the knowledge and current science from this and other regions provide us with a basic understanding of their habitat.

Lynx use of habitat is primarily dictated by its prey and location of suitable den sites. Snowshoe hares are the primary prey of lynx, comprising 35-97% of the diet throughout its range (Koehler and Aubry 1994). During the part of the cycle (approximating 10 years) when hares become scarce, and during summer, the proportion and importance of other prey species, especially red squirrel, increases in the diet (Brand *et al.* 1976, O'Donoghue *et al.* 1998, Apps 2000, Mowat *et al.* 2000). When hare densities decline, the lower quality diet causes sudden decreases in the productivity of adult female lynx and decreased

survival of kittens, which causes the numbers of breeding lynx to level off or decrease (Nellis *et al.* 1972, Brand *et al.* 1976, Brand and Keith 1979, Poole 1994, Slough and Mowat 1996, O'Donoghue *et al.* 1997).

Lynx use large woody debris, such as downed logs, root wads, and windfalls, to provide denning sites with security and thermal cover for kittens (McCord and Cardoza 1982, Koehler 1990, Koehler and Brittell 1990, Mowat *et al.* 2000, Squires and Laurion 2000, U.S. Fish and Wildlife Service, in litt. 1999). And denning habitat must be in or near foraging habitat to be functional.

The distribution of lynx in North America is closely associated with the distribution of North American boreal forest (Agee 2000). Within these general forest types, lynx are most likely to persist in areas that receive deep snow, to which the lynx is highly adapted (Ruggiero *et al.* 2000b). This gives them the competitive advantage over other predators.

Status

Recently, the Minnesota DNR has been keeping track of Minnesota lynx sightings based on field observations and information from the National Forests snow-trailing, incidental take, or other observations. Results to date include (Ed Lindquist, memo April 29, 2004):

Minnesota

- 217 reports with location information have been received
- 88 (41%) reports have been verified as lynx
- 18 (8%) reports are assumed to provide evidence of reproduction
- 190 (87%) of reports are from St. Louis, Lake, and Cook Counties
- 15 (7%) of reports are from Beltrami, Itasca, Koochiching, and Cass Counties
- 12 lynx shot or incidentally trapped
- 3 apparently killed by vehicle or train
- 2 dead, cause unknown

Though it is not possible to derive a statistically valid population estimate for the National Forests based on lynx collared, observed, or detected from incidental take or DNA samples, using a conservative approach, it is likely that the Forest has a minimum of 100 lynx, and possibly several hundred (Ed Lindquist, memo April 29, 2004). This includes breeding lynx.

Threats and Existing Condition

This section summarizes key risk factors identified in the LCAS affected by National Forest management and describes those that are used to analyze differences in each alternative. The Draft Biological Assessment provides a full description of these risk factors as well as risks identified by the LCAS that are not analyzed in detail because they are not applicable, are not under Forest Service control, would not differ among alternatives or would be very minor on the Superior and Chippewa. Providing for these needs and reducing risk is expected to favorably influence the welfare of lynx in Minnesota. Indicators assessed fall under two main categories:

- Lynx Habitat
- Human Access

Lynx Habitat

Differences in the vegetation objectives and projected conditions for forest types, ages, and distribution by alternative could have effects on lynx prey densities; the ability of lynx to move across the landscape in preferred forest canopy conditions; and the distribution and interconnectedness of habitat providing forage, travel, security, and denning.

The draft Biological Assessment compares the vegetative standards and guidelines incorporated from the LCAS against the proposed vegetation management of each Plan alternative in order to identify potential effects on lynx habitat. Alternative Modified E used a slightly different existing condition based on a different base year (2003). Although a different base year was used, effects remain the same. What is shown here is data based on a base year of 2000. See the Draft Biological Assessment for further detail. Factors summarized in this section include:

- Snowshoe hare habitat

- Red squirrel habitat (acres of seedling/sapling and mature hardwood and conifer)
- Connectivity

Snowshoe Hare Habitat

Previous research, mostly from other parts of the country, has shown that lynx have evolved to favor the same habitat as their major prey - snowshoe hares. This habitat is characterized by deep snow (Bittner and Rongstad 1982). Primary forest types are spruce/fir, pine, deciduous, and mixes of these forests in the Lake States and eastern United States (Hodges 2000). Within these habitat types, snowshoe hares prefer sapling and older sawlog stands, rather than the very early regenerating or pole-sized stands (Ruediger *et al.* 2000). They prefer stands of conifers with shrub understories that provide forage, cover to escape predators, and protection during extreme weather (Wolfe *et al.* 1982, Monthey 1986, Koehler and Aubry 1994). The current condition of snowshoe hare habitat Forest-wide using 3-15 year old upland hardwood and hardwood conifer mix forest as an indicator is:

Chippewa NF: 57,200 acres
Superior NF: 86,300 acres

Squirrel Habitat

Red squirrels can also be a component of the lynx diet and are associated with forest stands that contain conifers of cone bearing age. The current condition of red squirrel habitat Forest-wide using 30+ year old upland conifer as an indicator is:

Chippewa: 86,600 acres
Superior: 219,200 acres

On both Forests the current levels of snowshoe hare and squirrel habitat are below the amount expected under RNV.

Connectivity

Connectivity may be inferred by the timber harvest schedules and Management Area distribution of each alternative.

The current condition for timber harvest during the last ten years (1992-2001) is:

Chippewa: 63,500 acres (73% of harvest was clearcutting, shelterwood or seed tree). Clearcuts are limited to 40 acre opening size.

Superior: 77,300 acres (93% of harvest was clearcutting, shelterwood, overstory removal or seed tree). Clearcuts are limited to 40 or 200 acre opening size, depending on the Management Area (USDA FS 1986b).

Refer to Final EIS Chapter 2.4.1, Table 2-1 for current distribution of Management Areas.

While conditions that promote connectivity occur on all Management Areas, the opportunity for continuous canopy connectivity are less in General Emphasis Management Areas (forest that is managed to maintain ecosystem integrity while providing for a variety of sustainable economic and social uses). On the Chippewa, 95% of the Forest is currently in General Forest Emphasis. On the Superior, 53% of the entire forest is in General Forest Emphasis (outside the BWCAW, 83% of the Forest is in General Forest Emphasis).

Human Access

The identified effects of roads are largely focused on winter access into lynx habitat (Ruediger *et al.* 2000). The LCAS recommended measures to reduce the potential for increases in snow compaction that could allow coyote and bobcat competitors into lynx habitat that would otherwise have been inaccessible.

The management guidance incorporated into the alternatives from the LCAS assures that any new low-standard (OML 1 or 2) or temporary roads would be effectively closed after use, unless they are designated for other management uses. In addition, recreational use of Forest roads and trails would be better planned so as to more effectively consolidate motorized use. The alternatives differ in the following factors:

- Temporary and OML 1 and 2 roads to be constructed.
- Maximum ATV and snowmobile trails allowed.
- Policy on ATV and snowmobile use

Table WTE-1: Existing conditions of designated ATV and snowmobile roads on NFS land (Biological Assessment Lynx Indicators 5 and 6). ‡

National Forest	Indic 5: ATV Trails	Indic 6: Snowmobile Trails
	Miles	Miles
Chippewa	20	378 (681‡)
Superior	40	686 (1,509‡)

‡Source: Final EIS, Chapter 3.8.3
‡Total miles within the Forest boundary (both NFS and non-NFS miles)

Table WTE-2: Total miles low standard roads: OML 1 and 2 roads and temporary roads. (Biological Assessment Lynx Indicator 7) ‡

National Forest	Units	OML 1	OML 2	Total OML 1 & 2	Temp Roads
Chippewa	miles	324	1,753	2,077	355
Superior	miles	883	867	1,750	432

‡Source: Final EIS Appendix F.

Table WTE-1 displays the current condition for recreational trails. Further detail and analysis can be found in the Final EIS, Chapter 3.8.3 Recreational Motor Vehicles.

Table WTE-2 displays the current condition for OML 1 and 2 and temporary roads Additional information on all roads can be found in the FEIS, Appendix F: Transportation System.

The current policy on ATV and snowmobile use on low standard roads or cross-country is described and analyzed in more detail in the FEIS, Chapter 3.8.3. In summary, the policy is:

- *Chippewa National Forest* prohibits cross-country ATV or snowmobile use. ATV use is allowed on all OML 1 and 2 and Unclassified roads

- *Superior National Forest* allows cross-country ATV and snowmobile use. ATV use is allowed on all OML 1 and 2 and Unclassified roads

Note: "Allowed" means RMV use on roads and trails, as well as cross-country, is generally allowed. However these may be restricted by season, type of vehicle, vehicle equipment, or type of activity specified in permits or Forest Supervisor order (Final EIS, Glossary).

Management Strategies

The long-term viability of lynx is best addressed with a combination of coarse and fine filter management strategies (McKelvey 2000a and 2000b). Habitat provided on federal lands, particularly in the Western United States, is crucial to lynx persistence in the United States (US Forest Service 1999b). Much of the lynx habitat in the Great Lakes Region is naturally marginal and may not support prey densities sufficient to sustain lynx populations (US Forest Service 1999b). However, habitat on the Superior NF is important because it is proximate to a source of lynx in Ontario, Canada.

The LCAS suggests both fine and coarse level guidance to maintain lynx. It recommends Lynx Analysis Units (LAUs) be identified for all areas with lynx habitat, and to which most of the coarse level guidance applies. LAUs are not intended to be home ranges, but are supposed to provide analysis units of the appropriate scale with which to analyze potential direct and indirect effects of projects or activities on individual lynx and to monitor habitat changes. LAUs include suitable and non-suitable habitat for lynx. Each is intended to provide high quality foraging habitat through time, limit habitat alteration, and collectively provide lynx habitat across the landscape. LAUs have been identified for both Forests (Planning Record) (Table WTE-3). The LCAS also suggests "fine filter" level guidance in the form of specific standards and guidelines. All guidance provided by the LCAS has been reviewed, modified to apply to both National Forests, and incorporated in all alternatives (planning record).

Table WTE-3: Acres and percent of 1) total NFS land in LAUs, 2) lynx habitat in LAUs on NFS land and 3) non-habitat in LAUs on NFS land. ‡ (Excludes all waterbodies and non-NFS land.)

National Forest	1. NFS Land	2. Lynx Habitat		3. Lynx Non-Habitat (not inclu water >10 ac)	
Number of LAUs	Acres	Acres	% of Total NFS land	Acres	% of Total NFS land
Chippewa					
21 LAUs	461,100	360,300	78%	100,800	22%
Superior					
47 LAUs	1,249,000	1,244,300	99.6%	4,700	0.4%

‡Source: Planning Record

Little is known about lynx habitat needs in the Lake States. With the confirmation of lynx in Minnesota, a study was initiated during the winter of 2002-2003 to track locations of lynx with radio collars and to identify key attributes of their habitat. It will take several years to obtain research results to use in planning lynx conservation for these Forests.

Table WTE-4: Resource Protection Methods in Revised Plans for Indicator 15: Canada Lynx

General Topic	Revised Plan Direction‡
General Lynx Habitat Management	D-WL-3 O-WL-4 through 10 O-WL-15 (SNF only) S-WL-1 G-WL-1 through 5
Road and Trail Management	Wildlife: D-WL-5 O-WL-7, 11 through 14 G-WL-6 through 9 S-WL-2, 4 Recreation: O-RMV-1 O-RMV-2 (CNF) S-RMV-1 S-RMV-2 (CNF) S-RMV-4 G-RMV-4 Transportation: O-TS-2 through 3 S-TS-3 through 4 G-TS-12

‡ Desired condition, objectives, standards and guidelines found in the Revised Plans

3.3.4.1.b Environmental Consequences for Indicator 15: Canada Lynx

Resource Protection Methods

Aspects of proposed management afford special attention to the conservation of the lynx. All alternatives incorporate integrated resource protection measures (including management objectives, standards, and guidelines), incorporating applicable measures from the LCAS. This direction would be considered at project level planning, analysis, and implementation to avoid or minimize potential negative impacts and to promote proactive management to benefit the species. Table WTE-4 below identifies management direction specific or relevant to lynx conservation found in Chapter 2 of revised plans.

Refugium – Boundary Waters Canoe Area Wilderness

On the Superior NF, the Boundary Waters Canoe Area Wilderness (BWCAW) is recognized for its importance and contribution to lynx conservation and recovery in the Great Lakes Geographic Area (Ruediger *et al.* 2000) For this reason the BWCAW is identified as refugium habitat for the Canada lynx.

Refugia are large, continuous areas encompassing the full array of seasonal habitats, in which lynx are present or occurred historically, and where natural ecological processes predominate. Refugia must be relatively secure from human exploitation, habitat degradation, and substantial winter access; however it is recognized that some active management may be needed to maintain or restore desired vegetation characteristics. Refugia should be sufficiently well-connected to permit genetic interchange within and between geographic areas.

The Boundary Waters Canoe Area Wilderness, together with Voyageurs National Park (VNP) and Quetico Provincial Park, provides, perhaps, the best lynx habitat in the Great Lakes Area (Ruediger *et al.* 2000). The combination of snow depth and lack of trails and roads may allow lynx to retain a competitive advantage against bobcats (Ruediger *et al.* 2000). Wilderness management goals and objectives complement those of refugia. According to the BWCAW Management Plan, wildlife habitat composition will be the result of natural ecological processes such as fire, wind, insects, disease, and plant community succession. Vegetation management objectives for the BWCAW include the preservation of natural ecosystems, including the protection of rare, endangered, and threatened animal habitats.

Effects Common to All Alternatives

All alternatives involve certain practices or activities that may influence lynx habitat. Vegetation management, and human access are the primary activities that contribute to impacts to lynx and lynx habitat. These general effects are described below.

Forest Vegetation Management

Timber and Wildlife

Current, projected, and historical conditions of vegetation and vegetation management are described in detail in Chapters 3.2 (Vegetation), 3.4 (Timber Management) and 3.5 (Role of Fire).

Vegetation management, whether through activities such as timber harvest or allowing forests to succeed, alters habitat for all species, including the lynx. The context for evaluating whether there is sufficient habitat to support lynx and how the alternatives would vary in amounts is based on our current understanding of the range of natural variation (RNV). Refer to Appendix G for more information related to RNV. The goals of the alternatives vary by alternative and, on National Forest land, are within, above, or below RNV. Those that are outside RNV were designed to be likely to have adequate ecological representation of each vegetative growth stage of each Landscape Ecosystem. See Chapter 3.2 for a more detailed description of the relationship between the alternatives and RNV.

Prescribed fire

Likely practices include a variety of prescribed fire treatments (Final EIS, Section 3.5, Tables FIR-1 and FIR-2): fire to achieve ecological objectives, fire for hazardous fuel reduction, and fire for site-preparation after timber harvest. Most of these treatments would be surface fires, not stand-replacement fires. Other probable practices include a variety of forest regeneration mechanical treatments that decrease fuels.

Natural processes

Natural processes affecting vegetation include succession, fire, wind, insects, disease, flooding, and nutrient cycling. Though we can assume that all of these processes will continue to occur across the landscape and affect lynx and its habitat, we cannot predict when or where most of these will occur. Thus, if these processes substantially impact the landscape and lynx habitat in major events, they would be addressed either in a project that deals specifically with the event or under other vegetation management projects. For analysis purposes, we have considered vegetation succession an exception and include it in our evaluation of effects. The vegetation objectives of the Revised Plans (Chapter 2) by forest type and age can be interpreted to show how much and what type of vegetation succession are proposed. These contribute substantially to conditions of lynx forest habitat.

These types of vegetation management activities may have the following effects. Refer to the Final Biological Assessment for a complete discussion:

Research on the effects of forest management on lynx is limited and effects on snowshoe hare and red squirrel habitats are not well understood (Ruediger et

al. 2000, p. 2-2). Nevertheless, proposed vegetation management activities or programs have predictable influences. These would vary by based on intensity, timing, amount and distribution of activity.

Given the extensive NFS acreage, the scattered dispersal of harvest, burning, and other vegetation management activities, management direction to protect known dens, and the small number of resident lynx expected most of the time, the number of lynx that may be subject to any added stress, displacement, mortality, or other harm is likely to be low. Stress from displacement or disruption of use patterns would also likely be temporary and, if habitat is not made unsuitable for foraging, denning, or travel, short term.

Change to forest landscapes is more long term, from 3-9 years or many decades, depending on how the habitat is used by lynx. Because these changes are limited by management direction (objectives, standards and guidelines) for and sufficient amounts of habitat would be present elsewhere in LAUs, the impact to lynx is generally assumed to continue to provide adequately for lynx recovery.

Indirect effects are expected to have greater influences on lynx recovery over time than direct effects. Changes to lynx habitat generally would be longer term. For example, after timber harvest or prescribed fire, habitat for denning, squirrel habitat, and connectivity may not return to suitable conditions for from one to six decades, depending on forest type and ecological setting. Hare habitat, however, may become suitable again after 3 to 10 years, also depending on forest type and ecological setting.

Human access

Forest Roads:

Appendix F: Transportation System provides detailed information on the current condition of forest roads on the National Forests.

Lynx have been documented using and readily crossing low-traffic roadbeds for travel and foraging (Parker 1983; Koehler and Brittell 1990; Ruggiero et al. 2000). Forest/backcountry roads and trails may facilitate snowmobile use and other snow-compacting activities, which may provide competing predators access into lynx habitat during the critical winter period. Summer use of roads and trails through denning habitat may have negative effects, if lynx are forced to move kittens because of associated human disturbance (Ruggiero et. al. 2000). The effects of new forest road construction in lynx habitat are largely unknown.

The identified effects of roads were primarily focused on winter access into lynx habitat (Ruediger *et al.* 2000). The LCAS would reduce the potential for increases in snow compaction that could allow competitors into lynx habitat that would otherwise have been inaccessible.

Winter Dispersed Recreation:

Buskirk et al. (2000) hypothesize that the usual spatial segregation of lynx and coyotes (Murray and Boutin 1991; Litvaitis 1992; Murray et al. 1994) may break down where snow compaction facilitates access by coyotes to deep snow areas. There are no data available to demonstrate that coyote competition currently is negatively affecting lynx populations. The LCAS would limit the expansion of winter dispersed recreation activities within lynx habitat until more conclusive information is available.

Trails or Roads.

Information on the current conditions of trails and roads is found in Appendix F: Transportation System and in Chapter 3.8.3 Recreational Motor Vehicles (Tables RMV-2 through RMV-4).

Roads and trails often provide recreational access either as an intended or unintended consequence. Dispersed recreation activities seldom result in a direct loss of habitat, but are more likely to impart indirect effects, such as increased competition resulting from snow compaction.

Trapping and shooting:

Incidental or illegal mortality of lynx may occur from trapping and hunting/poaching activities. The LCAS includes conservation measures that would benefit individual lynx that may otherwise be adversely affected by incidental or illegal trapping. Potential for trapping and shooting increases with increased road access.

Habitat Degradation by Non-native Invasive Plant Species:

The potential for non-native, invasive plants increases with increasing road access. Human activities are a major factor in spreading these plants. Roads are likely to provide conditions for these plants to gain access into new habitats (Westbrooks, 1998). The impact of non-native invasive plants on biological diversity is a major concern. Although the magnitude of effects of non-native, invasive plant infestations specifically on lynx habitat is uncertain. However, the potential exists for large-scale impacts.

These types of human access activities may have the following effects. For a complete discussion refer to the draft Biological Assessment:

The increasing growth in human use of National Forests and human developments in lynx habitat off NFS lands increase the potential for impacts to lynx recovery. Very few studies have investigated the complex interactions between humans and lynx, but some anecdotal information suggests they can be quite tolerant of humans and a wide variety of behavioral responses can be expected (Ruediger et al. 2000, p. 2-6). Currently the LCAS identifies the indirect effects as a higher potential risk than direct impacts: primarily as a result of increased snow compaction that allows competing carnivores such as bobcat or coyote access into lynx habitat.

Ruediger *et al* (2000) and Hickenbottom *et al.* (1999b) did not consider direct effects from road or trail construction a risk factor to lynx in the Great Lakes geographic area. At the National Forest scale, it generally would remain a very low risk; however, considered over both the first decade of implementation and over the long term, it may become a measurable risk. The loss of an individual during cyclic population lows could temporarily affect reproductive success within the Forest boundaries, though its consequent effect on lynx cycles or population is likely to be low.

Given the extensive NFS acreage, the scattered dispersal and timing of road and trail construction, management direction to protect known dens, and the small number of resident lynx expected most of the time, the number of lynx that may be subject to any added stress, displacement, mortality, or other harm is likely to be low. Stress from displacement or disruption of use patterns would also likely be temporary.

These effects are generally long term on recreational trails or low standard open roads since, once on the landscape, they are generally not removed and access is rarely prohibited. Revised Plans place a new emphasis on better planning to more effectively consolidate motorized use. Additionally, Revised Plans direct no net increase in designated snow-compacting trails, thus increased competition should not result from proposed recreation management. ATV trails, however, will constitute increased trail density since there is no provision for a "no net increase" on these types of trails.

Low standard closed or temporary roads have shorter term impacts because they are generally closed after their intended use. However, a portion of low standard roads would always be open at any given time dependent on the management activity that they are intended to support (such as temporary roads into timber sales). The miles of low-standard roads open at one time would vary by year. Management direction in the Revised Plans places a new emphasis on effective closure of these roads, especially where they may intersect newly constructed trails.

Boundary Waters Canoe Area Wilderness

On the Superior, the BWCAW provides important habitat for lynx and connects to lynx habitat in Canada, which in the past regularly supplemented lynx populations with dispersing lynx (Ruediger *et al.* 2000, p. 4-25). The quality, quantity, and distribution of lynx foraging and denning habitat, connectivity, and human uses in the BWCAW is not significantly influenced by the proposed actions of the Revised Plans since no change to BWCAW management direction is proposed.

The recent Final EIS for BWCAW fuel treatment (USDA FS 2001a) analyzed impacts on lynx and its habitat from the Fuel Treatment Plan. This Plan addressed the changed vegetation condition in the wilderness as a result of the July 4, 1999 storm event. As a result of this storm, approximately 165,000 acres (22% of total BWCAW forest) of new seedling/sapling forest were created. Using current habitat model parameters these acres would have been categorized as unsuitable for snowshoe hare for 3 or more years.

The Biological Assessment measured conditions in lowland conifer seedling/sapling forest as the indicator of impacts to lynx since these areas were assumed to produce suitable habitat with the highest densities of snowshoe hares and to also serve as refugia during low points in the hare population cycle. The Biological Assessment documents the conclusion of the Forest Service that, overall, the short term indirect effects of the Fuel Treatment Plan on Canada lynx in the BWCAW are expected to be beneficial and would result in short-term increases in prey populations in areas where fire would create suitable hare foraging habitat. Over the long term, foraging habitat would likely decrease as forests age. Human disturbance could increase during implementation of the fire plan, but mitigations would minimize the impacts. Thus, fuel treatment proposed action *may affect, but would not be not likely to adversely affect the Canada lynx*. The FWS concurred with this assessment.

Using 2003 updated data and the lynx forest habitat conditions indicators described in the Biological Assessment, analysis shows that the BWCAW refugium provides ample habitat. Although LAU management direction for forest habitat do not apply in the wilderness, the BWCAW refugium would more than meet the direction for minimum habitat conditions of the LAUs. Table WTE-5 displays the current conditions, based on 2003 vegetation data.

Although the BWCAW Final EIS did not specifically measure unsuitable habitat, as noted above, the 165,000 acres of blowdown would have been considered unsuitable. The significant difference from the current conditions displayed in Table WTE-5 is explained by the fact that the blowdown acres, having aged since 1999, would by now have moved out of unsuitable into suitable habitat conditions. New acres of unsuitable are expected to be created in the future from the implementation of the Fuel Treatment Plan and, at an estimated rate of 2% per year, from natural disturbances such as fire or wind (USDA FS 2001a).

Other effects common to all alternatives

The National Forests do not own mineral rights over a significant portion of the Chippewa or Superior National Forests. The potential for prospecting and mining could have effects, possibly significant, on lynx habitat due to high standard road construction and fragmentation from the area impacted by the mine. The Forest Service would, however, ensure that potential developments consider effects to lynx recovery and that appropriate mitigation is applied.

All alternatives would have similar effects from other risk factors identified in the LCAS for the Great Lakes Geopgraphic Area that are not applicable or would be very minor (pre-commercial thinning) or are not under Forest Service control (livestock grazing, highway construction, and conversion to agriculture). As with mining development, for any project that would require a permit or other authority from the Forest Service, the Forest Service would ensure that lynx habitat and appropriate mitigation measures were considered.

Direct and Indirect Effects to Indicator 15: Canada Lynx

Table WTE-5: Lynx habitat types: Current conditions on lynx habitat on NFS lands in BWCAW refugium. ‡

Habitat Indicators	Acres (in 1000s)	Percentage of NFS lynx habitat
Total acres of lynx habitat on NFS land in BWCAW	755	
Hare habitat	628	83%
Unsuitable habitat	5	<1%
Squirrel habitat	353	47%
Forested acres	728	*% of NFS forested ac*
Denning	481	66%
Denning > 5 Ac	458	63%

‡ Planning record

In general, given the resource protections and other considerations above that are common to all alternatives, the differences in most of the alternatives appear to be small. While all alternatives vary in the amount of habitat they provide, all are likely to provide foraging habitat in amounts at least sufficient to provide for lynx. There are also differences in likely amounts of human disturbance and competition with other species because of snow

Table WTE-6: Snowshoe hare habitat acres (in 1000s) (Biological Assessment Lynx Indicator 1). ‡

National Forest	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod. Alt. E‡‡	Alt. F	Alt. G
Chippewa National Forest							
Existing acres 2000	57.2	57.2	57.2	57.2		57.2	57.2
Existing acres 2003					57.2		
Decade 1 acres	64.8	28.3	65.0	25.6	34.1	28.0	31.6
Decade 10 acres	57.0	11.5	47.7	5.9	24.6	13.7	20.5
Superior National Forest							
Existing acres 2000	86.3	86.3	86.3	86.3		86.3	86.3
Existing acres 2003					76.8		
Decade 1 acres	115.9	66.0	143.1	43.0	65.9	64.2	67.1
Decade 10 acres	116.8	36.1	109.6	4.7	68.0	61.7	64.5

‡Source: Dualplan 2002 – for Alternatives except Alt E. Planning Record.
‡‡ Source: Dualplan 2003 – for Alternative Mod. E

Table WTE-7: Red squirrel habitat acres (in 1000s) (Biological Assessment Lynx Indicator 2). ‡

National Forest	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod. Alt. E	Alt. F	Alt. G
Chippewa National Forest							
Existing acres 2000	86.6	86.6	86.6	86.6		86.6	86.6
Existing acres 2003					86.9		
Decade 1 acres	85.7	99.8	81.4	97.1	96.2	99.4	96.9
Decade 10 acres	84.4	217.4	106.4	238.5	149.7	197.7	184.4
Superior National Forest							
Existing acres Year 2000	219.2	219.2	219.2	219.2		219.2	219.2
Existing acres Year 2003					236.9		
Decade 1 acres	240.7	255.4	230.9	258.6	260.9	248.8	247.1
Decade 10 acres	361.9	673.7	368.6	689.3	479.5	573.1	515.9

‡Source: Dualplan – Planning Record.

compacting
activities, but all alternatives are likely to provide an adequate amount of protection.

Direct, indirect, and cumulative effects of selected habitat factors are summarized below. The alternatives were assessed by their provision for moving toward or away from the preferred management strategies for habitat and human contact found in the LCAS. Other important habitat factors are addressed in detail in the Forest Service draft Biological Assessment (planning record).

Forest habitat

Differences in the amounts and distributions for forest types, ages, and conditions would vary by alternative and could have effects on lynx prey densities described below. The draft Biological Assessment compares the vegetative standards and guidelines of the LCAS against the proposed vegetation management of each Plan alternative in order to identify potential effects on lynx habitat. Factors analyzed are:

- Snowshoe hare habitat: indicated by seedling/sapling forest

- Red squirrel habitat – indicated mature and older conifer
- Connectivity

The data in Tables WTE-6 and Table WTE-7 show the condition of prey habitat on a Forest-wide basis.

Tables WTE-8 and WTE-9 provide information on the levels of timber harvest in the alternatives for Decades 1 and 3. Refer also to Final EIS, Chapter 3.4.1 for additional information on harvest in the alternatives. Alternatives B, C, D, E, F, and G all allow a maximum temporary opening size for timber harvest of 1,000 acres. On the Chippewa, Alternative A has a maximum of 40 acres. On the Superior, Alternative A has a maximum of 40 to 200 acres depending on the current Management Areas (USDA FS, 1986b). Refer to Final EIS, Chapter 2 for information on the acres and percent of General Forest Emphasis Area acres.

Human Access

The management guidance incorporated into the alternatives from the LCAS assures that any new low-standard or temporary roads would be effectively closed after use, unless they are designated for other management uses. In addition, recreational use of Forest roads and trails will be better planned to more effectively consolidate motorized use. The alternatives differ in the following factors to be

Table WTE-8: Conditions for connectivity. Model Results for Decade 1: Type of Harvest - Chippewa and Superior NFs (Biological Assessment Lynx Indicator 3).‡

	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod. Alt. E	Alt. F	Alt. G
	Acres %	Acres %	Acres %	Acres %	Acres %	Acres %	Acres %
Even-aged	222.1 97%	72.5 53%	314.7 97%	83.6 75%	147.6 71%	99.7 70%	119.7 72%
(clearcut)	173.4 76%	53.6 39%	239.8 74%	0 0%	113.6 54%	88.8 62%	84.3 51%
Uneven-aged	6.1 3%	64.4 47%	10.5 3%	27.2 25%	43.5 21%	42.5 30%	45.7 28%
Total Acres	228.2	136.9	325.1	110.9	304.7	142.2	165.4

Source: Dualplan model output

Table WTE-9: Conditions for connectivity. Model Results for Decade 3: Type of Harvest Acres (in 1000s) and percent – Chippewa and Superior NFs (Biological Assessment Lynx Indicator 3).

	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod. Alt. E	Alt. F	Alt. G
	Acres %	Acres %	Acres %	Acres %	Acres %	Acres %	Acres %
Even-aged	234.3 92%	74.3 46%	182.3 78%	33.7 86%	145.4 71%	104.3 64%	127.7 65%
(clearcut)	171.7 67%	55.8 35%	119.3 51%	0 0%	116.9 57%	92.8 57%	86.4 44%
Uneven-aged	20.4 8%	86.2 54%	51.6 22%	5.3 14%	43.5 21%	58.1 36%	67.4 35%
Total Acres	254.7	160.5	234.0	38.966	305.9	162.4	195.1

‡Source: Dualplan model output

Table WTE-10: Maximum new designated ATV trail for Decade 1 (Biological Assessment Lynx Indicator 4). ‡

National Forest	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod. Alt. E	Alt. F	Alt. G
	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Chippewa	60	30	60	0	90	60	60
Superior	60	30	60	0	90	60	60

Source: 10/2002 INFRA database, Project file.

Table WTE-11: Maximum new designated snowmobile trail Decade 1 (Biological Assessment Lynx Indicator 5)‡

National Forest	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod. Alt. E	Alt. F	Alt. G
	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Chippewa	100	40	100	0	100	70	70
Superior	90	50	90	0	130	90	90

‡Source: 10/2002 INFRA database, Project file.

Table WTE-12: Estimate of new Construction of Temporary Roads (Biological Assessment Lynx Indicator 6a). ‡

National Forest	1992-2001	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)
Chippewa								
Est. Current	355							
Decade 1		473	262	653	183	386	237	304
Decade 2		481	259	517	147	412	287	342
Decade 3		418	335	547	145	367	297	351
Decade 10		496	465	564	57	484	503	400
Superior								
Est. Current	432							
Decade 1		873	494	1,236	425	754	600	653
Decade 2		957	548	1,210	281	764	659	716
Decade 3		1,038	572	972	145	761	695	761
Decade 10		956	538	1,139	145	764	651	710

‡Source: Appendix F of Final EIS.

Table WTE-13: Miles of OML 1 and 2 System Roads (Biological Assessment Lynx Indicator 6b) ‡

Road Type	Current	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
		(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)
Chippewa								
OML 1								
Decade 1	324	346	338	354	333	343	336	339
Decade 2	324	155	152	156	140	155	151	154
Decade 3	324	155	155	156	140	155	155	155
Decade 10	324	155	155	156	140	155	159	155
OML 2								
Decade 1	1,753	1,753	1,753	1,753	1,753	1,753	1,753	1,753
Decade 2	1,753	1,753	1,753	1,753	1,753	1,753	1,753	1,753
Decade 3	1,753	1,753	1,753	1,753	953	1,753	1,753	1,753
Decade 10	1,753	1,753	1,753	1,753	953	1,753	1,753	1,753
Superior								
OML 1		(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)
Decade 1	883	1172	1046	1292	1024	1132	1082	1099
Decade 2	883	1425	1191	1612	1098	1334	1256	1289
Decade 3	883	1631	1304	1805	1127	1485	1394	1440
Decade 10	883	2,032	1,781	2,068	586	2,022	1,962	1,977
OML 2								
Decade 1	867	867	867	867	867	867	867	867
Decade 2	867	867	867	867	867	867	867	867
Decade 3	867	867	867	867	867	867	867	867
Decade 10	867	867	867	0	867	867	867	867

‡Source: Appendix F of Final EIS.

Table WTE-14: Cross-country ATV and Snowmobile Policies for Alternatives (Biological Assessment Lynx Indicator 7)‡

Forest Emphasis	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod. Alt. E	Alt. F	Alt. G
CNF ATV Cross-country	Prohibited	Prohibited	*Big game retrieval and furbearer trapping access only.	Prohibited	*Big game retrieval and furbearer trapping access only.	Prohibited	Prohibited
CNF Snowmobile Cross-country	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
SNF ATV Cross-country	Allowed	Prohibited	*Big game retrieval and furbearer trapping access only.	Prohibited	*Big game retrieval and furbearer trapping access only.	Prohibited	Prohibited
SNF Snowmobile Cross-country	Allowed	Allowed *	Allowed *	Prohibited	Allowed*	Allowed*	Allowed*

‡Source: Project file.
Notes: *See Final EIS Chapter 3.8.3 for exceptions by Management Area.
Site-specific deviations could also occur during implementation.

Table WTE-15: Potential for ATV Use on Existing OML 1 and 2 and Unclassified Roads (Biological Assessment Lynx Indicator 8)‡							
Forest and Existing Road Type	**Alt. A** No Action	**Alt. B**	**Alt. C**	**Alt. D**	**Mod. Alt. E**	**Alt. F**	**Alt. G**
CNF OML 1 and 2 roads	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed
CNF unclassified roads	Allowed	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
SNF OML 1 and 2 roads	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed
SNF unclassified roads	Allowed	Allowed	Allowed	Prohibited	Allowed	Allowed	Allowed
‡Source: Project file. Notes: See Final EIS text for exceptions by Management Area. Site-specific deviations could also occur during implementation.							

analyzed:

- Temporary and OML 1 and 2 roads to be constructed.
- Maximum ATV and snowmobile trails allowed.
- Cross-country use of recreation vehicles.

Tables WTE-10 through WTE-15 below provide information on projected conditions of Human Access.

Proposed road and recreational trail construction, management activities, and programs (Tables WTE 10-15 above, with additional information on expected road maintenance and decommissioning in Final EIS, Appendix F), have the potential for disturbance or harm to lynx, especially when and where construction activities may occur in close proximity to lynx dens. These activities may also disturb lynx travel, foraging, or resting patterns.

Temporary and OML 1 and 2 roads (low-standard roads) will be effectively closed following their intended use. However, a portion of these roads would always be open at any given time dependent on the management activity that they are intended to support (that is, temporary roads into timber sales). The miles of low-standard roads open at one time would vary by alternative. Alternatives with higher levels of harvest would require more temporary and low-standard roads to be open at one time, which would increase the potential for motorized access into an area. Alternatives that support higher levels of developed and dispersed recreation would also increase visitor use of an area, especially those alternatives that increase the number of miles of motorized trails.

Alternatives Discussions

All alternatives vary in the amount of habitat they provide and differences occur in likely amounts of human access. Following is a discussion of effects by alternative or group or alternatives with similar effects.

Alternatives A, C, and Modified E

Short-term effects (one to two decades)

Forest habitat:

Alternatives A, C, and modified E are similar and provide more than sufficient habitat necessary for healthy hare populations; however, less of the hare foraging habitat would occur in good juxtaposition to cover. Red squirrel habitat potential is slightly reduced from current conditions. Canopy cover would be discontinuous, however, management standards would ensure that conditions would be likely to provide adequate connectivity among LAUs.

Human access:

Alternatives A and C would have a relatively high amount and Alternative Modified E would have a moderate increase of open or closed temporary or OML 1 and 2 roads. When there are more numerous temporary road corridors developed, when they are open or even after they are closed, they may be found

by cross-country motorized trail users. Alternatives A and C allow a moderate increase in new motorized trails. Alternative Modified E allows a relatively high increase.

Alternative B

Short-term effects (one to two decades)

Forest habitat:

Alternative B would provide more than sufficient habitat in the next two decades because hare habitat would be well dispersed with young stands in the initial stage of conversion to conifer. However, this habitat is somewhat fragmented or discontinuous because management areas concentrate young and older forests spatially. It moderately increases relatively well-distributed conifer for red squirrel. The forest canopy would remain well connected across the landscape.

Human access:

Restrictive management areas and limited timber harvests create areas protected from recreational vehicles. There would be relatively low level of open or closed temporary and OML 1 and 2 roads. There would be relatively low level of new motorized trail construction. However, winter recreation is likely to increase slightly through the addition of miles of snowmobile trail.

Alternative D

Short-term effects (one to two decades)

Forest habitat:

Alternative D would provide more than sufficient habitat in the next two decades because hare habitat would be well dispersed with young stands in the initial stage of conversion to conifer. Conifer forest types and the within-stand structure and conifer component would moderately increase, thus increasing red squirrel habitat. The forest canopy would remain well connected across the landscape.

Human access:

Alternative D would have relatively few open or closed temporary or low-standard roads. Motorized recreation trails are not developed. This provides a relatively low potential for increased access, protects large areas from snow compacting conditions and provides a high level of security from potential disturbances by winter recreationists. It also decrease the chance of denning interference, collision, shooting and trapping.

Alternative F and G

Short-term effects (one to two decades)

Forest habitat:

Alternatives F and G provide well-dispersed and sufficient hare habitat. There would be a moderate increase in conifer for red squirrel. These alternatives would provide good canopy continuity in large patches of mature and older forest.

Human access:

Alternatives F and G allow a moderate increase in recreation trail construction and a moderate amount of open or closed temporary or OML 1 and 2 roads.

Alternatives A, C, and Modified E

Long-term effects (ten decades)

Forest habitat:

Alternatives A, C, and modified E would provide more habitat than necessary for healthy hare populations, less of the hare foraging habitat would occur in good juxtaposition to cover. Red squirrel habitat potential is reduced and not well connected.

Human access:

Alternative A and C would continue to have relatively high amount and Alternative Modified E would have a moderate level of temporary road corridors. Although closed, these may be found by cross-country snowmobile users.

For trails, long-term effects are projected to be similar to short-term because of the much higher uncertainty about amounts and distribution of future trails. Trail management for the future would depend on results of monitoring environmental and social impacts (reference Chapter 3.8 cumulative effects).

Alternative B

Long-term effects (ten decades)

Forest habitat:

There would be a decrease in hare habitat, especially in the many areas managed with an emphasis on old forest. However, this alternative is likely to provide adequate hare habitat. Conifer habitat for red squirrel would increase from current and provide more than sufficient prey habitat for lynx. The canopy would be well connected across the landscape.

Human access:

This alternative would have a relatively low amount of open or closed temporary and OML 1 and 2 roads.

For trails, long-term effects are projected to be similar to short-term because of the much higher uncertainty about amounts and distribution of future trails. Trail management for the future would depend on results of monitoring environmental and social impacts (reference Chapter 3.8 cumulative effects).

Alternative D

Long-term effects (ten decades)

Forest habitat:

In the long-term hare habitat potential is reduced; but red squirrel habitat potential is greatly increased. The forest canopy would be the extensive and highly interconnected. However, red squirrel habitat and canopy connectivity would far exceed that necessary and would likely be imbalanced in proportion to the lower availability of hare habitat.

Human access:

Human access would be very controlled and there would be a very low number of open or closed temporary or OML 1 and 2 roads. The result would be least likelihood of compacted trails over the landscape and low chance of denning interference, collision, shooting and trapping.

.

Alternative F and G

Long-term effects (ten decades)

Forest Habitat:

Alternative F and G would provide well-dispersed and sufficient hare habitat and increased amounts from current conditions of conifer for red squirrel. The forest canopy would be continuous across the landscape because management would promote large patches, but with a high level of remnant canopy. Large patches of young forest would have, therefore, enough canopy to provide for lynx movement where hare populations may be highest.

Human access:

Similar to the short-term, Alternatives F and G allow a moderate increase in recreation trail construction and a moderate amount of open or closed temporary and OML 1 and 2 roads to be built for vegetation management. As describe above, this would offer some potential for increases in snowmobile use on temporary road corridors and cross-country.

For trails, long-term effects are projected to be similar to short-term because of the much higher uncertainty about amounts and distribution of future trails. Trail management for the future would depend on results of monitoring environmental and social impacts (reference Chapter 3.8 cumulative effects).

Cumulative Effects to Indicator 15: Canada Lynx

Lynx are a wide-ranging species and do not limit their wanderings to the National Forests. Additional impacts to lynx would occur on lands outside of National Forest jurisdiction. It is very difficult to estimate the cumulative effect resulting from management of the National Forests along with neighboring land management and land uses in the reasonably foreseeable future (approximately the next 20 years). This may be especially true for lynx, given the uncertainty about the potential impacts from the indicators of vegetation condition and roads, trails and other human access risk factors. However, key aspects of cumulative effects from the draft Biological Assessment include:

Table WTE-16: Estimated lynx forest habitat conditions for snowshoe hare habitat, connectivity habitat, denning habitat, and unsuitable habitat in the Drift and Lake Plains (DLP) and Northern Superior Uplands (NSU) Sections.

	Snowshoe Hare and Connectivity Habitat	Denning Habitat	Unsuitable Habitat
	Age: 10-30, 60+	**Age: 0-10**	**Age: 70+**
DLP Landscape Ecosystems			**0-10**
Mesic boreal hardwood conifer	70%	3%	38%
Mesic northern hardwood	76%	2%	41%
Dry-mesic pine-oak	72%	4%	37%
Dry-mesic pine	72%	4%	38%
Dry pine	67%	5%	30%
	Age: 10+	**Age: 0-10**	**Age: 40+**
White Cedar and Semi-terrestrial White Cedar	na	na	na
Tamarack Swamp, Forested Bog	na	na	na
NSU Landscape Ecosystem	**Age: 10-30, 60+**	**Age: 0-10**	**Age: 70+**
Dry-mesic jackpine-black spruce	72%	10%	65%
Dry-mesic red and white pine	71%	14	47%
Mesic red and white pine	65%	11	38%
Mesic birch-aspen-srpuce-fir	78%	9%	59%
Sugar Maple	84%	1%	58%
	Age: 10+	**Age: 0-10**	**Age: 40+**
Lowland Conifer	91%	2%	83%

Source: Project File

Forest habitat

Based on the current and expected conditions of the Minnesota Drift and Lake Plains (CNF) and Northern Superior Uplands (SNF) Sections, it is likely that forest vegetation conditions would provide sufficient or greater habitat for foraging – hare and squirrel habitat, denning, cover, and dispersal. Additionally, unsuitable habitat is likely to remain within thresholds recommended in the LCAS and by G-WL-3 (<30% unsuitable). All alternatives would contribute to maintaining suitable vegetation conditions for lynx recovery.

Table WTE-16 displays the coarse estimates of habitat for 1) snowshoe hare and travel cover habitat 2) unsuitable hare habitat, and 3) denning habitat.

Though Revised Plans and the LCAS do not specify what how much hare habitat is necessary, the assumption is that there must be an adequate representation of the range of natural variability. In the Biological Assessment and the Final EIS, analysis suggests that although conditions do not match the RNV, each Landscape Ecosystem has adequate representation of the different vegetative growth stages. Since hare use many different age classes, it appears that Revised Plans and cumulative effects will provide more than sufficient habitat.

Connectivity habitat (based on adequate vegetation cover) should also be more than adequate. Though it is likely that portions of both the DLP and NSU will be deforested in the next two decades due to human settlement, the Revised Plans do not propose any deforestation and thus there is no cumulative effect from Plan implementation.

Amounts and quality of habitat (including juxtaposition to denning or dispersing habitat) would continue to vary spatially within lynx habitat – with different areas providing a range of low to very high quality forest habitat. These impacts are expected to be similar because vegetation management by other landowners is likely to be similar to current management. Timber harvest, vegetation succession, and other natural ecological processes will continue to provide an array of conditions suitable for hare and squirrel, even if trends for clearcutting and other

timber harvest change as a result of landscape goals developed for under the leadership of the Minnesota Forest Resources Council (Appendix H).

Other factors affecting hare, including both its cyclic population dynamics and the potential for climate change (warming) to adversely affect its overall habitat conditions here at the southern edge of its range affect both the degree to which the hare would occupy suitable habitat or the long-term quality of that habitat. But, these factors are uncertain and are not likely to be affected by differences among the alternatives.

Potential adverse cumulative impacts to forest habitat would be mitigated to the degree possible through management requirements that allow no more than 30% of all ownerships within LAUs to be in unsuitable condition at any given time (G-WL-3). In most LAUs, the National Forests should have a reasonable ability to protect adequate amount of suitable vegetation, considering that current condition at the Landscape Ecosystem level is well within the 30% threshold for unsuitable habitat (Table WTE-16).

The exception to the likelihood of maintaining adequate forest vegetation to support lynx may be in some areas where increased human development may permanently deforest lynx habitat. In the reasonably foreseeable future there may be new roads, home sites, recreational developments (such as golf courses), mining developments and other developments that make lynx forest habitat unsuitable. However, from the vegetation condition perspective, these cumulative effects are likely to be relatively minor.

Human access

The greater potential for cumulative negative impacts and pressure on lynx recovery is likely to be the result of human access. Private lands in northern Minnesota and throughout the Lake States continue to be developed. Private, State, County, and other landowners will continue to build roads, many of which would become permanent or, if needed temporarily, may not be effectively closed after use. Increasing human populations, increased recreational demands may result in greater number of miles of trails for both summer and winter use. Currently, in an attempt to help meet recreational demand for more motorized trails, County and State land managers are considering development of additional ATV trail systems in North Central and Northeastern Minnesota. Refer to Chapter 3.8 Recreation and 3.9 Social and Economic Stability for more discussion of cumulative impacts of roads, trails, and other human uses.

These changes are likely to increase risks to lynx productivity, mortality, and dispersal opportunities from vehicle collisions, shooting, trapping, starvation, and competition with other hare predators (bobcat, coyote). This could put greater put pressure on lynx recovery.

Those alternatives (B and D) that emphasize or allow a very low amount of road and trail development (including relatively high acres of management areas that de-emphasize human use and development) may provide secure areas (small refugia) that would not otherwise be as available. These may mitigate pressures from human access on the landscape. The other alternatives (A, C, Modified E, F, and G) that emphasize or allow a moderate to high amount of road and trail development are likely to have fairly similar effects – that is, National Forests will have limited ability to affect the risk factors that result for land uses out of the jurisdiction of the National Forests.

Finally, in general, it not anticipated that any alternative would have a significant greater or lesser effect than others on the rapidity of development of non-National Forest land.

Determination of Effects to Indicator 15: Canada Lynx

The Forest Service has determined that all alternatives are “likely to adversely affect the lynx”, but that adverse effects from the alternatives are not likely to impede recovery. This determination is the same for both forests because alternatives would have similar effects. The context and rationale for this determination are described in more detail in the draft Biological Assessment and are summarized below.

Effects analysis conducted in the draft Biological Assessment indicates that lynx conservation would occur under all alternatives. All alternatives incorporate conservation measures, based on those

presented in the Lynx Conservation Assessment and Strategy, which represent the best available science at a national level. No recovery plan currently exists for the lynx. The national measures have been modified to be applicable to Minnesota and the specific conditions on the Chippewa and Superior National Forests. The Forests' conservation measures (including management objectives, standards, and guidelines) address conservation of lynx for all alternatives in two important ways. First, the measures of all alternatives promote the proactive conservation of lynx and its habitat by maintaining or enhancing extensive areas of suitable habitat and by maintaining or enhancing the ecosystems on which this species depends. Secondly, conservation measures of all alternatives identify actions to reduce or, where possible, eliminate adverse effects or risks to the species and its habitat.

Many aspects of the Revised Plans would not likely adversely affect lynx or would proactively benefit them – or have no effect. The overall Determination of Effect "may affect, and likely to adversely affect" was based on the potential for adverse impacts from human access and disturbances: primarily from the potential for shooting and trapping. Vehicle collision is also a potential threat from human access, although this would be unlikely on the low standard roads that are part of the proposed and probably practices.

Although protective management guidance would reduce potential for adverse impacts, some mortality or harm during the planning period is likely because Canada lynx are known to be susceptible to being shot or trapped and effectiveness of conservation measures is still untested and uncertain. Because Revised Plans increase access on the Forest, there exists a potential for greater human access into lynx habitat and the possibility for either intentional or unintentional harm to lynx.

As per Section 7 of Endangered Species Act, we provided the Biological Assessment to the Fish and Wildlife Service, requesting consultation and a Biological Opinion.

In its Biological Opinion (7/15/2004), the US Fish and Wildlife Service concluded:

> *"It is the Service's biological opinion that the action as proposed is not likely to jeopardize the continued existence of the contiguous U.S. distinct population segment of the Canada lynx. No critical habitat has been designated for this species; therefore, none will be affected.*
>
> *The Service's biological opinion in 2000 for effects of federal land management plans on lynx rangewide anticipated that consultations for future Forest Plan revisions would incorporate the LCAS and would tier to that document. In the 2000 opinion, the Service determined that lynx would not be jeopardized by continued land management that was consistent with interagency Conservation Agreements signed in February 2000. The revisions of the Chippewa and Superior National Forest Plans considered here fully incorporate the LCAS and tailor it to conditions in northern Minnesota. We concur that the LCAS guidelines are sufficiently protective to ensure reproduction, numbers, and distribution of lynx will not be appreciably reduced.*
>
> *The Forest Plans include many provisions for protection and enhancement of lynx habitat, as well as measures that would maintain or reduce the risk that actions would increase human-caused mortality. Interspecific competition with other carnivores resulting from snow-compacting activities would continue under implementation of the Revised Forest Plans, but measures are included that would moderate those effects and curb their increase. The goals and objectives of the Forest Plans may render some areas less suitable for lynx and are likely to increase the incidences of negative interactions with humans. However, the objectives and standards and guidelines specifically proposed for lynx will ensure that throughout implementation of the Forest Plans lynx mortality will be minimized, and the habitat conditions will remain stable or improve, even during low population cycles. Based on these considerations, the Service concludes that implementing the Revised Forest Plans would not appreciably reduce the likelihood of survival and recovery of the contiguous U.S. distinct population segment of Canada lynx by reducing reproduction, numbers, or distribution."*

3.3.4.2 Gray Wolf

Indicator 16 - Gray wolf

(Threatened Species and 36CFR 219.19 Management Indicator Species)

Evaluation of gray wolf is based primarily on acres and distribution of foraging habitat and on human disturbance. Analysis indicators are type, age, and location of prey habitat, and open road density. The draft Biological Assessment (USFS 2004c) provides more detailed evaluations.

Wolf was selected as a management indicator species based on its status as a federally threatened species, the potential for impacts from National Forest management to affect its habitat, and existing opportunities to enhance wolf recovery efforts (FSM 2621.1). Additionally, management activities and human access/development can affect changes in wolf populations, prey habitat, and related prey species (deer, moose, and beaver). Wolf is a high public interest species; addresses major management issues; and can be practically monitored. Finally, National Forests in the western Great Lakes region play a major role in contributing to recovery of this species.

3.3.4.2.a Affected Environment for Indicator 16: Gray Wolf

The original recovery plan of 1978 established five zones with differing management/population strategies. The revised plan of 1992 continued these zones, but made changes in their boundaries. The SNF is predominantly Zones 1 and 2; the Chippewa is in Zone 3 and 4. Zone 1 has no population goals, but wolf populations are expected to fluctuate naturally. Zones 2 and 3 have a goal of 1 wolf per 10 square miles, and Zone 4 is 1 wolf per 50 square miles. The 1992 Recovery Plan sets the population goal for Minnesota as 1251 to 1400 wolves by year 2000. By 1998 the Minnesota DNR estimated that 2,450 wolves ranged over the state (Minnesota Wolf Management Plan, 2001). The wolf may be delisted and management authority given to the State of Minnesota in the future. At the time of delisting, the state would over see the management of the wolf.

Habitat

Wolves

Wolves are habitat generalists. Type, age, and structure of vegetation do not affect their distribution. However, human settlement and roads have been considered major determinants in wolf distribution. Since at least 1985, 0.9 to 1 mile of road per square mile of land area has been touted as the maximum threshold for wolf viability in an area (Thiel 1985, Jensen, et.al.1986, Mech, et.al. 1988). Included are roads open to public use and passable by 2-wheeled drive vehicles (Forest Service classifies these as Objective Maintenance Level [OML] 3, 4, and 5).

The Plan Revision will follow the density guideline for 2-wheel drive vehicles in the wolf recovery plan, a maximum of 1 mile per square mile in Recovery Zones 1, 2, and 3. In addition, all new temporary and low standard roads will be closed to the public unless they are designated as recreation trails.

Prey

Recovery plans discuss habitat management for wolf prey. The 1992 federal plan emphasizes increasing deer and moose populations. The 2001 state wolf plan does not emphasize increasing deer, but promotes maintaining “healthy populations” of these species. Rather than promoting high deer and moose populations for wolf alone, goals are designed to balance a variety of factors, including compatibility with habitats and ecosystems, sustainable harvests for hunters, observation opportunities (aesthetics), and conflicts with humans such as vehicle accidents, Lyme’s disease, and crop damage.

Current Status

Wolves

Since 1969 the wolf population on the Superior has averaged about 1 wolf per 14 – 15 sq. mi. (Mech, 2000; and Lindquist, 2002). The populations for the Chippewa are not known. Canine parvovirus, mange,

and heartworm exist in the wolf population and may be having some depressive effects on it.

The wolf population on the SNF may be higher today than it was prior to1900. Wolf density is directly related to the density of their primary prey - moose, white-tailed deer, and beaver. All three of these species occur on the two national forests.

Prey

The SNF makes up almost all of the Northeastern Moose Zone. The MNDNR estimated the current Northeastern Moose Herd at around 3,800 animals between 1996-2001 or approximately 0.7 moose/sq. mi, and has set a goal of 7,000 (Lenarz, pers. com.).

The CNF is not within a moose management zone, but has a continual, low presence of moose. MNDNR pre-fawn deer density for the CNF ranges from 10 to 24 deer per square mile. On the SNF, the pre-fawn densities range from 1 to 16 deer per square mile.

Experience in Minnesota strongly suggests that, at the current population level of deer, wolves do not suppress deer numbers. For more than 20 years the MNDNR has successfully managed deer populations at levels that have provided increasing hunter harvests and ample prey for wolf recovery and persistence despite the typical mortality factors (Minnesota Wolf Management Plan, 2001).

Beaver populations are not monitored closely by the MNDNR. Some colony surveys and anecdotal information leads MNDNR furbearer biologist, John Erb (pers. com.), to assume a declining population. However, beaver are well distributed and still occur in good numbers across the two Forests.

Threats and Existing Condition

The Recovery Plan for the Eastern Timber Wolf (USDI FWS 1992) and the Minnesota Wolf Management Plan (MN DNR 2001b) identify habitat factors considered as essential for a recovering and recovered wolf population. Those within the purview of the Forest Service and that may be affected by alternatives are analyzed. These factors are expressed under two main categories:

- Prey habitat
- Human access

Refer to the Draft Biological Assessment for a full discussion on risk factors and analysis indicators.

Prey Habitat:

The current status of forage habitat and cover in the two national forests, as measured by the young upland forest and the pine, spruce, and fir acreage over 10 years old, is displayed in table WTE-17 below.

Table WTE-17: Forage habitat and Upland conifer cover habitat (Acres and percent of total upland forest).

	Forage (<10 yrs old)	Upland Conifer Cover (>10 yrs old)
Chippewa*	51,082 acres	110,904 acres
	11%	25%
Superior**	125,042 acres	321,948 acres
	13%.	34%.

* Total upland forest on Chippewa: 450,786 ac
** Total upland forest on Superior (outside BWCAW)): 960,307 ac
Source: Dualplan

Note: **In addition environmental effects to deer are analyzed in more detail in the Final EIS, Chapter 3.3.6.4. (Other Species of Interest).**

Human Access

Table WTE-18 displays the current conditions of Human Access Indicators.

The current policy on ATV and snowmobile use on low standard roads or cross-country is described and analyzed in more detail in the Final EIS, Chapter 3.8.3. In summary, the policy is:

- Chippewa National Forest prohibits cross-country ATV or snowmobile use. ATV use is allowed on all OML 1 and 2 and Unclassified roads

Table WTE-18: Existing conditions of designated ATV and snowmobile trails and low standard and temporary roads.

National Forest	ATV Trails	Snowmobile Trails	OML 1 Roads	Temp Roads‡
	Miles	Miles	Miles	Miles
Chippewa	20	378 (681*)	324	355
Superior	40	686 (1509*)	883	432

‡ Estimated for 1992-2001 based on acres harvested.
* Total mileage on all ownerships within Forest boundaries
Source: Final EIS, Chapter 3.8 and Appendix F.

Table WTE-19: Resource Protection Methods in Revised Plans for Indicator 16: Gray Wolf

General Topic	Revised Plan Direction‡
General Wolf Management Direction	D-WL-3 O-WL-4 through 6 O-WL-16 S-WL-4 G-WL-10
Road and Trail Management	Wildlife: D-WL-5 G-WL-8 S-WL-4 Recreation: O-RMV-1 O-RMV-2 (CNF) S-RMV-1 S-RMV-2 (CNF) S-RMV-4 G-RMV-4 Transportation: O-TS-2, 3 S-TS-3, 4 G-TS-12 14

‡ Desired condition, objectives, standards and guidelines found in the Revised Plans

- Superior National Forest allows cross-country ATV and snowmobile use. "Allowed" means that use could occur as long as the land, wildlife, or vegetative resources can withstand use. ATV use is allowed on all OML 1 and 2 and Unclassified roads

The draft Biological Assessment (planning record) provides more detailed information on the affected environment.

3.3.4.2.b Environmental Consequences for Indicator 16: Gray Wolf

Resource Protection Methods

The Revised Forest Plans afford special attention to the conservation of wolf. Revised Plans incorporate integrated resource protection measures (including management objectives, standards, and guidelines), incorporating applicable measures from recovery plans. This direction would be considered at project level planning, analysis, and implementation to avoid or minimize potential negative impacts and to promote proactive management to benefit the species. Table WTE-19 below identifies management direction specific or relevant to wolf conservation found in Chapter 2 of revised plans.

Effects Common to All Alternatives

All alternatives for both Forests will have the following common actions, potential effects, and mitigation measures:

1. The Recovery Plan for the Eastern Timber Wolf, Revised 1992, will guide wolf management under the revised Forest Plans just as it does today. The wolf may be taken off the federal Threatened and Endangered Species list within the next few years. The Minnesota Wolf Management Plan would become the guiding document subsequent to delisting.

2. On the Superior, the current and predicted vegetation conditions for moose and deer habitat in the Boundary Waters Canoe Area Wilderness (BWCAW) are analyzed in the BWCAW Fuel Treatment Final EIS (USDA 2001a). The contribution of the BWCAW to provide forage in young upland forest for beaver, moose, and deer, and the persistence of pine, spruce, and fir for moose and deer cover would remain the same for all alternatives. Therefore, the potential for impacts to wolves within the BWCAW would not vary by alternative. The Revised Forest Plans include a section on BWCAW management direction which does not represent any major changes in current management and all alternatives have the same wilderness management strategies.

3. The road density guidance of 1 mile per square mile OML 3, 4, and 5 would not change under any plan alternative for either Forest. The maximum road density standard on the Superior would change from 0.9 to 1 mile per square mile, and the guideline would be applied to the north half of the Chippewa (north of Highway 2), because that area is now in proposed Management Zone 3 according to the 1992 federal wolf Recovery Plan. Except for road straightening, or possibly short access roads to boat launches and similar projects, no new OML 3, 4, and 5 roads would be built during the next couple of decades in any of the alternatives. Mileage of Forest Service roads drivable by 2-wheel drive vehicles (OML 3, 4, and 5) would not change during the planning horizon.

4. Riparian management for all alternatives would protect the "near bank" zone of all riparian areas of lakes, open water wetlands, and streams over three feet wide to maintain a buffer against timber harvest. Management within the near bank zone generally would emphasize management for riparian values, including, in some cases, older forest and long-lived species, but would also allow timber management to promote the objective of restoring functional riparian areas. This could include timber harvest, where it may be warranted, based on a fifth level watershed analysis, to promote young aspen for beaver. Management may also discourage beaver in some areas to protect important or critical riparian habitats, sensitive species, or trout management.

5. Barriers would be placed on all Objective Maintenance Level 1 (low standard) roads not in use. Also, all roads not needed as part of the Forest road and trail system would be decommissioned. These road control measures, in conjunction with the removal of stream crossings, would reduce potential for recreational motor vehicle (RMV) use in areas close to dens or rendezvous sites.

6. MNDNR moose and deer population goals are not linked to Forest Plan alternatives.

Vegetation manipulation proposed under each alternative could affect potential moose and deer populations in broad patterns, depending on where it occurs on the Forest and general soil productivity. The incidence of brainworm (*Parelaphostrongylus tenuis*), areas of traditional occupancy, deer densities compared to moose densities, winter severity, health of the herd, and other uncontrollable factors would also affect current deer and moose populations.

7. Monitoring and reporting frequency for gray wolf populations would be at lease once every five years for the life of revised plans, with anticipated continued cooperation with FWS, US Geological Survey, and MN DNR.

Direct and Indirect Effects for Indicator 16: Gray Wolf

This section provides a summary of the effects on key indicators of wolf habitat from the draft Biological Assessment. Alternatives were assessed by their provision for moving toward or away from the preferred management strategies for habitat and human contact found in the wolf Recovery Plan.

Prey Habitat

Changes in vegetation related to forest type and age could affect moose, deer, and beaver densities changing the amount of available forage or cover. Wolf indicators used to assess impacts to prey habitat include:

- Acres and percent of young upland forest < 10 years old
- Acres and percent of upland conifer (spruce and pine) >9 years old on all uplands.

Table WTE-20: Acres and percent of young (0-9 year old) upland forest on Chippewa National Forest (Biological Assessment Wolf Indicator 1). ‡

		A	B	C	D	Mod Alt. E	F	G
Existing*	Acres (1,000s)	55.5	55.5	55.5	55.5	51.1	55.5	55.5
	Percent	12.2%	12.2%	12.2%	12.2%	11.3%	12.2%	12.2%
Decade 2	Acres (1,000s)	59.9	17.2	65.8	16.9	37.9	21.5	29.9
	Percent	13.1%	3.8%	14.4%	3.7%	8.3%	4.7%	6.6%
Decade 5	Acres (1,000s)	71.9	17.3	54.1	9.8	39.1	20.5	29.9
	Percent	15.8%	3.8%	11.9%	2.2%	8.7%	4.5%	6.6%
Decade 10	Acres (1,000s)	71.6	18.2	66.8	9.9	33.1	25.5	33.6
	Percent	15.7%	4.0%	14.7%	2.2%	7.4%	5.6%	7.4%
Est. low end RNV	18.2%							
Est. mid pt RNV	25.5%							
Est. high end RNV	32%							

‡Source: Dualplan
* Year 2000 for alternatives A, B, C, D, F, and G, and year 2003 for alternative mod E

Table WTE-21: Acres and percent of young (0-9 year old) upland forest on Superior National Forest (Biological Assessment Wolf Indicator 1). ‡

		A	B	C	D	Mod Alt. E	F	G
Existing*	Acres (1,000s)	128.2	128.2	128.2	128.2	125.0	128.2	128.2
	Percent	13.3%	13.3%	13.3%	13.3%	13.0%	13.3%	13.3%
Decade 2	Acres (1,000s)	129.1	46.0	141.8	44.7	101.7	80.0	86.2
	Percent	13.4%	4.8%	14.7%	4.6%	10.4%	8.3%	8.9%
Decade 5	Acres (1,000s)	145.9	46.2	142.3	23.5	97.7	70.3	86.5
	Percent	15.1%	4.8%	14.8%	2.4%	10.2%	7.3%	9.0%
Decade 10	Acres (1,000s)	143.5	57.6	137.9	22.6	94.2	90.5	97.4
	Percent	14.9%	6.0%	14.3%	2.3%	9.8%	9.4%	10.1%
Est. low end RNV	4.0%							
Est. mid pt RNV	6.0%							
Est. high end RNV	8.0%							

‡Source: Dualplan
* Year 2000 for alternatives A, B, C, D, F, and G, and year 2003 for alternative mod E

Table WTE-22: Acres and percent of upland conifer forest >10 years old on Chippewa National Forest (Biological Assessment Wolf Indicator 2). ‡

		A	B	C	D	Mod Alt. E	F	G
Existing*	Acres (1,000s)	112.1	112.1	112.1	112.1	110.9	112.1	112.1
	Percent	25%	25%	25%	25%	25%	25%	25%
Decade 2	Acres (1,000s)	108.2	139.7	121.6	143.4	138.8	142.3	137.3
	Percent	24%	31%	27%	31%	31%	31%	30%
Decade 5	Acres (1,000s)	123.8	176.2	139.6	196.7	159.7	179.3	180.3
	Percent	27%	39%	31%	43%	36%	39%	40%
Decade 10	Acres (1,000s)	122.2	243.0	144.6	256.5	176.9	221.4	212.0
	Percent	27%	53%	32%	56%	40%	49%	47%

‡Source: Dualplan
* Year 2000 for alternatives A, B, C, D, F, and G, and year 2003 for alternative mod E

Table WTE-23: Acres and percent of upland conifer forest >10 years old on Superior National Forest (Biological Assessment Wolf Indicator 2).‡

		A	B	C	D	Mod Alt. E	F	G
Existing*	Acres (1,000s)	312.1	312.1	312.1	312.1	322.0	312.1	312.1
	Percent	32%	32%	32%	32%	34%	32%	32%
Decade 2	Acres (1,000s)	355.9	366.6	338.6	445.9	411.7	353.2	394.3
	Percent	37%	38%	35%	46%	43%	37%	41%
Decade 5	Acres (1,000s)	334.4	360.2	336.5	644.8	531.0	351.5	345.2
	Percent	35%	37%	35%	67%	55%	36%	36%
Decade 10	Acres (1,000s)	453.6	747.9	464.2	756.1	554.0	657.7	605.9
	Percent	47%	78%	48%	78%	58%	68%	63%

‡Source: Dualplan
* Year 2000 for alternatives A, B, C, D, F, and G, and year 2003 for alternative mod E

Table WTE-24: Maximum New Designated ATV and Snowmobile Trail for Decade 1 (Biological Assessment Wolf Indicator 3).

National Forest	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
	Miles	Miles	Miles	Miles	Miles	Miles	Miles
ATV							
Chippewa	60	30	60	0	90	60	60
Superior	60	30	60	0	90	60	60
Snowmobile							
Chippewa	100	40	100	0	100	70	70
Superior	90	50	90	0	130	90	90

Source: Project file, FEIS chapter 3.8 (tables RMV-2 and RMV-3).

Table WTE-25: Cross-country ATV and Snowmobile Policies for Alternatives (Biological Assessment Wolf Indicator 4)

Forest Emphasis	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod. Alt. E	Alt. F	Alt. G
CNF ATV Cross-country	Prohibited	Prohibited	*Big game retrieval and furbearer trapping access only.	Prohibited	Prohibited	Prohibited	Prohibited
CNF Snowmobile Cross-country	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
SNF ATV Cross-country	Allowed	Prohibited	*Big game retrieval and furbearer trapping access only.	Prohibited	Prohibited	Prohibited	Prohibited
SNF Snowmobile Cross-country	Allowed	Allowed *	Allowed *	Prohibited	Allowed*	Allowed*	Allowed*

Source: Project file.
Notes: *See FEIS text for exceptions by Management Area.
Site-specific deviations could also occur during implementation.

Table WTE-26: Objective Maintenance Level (OML) 1 (Biological Assessment Wolf Indicator 5)								
Decade	Current	Alt. A **No Action**	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
Chippewa	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)
Decade 1	324	346	338	354	333	343	336	339
Decade 2	324	155	152	156	140	155	151	154
Decade 3	324	155	155	156	140	155	155	155
Decade 10	324	155	155	156	140	155	159	155
Superior								
Decade 1	883	1172	1046	1292	1024	1132	1082	1099
Decade 2	883	1425	1191	1612	1098	1334	1256	1289
Decade 3	883	1631	1304	1805	1127	1485	1394	1440
Decade 10	883	2,032	1,781	2,068	586	2,022	1,962	1,977
Source: Project file, FEIS chapter 3.8 (tables RMV-2 and RMV-3).								

Table WTE-27: Temporary Road on National Forests (Biological Assessment Wolf Indicator 5).								
Decade	1992-2001	**Alt. A** No Action	**Alt. B**	**Alt. C**	**Alt. D**	**Mod Alt. E**	**Alt. F**	**Alt. G**
	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)
Chippewa								
Est. Current	355							
Decade 1		473	262	653	183	386	237	304
Decade 2		481	259	517	147	412	287	342
Decade 3		418	335	547	145	367	297	351
Decade 10		496	465	564	57	484	503	400
Superior								
Est. Current	432							
Decade 1		873	494	1,236	425	754	600	653
Decade 2		957	548	1,210	281	764	659	716
Decade 3		1,038	572	972	145	761	695	761
Decade 10		956	538	1,139	145	764	651	710
Source: Project file, FEIS chapter 3.8 (tables RMV-2 and RMV-3).								

Tables WTE-20 through WTE-23 display the current conditions, and predicted conditions by alternative, of Prey Habitat Indicators. All alternatives show that habitat for prey species would be available at various levels.

Human Access

Each alternative has a different potential for disturbance to wolf based on human access. All alternatives would remain within the recovery plan guidance relating to road density. However, trail construction and recreational capacity and encouragement would be different by alternative.

Human access, both foot travel or with a Recreation Motor Vehicle (RMV), is usually on recreation trails and on low standard roads developed for management operations, especially timber sales. While open, these trails and low standard roads provide access to wolf habitat.

The trend towards continued growth of the human population creates a related increase in those recreating on national forest land. The current distribution of wolves in Minnesota is spread over areas of highly varying road densities and human

settlement. The threshold at which wolves can tolerate human disturbance is not known. All indications are that wolves prefer blocks of natural habitat, and research is not available on the possible limits to human intrusion into the habitat, nor its effects on wolf viability. Factors analyzed are:

- Proposed miles of Recreational Motor Vehicle (RMV) trails.
- Temporary and OML 1 roads anticipated per decade. These differ by alternative due to differing levels of timber harvest. Temporary roads, while open for a short period of time (1-4 years), would be obliterated and made impassable to motorized vehicles. OML 1 roads would be effectively closed to motorized use. Instances of motorized use on these closed or obliterated roads would be rare.

Tables WTE-24 through WTE- 27 display the current conditions, and predicted conditions by alternative, of Human Access Indicators.

Alternatives Discussions

None of the alternatives ranked as entirely positive for wolves. Negative effects from issues of human access reduced the positive potential for prey habitat present in most of the alternatives. Following is a discussion of effects by alternative or group of alternatives with similar effects.

Alternatives B, D, F, and G

Short-term effects (one to two decades)

Prey habitat

These alternatives provide a similar level and pattern of timber harvest over the first two decades resulting in similar effects related to prey habitat and human access. Acres harvested in the first decade for these four alternatives range from 110,851 acres to 177,415 acres. Refer to Chapter 3.4.1 for more specific information related to acres harvested by alternative.

CNF - Based on the prescription for mature+, upland conifer acreage at Decade 2, all but Alternative G increase from the existing by close to 6%; Alternative G increases by close to 5%. These figures indicate a continual increase in potential for thermal and escape cover.

SNF - The prescription in Decade 2 for mature+ conifer outside the BWCAW (conifer would continue to be the dominate species within the BWCAW) shows all of these alternatives increasing the conifer component, especially so with Alternative D (+12%) and G (+7%). An increasing conifer component provides more thermal and escape cover.

All of these alternatives would have large areas of inactivity due to protected management areas, large patch management, and relatively low levels of harvest. The differences among the alternatives would not likely alter deer and moose foraging habitat enough to have a direct affect on the wolf population.

Human access

Since B would allow relatively few ATV trails and D none, the potential relative reduction in human disturbance compensates for the somewhat lower levels of young forest created through timber harvest in these two alternatives. Alternatives F and G allow a moderate increase in recreation trails. These trails could lead to a slightly higher chance for disturbance to wolf than the first two alternatives. But, since they would create more prey forage, the effects should balance out.

Alternatives A and C

Short-term Effects (one to two decades)

Prey habitat

These alternatives provide a similar level and pattern of timber harvest over the first two decades resulting in similar effects related to prey habitat and human access. Acres harvested in the first decade for these three alternatives range from 241,541 acres to 339,020 acres. Refer to Final EIS, Chapter 3.4.1 for more specific information related to acres harvested by alternative. Additional analysis of white tailed deer, Indicator 22 can be found on pp. 3.3.6-27 of the Final EIS.

Based on the response of local populations of moose and deer to available forage in the last two decades, these alternatives would provide forage at a more than adequate level for high populations.

CNF - Alternatives A and C would reduce the available conifer, thus decreasing the potential for cover near forage.

SNF – Alternatives A and C would increase the conifer component by a relatively low amount. Conifer cover would not be concomitant with forage availability.

Human access

Alternative C allows cross-country travel by ATV and snowmobile for big-game retrieval and trapping. Alternatives A and C would have the highest number of temporary roads open at one time. These road and trail opportunities provide the highest potential for den site disturbance, shooting, trapping, and collisions with wolves.

Alternative Modified E

Short-term Effects (one to two decades)

Prey habitat

This alternative provides a similar level and pattern of timber harvest over the first two decades resulting in similar effects related to prey habitat and human access. Alternative Modified E proposed to harvest 209,199 acres in the first decade. Refer to Final EIS, Chapter 3.4.1 for more specific information related to acres harvested by alternative. Additional analysis of white tailed deer, Indicator 22 can be found on pp. 3.3.6-27 of the Final EIS.

This alternative is similar to A and C in that, based on the response of local populations of moose and deer to available forage in the last two decades, it would provide forage at a more than adequate level for high populations.

CNF - Alternative Modified E would increase the mature and older, upland conifer component. In two decades it would increase by 6% from the current level.

SNF – The prescription in Decade 2 for mature+ conifer outside the BWCAW (conifer would continue to be the dominate species within the BWCAW) shows this alternative increases the conifer component (+9%) to levels comparable with alternatives D and G. An increasing conifer component provides more thermal and escape cover.

Human access

Alternative Modified E emphasizes ATV and snowmobile trails on both Forests, potentially allowing the most trail construction and therefore the most potential for human disturbance of all the alternatives. Alternative Modified E allows cross-country travel snowmobile travel on the Superior National Forest. Alternative Modified E is third behind alternative A and C for having a high number of temporary roads open at one time. These road and trail opportunities provide the highest potential for den site disturbance, shooting, trapping, and collisions with wolves. The hunting and winter trapping seasons would be the time of highest risk to wolves (Fuller 1989). Any corridor open to RMV's provide the potential for hunters and trappers to shoot, harass, trap (mostly incidental), injure, or collide with wolves. Although incidents of wolf poaching are lower today than in the past (Fuller 1995), human killing of wolves remains a fact today despite the wolf's legally protected status. It is reasonable to assert, then, the more human access in wolf habitat by whatever means, the greater increase in chances for negative contact. Effect from road and trail access on the Forests would be on the reproductive success of individuals and not likely to threaten the population.

Alternatives F and G

Long-term Effects (10 decades)

Prey habitat

Alternatives F and G provide for continual and well-dispersed timber harvests which in turn will provide good wolf habitat over the long term. In addition, larger harvest units may benefit moose.

On both Forests these alternatives provide a significant increase in conifer cover and the percentage fits closely with that expected under the Natural Range of Variation. Alternative F increases conifer cover by 34% on the Superior and 24% on the Chippewa; Alternative G increases conifer cover by 31% on the Superior and 22% on the Chippewa.

Human access

These alternatives offer moderate increases in road and trail corridors. Alternative G would provide large areas of old-growth/old-forest where motorized recreation would be discouraged.

Alternatives A and C

Long-term Effects (10 decades)

Prey habitat

Alternatives A and C would provide deer and moose forage at more than adequate levels. These alternatives provide much more young forest and less conifer forest than likely was found under the natural range of variation.

CNF – The conifer component would be maintained slightly above (+2%) current levels under Alternative A. It would increase by 7% in Alternative C

SNF – The conifer component would increase by 13% in Alternative A, by 14% in Alternative C.

Within Alternatives A and C, stand diversity is likely to drop. There would be fewer conifers within stands dominated by other types. Also, because of more intensive management, these stands may become larger and less intermixed than is the current condition. If cover is not near or intermixed with forage, the ability of moose and deer to take advantage of forage may be reduced.

Human access

As in the short-term, the level of temporary roads open at one time could potentially disturb packs at dens and rendezvous sites.

Alternatives B and D

Long-term Effects (10 decades)

Prey habitat

These alternatives provide similar effects in the long tern, are probably least favorable for wolves. After the second decade in particular, they provide declining forage potential, maintaining deer and especially moose at levels very likely lower than those currently existing. However, Alternative B provides vegetative conditions that are thought to be within the range of natural variation and work toward these conditions quicker than other alternatives. Alternative D would provide more old forest than was likely found under the natural range. Alternative B would provide amounts of young forest similar what existed on both forests under the natural range and Alternative D much less. Base rates of disturbance in Alternative D would still provide a continual supply of young forest.

CNF - Alternative B declines 7% and Alternative D 8.8% from current levels of young forest.

SNF – Alternative B declines 7% and Alternative D 10.3%.

However, mature, upland conifer in these alternatives increases between 28 and 44% on both the Chippewa and Superior.

Human access

Alternatives B and D would have the fewest temporary roads open at one time. The potential for human disturbance related to motorized access would be low.

Alternative Modified E

Long-term Effects (10 decades)

Prey habitat

Alternative Modified E would provide deer and moose forage at more than adequate levels. This alternative provides much more young forest and less conifer forest than likely was found under the natural range of variation.

CNF – The conifer component would increase by 15% in this Alternative

SNF – The conifer component would increase by 24% in Alternative Modified E.

Human access

As in the short-term, the level of temporary roads open at one time could potentially disturb packs at dens and rendezvous sites. Alternative Modified E encourages the greatest recreational activities, which could lead to wolf/human conflict, even though it provides fairly beneficial habitat.

While individual wolves may be threatened, wolf populations are likely to remain viable on either Forest, at least in the 10 – 15 year Plan horizon. All the alternatives would require compliance with the Recovery Plan for the Eastern Timber Wolf. The Plan's main concerns are for limiting roads drivable by two-wheeled, highway vehicles, and maintaining prey. All the alternatives would do that. However, prey habitat is affected quite differently by alternative.

Cumulative Effects for Indicator 16: Gray Wolf

Additional impacts to wolf could occur on lands outside of National Forest jurisdiction. Increases in the potential for human access into wolf territory would occur as people buy, subdivide, and develop private parcels of land. New road construction would be needed to access this property. Harvesting on State, County, and private land would also require additional road development. Not all of these roads would be effectively closed following harvest. In an attempt to help meet recreational demand for more motorized trails, County and State land managers are considering development of additional ATV trail systems in north-central and northeastern Minnesota.

Even-age harvesting on State, County, and private land will continue to provide habitat for deer. In addition, both the State and County are increasing the conifer component on their lands. Overall, more than adequate deer habitat is available in north-central and northeastern Minnesota. This condition is not expected to change. Trends in edge habitat appear to be increasing (Wolter and White 2002).

Shooting, trapping, or other harassment of wolves will most likely continue to occur on all land ownerships at a minimal level. Additional mortality associated with vehicle collision will continue, especially if design speeds on non-federal roads increase.

Based on increasing wolf populations over the past two decades, cumulative impacts to wolf related to changes in habitat and human disturbance are not expected to have major impacts on wolf populations.

Determination of Effects for Indicator 16: Gray Wolf

The Forest Service has determined that all alternatives are "likely to adversely affect the wolf" (even though some alternatives may have overall beneficial effects), but because of the current healthy condition of the population, the adverse impacts are not likely to impede recovery. The determination is the same for both Forests because alternatives would result in similar effects. The context and rationale for this determination are described in more detail in the draft Biological Assessment and are summarized below.

Effects analysis conducted in the draft Biological Assessment indicates that gray wolf conservation would continue under all alternatives. Wolf currently have viable populations and well-distributed habitat and this is likely to continue under the alternatives.

All alternatives incorporate conservation measures (including management objectives, standards, and guidelines), based on the The1992 Wolf Recovery Plan, that addresses conservation of wolf in in two important ways. First, all alternatives promote the proactive conservation of wolf and its habitat by maintaining or enhancing extensive areas of habitat sufficient or greater than sufficient to support populations of wolf's primary prey species deer, and by maintaining or enhancing the ecosystems on which this species depends. Secondly, all alternatives identify actions to reduce or, where possible, eliminate adverse effects or risks to the species and its habitat.

All alternatives proactively promote wolf conservation and provide measures to reduce risks to wolf, and many aspects of the alternatives would not likely adversely affect wolves or would benefit them – or have no effect. For example, when considering effects on prey habitat most of the alternatives are likely to have overall beneficial effects since it is likely that there will be more than sufficient habitat for moose and deer. The alternatives still have the potential to have adverse effects to wolf some time during the life of the plan. The overall adverse determination was based on the potential for adverse impacts from human access and disturbances: primarily shooting, trapping, and, possibly, vehicle collision. Although protective management guidance would reduce potential for

adverse impacts, past management experience indicates wolves are susceptible to harm from humans where access is provided into wolf habitat. Because Revised Plans increase access on the Forest, there exists a potential, for harm to wolves.

As per Section 7 of Endangered Species Act, we provided the Biological Assessment to the Fish and Wildlife Service, requesting consultation and a Biological Opinion.

In its Biological Opinion (7/15/2004), the US Fish and Wildlife Service concluded:

> *"It is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Eastern DPS of the gray wolf. Critical habitat has been designated for the gray wolf in northern Minnesota; however, as stated above the proposed action is not likely to adversely affect critical habitat.*
>
> *The gray wolf population in the action areas and in the rest of northern Minnesota is evidently stable and may be increasing as it was during the period between 1989 and 1997. The desired conditions, objectives, standards, and guidelines are intended to contribute to the recovery of the gray wolf and are expected to have long term beneficial effects. The risk of adverse effects of actions that could be implemented under the Forest Plans is expected to be minor and is moderated by direction to maintain or improve conditions for the species. Therefore, the Minnesota Revised Forest Plans would contribute to the recovery of the Eastern DPS of the gray wolf and would provide long term management assurance for the wolf within the DPS".*

3.3.4.3 Bald Eagle

Indicator 17 - Bald eagle

(Threatened Species and 36CFR 219.19 Management Indicator Species)

Evaluation of bald eagle is based primarily on acres of nesting habitat and potential for human disturbance. The draft Biological Assessment (USFS 2004c) provides more detailed evaluations.

The eagle was selected as a "management indicator species" based on its status as a federally threatened species, the potential for impacts from National Forest management to affect its habitat, and opportunities to enhance recovery efforts (FSM 2621.1). Additionally, changes in eagle populations and habitat can indicate effects of management on other species requiring mature riparian forest. Eagle is a species of high public interest; addresses major management issues (riparian forests with old, large trees and watershed health); and can be practically monitored. Finally, National Forests in the western Great Lakes region play a major role in contributing to recovery of the species (eagle is also a management indicator on the Chequamegon-Nicolet National Forest).

3.3.4.3.a Affected Environment for Indicator 17: Bald Eagle

Aquatic and Terrestrial Habitat

A. Nesting structure – Bald eagles prefer old growth white pine taller than the average, surrounding forest canopy; otherwise known as super canopy. Of 233 nest trees on the Superior NF 84% were white pine (*Pinus strobus*), 12% were red pine (*Pinus resinosa*), and 4% were aspen (*Populus* spp.). On the Chippewa 53% of 292 nests were white pine, 27% were red pine, and 16% were aspen. Ideally these super-canopy nest trees should occur within a mature or over mature forest, but the composition and actual structure is highly variable.

B. Roosting structure – Like nest trees, roost trees tend to be prominent with good flight access and commanding views. During the breeding season, roosting usually occurs within 50-200 m of the nest tree.

C. Perching structure – Perch trees expedite foraging and are usually within 50 meters of the shoreline and shallow water. Similar to nest and roost trees, perch trees offer good visibility and easy flight access, and are usually not near habitual human disturbance.

D. Aquatic foraging area – Fish are the predominant prey of bald eagles during the time of the year they inhabit these National Forests. Water associated birds, especially waterfowl, and mammals are taken when available. Eagles are more likely to feed on any available carrion than to pursue live prey (Rossman et al. 1972). Eight hectares is the smallest lake size on which eagles have nested, and nesting near small lakes usually means there is a larger lake or several smaller lakes nearby.

Status

The Forest Service began using protective buffer zones around eagle nests in the Lake States National Forests in 1963. In 1978 the species was listed under the Endangered Species Act as threatened in Minnesota, Michigan, Oregon, Wisconsin, and Washington, and endangered in the remainder of the contiguous United States.

The 2000 eagle survey throughout Minnesota checked 1300 known breeding areas and found 681 active. The 413 nests that produced young had an average of 1.23 young per nest. That compares with 115 nests in the 1973 survey (Baker et al. 2000). At all three levels, local, regional, or national, eagle populations have increased steadily and markedly. The national eagle population has nearly doubled every seven to eight years for the past 30 years (FWS 2002a) and the US Fish and Wildlife Service has proposed to take the eagle from the Threatened and Endangered Species list.

If the bald eagle is delisted, the State and national forests will be obliged to monitor known nests for at least five years in an effort to detect any abrupt turnaround in the positive trend the species has shown, and to know if more protection is needed.

Wintering

Bald eagles winter throughout the country, but are concentrated most in the west and mid-west. Abundant food supplies in conjunction with favorable night roost sites are the main factors (Northern States Bald Eagle Recovery Plan, 1983). Roughly 50% of the population winter in very scattered locations throughout the region singly or in small groups (Northern States Bald Eagle Recovery Plan, 1983).

Eagles occasionally occur in winter on the Chippewa NF. They are seen near big lakes and the Mississippi River when there is open water, typically in late fall/early winter and again in early spring. Scattered individuals are occasionally seen in winter and are probably subsisting on carrion. No concentration areas are known nor is any particular habitat attracting them in the winter (Al Williamson, pers. comm. 2002).

Wintering eagles on the Superior NF are perhaps as likely as on the Chippewa NF. They would also be more likely to occur with open water where fish may be available. However, ice occurs throughout more of the winter on the Superior NF. Car killed deer and other carrion provide sustenance for several days of habitation. As on the Chippewa, there is no concentration area or special winter habitat, although there are areas along the north shore where wintering eagles are more likely.

Threats and Existing Condition

The Northern States Bald Eagle Recovery Plan (USDI FWS 1983 identifies factors for breeding and non-breeding eagles that are considered essential for recovery or for recovered populations. They fall into three categories, relevant to the NFs' eagle populations:

- Aquatic and terrestrial habitat (food, water, cover, or other physiological requirements,
- Human disturbance (protection from disturbance)

Table WTE-28: Red and White Pine 0-9 year age class‡ (acres regenerated during the last decade of Forest Plan implementation) (Biological Assessment Eagle Indicator 1).

National Forest	Red Pine planted	White Pine planted
	Acres	Acres
Chippewa1992-2001[1]	2,800	700
Chippewa 1994-2003[2]	2,700	800
Superior 1992-2001[1]	12,500	10,200
Superior 1994-2003[2]	4,700	10,300

‡Source: Dualplan - Planning Record
1. Basis for analysis of Alternatives A, B, C, D, F,G
2. Basis for analysis of Alternative Modified E

Table WTE-29: Existing conditions of red and white pine forest type (Biological Assessment Eagle Indicator 2a).‡

	Red pine Forest Type		White Pine Forest Type		Red and White Pine Total	
Chippewa	Acres	% of total Upland Forest	Acres	% of total Upland Forest	Acres	% of total Upland Forest
Existing - 2000[1]	72,500	16%	4,000	1%	76,600	17%
Existing – 2003[2]	72,900	16%	4,600	1%	77,400	17%
Superior						
Existing - 2000[1]	76,200	8%	29,700	3%	105,900	11%
Existing – 2003[2]	76,400	8%	31,000	3%	107,500	11%

‡Source: Dualplan - Planning Record.
1. Basis for analysis of Alternatives A, B, C, D, F,G
2. Basis for analysis of Alternative Modified E

Table WTE-30: Existing conditions of red and white pine forest type in age classes ≥ 100 years old (Biological Assessment Eagle Indicator 2b).‡

National Forest	Red pine ≥100 years old	Percent of total red pine forest type	White pine ≥100 years old	Percent of total white pine forest type
Chippewa	Acres	%	Acres	%
Existing - 2000[1]	11,600	16%	1,200	29%
Existing – 2003[2]	13,000	18%	1,400	32%
Superior				
Existing - 2000[1]	8,400	11%	10,700	36%
Existing – 2003[2]	8,700	11%	11,800	38%

‡Source: Dualplan - Planning Record.
1. Basis for analysis of Alternatives A, B, C, D, F,G
2. Basis for analysis of Alternative Modified E

- Habitat sufficiency (space for individual and population growth, sites for breeding, reproduction, rearing of offspring)

Those factors affected by management activities on Federal Lands were analyzed. Refer to the Draft Biological Assessment for detailed discussion of all factors considered. Just those factors chosen as eagle indicators to measure differences in the alternatives are summarized below.

Terrestrial Habitat

Forest management activities have the potential to affect eagle habitat. The Bald Eagle Recovery Plan identify loss of habitat, decline of habitat quality, and changes in forest composition and structure as potential risk factors to eagle recovery. Eagle habitat indicators used to analysis terrestrial habitat include:

- Acres and/or percentage of white and red pine forest type 0-9 years old, representing naturally or artificially regenerated pine communities (Future nesting and roosting habitat)**.**
- Acres and percentage of red and white pine forest type
- Acres of old-growth (>100 years old) white and red pine

Table WTE-28 through WTE-30 below displays existing condition of terrestrial habitat indicators for the eagle.

On both Forests, the number of white pine potential nest trees is, without a doubt, lower today than 15 years ago. The number of white pine trees to with the potential to become old-growth has diminished for decades due in particular to the white pine logging era at the turn of the last century; the continuing, and wide-spread white pine mortality caused by blister rust (*Cronartium ribicola*) and, on the Superior, the windstorm of July 1999, which blew down 477,000 acres of mature forest. Despite habitat changes, both Forests still offer the premier nesting habitat in the State, some of the best in the nation, with thousands of acres of nesting habitat adjacent to tens of thousands of acres of fish bearing water, and where human intrusion is yet minimal.

Human Access

The Bald Eagle Recovery Plan identifies human disturbance as a potential risk factor to eagle recovery. Not all disturbances result in potentially adverse effects, since eagle response to and tolerance of disturbance varies [USDI FWS 1983, p.7]. While bald eagles are not generally known to be affected by low degrees of human disturbance, numerous studies indicate habitat quality declines as human disturbance increases (See summaries in Peterson 1986, Stalmaster and Kaiser 1998). In general human disturbance can affect eagles by 1) by physically harming or killing eggs, young, or adults, 2) altering habitats, and 3) disrupting normal behavior (Hamann *et al.* 1999). Human disturbance results from:

- Forest harvest (including road building to access harvest sites)
- Recreation (on water or land, motorized and nonmotorized)
- Illegal acts (such as shooting or poisoning)
- Trauma (such as collision with vehicles, powerlines)

Human disturbance may result in:

- Potential for lower nest occupancy or nest abandonment, especially if disturbance occurs during sensitive times of breeding, resulting in loss of productivity
- Disturbance near nests while fledglings are still dependent on adults, may cause premature dispersal and decreased survival due to poor condition;
- Fledglings may move substantial distances from their parents and natal areas with the result of decreased survival
- Disturbance may limit eagles' use of foraging areas, potentially affecting productivity
- Disturbance may limit availability of nesting sites resulting in lost productivity
- Illegal acts may result in direct mortality from shooting or trapping
- Traumatic injury caused by vehicle collision or powerline collisions may result in direct mortality or a decrease an eagle's ability to hunt, predisposing it to further injury or mortality.

Eagle indicators used to assess the impact of human access include:

Table WTE-31: Existing conditions of designated ATV and snowmobile roads and low standard and temporary roads managed by NFs (Biological Assessment Eagle Indicators 2, 4, and 5).

National Forest	Indic 3: ATV Trails	Indic 4: Snowmobile Trails	Indic 5: OML 1 Roads	Indic 5: OML 2 Roads	Indic 5: Temp Roads‡
	Miles	Miles	Miles	Miles	Miles
Chippewa	20	378 (681‡‡)	324	1,753	355
Superior	40	686 (1509‡‡)	883	867	432

‡ Estimated for 1992-2001 based on acres harvested.
‡‡ Total mileage on all ownerships within Forest boundaries
Source: Final EIS, Chapter 3.8 and Appendix F.

Table WTE-32: Resource Protection Methods in Revised Plans for Indicator 17: Bald Eagle

General Topic	Revised Plan Direction‡
General Eagle Management	D-WL-3, 8 O-WL-4 through 7 O-WL-15 (CNF) O-WL-16 (SNF) S-WL-3
Road and Trail Management	Wildlife: D-WL-5 G-WL-8 S-WL-3 Recreation: O-RMV-1 O-RMV-2 (CNF) S-RMV-1 S-RMV-2 (CNF) S-RMV-4 G-RMV-4 Transportation: O-TS-2, 3 S-TS-3, 4 G-TS-12, 14
Watershed Health	Revised Plans Chapter 2: sections on Watershed Health, Riparian Areas, and Soil Resource, provide a full suite of objectives, standards, and guidelines to protect, maintain, or enhance riparian area ecological functions and aquatic/terrestrial linkages (too numerous to list here).
Red and White Pine	Across both forests revised plans gradually increase the amount of red and white pine by forest type and gradually increase the amount of white pine as a component in mixed upland forest types. Refer to FEIS appendix G LE tables for *Stand Diversity Objectives and Species Diversity Objectives*.

‡ Desired condition, objectives, standards and guidelines found in the Revised Plans

- Miles of ATV trails allowed
- Miles of snowmobile trails allowed
- Miles of temporary road and Objective Maintenance Level (OML) 1 and 2 (low standard) system road planned

Table WTE-31 displays the current condition of the selected indicators of human access.

3.3.4.3.b Environmental Consequences for Indicator 17: Bald Eagle

Resource Protection Methods

The Revised Forest Plans afford special attention to the conservation of the bald eagle. Revised Plans incorporate integrated resource protection measures (including management objectives, standards, and guidelines), incorporating applicable measures from recovery plans. The direction would be incorporated at project level planning, analysis, and implementation to avoid or minimize potential negative impacts and to promote proactive management to benefit the species. Table WTE-32 below identifies management direction specific or relevant to eagle conservation found in Chapter 2 of revised plans.

Effects Common to All Alternatives

All Alternatives for both National Forests will have common actions, potential effects, and mitigation measures, which are:

1. The Northern States Bald Eagle Recovery Plan (1983) will guide bald eagle management under all alternatives. The eagle may be taken off the federal Threatened and Endangered Species list within the next few years. Minnesota would be expected to manage the species with an approved management plan subsequent to delisting.

2. On the Superior, the potential for pine replacement in the BWCAW in stands of all ages would remain the same under all alternatives as analyzed in the Boundary Waters Canoe Area Wilderness (BWCAW) Fuel Treatment Final EIS (USDA 2001a). Some natural regeneration to red or white pine is possible in the BWCAW because it is likely to burn at least somewhat and may experience blowdown from wind, but the magnitude and timing are impossible to assume. Human impacts from canoeing and camping have been assessed before and it was determined that BWCAW management would not adversely affect eagle. Generally, these activities are not considered to significantly impact eagle nesting - primarily because they occur in specific areas and are constant. The activities become a feature of the landscape to which eagle may adapt. The Plans include a section on BWCAW management direction but this does not represent any major changes in current management. No planting program exists or is being proposed to recover the white pine in the BWCAW, although planting of native flora is allowed.

3. The five-year nest-monitoring schedule will continue in conjunction with the State. If and when the eagle is delisted monitoring will continue for at least another five years.

4. Generally, all stream crossing drainage structures and fill would be removed on Maintenance Level 1 (lowest maintenance level) roads where they are not scheduled for use within 2 years. These structures would also be removed when roads are decommissioned (taken off the records and obliterated). This could help safeguard against excessive, continuing siltation into streams. This may, in turn, safeguard spawning potential for fish on which the eagles forage. It could, also, help maintain water quality, and, thus, the food chain of lakes and rivers in which eagles forage.

5. Barriers would be placed on all Maintenance Level 1 roads not in use. Also, all roads not needed as part of the Forest road and trail system would be decommissioned. These road control measures, in conjunction with the removal of stream crossings, would reduce potential for recreational motor vehicle (RMV) use in areas close to nests or potential nest sites.

6. New emphasis will be placed on erosion, sedimentation, and water flow control, and maintaining stream profiles. Aquatic systems thus

protected may potentially benefit fish and the food chain on which eagles depend.

7. Generally, no new Maintenance Level 3, 4, and 5 roads will be built. Therefore, no additional paved or graveled roads would likely threaten potential or existing breeding habitat.

8. Special riparian management would be applied to the functional riparian area. All riparian areas of lakes, open water wetlands, and streams over three feet wide will be managed to maintain a riparian buffer against timber harvest. Management within the near bank zone generally would emphasize management for riparian values, including, in some cases, older forest and long-lived species, but would also allow timber management to promote the objective of restoring functional riparian areas. This could potentially benefit fish and the aquatic food chain on which eagles depend.

9. The MNDNR, and on the CNF, the Leech Lake Band, are expected to continue current fish management programs for the next one hundred years for the purposes of analyzing the alternatives. It also presupposes environmental conditions will remain favorable for artificial and natural fish production.

10. The maximum number of new or expanded water accesses is the same for all alternatives, except Alternative D on the Chippewa where no new expanded water accesses would be developed. In all the other alternatives, over the next 10 to 15 years, a maximum of five new accesses to bodies of water on the Chippewa and ten new accesses to bodies of water on the Superior may be constructed. Each alternative however would emphasize different types of accesses and are generally referred to as H – high, M – medium, and L – Low. A carry-in trail would be "Low", for example, and a concrete ramp would be "High". Management direction for all alternatives promotes protection or enhancement of aquatic systems for, among other values, forage habitat for the eagle. Therefore, development of water accesses would consider and reduce potential impacts to eagle. This could include consideration of the quality of forage habitat and direction to avoid placing new accesses in the vicinity of known nests or even high quality unoccupied potential nest locations, Refer to Final EIS Chapter 3.8.4 Water Access for further explanation and analysis.

Direct and Indirect Effects for Indicator 17: Bald Eagle

This section provides a summary of the effects described in the draft Biological Assessment to the bald eagle. The alternatives were assess by their provision form moving toward or away from the preferred management strategies for habitat and human contact found in the bald eagle recovery plan.

Red and White Pine Management

The Forest Service can play a key role in managing the pine resource. Each alternative provides a different

Table WTE-33: Pine regeneration in Decade 1 (Biological Assessment Eagle Indicator 1). ‡

National Forest	Current (1992-2001)	Current (1995-2004)	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
Chippewa									
Decade 1									
Red pine	2,800	2,700	7,000	2,800	12,100	4,800	2,900	2,500	4,000
White pine	700	800	400	900	1,800	1,800	1,000	2,100	1,800
Total[1]	3,500	3,500	7,400	3,700	14,000	6,500	3,900	4,600	5,800
Superior									
Decade 1									
Red pine	12,500	4,700	900	0	1,600	200	2,500	800	800
White pine	10,200	10,300	600	1,300	1,300	6,000	6,800	2,000	1,000
Total[1]	22,700	15,000	1,600	1,300	2,900	6,200	9,200	2,800	1,800

‡Source: Dualplan - Planning Record.
1. Any sum total error is due to rounding.

Table WTE-34: Chippewa NF acres and percent of red and white pine forest type (Biological Assessment Eagle Indicator 2a).‡ (Percent = percent of all upland forest in red and white pine)

National Forest	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
Chippewa	All upland forest = 455,900 acres (Mod E based on 447,017)						
Red Pine							
Year 2000 acres percent	72,500 16%	72,500 16%	72,500 16%	72,500 16%		72,500 16%	72,500 16%
Year 2004 acres percent					72,900 16%		
Decade 1 acres percent	72,600 16%	74,600 17%	77,200 17%	77,300 17%	74,800 17%	73,300 16%	74,000 16%
Decade 2 acres percent	72,800 16%	77,900 17%	77,800 17%	79,900 18%	77,400 17%	78,000 17%	77,100 17%
Decade 10 acres Percent	80,000 18%	98,500 22%	79,300 18%	91,900 20%	85,000 19%	86,200 19%	84,900 19%
White Pine							
Year 2000 acres percent	4,000 1%	4,000 1%	4,000 1%	4,000 1%		4,000 1%	4,000 1%
Year 2004 acres percent					4,600 1%		
Decade 1 acres percent	4,400 3%	5,000 3%	6,000 3%	6,800 4%	5,800 1.3%	6,200 3%	6,000 3%
Decade 2 acres percent	4,700 3%	7,300 3%	8,000 3%	11,900 4%	11,300 3%	8,400 4%	9,100 4%
Decade 10 acres percent	5,400 1%	42,000 9%	19,200 4%	49,100 11%	28,600 6%	32,100 7%	32,300 7%

‡Source: Dual plan – Planning Record

Table WTE-35: Superior NF acres and percent of red and white pine forest type (Biological Assessment Eagle Indicator 2a).‡ (Percent = percent of all upland forest in red and white pine)

National Forest	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
Superior	All upland forest = 963,700 acres (Mod E based on 960,355)						
Red Pine							
Year 2000 acres percent	76,200 8%	76,200 8%	76,200 8%	76,200 8%		76,200 8%	76,200 8%
Year 2004 acres percent					76,444 8%		
Decade 1 acres percent	76,800 8	76,200 8	77,600 8	76,500 8	78,100 8	76,500 8	76,800 8
Decade 2 acres percent	77,200 8%	76,700 8%	79,700 8%	76,500 8%	79,900 8%	76,600 8%	77,500 8%
Decade 10 acres Percent	100,500 10%	78,600 8%	88,000 9%	76,700 8%	88,200 9%	76,600 8%	76,600 8%
White pine							
Year 2000 acres percent	29,700 3%	29,700 3%	29,700 3%	29,700 3%		29,700 3%	29,700 3%
Year 2004 acres percent					31,000 3%		
Decade 1 acres percent	30,300 3%	31,200 3%	31,000 3%	36,400 4%	39,400 4%	31,700 3%	30,700 3%
Decade 2 acres percent	30,900 3%	32,600 3%	33,600 3%	40,400 4%	47,700 5%	34,800 4%	34,400 4%
Decade 10 acres Percent	31,100 3%	73,700 8%	37,900 4%	76,300 8%	60,100 6%	76,800 8%	66,000 7%

‡Source: Dual plan – Planning Record

Table WTE-36: Chippewa NF acres of old-growth red and white pine >100 years old (Biological Assessment Eagle Indicator 2b)‡ (Percent = percent of total red/white pine forest types in ≥100 yrs.)

National Forest	Existing	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
Chippewa								
Red Pine								
Year 2000 acres	11,600	11,600	11,600	11,600	11,600		11,600	11,600
percent	16%	16%	16%	16%	16%		16%	16%
Year 2004 acres	13,027					13,027		
percent	18%					18%		
Decade 10 acres		21,275	55,600	27,478	72,553	27,235	49,884	44,213
Percent		27%	56%	35%	79%	32%	58%	52%
White Pine								
Year 2000 acres	1,170	1,170	1,170	1,170	1,170		1,170	1,170
percent	29%	29%	29%	29%	29%		29%	29%
Year 2004 acres	1,447					1,447		
percent	32%					32%		
Decade 10 acres		2132	4,024	3,002	4,026	4,174	3,596	3,668
percent		39%	10%	68%	8%	15%	11%	11%

‡Source: Dual plan – Planning Record

Table WTE-37: Superior NF acres of old-growth red and white pine >100 years old (Biological Assessment Eagle Indicator 2b)‡ (Percent = percent of total red/white pine forest types in ≥100 yrs.)

National Forest	Existing	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
Superior								
Red Pine								
Year 2000 acres	8,400	8,400	8,400	8,400	8,400		8,400	8,400
percent	11%	11%	11%	11%	11%		11%	11%
Year 2004 acres	8,663					8,663		
percent	11.3%					11.3%		
Decade 10 acres		21,618	56,497	24,965	76,204	29,537	37,682	33,702
Percent		22%	72%	28%	99%	36%	49%	41%
White pine								
Year 2000 acres	10,690	10,690	10,690	10,690	10,690		10,690	10,690
percent	36%	36%	36%	36%	36%		36%	36%
Year 2004 acres	11,848					11,848		
percent	38.2%					38.2%		
Decade 10 acres		22,418	29,682	25,869	29,683	29,246	37,546	26,646
Percent		72%	40%	68%	39%	49%	39%	40%

‡Source: Dual plan – Planning Record

Table WTE-38: Maximum New Designated ATV Trail for Decade 1 (Biological Assessment Eagle Indicator 3). ‡

National Forest	Alt. A No Action	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Chippewa	60	30	60	0	90	60	60
Superior	60	30	60	0	90	60	60

‡Source: Final EIS, Table RMV-3

Table WTE-39: Maximum New Designated Snowmobile Trail (Biological Assessment Eagle Indicator 4). ‡

National Forest	Alt. A No Action	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Chippewa	100	40	100	0	100	70	70
Superior	90	50	90	0	130	90	90

‡Source: Final EIS, Table RMV-3

Table WTE-40: Chippewa National Forest OML 1 and 2 System Roads total miles expected to be on the Forest during each decade (Biological Assessment Eagle Indicator 5a‡). ‡‡

Road Type	Current	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
OML 1		(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)
Decade 1	324	346	338	354	333	343	336	339
Decade 2	324	155	152	156	140	155	151	154
Decade 3	324	155	155	156	140	155	155	155
Decade 10	324	155	155	156	140	155	159	155
OML 2								
Decade 1	1,753	1,753	1,753	1,753	1,753	1,753	1,753	1,753
Decade 2	1,753	1,753	1,753	1,753	1,753	1,753	1,753	1,753
Decade 3	1,753	1,753	1,753	1,753	953	1,753	1,753	1,753
Decade 10	1,753	1,753	1,753	1,753	953	1,753	1,753	1,753

‡Source: Final EIS, Appendix F
‡‡This represents the total number of roads estimated to be on the National Forest during the Decade; miles are not additive over the Decades, but will come from new construction, reconstruction of old road beds, decommissioning of roads, or classification of existing unclassified roads.

Table WTE-41: Superior National Forest OML 1 and 2 System Roads total miles expected to be on the Forest during each decade (Biological Assessment Eagle Indicator 5a‡). ‡‡

Road Type	Current	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
OML 1		(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)
Decade 1	883	1172	1046	1292	1024	1132	1082	1099
Decade 2	883	1425	1191	1612	1098	1334	1256	1289
Decade 3	883	1631	1304	1805	1127	1485	1394	1440
Decade 10	883	2,032	1,781	2,068	586	2,022	1,962	1,977
OML 2								
Decade 1	867	867	867	867	867	867	867	867
Decade 2	867	867	867	867	867	867	867	867
Decade 3	867	867	867	867	867	867	867	867
Decade 10	867	867	867	0	867	867	867	867

Source: Final EIS, Appendix F

‡‡This represents the total number of roads estimated to be on the National Forest during the decade; miles are not additive over the Decades. They will come from new construction, reconstruction of old road beds, decommissioning of roads, or classification of existing unclassified roads.

Table WTE-42: National Forest Temporary Road Estimates (Biological Assessment Eagle Indicator 5b).

	1992-2001	Alt. A No Action	Alt. B	Alt. C	Alt. D	Mod Alt. E	Alt. F	Alt. G
Chippewa	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)	(miles)
Est. Current	355							
Decade 1		473	262	653	183	386	237	304
Decade 2		481	259	517	147	412	287	342
Decade 3		418	335	547	145	367	297	351
Decade 10		496	465	564	57	484	503	400
Superior								
Est. Current	432							
Decade 1		873	494	1,236	425	754	600	653
Decade 2		957	548	1,210	281	764	659	716
Decade 3		1,038	572	972	145	761	695	761
Decade 10		956	538	1,139	145	764	651	710

Source: Final EIS, Appendix F

scenario for pine management. Eagle habitat indicators analyzed are:

- acres and/or percentage of white and red pine type to be naturally or artificially regenerated
- amount of red and white pine forest type
- amount of old-growth white and red pine

Table WTE-33 through WTE-37 displays the current and projected eagle habitat indicators at Decade 1 by alternative.

Human Access

If nesting eagles are disturbed at critical times reproductive success could be affected. The most critical time is one month prior to egg laying through incubation. Human disturbance should be avoided during that time. One month before and after the above period is a moderately critical time, and human presence is discouraged. The less critical time is when chicks are one month old to six weeks after fledging. Certain human activities are discouraged at this time too. Eagle habitat indicators considered are:

- maximum miles of snowmobile trails allowed
- maximum miles of ATV trails allowed
- miles of temporary and low standard road

These habitat indicators are used only as indices to the potential for disturbance, since the actual location of roads and their vicinity to eagle nests will be identified during project level analysis.

Tables WTE-38 through WTE-42 below provide information on projected conditions of Human Access.

Alternatives Discussions

The direct and indirect effects on the above habitat factors are summarized by alternative below. The alternatives were assessed by their provision for moving toward or away from the preferred management strategies for habitat and human contact found in the bald eagle recovery plan. These effects may be rather small and this summary will not indicate degree of effect. Potential negative effects from issues of human access were the most important in reducing the beneficial effects of pine management proposed by the alternatives. Following is a discussion of effects by alternative or group of alternatives with similar effects.

Alternative D

Short-term effects (one to two decades)

Pine Management

Alternative D provides a high potential for increasing habitat for eagles in the short-term. On the Chippewa the red pine would increase by a percent to 17% in the first decade and to 18% in the next decade. On the Superior the red pine percentage would not change over the two decades. The white pine would increase to 2% on the Chippewa in the first decade and to 3% in the second. On the Superior the white pine would increase to 4% in the first decade and remain so during the next decade.

These increases in percentages result from harvesting only to regenerate without reducing the acreage of pine type.

Human Access

Some disturbance to nesting eagles is possible during these harvest and reforestation activities. However, Alternative D does not allow an increase in recreational trails, so there is some counterbalance in effects.

Alternative B

Short-term effects (one to two decades)

Pine Management

On the CNF the red pine would increase by a percent to 17% in the first decade and remain so for the next decade. On the SNF the red pine percentage would not change from its current level of 8% over the entire 100- year horizon. The white pine would increase to 2% on the CNF in the first decade and remain so in the second. On the SNF the white pine would remain at 3% for the first two decades. It basically reforests enough pine to maintain its percentages on the forests.

The mature age class would increase to the maximum extent expected by aging stands with no harvests.

Human Access

Although Alt B does not reforest a high level of pine, it derives benefits from the minimal number and locations of harvest activities, and it allows minimal increase in the recreational trail systems – up to 30

miles of new ATV trail on each Forest, and up to 40 miles of snowmobile trail on the CNF and 50 miles on the SNF. It may offer a high degree of protection from disturbance by having a relatively high acreage in Management Areas protected from management and recreation activities.

Alternatives F and G

Short-term effects (one to two decades)

Pine Management

Alternatives F and G offer similar benefits of pine protection and reforestation. They would assume a relatively low to moderate amount of red pine harvest. Reforestation occurs but at a low to moderate level. The percentage of red or white pine does not change from the current levels on either Forest in the first decade. By the second decade red and white pine are increased by a percent on the CNF, and only white pine is increased by a percent on the SNF.

The mature age class would increase to the maximum extent expected in white pine by aging stands with no harvests. Regeneration harvests of red pine occur at a low rate.

Human Access

These alternatives offer a moderate level of potential roading disturbance. Likewise, they propose a moderate increase in recreational trails– up to 60 miles of new ATV trail on each Forest, and up to 70 miles of snowmobile trail on the CNF and 90 miles on the SNF. Alternative G may offer more protection from disturbance by a relatively high acreage in Management Areas protected from management and recreation activities.

Alternatives C and Modified E

Short-term effects (one to two decades)

Pine Management

On the CNF, the red pine in Alternative C would increase by a percent to 17% in the first decade and the percent in Alternative E would not change. The white pine percentage does not change in either alternative in the first decade. On the SNF neither pine percentage would change in the first decade from their current levels. Reforestation of pine occurs at the same rate as it is being harvested.

White pine acreage would remain the same throughout all the alternatives, indicating these alternatives may harvest within white pine stands, particularly for natural regeneration, while maintaining its dominance. Mature red pine acreage could be reduced, but this is unlikely to significantly reduce the potential for future nest structure.

Human Access

The roads and harvest activities necessary would offer some negative potential to nesting eagles. Alternative C would offer a relatively high potential for timber sale activity. Alternative E would offer moderate potential. The potential for recreational disturbance would increase during the period of time that the OML 1 and temporary roads are open for timber hauling.

These alternatives could bring more Forest visitors in contact with nesting eagles. Under Alternative C, both Forests could add up to 60 miles of new ATV trail, and up to 100 miles of snowmobile trail on the CNF and 90 miles on the SNF. Alternative E could add the most recreational trails of all alternatives – up to 90 miles of ATV trails on both Forests, and up to 100 miles of snowmobile trails on the CNF and 130 miles on the SNF.

Alternative A

Short-term effects (one to two decades)

Pine Management

Alternative A includes a relatively high potential for negative effects. The percentages of red and white pine do not change on either Forest in the first decade, although it offers a relatively high acreage in red pine reforestation on the CNF.

Alternative A would also harvest a relatively high number of red pine acres; white pine harvest is not scheduled under an extension of the current Forest Plans. Mature red pine acreage could be reduced, but this is unlikely to significantly reduce the potential for future nest structure.

Human Access

Alternative A has more potential for disturbance from timber harvest and recreational use of the roads. It is similar to Alternative C in this regard, and has the same number of potential recreation trails proposed.

All Alternatives

Long-term (10 decades plus)

Pine Management

The important differences on the Chippewa concern Alternatives A, B, C, and D. Alternative D would increase red pine by 5% and white pine by 10% while Alternative B would increase by 6% and 9% respectively. Except for Alternative A the other alternatives increase these same percentages by between 2 to 3 % for red pine and 3 to 6% for white pine. Alternative A increases red pine by 2% and maintains the current 1% in white pine. Other than for Alternative A, these figures disclose a common goal of restoring white pine.

On the Superior there is no major difference in the combined, long-term management of pine. Red pine is maintained at a relatively constant level in all alternatives except in Alternative A where it would increase by 2% (form 8 to 10%). The white pine is increased between 1 and 3%, again except for Alternative A where it would be maintained at current levels. Except for Alternative A, these figures also show a common provision for increasing white pine.

There may be some concern about the certainty of whether all alternatives would actually reach their pine goals. These concerns include current difficulties associated with successfully regenerating white pine and reliance alternatives such as B and D have on restoring pine using prescribed burning. This method is not currently considered as reliable as using timber management to provide planting or seeding sites. Nevertheless, for effects analysis, we assume goals would be achieved.

Alternative D

Long-term (10 decades plus)

Human Access

Alternative D would offer recreation primarily in semi-primitive, non-motorized settings. Eliminating motorized recreation vehicles and minimizing the road network offers the best protection of all alternatives from potential for increased human disturbance from recreational vehicle traffic. It also reduces the chances for disturbance from present conditions.

Alternatives B, F, and G

Long-term (10 decades plus)

Human Access

Alternatives B, F, and G offer similar, overall benefits for eagles from the combination of vegetation management and human access. Potential negative effects could result from disturbance from road construction and burns, and anticipated future increase in recreational demand. Even in the 10 – 15 year plan horizon, recreational activities may have some negative effects.

Alternatives A, C, and Modified E

Long-term (10 decades plus)

Human Access

Alternatives A, C, and E offer higher levels of disturbance compared to current conditions and to the other alternatives based on planned road construction and an increase in disturbance from recreational use of Forest roads and trails.

Cumulative Effects for Indicator 17: Bald Eagle

Additional impacts to bald eagle would occur on lands outside of National Forest jurisdiction. Specifically, cumulative effects related to habitat conditions such as red and white pine forest and human disturbances could occur.

Red and White Pine Forest

According to the Minnesota Generic Environmental Impact Statement Study on Timber Harvesting and Forest Management practices (GEIS) (Jaako Poyry 1994) red and white pine forest acres are expected to increase. The amount of old forests in both these forest types is also expected to increase. Cumulative effects of forest management on all ownerships should benefit eagle by increasing preferred nesting, roosting, and perching habitat over the next four or more decades on both NFS and non-NFS lands.

Human Access/Disturbance

Increases in the potential for human access near bald eagle territories would occur as people buy, subdivide, and develop private parcels of land. New road construction would be needed to access this property. Some of these roads may be developed near to current or future nesting habitat. Development of cabins and second homes next to lakeshores could also decrease high quality eagle habitat through actual destruction of potential nesting habitat or indirectly through increases in disturbance associated with motorized recreation such as ATVs and motorboats. Populations of fish, one of the primary types of prey species for eagle, may decrease on lakes with increased fishing pressure. Increasing fish populations through Minnesota DNR stocking would mitigate fish declines in some lakes.

Current relatively high or increasing deer populations across the landscape also are likely to pose potential negative indirect cumulative impacts on eagle. High populations are a result of factors outside the control of Forest Service (warm winters that increase survival, DNR population management through hunting permits) and factors to which Forest Service cumulatively contributes (forest vegetation management for suitable deer habitat). Over the last ten years eagle mortality is becoming increasingly more common from highway collisions (Based on information from Raptor Center 2004). This is likely a result of greater numbers of deer killed along highways and eagles taking advantage of the carrion.

Based on an increasing population of eagles, overall negative cumulative impacts to eagle from human disturbance and habitat modification would not be significant enough to reverse its positive population trend.

Determination of Effects for Indicator 17: Bald Eagle

The Forest Service has determined that all alternatives "may effect but are not likely to adversely affect the bald eagle." The determination is the same for both Forests because alternatives would result in similar effects. The context and rationale for this determination are described in more detail in the draft Biological Assessment and are summarized below.

Effects analysis conducted in the draft Biological Assessment indicates that bald eagle conservation would continue under all alternatives. Eagles currently have viable populations and well-distributed habitat and these conditions are likely to continue under the alternatives. When considering effects on nesting habitat most of the alternatives are likely to maintain or have overall beneficial effects since it is likely that there will be adequate or more than sufficient habitat for eagle.

All alternatives incorporate conservation measures (including management objectives, standards, and guidelines), based on those from The Bald Eagle Recovery Plan, that address conservation of eagle in two important ways. First, all alternatives promote the proactive conservation of the eagle and its habitat by maintaining or enhancing extensive areas of habitat sufficient or greater than sufficient to support prey base and nesting and roosting habitat and by maintaining or enhancing the ecosystems on which this species depends. Secondly, all alternatives identify actions to reduce or, where possible, eliminate adverse effects or risks to the species and its habitat.

Many aspects of the alternatives would proactively benefit or have no effect on eagles. The overall Determination of Effect "may affect and not likely to adversely affect" was based primarily on potential effects of human access and disturbance.

Although there are potential negative impacts to eagle from human disturbances associated with roads and trails, these are likely to be insignificant or discountable. This is because management standards and guidelines carried over from the previous Plans and the Bald Eagle Recovery Plan have proven over the last 15 years to be effective at preventing or

reducing disturbance and are likely to continue to provide protection.

As per Section 7 guidance the Forest Service has sought and received a letter of concurrence from the Fish and Wildlife Service if they agree with this conclusion.

In its letter of concurrence (7/15/2004), the US Fish and Wildlife Service concluded:

> *"The Service concurred with your determination in the BA that the Revised Forest Plans are not likely to adversely affect the bald eagle. This concurrence was based on the guidance in the plans to follow the provisions set forth in the Northern States Bald Eagle Recovery Plan; direction to maintain and restore aquatic ecosystem composition; direction to maintain, protect, or improve habitat for endangered and threatened species and reduce or eliminate adverse effects on these species."*