

TERRESTRIAL MANAGEMENT INDICATOR SPECIES

Monitoring Conducted

Population and Habitat trends of management indicator species (36 CFR 219.19(a)(6))

Background:

MIS are defined as species monitored over time to assess the effects of management activities on their populations and the populations of other species with similar habitat requirements (Forest Service Manual 2620.5).

The Forest Plan designates four species as management indicator species (MIS):

- Gray wolf
- Bald eagle
- Northern goshawk
- White pine

The SNF and the other National Forests in the western Great Lakes region play a major role in contributing to the overall conservation of these species.

Monitoring management indicator species is accomplished in various ways described below for each species. They range from interagency cooperative statewide or regional monitoring programs to Forest-wide or project level surveys.

Since the Forest Plan went into effect in 2004 there have been about 30 decisions made to implement projects. Eight of these have been large landscape scale (10,000s of acres) vegetation management projects whose purposes have included the need to manage to maintain or enhance habitat for management indicator species. These include the following projects: Virginia, Tomahawk, Dunka, Inga South, Mid-Temperance, Whyte, Devil Trout, and Echo Trail.

Gray Wolf

The three main sources of population data for wolf on the SNF are from:

- Minnesota Department of Natural Resources statewide wolf monitoring
- US Geological Survey long-term monitoring of radio-collared wolves in SNF
- SNF project-specific inventory and monitoring

Minnesota Department of Natural Resources (MN DNR): MN DNR has monitored statewide wolf distribution and abundance since the late 1970s. In

Management Indicator Species Summary Points

Gray Wolf

- Population trends on SNF, based on 2005 State wolf survey and SNF study, appear to be increasing: SNF continues to meet or exceed Forest Plan goal of contributing to statewide population of 1250-1400 wolves.
- Between 2004-2007 most vegetation management projects benefited wolf by providing habitat for their prey species, deer and moose.
- Wolf was delisted from threatened status in 2007. (Refer to WL. TE section for more information.)

Bald eagle

- Population trends on SNF, based on active nest survey in 2005, have increased since 2000: 90 active breeding territories, exceeding Forest Plan goal of 85 (O-WL-16).
- Between 2004-2007 most vegetation management projects benefited eagle by restoring white pine near lakes and streams.
- Eagle was de-listed from threatened status in 2007. (Refer to WL. TE section for more information.)

Northern Goshawk

- In 1996 there were no known nests on the SNF. By 2007 24 nests had been found.
- In 2007 there were 7 active goshawk nests: 5 pairs successfully produced young. SNF goal is 20-30 breeding pairs (O-WL-31).
- Between 2004-2007 most vegetation management projects impacted goshawk habitat, but were not likely to cause loss of viability or a trend toward listing.
- Mature and older upland forest, a key indicator of suitable habitat for goshawk, was 56%, well above the 41% threshold and the 48% projected for the end of Decade 1 of Plan implementation.

White pine

- Between 2004 and 2007 over 1.7 million white pine seedlings were planted.
- 3,010 acres were planted with white pine to change forest type to white pine.
- 547 acres were planted within other forest types to enhance diversity.
- 12,600 acres of white pine were treated to improve survival.
- In 3 of the 5 upland Landscape Ecosystems objectives for the amount of white pine forest type have been met or surpassed.

the last 30 years, the survey methods have remained relatively consistent, using several combined sources of data. Previous surveys have taken place at 10-year intervals (1978-79, 1988-89, and 1997-98). However, in anticipation of a federal de-listing proposal in 2004, the survey interval was lowered to 5 years, thus surveys were conducted in 2003/2004 and 2007/2008 (results from this survey are not yet available). SNF field staff contribute observation information to all surveys. The MN DNR then uses this information, along with other wolf and deer data, to compute the total wolf range and the total occupied range, as well as estimate the wolf population within the state of Minnesota. More information on methods is available on the web at: http://files.dnr.state.mn.us/natural_resources/animals/mammals/wolves/2004_wolfsurvey_report.pdf

US Geological Survey (USGS) wolf monitoring: This research and monitoring program has been ongoing since 1966 in a 2,060 km² census area in central Superior National Forest (this represents 5% of all wolf range in Minnesota and 17% of the SNF). The project area includes some lands within the Boundary Waters Canoe Area Wilderness (BWCAW). Wolves are live-trapped and radio-tagged during summer and fall, and then aerially observed for their pack sizes during winter. Besides providing population trend estimates this project is also the basis for a vast amount of information on many aspects of wolf biology, ecology and management impacts.

SNF project-level monitoring: In general, project level surveys are not needed to search for wolves. This is because wolf distribution across the SNF is well-established and thus presence of wolves and importance of managing for prey habitat can be assumed. Additionally, the MN DNR cooperative wolf surveys, winter track survey routes, predator/furbearer scent station surveys routes intersect most of the project areas and provide the basis for determining trends while confirming presence and distribution. Nevertheless, between 2004 and 2007 winter track wolf surveys to confirm presence and distribution were conducted in conjunction with lynx surveys on the Tomahawk, Dunka, Mid-Temperance, Whyte, and Echo Trail vegetation management projects.

Bald Eagle

The two main sources of population data for bald eagle on the SNF are from:

- Minnesota Department of Natural Resources (MN DNR) statewide eagle periodic monitoring
- SNF long-term Forest-wide and project level inventory and monitoring

Minnesota Department of Natural Resources statewide eagle monitoring: The Minnesota DNR, in cooperation with the Fish and Wildlife Service, National Park Service, US Geological Service, and the Chippewa and Superior National Forests, conducted statewide bald eagle surveys during the 2000 and 2005 nesting seasons. The surveys were designed to visit all known nests, including all on the SNF (including in the BWCAW), estimate the number of nests missed, provide a baseline for monitoring the state's bald eagle population in the future, and clarify current habitat needs of the species. The 2005 survey also included a random plot survey to allow the estimation of the total number of nests in Minnesota. More information on methods is available on the DNR website at: http://files.dnr.state.mn.us/eco/nongame/projects/eagle_report_2005.pdf

SNF monitoring: The SNF monitored bald eagles annually Forest-wide (including in the BWCAW) between 1964 and 1994. Eagle population trends were estimated through surveying of occupied eagle nests and follow-up checks for nesting success indicated by number of eggs, nestlings and fledglings. Nests may be first detected from reports from observers on the ground or from low-level flights to search likely nesting habitat early in the breeding season in April.

Since 1995 the SNF has changed its monitoring methods to rely more on the MN DNR's five year eagle nest survey. For this reason, and because most projects are designed to protect or maintain potential habitat near lakes and streams, project level surveys are generally not needed to search for eagles. Nevertheless during project planning and analysis potential impacts to eagle are considered and, if warranted, project-specific low level aerial surveys are taken to search for new nests or check known nests. For example, in Tomahawk and Mid-Temperance projects surveys were conducted in potential habitat. And when the Spring 2007 Ham Lake Fire burned where there were known nests both inside and outside of the BWCAW, surveys were flown to detect whether eagles were affected.

Northern Goshawk

The two main sources of population data for northern goshawk on the SNF are from:

- Minnesota Department of Natural Resources nest territory monitoring
- SNF project-specific inventory and monitoring

SNF project-specific inventory and monitoring: Since 2004 the Forest Service has made substantial efforts to survey for goshawk in the upcoming large landscape scale vegetation management project areas. Of the eight projects with decisions up through 2007, searches for new nests were conducted in seven: Virginia, Dunka, Inga South, Mid-Temperance, Devil Trout, and Whyte. Additionally, known nests have generally been monitored annually for occupancy, nesting, and nesting success. Methods are similar to those used by MN DNR summarized below. Areas surveyed within project areas include random transects or in habitat identified by biologists as potentially good for nesting.

Minnesota Department of Natural Resources nest territory monitoring: MN DNR has been monitoring nest territories since 2003. Its primary objective is to assess occupancy and productivity (nesting success) of all known territories in northern Minnesota. Methods include: 1) conducting occupancy surveys using nest observation or broadcasting alarm calls to which goshawk generally respond; 2) conducting nest surveys in late April or May at occupied nests by quietly entering area to detect whether birds are nesting; and 3) revisiting active areas in June and July to whether nesting was successful by searching for fledglings.

White Pine

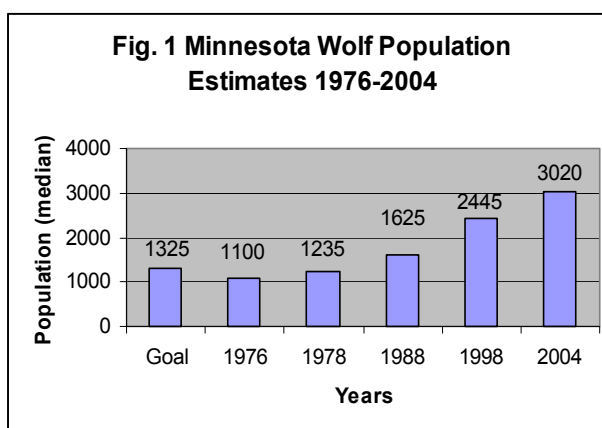
Acres of white pine forest types, amounts of white pine planted, and activities done to improve white pine survival are all monitored annually by SNF. Forest type and forest stand diversity inventories or “stand exams” are conducted in areas such as the in the large landscape scale vegetation management project areas. Conditions are tracked Forest-wide in vegetation databases. Management activities such as timber harvest and tree planting are recorded in databases. Planting success is monitored through periodic field surveys. White pine conditions in areas treated to improve survival are also monitored to judge success.

Evaluation and Conclusions

Gray Wolf

Minnesota Department of Natural Resources (MN DNR):

Figure 1 shows most current statewide wolf population trend estimate. In the most recent survey in 2003-2004 for the first time since consistent surveys were initiated in the late 1970s, total wolf range in Minnesota did not increase, and estimated occupied range declined only slightly. The 2004 population size estimate (3,020 wolves) is larger than in 1997-98. However, the MN DNR concludes that because of overlapping ranges in the estimates of population, there has been no significant change in the distribution or abundance of wolves in Minnesota since 1997. This current wolf population estimate far exceeds the recovery plan goal of 1250-1400 wolves in Minnesota, as well as the MN DNR wolf plan’s minimum population goal of 1,600 wolves to ensure the long-term survival of the wolf in Minnesota. Details of wolf survey methods, results and discussions can be found in MN DNR report (Erb and Benson 2005).

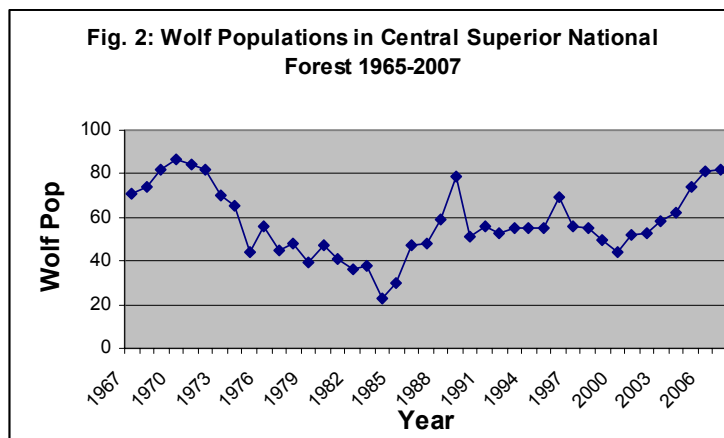


In large part due to this increasing population the Fish and Wildlife Service removed the Western Great Lakes Distinct Population Segment (MN, WI, MI) of wolves from its list of endangered and threatened wildlife. Read more about this in the Threatened and Endangered Species Section.

The wolf population will continue to be monitored through population surveys every five years. The Endangered Species Act requires the U.S. Fish and Wildlife Service to monitor wolves in Minnesota for five years after de-listing to ensure that recovery continues.

US Geological Survey (USGS) wolf monitoring:

Figure 2 shows the results of over 40 years of wolf monitoring on the SNF up to the winter of 2006-2007. During this last survey, eleven radioed packs and one non-radioed pack of 2-12 individuals used all or part of the census area. About 82 wolves were present with a density of 3.9 wolves per 100 km sq. This density is the same as in winter 2005-2006 and the highest the wolf population of the study area has reached since 1971 (Mech 2007).



SNF project-level monitoring:

Wolf winter track detection surveys confirmed presence of gray wolf in all project areas surveyed (Tomahawk, Dunka, Mid-Temperance, Whyte, and Echo Trail).

Gray Wolf Management and Habitat Trends

Of 30 projects outside the BWCAW since 2004, 27 affected, but did not adversely affect wolf. In fact, many of these projects, especially the eight large landscape scale projects, had beneficial impacts on wolf habitat. Table 1 shows the changes to wolf habitat, as indicated by conditions favored by prey species deer and moose from beginning of plan implementation to present. Young upland forest foraging habitat has decreased, however much of the change is due to stands aging into forest greater than ten years old. Replacement habitat has or will come from timber harvest in all eight of the large vegetation management and other smaller projects.

With just three years of implementation the projects have, generally, moved habitat conditions toward those predicted in the Final Environmental Impact Statement for Forest Plan. Projects will continue to create young forest habitat to the benefit of wolves.

Table 1. Comparison of conditions of indicators of wolf habitat based on habitat for prey species (deer, moose) between condition in 2004, current condition in 2007, and condition projected by FP FEIS for 2014 .			
Indicators of wolf habitat based on Deer and moose habitat	2004 Existing Condition	2007 Existing Condition	2014 FP FEIS Projected Condition
1. Acres and percent of young upland forest <10 years old	13%	6.8%	10.4%
2. Acres and percent of upland conifer (spruce and pine) > 9 years old on all uplands	34%	36%	38.7%

Data source: 2004 & 2014: Forest Plan Biological Assessment for FP FEIS - Forest Plan Final Environmental Impact Statement, (USDA Forest Service 2004, p. 69-70). 2007: Superior NF vegetation database, snapshot December 2007 of existing conditions (not including unimplemented projects).

We have not conducted any new Forest-wide wolf habitat analyses within the BWCAW since the Forest Plan revision. However, since 2004 there have been a substantial number of acres burned within the wilderness in both wildfires and prescribed fires intentionally set to reduce fuel hazards created by the 1999 blowdown. For example, in 2007 Ham Lake wildfire burned over 20,000 acres within the wilderness. In 2006 Cavity, Red Eye, and Famine Lakes wildfires burned over 40,000 acres. In 2004-5 Alpine Lake wildfire burned over 1300 acres. Additionally over 40,000 acres of 2001 BWCAW Fuel Treatment project prescribed fires (50%) have been accomplished. Although not all burned acres can be assumed to have changed to young forest habitat, many acres of habitat for deer and moose have been reestablished. Acres partially burned to maintain needed older

forest also help maintain good habitat. These fires and prescribed burns should improve wolf habitat in the wilderness. More information on these fires can be found in the section of this report on fire.

Another indicator of quality wolf habitat is road density. This, of course, is limited to the lands outside the BWCAW since there are no roads in the wilderness. While the Forest Plan Biological Assessment looked at potential impacts to wolf from a variety of types of road, Forest Plan standard S-WL-4 provides direction to maintain high standard road density (Objective Maintenance Levels 3, 4 5) below 1mi/sq mi., since Forest Plan implementation. Table 2 shows that since 2004 this standard has been met. (The source of the slight decrease in miles is undetermined – it may come from corrections to INFRA database or closure of some roads.)

Year	OML 3, 4, 5 road density
Forest Plan standard	1.00 mi/mi ²
2004	0.46 mi/mi ² (1353 mi)
2007	0.44 mi/mi ² (1313 mi)

Data source: 2004: Forest Plan Biological Assessment, (USDA Forest Service 2004, p. 58 [INFRA roads database]) 2007: INFRA roads database, snapshot December 2007.

In summary, wolf management on the SNF since beginning of forest plan implementation has been fully consistent with Forest Plan objectives, standards and guidelines, both inside and outside of the BWCAW. This is true whether wolf is considered in its former status as a threatened species or its current status as a sensitive species and a management indicator species. This is because:

- All projects with decisions have been determined to be unlikely to adversely affect wolf (as a threatened species) As a sensitive species, biological evaluations of impacts of projects have determined that the Forest Plan standard (O-WL-5, p. 2-32) that projects must not have negative impacts that could lead to trend toward federal listing has been met.
- As a management indicator species population goals continue to be met or exceeded.
- Relevant standards and guidelines are met for all projects.
- All vegetation projects are continuing to maintain or improve (increase) habitat for wolf.
- Road density of high standard roads (OML 3-4-5) has not increased and remains well below the 1mi/sq mi threshold standard on a Forest-wide basis.
- In the BWCAW management objectives are to allow natural processes to dictate the amount and quality of habitat for wolf. Substantial acres of both wildfire and BWCAW fuel treatment burns since 2004 have likely improved habitat for wolves by providing both forage and cover for their primary prey deer and moose.
- Population and habitat trends will continue to be monitored.

We can expect that the SNF, in the very heart of best available habitat in the Western Great Lakes, will continue to play an important role in sustaining wolf populations.

Bald Eagle

Minnesota Department of Natural Resources statewide eagle monitoring:

The following is from the MN DNR 2005 Bald Eagle Report (MN DNR 2006) The 2005 bald eagle survey of all known nest sites in Minnesota identified 872 nests with adult eagles present, a 28% increase over the 681 active nests found in 2000, the year of the most recent similar survey. A separate, first-time survey of 61 random plots yielded an estimate of 1,312 active bald eagle nests within Minnesota, indicating that the locations of only 66% of the state’s nests had been found in the survey of known nests. Additional information on results is available online at

http://files.dnr.state.mn.us/eco/nongame/projects/eagle_report_2005.pdf.

On the Superior NF the number of active nests increased to 90 from

Year	Number
Forest Plan Objective	85
1990	71
1991	101
1992	90
1993	93
1994	91
1995	85
2000	78
2005	90

Data Source: 1990-1995: SNF eagle nest databases 2000/2005: MN DNR 2006

78 in 2000, bringing the SNF back in line from with Forest Plan population objectives of a minimum of 85 occupied breeding territories (Table 3).

With the support of the results of these and other population information in the lower 48 states, the Fish Wildlife Service removed the bald eagle from its list of endangered and threatened wildlife in August, 2007. More information on the Bald Eagle can be found in the Threatened and Endangered section.

The DNR, with cooperation from the Superior National Forest and others, intends to conduct the next Random Plot and Known Nest Surveys in 2010.

SNF monitoring: In the only project-specific eagle surveys conducted since 2004, the survey in the Tomahawk area found no nests and the survey in the Mid-Temperance project area, one of two known historical nests was active. During the Ham Lake fire in the spring of 2007, one new active nest was found within the burn perimeter within the BWCAW.

Bald Eagle Management and Habitat Trends

Of 30 projects since 2004, 15 affected, but did not adversely affect eagle. In fact, many of these projects, especially the eight large landscape scale projects, had beneficial impacts on eagle habitat where they restored white pine in areas close to lakes and streams, providing future habitat.

At a Forest-wide level, amount of both regenerating (0-9 year old) and old growth (120+ year old) red and white pine serve as indicators of current and future eagle nesting habitat. (At site-specific project level, these indicators are refined to look more closely at conditions within ½ mile of fish-bearing lakes and streams where eagles prefer to nest.) Table 4 shows amount of indicators since the beginning of Forest Plan implementation in 2004. The amount of both young and old growth forest is increasing. While it appears that the amount of young white pine could exceed projected amounts for 2014, much of this acreage will succeed out of young into sapling stage, so acres are expected to be consistent with Forest Plan objectives. Old growth forest is also trending toward and consistent with Forest Plan objectives.

Table 4. Comparison of young red and white pine regeneration and old growth red and white pine from beginning of Plan implementation (2004) to 2007, with amounts projected by Plan for 2014.			
National Forest	2004	2007	Projected 2014
Regeneration - 0-9 years old			
Red pine	4,700	3,300	2,500
White pine	10,300	13,400	6,800
<i>Total</i>	15,000	16,700	9,200
Old Growth 120 years+ old			
Red pine	1,700	2,700	4400
White pine	3,700	5,500	7700
<i>Total</i>	6,400	8,200	12,100
<i>Data Source: 2004 & 2014: Forest Plan record 1384: Dualplan vegetation model 2007: Superior NF vegetation data base, snapshot December 2007 of existing conditions (not including unimplemented projects).</i>			

In addition to these acres of red and white pine habitat, a significant number of white pines have been planted to improve diversity within stands of other forest types. In areas within ½ mile or so of lakes and streams, part of the purpose for diversity planting has been to provide future nesting habitat. Refer to the section on white pine below for more information. Together with red and white pine forest types, habitat conditions for bald eagle should continue to maintain and enhance habitat for bald eagle now and into the future.

The SNF has no new Forest-wide estimates for amounts of habitat or potential nest trees within the BWCAW since the Forest Plan Final Impact Statement, it considers red and white pine forest type acres to be similar to what was analyzed in 2004: 20,300 acres of 0-9 year old and 30,500 acres of 50+ year old of red and white pine forest type. However, the wildfires of 2004-2007 described in wolf section above may have changed those conditions. Also, potential nest trees such as old growth white pines are known to have burned. Loss of old pines is of concern, so management actions are taken when possible to protect existing old growth pines. For example, in the Ham Lake wildfire of 2007 one of the three known nests that survived, had been treated in a previous year to remove nearby ladder fuels (brush, small conifer trees) to help increase the odds of the tree surviving wildfire.

In summary, eagle management on the SNF since beginning of Forest Plan implementation has been fully consistent with Forest Plan objectives, standards and guidelines, both inside and outside of the BWCAW. This is true whether eagle is considered in its former status as a threatened species or its current status as a sensitive species and a management indicator species. This is because:

- All projects with decisions have been determined to be unlikely to adversely affect eagle (as a threatened species). As a sensitive species, biological evaluations of impacts of projects have determined that the Forest Plan standard (O-WL-5, p. 2-32) that projects must not have negative impacts that could lead to trend toward federal listing has been met.
- Relevant standards and guidelines are met for all projects.
- All vegetation projects are continuing to maintain or improve (increase) habitat for eagle.
- In the BWCAW, management objectives are to allow natural processes to dictate the amount and quality of habitat for eagle. It is difficult to measure changes or their impacts. Substantial acres of both wildfire and BWCAW fuel treatment burns since 2004 have likely impacted habitat for eagles by killing large old growth red and white pine trees preferred for nesting. However, these disturbances are also likely will regenerate young pines needed to replace old growth trees that are being lost to wind and age as well as fire.
- Population and habitat trends will continue to be monitored.

The SNF expects that it will continue to play an important role in sustaining eagle populations.

Northern Goshawk

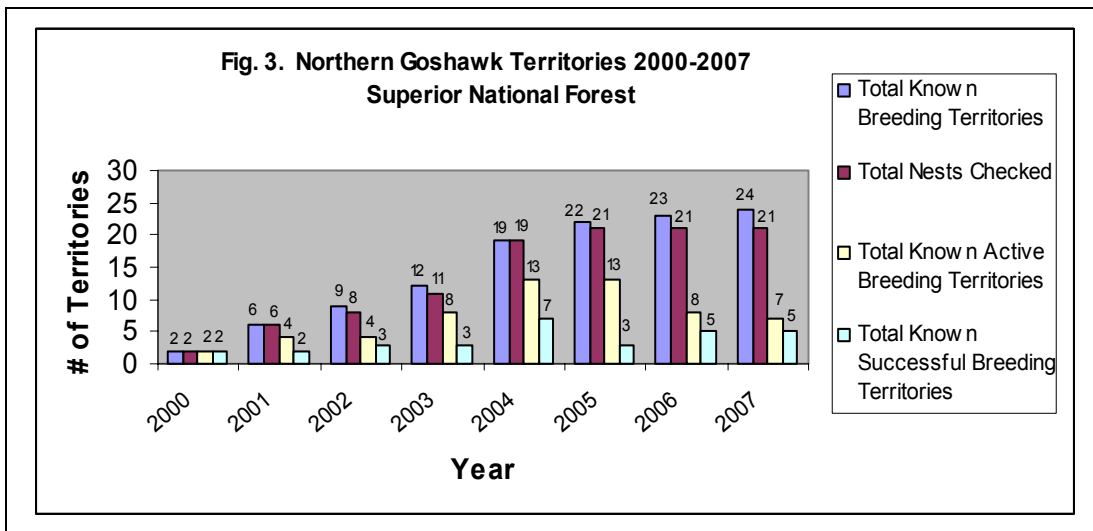


In northern Minnesota, as a result of the Minnesota DNR collaborative monitoring effort, over 68 goshawk territories were surveyed in 2007. A total of 32 territories were occupied by goshawks and 23 territories had nest attempts. 75% of the nests were successful and productivity was 1.0 young/nest or 1.3 young/successful nest. (MN DNR 2007)

Within the SNF boundary over 24 nests have been identified since 2000, double the 12 nests that the SNF was aware of during Forest Plan revision in 2003-2004. This increase is likely, a result of higher interest and greater effort in monitoring goshawk populations, nesting activities and habitat conditions in northern Minnesota.

Figure 3 below shows total known breeding territories on the SNF from 2000-2007. Although known nests have steadily increased over the last seven years, breeding success has remained modest relative to the number of nests checked and active nests. Of note, by 2007 nine of the 24 known nests were gone. Of those, however, five of the territories had new or possible new nests detected. The Forest Plan objective is 20-30 breeding pairs (O-WL-31).

These monitoring efforts have been valuable in helping better understand goshawk presence, distribution, habitat use, and management impacts. However, population trends and dynamics for goshawk in northern Minnesota are not clearly understood. Population data collected is primarily based upon goshawk territories discovered during project surveys and on-going field operations. Therefore, there may be some bias in how territories are found, the habitats they are found in and the results of their subsequent monitoring efforts.



Northern Goshawk Management and Habitat Trends

The Final Environmental Impact Statement for Forest Plan revision assessed potential suitable habitat for goshawk outside the BWCAW with three indicators of habitat: 1) percent and area of mature upland forest; 2) area and number of 100 acres or larger mature/older forest patches; and 3) use of management treatments that increase within-stand complexity. Table 5 below shows the current condition of indicator 1, mature upland forest. The conditions of the other indicators are available in the project file for this report.

The condition of mature upland forest habitat for northern goshawk remains well above the threshold for maintaining habitat suitability Forest-wide. The increase in mature and older forest since the Forest Plan Final Environmental Impact Statement in 2004 is due a substantial number of acres of forest growing into 40-50 year old age classes.

The difference between 2007 existing conditions and conditions projected in completed but not yet implemented decisions shows that mature forest should continue to decrease toward those expected by the Forest Plan Final Environmental Impact Statement.

While this single indicator of northern goshawk habitat does not address spatial configuration or stand complexity, it does show that as coarse filter habitat, conditions remain sufficient for maintaining goshawks.

Additionally, all the large vegetation management projects assessed impacts to goshawk as a sensitive species.

Biological evaluations of impacts of projects have determined that the Forest Plan standard (O-WL-5, p. 2-32) that projects must not have negative impacts that could lead to trend toward federal listing has been met for all projects. Further, projects were designed to maintain and protect fine filter nesting and post-fledging habitat conditions, meeting Forest Plan standards and guidelines S-WL-10 and G-WL-22 (p. 2-34-35).

White Pine

White pine individual tree diversity objectives. Since the Forest Plan was revised, the diversity of white pine trees in Landscape Ecosystems as a percentage of all trees (Forest Plan Landscape Ecosystem objectives for tree species diversity) has not been reassessed. Presently Forest Inventory and Assessment plot data and tree planting data serves as an indicator of efforts to move toward this objective.

Existing and Projected Conditions	Percent of all upland forest
Threshold of percent for maintaining adequate habitat	40%
2004	55%
2007	58%
2007 plus unimplemented Projects that have decisions	57%
Decade 1 FP FEIS Projected Condition	48%
<i>Data source: 2004 & 2014: FP FEIS - Forest Plan Final Environmental Impact Statement, (USDA Forest Service 2004, p. 3.3.6-4)2007: Superior NF vegetation database, snapshot December 2007 of existing conditions. 2007 + Unimplemented: same as 2007, but adding in those projects for which a decision has been made. Conditions would be as shown if all those projects with decisions were implemented.</i>	

White pine forest type: Through management activities such as planting, forest succession, and, in some cases, improved forest inventory data, white pine acreages continue to increase over the best SNF available information on amount of white pine at the time of Forest Plan revision (Table 6).

In the Jack/Pine Black Spruce Landscape Ecosystems (JPB) for Decade 1 data show that by 2007 the SNF has modestly exceeded the objectives for white pine forest types, while meeting the objectives for Dry-Mesic Red and White Pine and Mesic Birch/Aspen/Spruce-Fir. This increase has come both from planting to convert stands to white pine and from succession of some old aspen stands to white pine.

Exceeding objectives in JPB, may contribute to tree species diversity objectives. In this LE the historical condition of white pine was 9% of the trees, compared to <1% during the last assessment in 1990. However, because of the challenges to white pine successfully growing to maturity (deer, blister rust) and the time needed (decades) to determine planted white pine survival, exceeding objectives is reasonable.

Landscape Ecosystems	Existing (2003)		2007	Forest Plan Objectives:	
	Acres	%		Decade 1	Long-term 100 Year Goal
			%	%	
Forest-wide (all Landscape Ecosystems)	31,100	3%	4%	4%	6%
Jack Pine/Black Spruce	7,400	3%	4%	3%	2%
Dry-mesic Red and White Pine	13,200	7%	9%	9%	14%
Mesic Red and White Pine	4,400	3%	4%	5%	10%
Mesic Birch/Aspen/Spruce-Fir	5,400	2%	3%	3%	4%
Sugar Maple	300	1%	1.5%	2%	4%

Data source: 2003, Decade 1, 100-year: Forest Plan, Tables -1 for each LE, pp. 2-59 to 2-73. *2007:* Superior NF vegetation data base, snapshot December 2007 of existing conditions (not including unimplemented projects).

White pine planting: Since the Forest Plan was revised approximately 1,700,000 white pine seedlings have been planted on 3,060 acres with in the SNF outside the BWCAW. These plantings were intended to meet Forest Plan direction objectives of restoring white pine on different forest types such as aspen-conifer mix. White pines were also planted on 570 acres of other forest types to restore diversity of tree species to conditions more representative of native plant communities. Survival surveys since 2005 indicate an average third year white pine survival of 70% (Plantation Survival Surveys Year-end reports - 2005-2007).

Protection/enhancement activities: Besides objectives for increasing white pine, the Forest Plan calls for management to improve survival on planted sites and as many naturally regenerating sites as practical (O-WL-32, p. 2-35). Between 2004 and 2007, the SNF implemented the following projects to address this objective:

- **Animal Browse Control:** 193 acres. Two treatments were used. For some areas, protective mesh tubing was place over buds. In another area white pine was treated with pig’s blood, a commercial method that has been successful in deterring deer from eating and killing young white pines.
- **Pathological pruning:** 1,653 Acres. This activity is done to minimize the likelihood of blister rust infecting and killing white pine by pruning lower branches and creating a dryer warmer microclimate that is less favorable to this pathogen.
- **White pine release:** 10,500 acres. “Release” is the cutting or removal of unwanted tree species to reduce competition for water, soil, and sunlight to benefit desired species – in this case, white pine. It also reduces the cooler and moister microclimate that favors white pine blister rust
- **Fertilization:** 257 acres. Sites with very poor nutrient status were fertilized to improve growing conditions.

In summary, white pine management on the SNF since the beginning of Forest Plan implementation has generally been consistent with Forest Plan guidance, moving us towards objectives.