

Management Indicator Species (MIS)

The Forest Plan designates four species as management indicator species (MIS): bald eagle, northern goshawk, gray wolf, and white pine. This report addresses bald eagle and northern goshawk. Gray wolf can be found in the Threatened and Endangered Species section while white pine can be found in the Vegetation section of this report.

Bald Eagle and Northern Goshawk

Monitoring Question

MIS monitoring addresses the monitoring question listed for wildlife: MIS from Chapter 4 of the Forest Plan:

What are the population trends of management indicator species?

The question is driven by [Forest Plan direction](#) O-WL-16 -Promote the conservation and recovery of the bald eagle. Population goal minimum: 85 occupied breeding territories, O-WL-31-Provide goshawk habitat to provide for population goal minimum: 20-30 breeding pairs and O-WL-1-Provide ecological conditions to sustain viable populations of desired species and to achieve objectives for MIS.

The question was developed to determine the extent to which forest management is moving conditions toward short-term (10-20 years) and long-term (100 years) objectives for populations and habitat conditions for bald eagle and northern goshawk. Current ecological conditions and habitats help in making informed decisions during project-level analyses and guide future management decisions.

There are several units of measure for both bald eagle and northern goshawk. For bald eagle these include:

- Active bald eagle nests (Table 9a.1 2005 SNF Occupancy Surveys)
- Bald eagle habitat indicators (Table 9-a.2)
 - Acres of 0-9 year old red and white pine
 - Acres of old growth (120 plus year old) red and white pine
- Population data [from known nest and random plot surveys 2005 (MN DNR 2006)]
- Number of acres and/or sites protected through project-level design criteria and/or through site specific mitigation.

For northern goshawk these include:

- Total known nests, total nests checked, total active territories, total successful pairs (DNR Goshawk Territory Data 2009) (Tables 9-3 and 9-4)
- Goshawk habitat indicator: Percent of all upland forest in mature condition

- Number of acres and/or sites protected through project-level design criteria and/or through site specific mitigation.

In addition to units of measure, units of comparison are identified as a component of MIS monitoring. There are several units of comparison for both bald eagle and northern goshawk. For bald eagle these include:

- Active bald eagle nests (Forest Plan minimum = 85 nests)
- Past years, future projected (2014) acres of bald eagle habitat
 - Acres of 0-9 year old red and white pine
 - Acres of old growth (120 plus year old) red and white pine
- Past years population data verses most current data available
- Success of nests before and after treatments.

For northern goshawk these include:

- Past years nest data verses most current available data (Table 9a.3)
- Past years percent of all upland forest in mature condition
- Success of nests before and after treatments.

The habitat indicators were selected because they compare the existing condition with Forest Plan direction and also monitor and assess the achievement of Forest Plan objectives over-time. The population trend of associated species over-time was selected because it monitors and tests assumptions about habitat change and its relationship to associated species. This unit of measure determines success in meeting Forest Plan direction related to species populations. Measuring site specific data on nests and acres protected and nest success before and after treatment determines if standards and guidelines are being implemented and are successful in protecting nest territories.

Monitoring Methods

Monitoring methods for bald eagle and northern goshawk vary somewhat. The methods are described separately here.

Bald Eagle

The two main sources of population data for bald eagle on the SNF are from the SNF long-term Forest-wide and project level inventory and monitoring and the Minnesota Department of Natural Resources (MN DNR) State-wide eagle periodic monitoring.

Nests

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 can be detected from on the ground observers or from low-level flights searching likely nesting habitat during the breeding season of early April.

Since 1995, the SNF changed its monitoring methods relying 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. Since the last Forest-wide survey in 2005, various project-level inventory and monitoring efforts have taken place. While project-level surveys are useful for planning and implementation of activities at the district level, they offer little insight into overall population trends.

State-wide monitoring: The MN DNR, in cooperation with the US Fish and Wildlife Service, USDI National Park Service, US Geological Service, along with the Chippewa and Superior National Forests, conduct State-wide bald eagle surveys every five years. Two surveys have been conducted thus far (2000 and 2005). The surveys visit all known nests on the SNF (including 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 estimating the total number of nests in Minnesota. More information on methods is available on the DNR website ([Eagle Report 2005](#)).

Habitat

Forest-wide, the amount of 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 the project level these are refined to look at conditions within one-half mile of fish-bearing lakes and streams where eagles prefer to nest).

Northern Goshawk

The three main sources of population data for northern goshawk on the SNF are from SNF project-specific inventory and monitoring, MNDNR nest territory monitoring and Bio-regional monitoring.

Nests

SNF monitoring: Since 2004, the Forest Service has made substantial efforts to survey for goshawk nests in landscape-scale vegetation management project areas prior to planning. Known nests have also generally been monitored annually for occupancy, nesting and nesting success. The methods used are similar to those used by MN DNR and are summarized below. Areas surveyed within projects include random transects or targeted habitat identified by district biologists as potentially good nesting sites.

State-wide monitoring: The MN DNR has nest data from 1991 (although current survey protocols and coordination efforts with other agencies date from only 2003). Their objective is to assess occupancy and productivity (nesting success) of all known territories in northern Minnesota. Methods include: conducting occupancy surveys using nest observation or broadcasting alarm calls to which goshawk generally respond; conducting nest surveys in late April or May at occupied nests by quietly entering an area to detect whether birds are nesting; and revisiting active areas in June and July to determine whether nesting was successful by searching for fledglings.

Bio-regional Monitoring: In 2008, the SNF partnered with State and federal agencies in the Western Great Lakes Bioregion (portions of Minnesota, Wisconsin and Michigan) to collect

data determining goshawk population status. This effort was undertaken due to litigation aimed at forest management practices and the potential listing of the goshawk as a threatened species (under the assumption that goshawk populations were declining).

Habitat

The Final Environmental Impact Statement for the Forest Plan revision assessed potential suitable habitat for goshawk outside the BWCAW with three indicators: percent and area of mature upland forest, area and number of 100 acres or larger mature/older forest patches and use of management treatments that increase within-stand diversity and complexity.

Results

Bald Eagle

Nests

There were 90 active breeding territories found during the last Forest-wide survey (SNF 2005 Occupancy Surveys), exceeding the Forest Plan goal of 85. The SNF has averaged 87 active nests each year since 1990. The next Forest-wide nest survey is planned for 2010.

| 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

The 2005 bald eagle survey of all known nest sites in Minnesota identified 872 nests with adult eagles present, a 28 percent increase over the 681 active nests found in 2000. The random plot survey yielded an estimate of 1,312 active bald eagle nests within Minnesota, indicating that the locations of only 66 percent of the State’s nests had been found in the survey of known nests.

With the support of these results and other population information in the lower 48 states, the Fish & Wildlife Service removed the bald eagle from its list of threatened and endangered wildlife in August, 2007. They are no longer protected by the Endangered Species Act but are still protected under the [Bald and Golden Eagle Protection Act](#).

Habitat

The latest habitat projections are consistent with the Forest Plan as shown in Table 9a.2.

| | Forest Plan Data (2003) | Existing Condition (2009) ¹ | Projected 2014 ¹ | Forest Plan Objective ² |
|--------------------|----------------------------|---|--------------------------------|---------------------------------------|
| Acres 0-9 year old | 14,800 | 16,573 | 12,665 | - |
| Acres Old growth | 6,000 | 8,970 | 12,130 | + |

¹Tracks data run Dec. 2009. ²Decade 1 and 2 Objective. (Except in the Sugar Maple Landscape Ecosystem).

More than 50 decisions have been signed since the Forest Plan was signed in 2004, including 11 large landscape scale vegetation management projects. None of these projects are expected to have a negative impact or lead to a trend toward federal listing or a loss of viability for bald eagle. All of the large landscape scale vegetation management projects should benefit eagle in the long-term because the projects are generally designed to:

- Maintain current bald eagle habitat by reserving large mature red and white pine trees in final harvests
- Increase future preferred nesting, roosting and perching habitat through conversion to these forest types and/or diversity planting within other forest types
- Reduce open roads within potential eagle habitat
- Restore white pine near lakes and streams

In the BWCAW, management objectives allow natural processes to dictate the amount and quality of habitat for eagles. Therefore, it is difficult to measure changes or impacts. Since 2004, substantial acres of both wildfire and prescribed burns have likely impacted habitat for eagles by killing some large old growth red and white pine trees preferred for nesting. However, these disturbances are also likely to regenerate pines for future nesting trees.

Population

The 2005 Occupancy Surveys remain the most current data available on a Forest-wide basis. Project level surveys and reports of new nests indicate populations are stable or increasing slightly; however, an increase could be a result of birds moving around.

Pre and Post-treatment Nest Success

There is very little known on the validation of the standards and guidelines that are intended to protect nesting sites because most implementation has not yet occurred. District biologists reported protecting 21 eagle (or suspected eagle) nests during project planning or post-decision, but prior to implementation. Actions to protect the nests included decommissioning roads, seasonal restrictions and/or buffers around nest sites (buffers follow the USFWS National Bald Eagle Management Guidelines). Of the 21 sites where actions were taken, project implementation has only occurred on three. The standards and guidelines, such as decommissioning a road within one-quarter mile and a one-quarter mile buffer of vegetation treatment, seemed to be successful as the nests were active both before and after

implementation. Further nest monitoring during upcoming project implementation will be needed to determine the effectiveness of standards and guidelines.

The effectiveness of standards and guidelines lies mainly in the discovery of nests. Almost all NEPA documents include operational standards and guidelines designed to halt layout and notify the district biologist immediately if a stick nest is discovered. These standards and guidelines are working because approximately 46 stick nests have been reported to district biologists by timber sale preparation crews. Three new active bald eagle nests were found from these reports. Additional nests found from these reports include two inactive eagle or osprey nests, one active osprey nest, five active goshawk nests, three suspected goshawk nests and two active heron rookeries.

Northern Goshawk

Nests

In 1999, there were no known territories on the SNF, but by 2009, 35 territories had been found (MN DNR Non-Game Database 2009).

Figure 9a.1 shows the results of monitoring since 2000. Twenty-eight of the 35 nests within the SNF boundary were checked in 2009. There were 17 occupied nests. Fifteen nests were successful, which was a three-fold increase from 2008. This represents one of the best success rates for goshawk nests ever recorded on the SNF. Two nests were occupied but failed. No birds were detected in 11 territories and the status of seven other territories is unknown because they were not checked (MN DNR Non Game Database 2009).

The 17 occupied nests bring the SNF close to the Forest Plan goal of 20-30 breeding pairs (O-WL-31). Figure 9a.1 also shows that the number of known nest territories has steadily increased over the past 10 years.

Figure 9a.1. Goshawk Nests within the Superior National Forest Boundary.

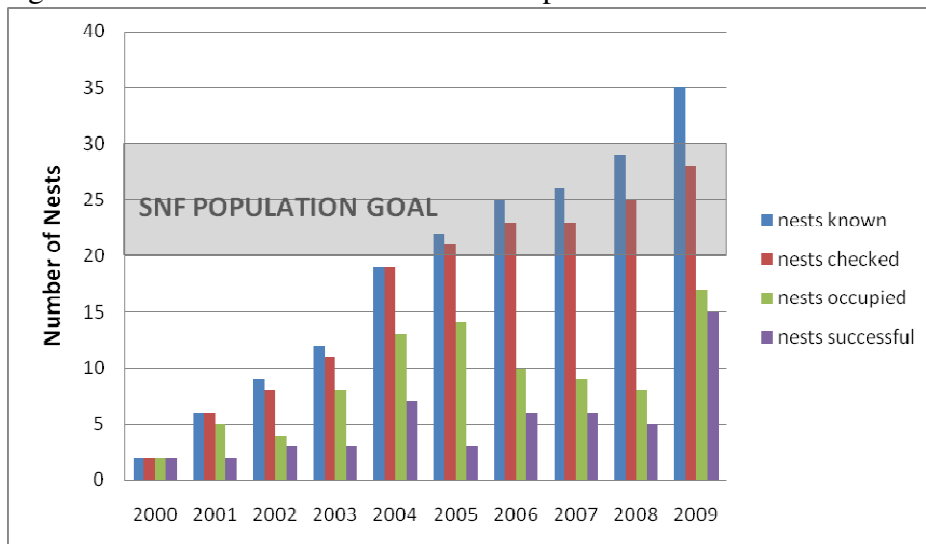
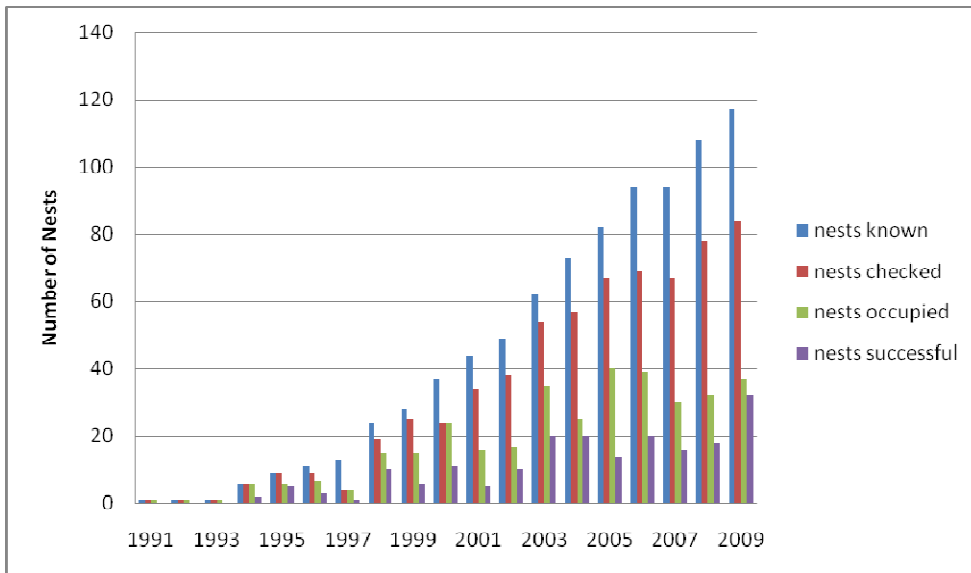


Figure 9a.2 displays the results of the collaborative monitoring effort with the MN DNR in northern Minnesota. This effort resulted in checking 84 goshawk territories (out of 117 known historic territories) during 2009. Thirty-seven territories were occupied and 32 were successful. This represents an all time high in nests checked and successful nests. The number of known nests has steadily increased over the past 16 years. Figure 9a.2 also shows the increase in the number of known nests since 2000.

These monitoring efforts have been valuable in understanding 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 that are discovered during project surveys and on-going field operations. Therefore, there may be some bias in how territories are found and the results of subsequent monitoring efforts.

Figure 9a.2. Minnesota Goshawk Nest Information from 1991-2009.



Results from the bioregional monitoring indicate goshawks are widely distributed and occur at significant densities throughout the western Great Lakes region. Goshawks were estimated to occupy nearly 27 percent of the potential goshawk habitat (Bruggeman et al. 2009). An estimate of occupancy was compiled for the Superior National Forest, but due to the small number of survey units on the Forest, the numbers are not reliable.

Habitat

Mature and older upland forest: Table 9a.3 shows that 56 percent of upland forest is mature or older. This is well above the 40 percent threshold for maintaining adequate habitat. The increase in mature and older forest since the Forest Plan FEIS (2004) is due to a substantial number of acres of forest growing into 40-50 year old age classes. This indicator shows that habitat conditions remain sufficient for maintaining goshawks.

| Conditions | Percent of mature upland forest |
|---|---------------------------------|
| Threshold for maintaining adequate habitat ¹ | 40 |
| Forest Plan 2004 ² | 55 |
| Existing Condition ³ | 56 |
| Projected 2014 ³ | 54 |
| Decade 1 FP FEIS Projected Condition | 48 |

¹ Forest Plan FEIS Volume I, p.3.3.6-3. ²2003 data ³Tracks Dec. 2009 data run

Number and acres of large (100+ acre) mature/older forest patches: Figure 9a.3 shows the existing conditions and the latest projections for 2014 exceed predictions for Decade 1 from the Forest Plan. There was not a drop in this indicator in the first decade as the Forest Plan predicted. This suggests that habitat for goshawks is more plentiful than the Forest Plan predicted. However, Decade 1 is only half over and future projects could move the number and acres of mature/older forest patches closer to the Forest Plan prediction. Figure 9a.4 displays Acres of Upland Habitat in 100+ Patches on the Superior National Forest.

Figure 9a.3. Number of 100+ Acre Patches of Upland Mature Habitat on the Superior National Forest for Forest Plan years 2004, 2009 and the projected 2014 as well as Forest Plan decades 1, 2, 5 and 10. (2009 and 2014 data from Dec. 2009 Tracks Project. All other data from 2004 Forest Plan).

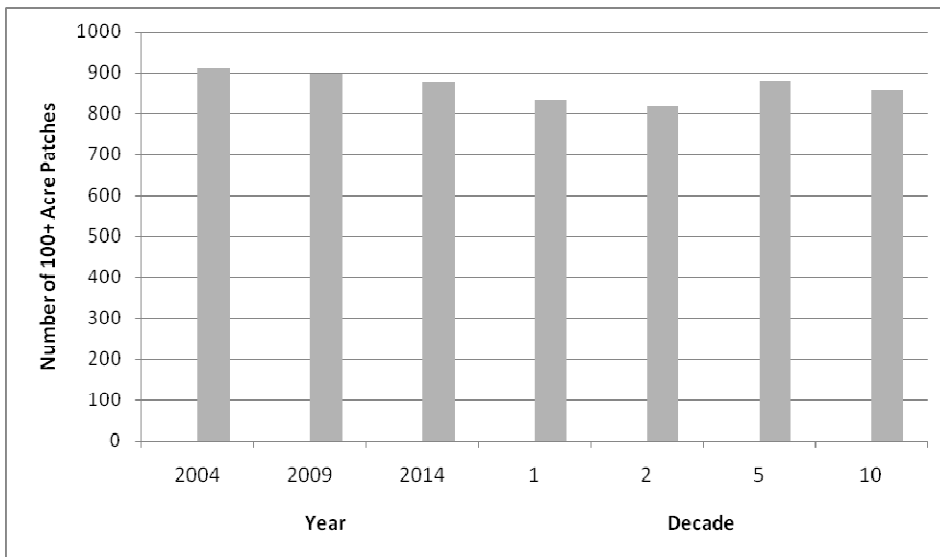
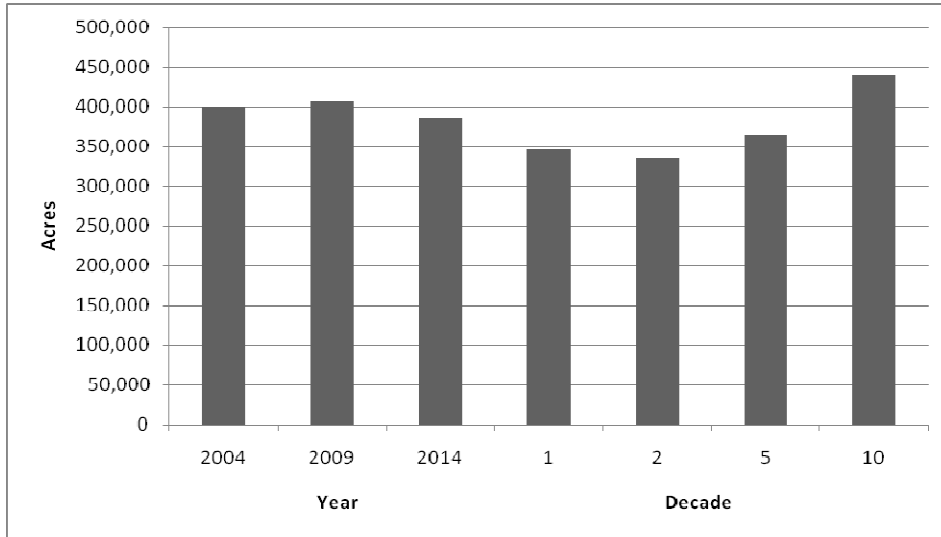


Figure 9a.4. Acres of Upland Habitat in 100+ Acre Patches on the Superior National Forest. (2009 and 2014 data from Dec. 2009 Tracks Project, all other data from 2004 Forest Plan).



Management Treatments to Increase within Stand Diversity and Complexity: Since the new Forest Plan (2004), nine of 11 biological evaluations (BE) for large vegetation management projects have used acres of stand complexity created through management activities as an indicator to analyze effects for goshawk. From these nine BEs, a total of 11,272 acres of management activities were proposed for the first five years of the Forest Plan. Although there is a general understanding of stand complexity, there is no exact standard for what is considered a “treatment that promotes complexity”. Projects have defined it differently based on local factors (landscape ecosystem, tree species, harvest prescription and/or the district biologists’ interpretation). Treatments have included: under planting, partial harvest, thinning, variable group selection, conversion to conifer, some site preparation and/or reforestation methods.

Additionally, all the large vegetation management projects assessed impacts to goshawk as a sensitive species. Forest Plan standards and guidelines have been met and any potential negative impacts to the species or habitat have been avoided. Further, projects were designed to maintain and protect nesting and post-fledging habitat conditions, again meeting Forest Plan standards and guidelines.

Pre and Post-treatment Nest Success

There is not enough information available to judge the effectiveness of standards and guidelines aimed at protecting nest sites for this species. District biologists reported protecting 12 goshawk (or suspected) territories that were discovered prior to project implementation. Actions to protect the nests included buffers, seasonal restrictions and deferring or dropping acres from harvest. To date, only three of the timber harvest units have been harvested. In all three cases, the nests went inactive prior to implementation.

Biologists reported designating protections for about 10,700 acres of foraging habitat around known nests and more than 1,500 acres in post-fledging areas. Actions to protect the nests

included: dropping or deferring acres from harvest, seasonal restrictions, buffers or deferring lay-out until biologists' investigation concluded no changes to prescription were necessary.

In one case, lay-out was halted and an entire sale area (five units totaling 347 acres) was dropped when analysis found that conditions already exceeded Forest Plan Guideline G-WL-22 for percent of suitable habitat in the post-fledging area. Thus, standards and guidelines were effective as the territory remains active.

The effectiveness of standards and guidelines lies mainly in the discovery and protection of stick nests found during lay-out. Almost all NEPA documents include operational standards and guidelines designed to halt layout and notify the district biologist immediately if a stick nest is discovered. These standards and guidelines are working as approximately 46 stick nests have been reported to district biologists by timber sale preparation crews. Five active goshawk territories have been found from these reports and 934 acres of protections were put in place through nest and/or post-fledging area buffers, seasonal restrictions, or dropping acres from harvest. Additionally, two active goshawks territories have been found by stand exam contractors due to the reward offered for reporting them.

Implications

Bald Eagle

All indications suggest Forest Plan goals are being met with regards to bald eagle populations. In fact, the 2005 MN DNR random plot sample suggests an underestimation of the population on the Forest. Likewise, habitat projections confirm that management activities are meeting Forest Plan goals and providing ecological conditions to sustain the viability of the species.

Northern Goshawk

This monitoring year (2009) was very successful. Numbers were close to the Forest Plan goal of 20-30 breeding pairs and number of known nests continues to grow. It is too early yet to know if this is a trend that will continue or if 2009 was the anomaly. Successful nest numbers may return to numbers more representative of previous years.

The latest goshawk habitat projections for Decade 1 are exceeding what the Forest Plan predicted. Conditions should benefit goshawks; however, the decade is only one-half over. Thus, more projects this decade could adjust the data closer to the Forest Plan prediction.

Standards and guidelines for sale preparation crews to stop lay-out and report stick nests to biologists' have been successful. Biologists can then implement standards and guidelines to protect nests. However, this is often after much work has been completed by lay-out crews, meaning lost time, money and resources if harvest units are dropped.

While Forest direction to report stick nests has been successful for both species, it is unknown if standards and guidelines used to protect the nests are successful because little implementation has occurred.

Recommendations

Bald Eagle

1. Additional monitoring is required to determine a population trend to ensure Forest Plan goals continue to be met (specifically O-WL-16; 85 breeding territories)
2. Five-year eagle surveys should be continued.

Northern Goshawk

3. Known nest monitoring should be continued along with the bio-regional goshawk surveys at five-year intervals to assess population trend.
4. Prior to sale layout, sale areas should be flown over in leaf-off condition (preferably with snow on the ground to aid visibility) when stick nests can easily be identified. This would save time for sale preparation crews as they would not put time into lay-out and marking only then to drop stands or whole sale areas later when nests are found.
5. Biologists need to begin tracking and documenting the standards and guidelines around nests before and after implementation of activities to answer this question for future reports.