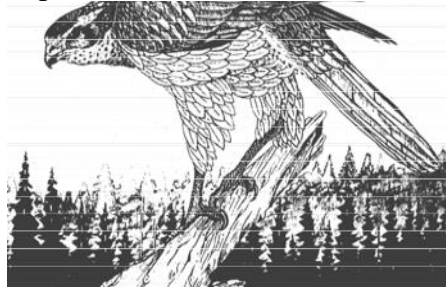


This document was developed collaboratively by staff in the divisions of Forestry, Ecological and Water Resources, and Fish and Wildlife. While not prescriptive, the considerations are designed to help inform decision-making by DNR field managers, area teams, landscape teams, subsection teams and other groups responsible for the management of state-managed forest lands.

NORTHERN GOSHAWK MANAGEMENT CONSIDERATIONS

Minnesota Department of Natural Resources, 06/25/03



INTRODUCTION

This document was developed by a Goshawk Working Group commissioned by the Minnesota Department of Natural Resources' (DNR) Forest Resources Issues Team, and consisting of representatives of the DNR's Divisions of Forestry, Wildlife, and Ecological Services. These considerations are designed to inform decision-making by DNR field managers, area teams, landscape teams, subsection teams, and other groups responsible for the management of Minnesota's state forest lands. The application of these considerations can enhance the DNR's ability to address diverse scenic, recreational, and timber values, in addition to increasing the likelihood that the goshawk will remain a component of Minnesota's forest ecosystem into the future.

These considerations have been based upon the best available science, but this science remains limited at present. The Working Group intends the use of these considerations to encourage adaptive management. That is, when applied, the effects of these considerations on goshawks should be monitored and, along with new scientific findings, should lead to the continuous modification and improvement of these considerations.

JUSTIFICATION

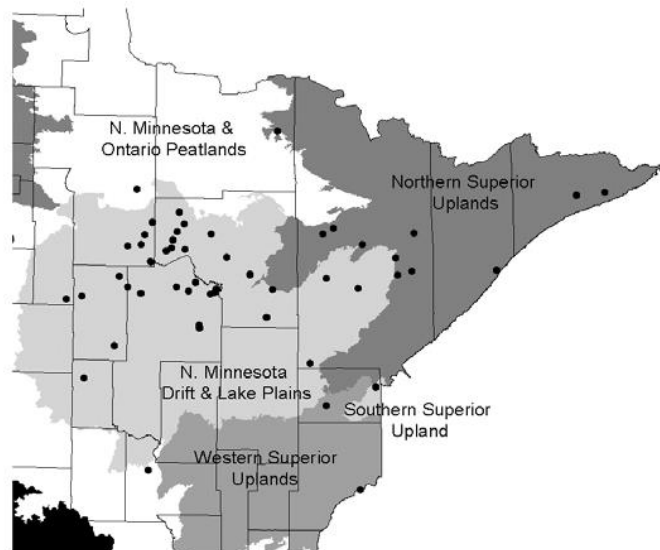
The development and implementation of management considerations to benefit the Northern Goshawk (*Accipiter gentilis*) is of value for several reasons. Like any top-level carnivore, the goshawk requires large areas of foraging habitat to successfully raise young, and tends to occur in low numbers across the landscape. Recent research in Minnesota has documented that goshawks use large areas containing certain forest structural characteristics, forest cover types, and forest age classes. Sustaining the state's breeding goshawk population may require maintaining landscapes as shifting mosaics of forest conditions, a strategy that could benefit goshawks, other species (e.g., large carnivores like lynx, fisher, marten), and other values (e.g., sawtimber production, scenic older forest, recreation in large forest patches) which might otherwise be insufficiently supported by Minnesota's state forest lands.

SUMMARY OF GOSHAWK STATUS AND BIOLOGY

Description: The Northern Goshawk is the largest forest raptor in Minnesota, with long, broad, and rounded wings, a long, rounded tail, and stout legs and feet. Average wingspan is 98-104 cm (39-41 inches) for males, and 105-115 cm (41-45 inches) for females. The Goshawk typically has a brown-gray to slate gray back, a light gray breast and belly with subtle barring, and a head with a black cap and a pronounced white "eyebrow" that widens behind the eye. Its tail is dark gray with 3-5 broad, dark bands and a thin, white band on the rounded tip. The Goshawk is particularly adapted to forest habitats and is often seen flying rapidly among the trees.

The Northern Goshawk is an aggressive species that tends to fiercely defend its nest. It has been known to harass people passing near or beneath the nest tree. Although the Goshawk is mostly silent, when alarmed it will utter a high-pitched "ki-ki-ki" or "kak-kak-kak" in a rapid series of 10-20 calls. This aggressive vocal response is more likely to be heard prior to egg-laying early in the nesting cycle, or later, after the chicks have hatched. In northern Minnesota, Goshawks generally initiate egg-laying between April 5th and April 20th, take 4-6 days to complete a clutch, and incubate for approximately 30 days, with hatching expected between May 10th and May 25th.

2001/2002 Distribution: The Goshawk is a resident of Minnesota's Laurentian Mixed Forest ECS province. Current knowledge of the distribution and abundance of northern goshawk breeding territories is based upon reports received from field personnel within and outside the DNR; no systematic surveys have been conducted for the species to date. While other territories have been active recently, and may be active in the future, the distribution of the 48 goshawk breeding territories known to be active in Minnesota in 2001 and/or 2002 is depicted below:



Breeding Territory: For the purposes of this document, a goshawk breeding territory is that area used by a pair of birds during the breeding season for nesting and foraging. In Minnesota, breeding territories have been identified in a variety of forest types and conditions, but generally are dominated by areas of mature forest condition. Boal et.al. (2001) estimated the average size of breeding territories of 11 nesting goshawk pairs ranged from 12,441 to 19,441 acres. The home ranges of individual members of the pair are smaller, and overlap by less than 50%. Breeding territories vary greatly in shape, and are not necessarily circular. Recent evidence suggests that in Minnesota, goshawks often winter in the vicinity of their breeding territory (Boal pers. comm.).

Foraging and Foraging Habitat: The goshawk hunts in diverse habitats throughout the breeding territory, including both open and dense forests. An on-going study in Minnesota has documented small mammals and birds comprising 54% and 36% of prey items, respectively (Smithers pers. comm.). Because its hunting strategy consists of perching briefly while searching for prey, and then moving on to another perch, the goshawk prefers forests with a relatively open flight path between the canopy and subcanopy. Boal et. al. (2001) inventoried 128 foraging stands and report that structurally, regardless of forest type, foraging habitat in Minnesota tends to have stem density from 230–417 stems per acre with a mean DBH of 8–10 in., a crown closure of 53–86%, a crown height averaging 48–55 ft., a crown base averaging 20–30 ft. high, and an understory crown averaging 18–20 ft. in height. This structure results in a 0–12 ft. high flight path between the crown base and the understory crown. Another 0–3 ft. high flight path is often present between the base of the understory canopy and the top of the shrub layer. (See figure, p.4) Foraging habitat also typically contains 1,291–7,874 linear ft. of partially decayed woody debris per acre, averaging 7–8 in. in diameter, and lying 2–8 in. above the ground.

Nest Site: Northern Goshawk nests in Minnesota have been found in a wide variety of forest types, including aspen, northern hardwoods, and pine. Typically, nests are in mature stands with a relatively high crown closure. The nest tree itself is usually one of the largest trees in the stand. In the Lake States, there may be some preference for deciduous trees, especially aspen, as the nest tree species. The nest is often situated at about 2/3 the height of the nest tree, at the base of the forest canopy. The nest is typically built in a lower crotch or fork, or on a large horizontal limb against the trunk. Goshawk nests are up to 3 ft. in diameter, constructed of thin sticks, slightly hollowed, and lined with bark chips, evergreen sprigs, and feathers and down. "Whitewash" is often seen on the forest floor beneath the nest. An active Goshawk territory may contain 1-8 alternative nests within 1/4 mile of the active nest.

CONSIDERATIONS FOR GOSHAWK BREEDING TERRITORY MANAGEMENT

I. A Goshawk Breeding Territory (GBT) encompasses the foraging habitat of a breeding pair of goshawks. For the purposes of this document, “Goshawk Breeding Territory” refers to the area around a nest that has been active within the past two years. The following considerations encourage management that would enhance a breeding territory’s suitability as goshawk habitat:

- A. Consider effects on an area of 12,000 to 19,000 acres, which corresponds to the estimated size of breeding territories in Minnesota (Boal et.al. 2001).
- B. Consider efforts to move the GBT toward the following structural conditions of goshawk habitat:
 1. Mature forests conditions (i.e. mean DBH of at least 8-10 inches) in large patches within the GBT.
 2. 60 – 100% closed canopy within at least 40% of upland forest within the GBT.
 - a. 25% of the upland closed canopy in patches of at least 600 acres.
 - b. 25% of the remaining upland closed canopy in patches of at least 100 acres.
 3. Manage for 4-12 foot flight paths (open spaces) between the top of the forest’s subcanopy and the bottom of its canopy.
 4. Manage for <3 foot flight paths (open spaces) between the top of the forest’s shrub layer and bottom of its subcanopy.
 5. Retain and manage for abundant woody debris to provide habitat for prey populations.
- C. Avoid destruction of alternate nests that may exist within ¼ mile of the active nest.

Note 1: A variety of silvicultural approaches are available to achieve these conditions, including (where appropriate) large patch management, shelterwood with reserves, femelschlag, reserve tree management, single-tree selection, small group selection, spatially variable overstory retention, dead wood augmentation, two-cohort management, and single cohort mixed-species management.

Note 2: Conditions outlined in this document are based upon the analysis of habitat selected by goshawks in the modern Minnesota forest, in which optimal goshawk habitat may be limited or nonexistent. For example, a mean DBH greater than 8-10 inches may be preferred by goshawks, but may not be currently available for selection by nesting birds included in habitat studies. Consequently, quantitative goals outlined on this page should be considered minimal, rather than optimal.

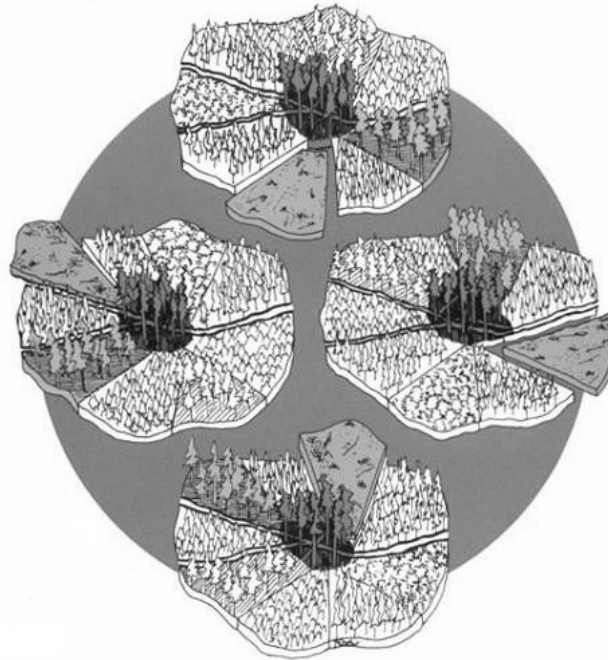
II. Within a GBT, a Goshawk Nest Area (GNA) is that area in the immediate vicinity of the active nest used for egg-laying, incubation, and to provision and protect nestlings. Because of the importance of this area to successful goshawk reproduction, the following accommodations are suggested:

- A. Consider identifying a zone of 30 to 40 acres surrounding any known nest site as a GNA.
- B. Avoid harvesting activities between February 1 and August 1 within a GNA.
- C. A common feature of GNAs appears to be interlocking canopies and high crown closure. Consider maintaining a minimum average canopy closure of at least 70% within a GNA.
- D. Protect any tree supporting a nest (including alternative nests) for at least two breeding seasons following the GNA’s last known occupancy.
- E. Monitor all known nests for breeding activity and reproductive success during any active season and for at least two years thereafter.
- F. Favor selective (i.e., uneven-aged) harvest as individual tree selection and/or small group selection at 1/3 – 1 acre scale within the GNA. Avoid exposing nest trees to blowdown.
- G. Report any large stick nest encountered on state land to the Regional Nongame Specialist if there is evidence that the area may be occupied by goshawks.

III. Also within a GBT, a Goshawk Post-fledging Area (GPA) is the portion of the GBT used to support alternative nest sites, and to provision and protect young until they gain independence.

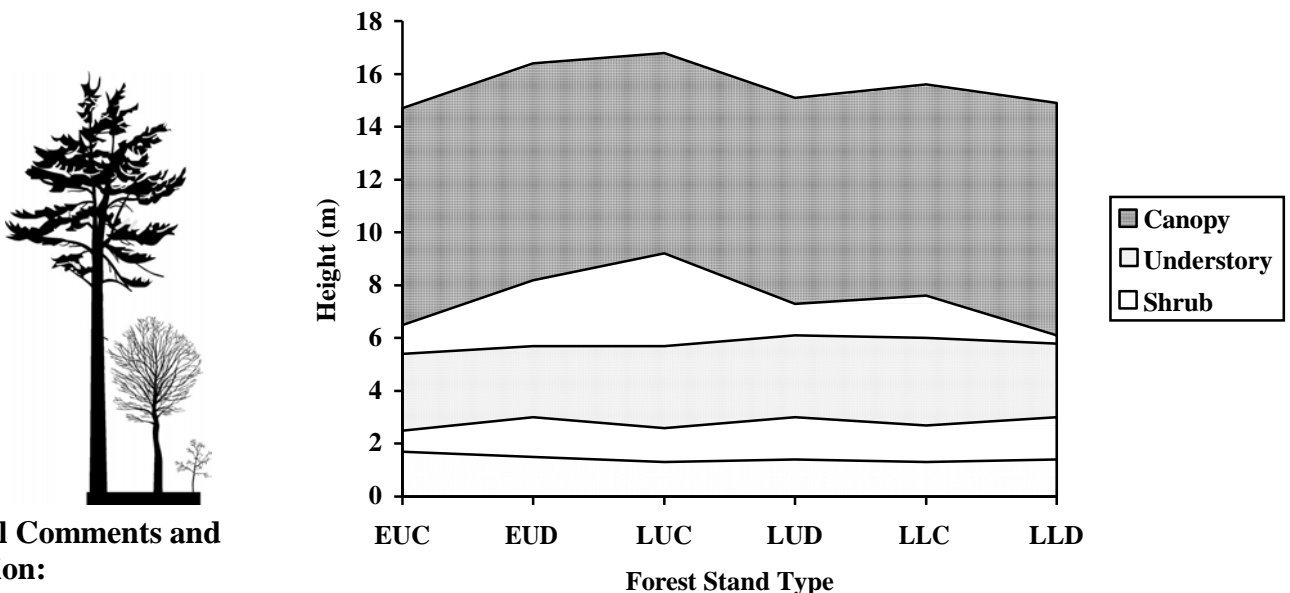
- A. Consider identifying a zone of 400-600 acres surrounding any known nest as a GPA.
- B. Maintain at least half of the area of a GPA in regeneration greater than 1/3 its potential height.
- C. Manage at least 2/3 of the forest within the GPA and adjacent to the GNA in a 60 – 100 % closed canopy condition at any time.

The following illustration provides a conceptual representation of the GPA management goals outlined above. In it, nine patches of similar size are harvested on a rotational basis around an intact GNA contained within the GPA. The hypothetical GPA is shown at four time intervals (clockwise). The majority of the forest adjacent to the GNA is in closed canopy conditions at any time.



From: Harris, L. 1984. *The Fragmented Forest*. Univ. Chicago Press
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To illustrate the flight path structure outlined in Recommendation I.B.3. and I.B.4., the following figure (from Boal et.al. submitted), shows the vertical heights of overstory canopy, understory canopy, and shrub layers in stands used by male northern goshawks during the breeding season in Minnesota, 1998-2000. (EUC = Early successional upland conifer, EUD = Early successional upland deciduous, LUC = late successional upland conifer, LUD = late successional upland deciduous, LLC = late successional lowland conifer, LLD = late successional lowland deciduous.)



Additional Comments and Clarification:

1. Most members of the

Goshawk Working Group believed that the structural conditions outlined in Recommendation I.B. could be applied by DNR groups responsible for the management of state forest beyond known goshawk breeding territories. Specifically, these conditions could be included in goal statements for landscapes in which there may be no known goshawk nests, but in which conditions are likely to support goshawks in the present or near future.

2. Large patch management goals outlined in these guidelines are in line with similar goals reflected in the Generic Environmental Impact Statement on Forest Management in Minnesota, in Forest Resource Council Guidelines, and in the Subsection Forest Resource Management Planning process.
3. Effort should be made to manage GNA's as outlined above. Where existing management plans or timber contracts preclude the above approaches, field staff should develop alternative strategies that will mitigate impacts to the goshawk territory.
4. Even-aged management may not be appropriate in low-disturbance cover types (e.g., northern hardwoods).
5. In cases where fragmented ownership, existing management plans, or timber contracts preclude the recommendations outlined in this document, breeding activity and reproductive success should be monitored during any active season and for at least two years thereafter to evaluate the effects of existing management activities on nesting goshawks.
6. Long-term goals that benefit goshawks and related values include:
 - a. age-class distribution in large patches, reflecting natural range of variation,
 - b. use of a variety of silvicultural tools within the GBT, GPA, and GNA, and
 - c. mixed species management.

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