



Credit: Carrol Henderson

# Northern Goshawk Minnesota Conservation Summary

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The *Blueprint for Minnesota Bird Conservation* is a project of Audubon Minnesota written by Lee A. Pfannmuller ([leepfann@msn.com](mailto:leepfann@msn.com)) and funded by the Environment and Natural Resources Trust Fund. For further information please contact Mark Martell at [mmartell@audubon.org](mailto:mmartell@audubon.org) (651-739-9332).

# Northern Goshawk

## Priority for Minnesota's Bird Conservation Plan:

- Boreal Hardwood Transition: Moderate Level Priority

## Other Status Classifications:

- Minnesota Species of Special Concern
- Classified as a Minnesota Species of Greatest Conservation Need
- On Audubon Minnesota's Action List
- Considered a Sensitive Species on both the Superior and Chippewa National Forests (2006)
- USFWS Bird Species of Management Concern (1995)
- Identified by Partners in Flight (PIF) as a Priority Species in Minnesota

## Population Information:

- U.S. and Canada population estimate 200,000 (U.S. PIF Plan)
- PIF continental population objective: Maintain
- Minnesota population estimate: 1,500; Target is 1,500
  - ✓ Estimated MN population in BCR11: 1,500; target is 1,500
- It is believed that food availability strongly affects goshawk population dynamics (WBCI)
- Currently no demographic evidence in North America that the goshawk is declining (Kennedy 2003) which could either mean that it is not declining or that it is declining but there is insufficient information to detect the decline.

## Minnesota BBS Data:

- Red Level of Regional Credibility
- 1966-2009: increasing trend (**not statistically significant**) of +4.5%; 1999-2009; increasing trend of +4.6%
- Minnesota does not include one of the species centers of highest abundance
- 0.94% of the Northern Goshawk's North American breeding range occurs in Minnesota; 0.3 % of the goshawk's population occurs in Minnesota.
- Average # birds/route is 0.01; found on 4 of 74 routes

## Minnesota Residency:

- Breeds in northeastern and north central Minnesota; irruptive migrant and winter visitant throughout the state

## Habitat Requirements: Forest

Although considered a habitat generalist at large spatial scales, goshawks tend to nest in a relatively narrow range of vegetation structural conditions. Nests are typically in mature to old-growth forests composed primarily of large trees with high (60–90%) canopy closure (Birds of North America/Cornell Lab or Ornithology).

## *From Wisconsin Bird Conservation Initiative (WBCI) Species Profile:*

- The northern goshawk is a large forest-dwelling hawk generally associated with mature deciduous, coniferous, or mixed forests. It breeds throughout much of the forested areas of western, upper Midwest, and the northeast U.S.
- Nests are typically found in mature to old-growth forests comprised primarily of large trees with high canopy closure (60-90%). Nesting areas may contain 1-5 alternate nest trees, which are located in relatively small forest stands, approximately 0.4 – 100 ha in size.

- Nest trees are usually the largest in the stand. Deciduous trees are usually favored for nest building in mixed forests because they provide a more stable structure to support the nest and have larger diameter limbs than conifer species of similar trunk diameter. This is in contrast with the western U.S. where nearly all goshawk nests are found in conifers.

*From A Technical Conservation Assessment of the Northern Goshawk in the Rocky Mountain Region (2003):*

- Although the goshawk uses a wide range of forest communities during the breeding season, it prefers mature and old-growth forest for nesting and hunting.
- Its winter habitat preferences in North America are poorly understood but the limited data available suggests that the bird uses the same habitats year-round as well as non-forested habitats at lower elevations.
- Although there is some evidence goshawks are resilient to forest fragmentation and can re-establish when cleared areas are reforested, the thresholds for population persistence have not been identified.

*From The Northern Goshawk in the Western Great Lakes Region (2003):*

- Goshawks generally nest and during the breeding season hunt in old growth and mature forest stands.
- Kennedy and Andersen (1999) completed a regional research and monitoring plan for the goshawk.
- The WGLR is at the southern extent of the goshawk's current breeding range at these longitudes. Thus, goshawks in the WGLR may be expected to be rarer and have more variation in demographic parameters than populations from the center of the species' range.
- Prey abundance and availability are important habitat attributes and potential limiting factors for goshawk populations.
- Studies of foraging habitat used by goshawks indicate that they tend to select foraging areas with specific structural characteristics, such as flight corridors between vegetation layers and stands with a high density of large trees.
- The area immediately surrounding the nest tree often contains alternative nests and may be reused in consecutive years.
- Goshawks nest in both coniferous and deciduous trees and appear to choose nest trees based on size and structure more than the species of tree. They often nest in one of the largest trees in the stand.
- Although they are considered habitat generalists at large scales, the species tends to nest in a relatively narrow range of structural conditions. They seem to prefer mature forests with large trees, relatively closed canopies (60-90%) and open understories. Overall, however, their preference of mature forests over other forest stages has been demonstrated in only a few studies.

*From Smithers, B. L 2003:*

- Goshawks depredated a variety of mammalian and avian species, but red squirrels and chipmunks were the dominant prey among all nests, accounting for 66% of identified prey and 46% of all prey deliveries.

*From Boal et. al 2001*

- Male goshawks demonstrated a clear preference to forage in old (>50 years) early successional upland hardwood (e.g. aspen, birch) stands, mature (>50 years) late successional upland conifers (e.g. red pine, white pine), and mature (>25 years) early successional upland hardwood and young (<50 years) late successional lowland conifer (e.g. black spruce, tamarack). Young (<25 years) early successional upland hardwood and young (<50 years) late successional lowland conifer stands were clearly avoided.
- Foraging stands, regardless of stand type, were consistent in having high stem densities (570-1030 stems/ha) of tall, large canopy trees, with horizontal open spaces of 1.1 to 3.5 m between the bottom of the overstory and the top of the understory trees and up to 1 m between the bottom of the understory canopy and top of the shrub layer. These relatively unobstructed spaces between vegetation layers may serve as important flight paths through forest stands.

- Mean canopy closure was high among all stand types (53-70%).
- The average size of breeding territories of 11 nesting goshawk pairs ranged from 12, 441 to 19, 441 acres.

Migration: Temperate

Area Sensitivity: Considered an area sensitive species (J. Green: Birds and Forests, 1995. MN DNR)

Climate Change Vulnerability: Low (0)

Threats/Issues:

*From WBCI Species Profile:*

- Harvesting of some 40-50 year old upland forest types (e.g. aspen and birch) may negatively influence productivity and large clear-cut areas also encourage competitive species to move in and displace goshawks from established nesting areas.
- Several mammal species are known to predate goshawk nests.
- The legal take of nestlings for falconry has a limited impact on the wild population.
- Other factors that affect productivity are anthropic disturbances near nest areas, prey availability, weather conditions during nesting, and the age of breeding females.

*From a Technical Conservation Assessment of the Northern Goshawk (2003)*

- The primary threat to goshawk populations is alteration of its preferred habitat from timber management practices. Biologists and land managers have raised concerns over destruction and modification of goshawk nesting, post-fledging, foraging, and wintering habitat.
- Issues cited by researchers, agency personnel and others as potential threats to habitat caused by various silvicultural treatments include forest fragmentation, creation of even-aged and monotypic stands, potential increase in area of younger age classes, and loss of tree species diversity.

*From BNA Species Profile:*

- Timber harvest is a primary threat to nesting populations (Reynolds 1989, Crocker-Bedford 1990). Each year nests are destroyed by logging operations, but impacts to nesting populations are unknown; breeding densities may be lowered or individuals may redistribute to adjacent areas. Harvest methods that create large areas of reduced forest canopy cover (<35–40%) may be especially detrimental (Bright-Smith and Mannan 1994, Beier and Drennan 1997).
- Timbering activities near nests can cause failure, especially during incubation (Anonymous 1989, Boal and Mannan 1994). Logging activities, such as loading and skidding, within 50–100 m of nest can cause abandonment even with 20-d-old nestlings present (JRS). However, see Zirrer (1947) for descriptions of repeated re-nesting attempts despite extreme disturbance. Camping near nests has also caused failures ( $n = 2$ ; Speiser 1992).

**OVERALL MINNESOTA GOAL: Maintain current population levels in Minnesota and implement the Northern Goshawk Management Considerations on public lands**

### **BEST MANAGEMENT PRACTICES**

*From A Technical Conservation Assessment of Northern Goshawks:*

- The most effective approach for managing breeding populations of goshawks is to manage goshawks at a variety of spatial scales. This requires a landscape management plan of goshawk preferred habitat.

*From Minnesota DNR Northern Goshawk Management Considerations (2003):*

- Guidelines within the **Goshawk Breeding Territory** (12,000-19,000 acres). Move the forest within the GBT to the following structural conditions:
  - ✓ Mature forest conditions (i.e. mean DBH of at least 8-10 inches) in large patches within the territory
  - ✓ 60-100% closed canopy within at least 40% of upland forest within the territory
    - 25% of the upland closed canopy in patches of at least 600 acres
    - 25% of the remaining upland closed canopy in patches of at least 100 acres
  - ✓ Manage for 4-12 foot flight paths (open spaces) between the top of the forest's subcanopy and the bottom of its canopy
  - ✓ Manage for <3 foot flight paths (open spaces) between the top of the forest's shrub layer and bottom of its subcanopy
  - ✓ Retain and manage for abundant woody debris to provide habitat for prey populations
  - ✓ Avoid destruction of alternate nests that may exist within ¼ mile of active nest
- Guidelines within the **Goshawk Nest Area**:
  - ✓ Consider identifying a zone of 30-40 acres surrounding any known nest site as a GNA
  - ✓ Avoid harvesting activities between February 1 and August 1 within a GNA
  - ✓ 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
  - ✓ Protect any tree supporting a nest (including alternative nests) for at least two breeding seasons following the GNA's last known occupancy
  - ✓ Monitor all known nests for breeding activity and reproductive success during any active season and for at least two years thereafter.
  - ✓ Favor selective (i.e. uneven-aged) harvest as individual tree selection and/or small group selection at 1/3 -1 acres scale within the GNA. Avoid exposing trees to blowdown.
  - ✓ Report any large stick nest encountered on state land to the Regional Nongame Specialists if there is evidence that the area may be occupied by goshawks.
- Guidelines for a **Goshawk Post-fledging Area** (the portion of the GBT used to support alternative nest sites and to provide for and protect young until they gain independence):
  - ✓ Consider identifying a zone of 400-600 acres surrounding any known nest
  - ✓ Maintain at least half of the area of a GPA in regeneration greater than 1/3 its potential height
  - ✓ 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.

*From WBCI Species Profile:*

- Reduce disturbance during the nesting period by delineating protected areas around nest trees. Crocker-Bedford (1990) reported that small (1.2-2.4 ha) and large (16-200 ha) buffer areas were inadequate, with only 16% re-occupied nests and nestling production dropping 94% following logging activities. This may be due to increased competition from open-area competitors, and changes in foraging habitat and prey abundance.
- Habitat may be improved with silvicultural activities that reduce the density of shrubs, saplings, and small poles, while maintaining or enhancing the canopy of large trees within foraging range of nests.
- Recent studies in the western U.S. have concluded that management strategies that account for interactions among habitat factors and their spatial and temporal effects on habitat suitability are likely to be more successful in retaining goshawks than prohibitive buffers around individual nests.
- In Wisconsin, the Chequamegon-Nicolet National Forest manages for goshawk habitat with silvicultural practices that emphasize higher residual basal areas and smaller size and number of canopy gaps. They conduct surveys for goshawk breeding pairs and active nests prior to timber harvest projects, and maintain, protect, and enlarge areas of mature hardwood, hemlock, and white pine forests with an emphasis on low fragmentation and high canopy cover (i.e., > 80% closure).
- Currently WDNR is using draft management guidelines designed to protect known nesting areas. These guidelines include:

1. Create a no-cut buffer around the active and any alternate nest tree(s);
  2. For uneven age harvests or selection thinnings maintain residual basal areas >110 ft<sup>2</sup>/acre within the nest area or 1000 feet of the nest tree;
  3. Limit harvest and road/trail building activities from February 1 to August 1; and
  4. Limit the timber sale contract to 1 year within 1000 feet of the nest tree or nest area center.
- Goshawks do not always breed every year, are very secretive, may abandon their territories for several years, or they may have an ephemeral territory outside the sale area. Therefore, surveys should be conducted for 2-3 years in a row to ensure that resident goshawks are detected and receive adequate protection.

*From BNA Species Profile:*

- Reynolds et al. (1992) developed management recommendations for nesting birds in the sw. U.S. These recommendations describe desired forest conditions for nesting and foraging habitat; especially emphasized are forest conditions for supporting diverse prey populations. Recommendations prescribe habitat conditions at 3 spatial scales—nest, post-fledgling areas and foraging areas.

## **MONITORING RECOMMENDATIONS**

*From Evaluating and developing survey techniques using broadcast conspecific calls for northern goshawks in Minnesota, 2001;*

- Broadcast surveys are effective at detecting northern goshawks during their breeding season. Goshawk surveys are generally conducted using the alarm call during the nestling phase and the juvenile food-begging call during the fledgling-dependency phase. However, goshawks are more vocal during their courtship phase than at any other time of the year. Results of the study indicate that in Minnesota, broadcast stations may be spaced 712m and 662m, respectively, when conducting systematic surveys during the courtship and fledgling-dependency phases.

*From Kennedy and Andersen 2004:*

- Authors recommended an approach to monitoring regional population distribution and trends but a lack of funds has prevented it from being implemented.

*From Wisconsin Bird Conservation Initiative:*

- Hargis and Woodbridge (2005) have developed and tested a monitoring design for goshawks that can yield a defensible population trend.

## **CONSERVATION ACTIONS**

- Identify and target high priority landscapes and habitats for conservation action

**Action:** Identify Important Bird Areas that are a priority for this species in Minnesota

## **RESEARCH NEEDS**

*From WBCI Species Profile:*

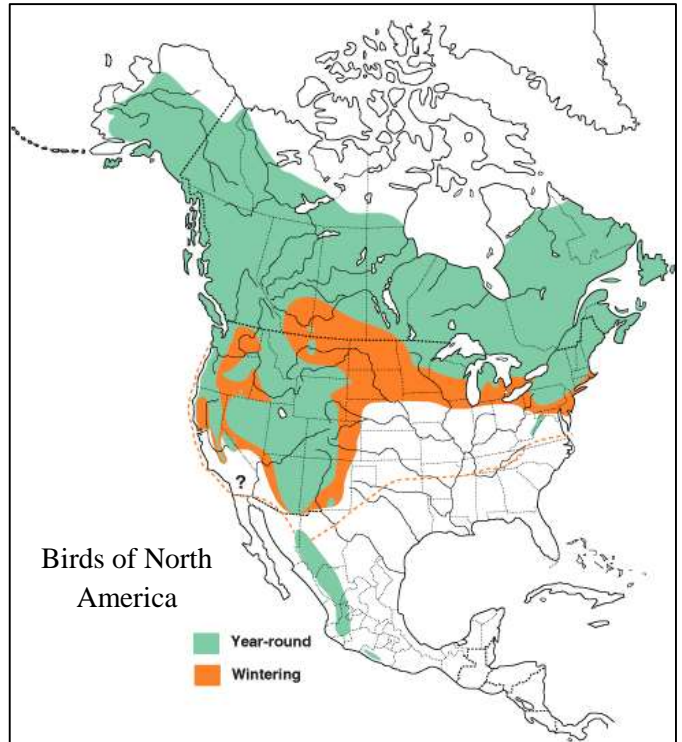
- Squires and Reynolds (1997) list several priorities for future research including:
  1. Determine how changes in forest structure and landscape patterns effect population viability
  2. Impacts of habitat alternations to prey species
  3. Effects of habitat fragmentation
  4. Development of monitoring procedures to determine population trends
  5. Winter ecology
  6. Dispersal capabilities and mortality rates.

- More recently Anderson et al. (2004) identified the following research priorities for goshawk populations throughout North America:
  1. Long-term population studies
  2. Coordinated studies of habitat use
  3. Studies of demography and habitat use in the non-breeding season
  4. Long-term experimental studies to understand how forest management influences goshawks.

*From The Northern Goshawk in the Western Great Lakes Region (2003):*

- More research is needed on population dynamics and on how to adequately monitor the population;

Northern Goshawk Distribution Maps



Birds of North America <http://bna.birds.cornell.edu/bna/>



MN DNR [http://www.dnr.state.mn.us/eco/mcbs/bird\\_map\\_list.html](http://www.dnr.state.mn.us/eco/mcbs/bird_map_list.html)

A MN BBA Map is not currently available