

# FOREST DWELLERS

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## CONSERVING THE NORTHERN GOSHAWK AND OTHER AREA-SENSITIVE SPECIES OF MINNESOTA'S MATURE NORTHERN FORESTS

It begins in March, typically in the tallest and largest trees of densely forested stands. The mated pair work through the lengthening days, building a new nest or refurbishing an old one with new sticks. Each nest is serious real-estate—2½ to 3 feet across—requiring a solid foundation. Some are snuggled against the tree's trunk on sturdy horizontal branches. Others are built in a primary crotch at the base of the canopy. Here in Minnesota's northern forests, mature aspens are favored above all as nesting trees, but a breeding pair may also choose a paper birch, red pine, sugar maple, white pine or jack pine in their territory that is large enough to serve the purpose.

Sprigs of fresh greenery—often pine needles or white cedar—line the nest, a final touch. It will be early April when the female lays first one egg, then two, sometimes a third and fourth, over a period of days. When the last egg has been laid, she hunkers down, taking on the greater share of incubation while the male takes on the greater share of hunting for food. Weeks pass as she periodically turns the eggs and works to keep them warm through the still-cold days and nights, holding them against the bare skin of her brood patch. Now and then, a molted flight feather floats down



Northern goshawk  
Photo by Michael Furtman

to land on the ground below the nest, where snow commonly still lingers. There are long spells of quiet, punctuated by the occasional howls of wolves, the tapping of woodpeckers, the *chirr* of a red squirrel or throaty croak of a raven. This is a vulnerable time. Many eggs do not make it through to hatching. But one day, nearly a month after they were laid, there can be a new sound in the forest: the sound of goshawk chicks vocalizing from within their eggs. Near the time of their hatching, new leaves unfurl overhead to screen the nest from above, forming a near-continuous canopy across much of this breeding pair's long-established territory. High in their nest, the young goshawks view this world of shadow and dappled light through bright yellow eyes.

The body of knowledge related to Minnesota's northern goshawks has expanded dramatically in the

past twenty-odd years, as state and regional scientific studies have uncovered many secrets of this notoriously secretive accipiter. We had a lot to learn. Studies done elsewhere on the species—in particular, in the mountainous western U.S. and Canada—could not be taken as relevant here, where everything from elevation to vegetative cover to prey species was different. Each question had to be addressed anew, in this landscape setting.

What was the species' range in Minnesota? What was the size of its resident breeding population? How large a territory was needed to sustain a breeding pair and its young? What characteristics defined suitable habitat for nesting and foraging? How did productivity here compare to elsewhere? Above all, how were Minnesota's northern goshawks faring? Were their numbers declining, stable or increasing?



A watchful northern goshawk chick at a nest  
Photo by Amber Burnette

The northern goshawk nests in mature and old upland forest, favoring aspens as nesting trees in stands 60 or more years old. In Minnesota, productive breeding territories are associated with large, contiguous forests with greater than 60-70% canopy cover.

In 2013, the goshawk was designated as a state species of Special Concern on the basis of past and projected declines in availability of this type of habitat, together with the species' relatively low abundance and reproductive rate in the state. It is considered a Sensitive Species on the Superior and Chippewa National Forests in Minnesota and is a U.S. Fish and Wildlife Service bird species of management concern.



*“The better we understand the species’ minimum requirements for nesting and foraging, the better chance we have to sustain the existing breeding population distributed across the species’ range.”*

**GAEA CROZIER,**  
Nongame Wildlife Program Biologist



Photo by MN DNR

The answers mattered, if the goal was to sustain the northern goshawk as a facet of Minnesota’s natural heritage. And that was the goal.

The MN DNR Nongame Wildlife Program’s work on the species picked up steam in the 1990s, with the impetus provided by the northern goshawk’s candidacy for federal listing under the Endangered Species Act. Nongame Wildlife Program funding was provided to the University of Minnesota in support of their research on habitat use, diet, and methodology for monitoring goshawk territories. “But systematic, annual monitoring of nest sites and breeding territories really began in earnest with federal grant funding to the state starting in 2003,” says Nongame Wildlife Program biologist Gaea Crozier. “In the years since then, an interagency team of collaborators has continued the effort, with partners monitoring lands they manage across the goshawk’s range in north-central and northeastern Minnesota.”

Monitoring begins in mid-March each year. Surveyors typically go out solo, checking known nest locations and documenting any new nests observed in previously occupied territories. Northern goshawks are elusive, both rarely and

barely seen as they dart through their densely forested habitat. (It is telling that the popular birding website eBird describes adult goshawks as “distinctive if seen well.”) Accordingly, surveyors employ a variety of techniques. The protocol includes broadcast of recorded calls from locations at set distances from the last used nest in each territory. A goshawk in the vicinity during the breeding season may give a vocal response to these recordings and/or fly in close enough to be seen, providing a way to determine whether a given territory is still active. It’s not failsafe, since the hawks may not always respond or may be too far away during the brief period when the recording is broadcast. But it’s a useful strategy to assess the presence or absence of a breeding pair in a remote landscape where single territories can occupy as many as 25 square miles.

The fiercely protective nature of northern goshawks can make monitoring an adventure. “You’ll hear this loud Ke-Ke-Ke-KEH coming from right behind you, and you feel the wind as they pass over you, inches from your head,” laughs Crozier. Rarely, when an adult goshawk dive-bombs an intruder in its territory to defend a nest, they’ll

manage to connect. Field researchers have been known to wear hard hats, dodge behind trees, even roll on the ground. “Let’s just say they can get your heart racing,” she says.

The species’ preferred habitat also creates obstacles to monitoring, commonly in remote settings in the interior of large blocks of forest, sometimes far from the nearest road. There can be deep snow even in late spring in Minnesota’s north country. The forest floor in the mature northern forests where the goshawk nests is characteristically rich in woody debris, with tangles of fallen branches and downed logs in varying stages of decay. In combination, these qualities make for difficult and slow going for those who are out there trying to better understand the goshawks’ status and habitat needs. Modeling of habitat availability has been important in guiding efforts to identify new territories, but the backbone of the work through the years has been the commitment of people in the field.

“It’s been a big investment in time from a lot of people, and well worth it,” says Crozier. “Monitoring has provided us with a wealth of information on the breeding status, nest location, and nest fate of mated pairs across the goshawks’ range in the state.” Data collected each year

on the more than 70 cooperatively-monitored territories is stored in Minnesota’s Natural Heritage Database, providing opportunity to integrate the habitat needs of northern goshawks into forest planning and management. “The better we understand the species’ minimum requirements for nesting and foraging, the better chance we have to sustain the existing breeding population distributed across the species’ range,” she notes. Habitat assessments done as part of monitoring provide managers with insight on vegetation type, structure and scale associated with successful nesting and, conversely, conditions associated with abandonment of territories. This information has been incorporated into management considerations put to use in many goshawk territories on public lands.

Decisions on how best to utilize the information rest with those who own and/or manage the land. Much of the area ranked as priority habitat in Minnesota is located on land administered by the MN DNR and the State of Minnesota. Most of the remaining priority habitat is within the proclamation boundaries of the Superior and Chippewa National Forests, a checkerboard of federal, state and private lands with a significant tribal component.



Nongame Wildlife Technician Bruce Lenning broadcasts recordings of goshawk alarm calls and juvenile begging calls, hoping to elicit a response.  
Photo by Kristi Coughlon, MN DNR

Dr. David Andersen heads the Minnesota Cooperative Fish and Wildlife Unit at the University of Minnesota and has been investigating northern goshawks since the mid-90s. He has been lead author and co-author on over a dozen scientific studies of the species in the western U.S. and the Midwest, and was among the authors of the foundational 2011 study, *Northern Goshawk Monitoring in the Western Great Lakes Bioregion*. It was the first large-scale effort in Minnesota, Wisconsin and Michigan.

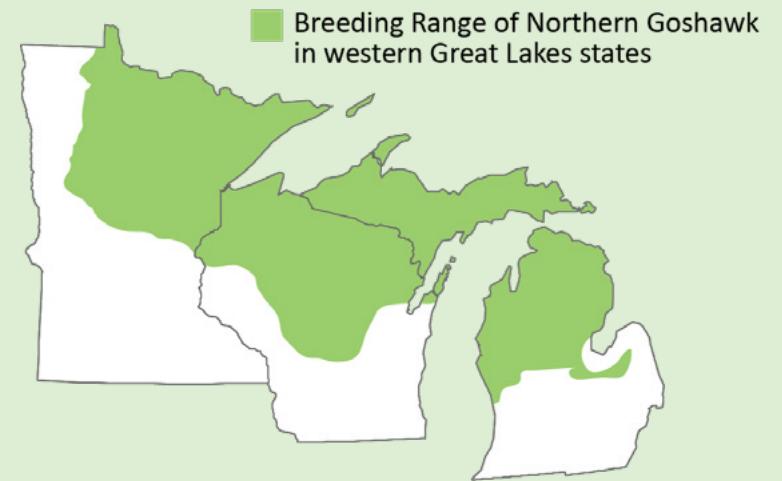


University of Minnesota Cooperative Fish and Wildlife Unit leader, Dr. David Andersen

to assess goshawk populations and habitat relations from this regional perspective, providing context and methodology useful in later studies with different but complementary objectives.

Andersen's work in other regions has given him a unique perspective on the species here in Minnesota. "We've learned that the northern goshawk is fairly widespread in the U.S., but at low densities in many places. They tend to use older patches of forest in the landscapes where they occur, but the structure of those patches is different in different regions. So, a place where a goshawk chooses to nest in northern Minnesota forests doesn't necessarily look a lot like where they nest in Pacific Northwest forests. Something that's old here might be 60 years old, while something that's old there might be 120-150 years old. They're considered generalists when it comes to diet if you look at the big picture, but within specific regions relatively few things make up the bulk of what they eat. In the far north, they're eating snowshoe and arctic hares, whereas here in Minnesota—at least during the breeding season—they're eating smaller prey, such as

The northern goshawk is sparsely distributed across its breeding range in the Western Great Lakes states of Minnesota, Wisconsin and Michigan.



Map source: Conservation Assessment for Northern Goshawk (*Accipiter gentilis*) in the Western Great Lakes Region, Dr. John Curnutt, USDA Forest Service, Eastern Region. 2009.



red squirrels, chipmunks, woodpeckers or crows.”

The relatively large territories they require in Minnesota suggests that prey availability is comparatively lower here than in some areas of the species’ range, Andersen says. “Our studies have taught us a fair bit about the characteristics of the forests they’re using in this bioregion. They tend to nest in areas of tall trees where not a lot of light gets to the forest floor and where canopy closure is high. The structure beneath the canopy is also an important feature, generally having some open, unobstructed space where they can maneuver.” Telemetry studies indicate that younger forest is not a preferred habitat for goshawks, based on the amount of use compared to its availability. “But, based on what they’re eating, some of their foraging may occur at the interface between older and younger forest.”

For all that has been learned, we still lack reliable estimates on the size of the breeding population in the state, largely due to the cost of mounting the necessary research. Counts during fall migrations at Duluth’s Hawk Ridge—considered one of the top places in the country for goshawk viewing—are understood to be predominantly birds moving into Minnesota from territories to the north. Data from monitoring of nests and active territories provides information on breeding rates in Minnesota and offers timely feedback as to whether goshawks are finding conditions sufficient to keep them there. Fresh insights are expected from a cumulative analysis of monitoring data to date, which is underway by members of Andersen’s team in collaboration with



Northern goshawk  
Photo by Michael Furtman





A northern goshawk nest in a mature conifer forest  
Photo by Michael Furtman

*Northern goshawks serve as a bellwether for a whole suite of species that rely on large, contiguous areas of older forest.*

the Nongame Wildlife Program. An additional strategy of the Nongame Wildlife Program and the U.S. Forest Service to identify individual goshawks by DNA analysis of molted feathers will further inform studies of the goshawks' movements in the context of habitat change from timber harvest, natural disturbances or other factors.

“Northern Minnesota and the western Great Lakes region is a dynamic landscape for a variety of reasons,” says Andersen. “The big question is, what is the landscape going to look like in the future, and will that continue to support goshawks? Will there be a state of flux similar to the last 75 years or will there be a broader change?” He cites a recent assessment of forest conditions in the Black Hills of South Dakota and Wyoming, where he provided technical assistance in a study completed for South Dakota Game, Fish and Parks. “We concluded that changes had occurred there at a scale where the structure of the forest is no longer as conducive to supporting goshawks,” says Andersen. Lead investigators Jason Bruggeman and Pat Kennedy summarized the findings: *Goshawk nest-site habitat suitability decreased across the Black Hills National Forest over the past three decades. The results suggest much of its high-quality nesting habitat was lost during this period due to a combination of timber harvest and natural disturbances.*



There are challenges, no doubt, in trying to sustain a species with the habitat requirements of the northern goshawk. Not all variables are in our control and for those that are, it is the classic balancing act of natural resource management—the give and take that allows society to glean one set of high value, desired resources at a scale and in a manner that allows other high value, desired resources to endure. The beauty of this particular equation is that, over the long term, the same conditions that sustain goshawks are important to the health of the forest ecosystem as a whole.

“There are benefits to having large contiguous areas of old forest, beyond habitat for certain charismatic wildlife species,” says Dr. Lee Frelich, Director of the University of Minnesota Center for Forest Ecology. “These include carbon storage, soil health, water quality, maintenance of plant diversity (and therefore maintenance of the plant-pollinator network), and an entire food web based on large coarse woody debris,

with many species of insects, fungi and mosses, along with seed beds for trees and plants. These old forests also show us how the landscape functions—the patch dynamics, variation in disturbance effects, frequency of microhabitats across the landscape, and the role of very large trees.”

Taking goshawks into account is nothing new for many public land managers across the goshawks’ range in northern Minnesota. “I’ve been on the forest for 32 years, and we’ve been tracking goshawks most of that time,” says Jeremy Cable, who leads the Monitoring, Inventory and Survey Team (known as MIST) for the Chippewa National Forest. “We’ve worked with the Nongame Wildlife Program on goshawk monitoring for many years, and it’s been a very successful partnership for us. We’ve relied on Gaea and the Nongame Wildlife offices in Grand Rapids and Bemidji to provide a lot of the leadership with the timing and phenology of what the goshawks are doing. Gaea is usually out checking a little bit ahead of us



MN DNR Interns Emma Vanhdy (left) and Cheyanne Rose (right) observe a fledged chick near a nest with biologist Gaea Crozier (center). Photo by Cynthia Osmundson, MN DNR





Juvenile northern goshawk  
Photo by Michael Furtman

on the territories, to see whether the birds are active yet, and she's helped train new, inexperienced crews in the techniques that are followed, so we use the same methodologies. Among the MN DNR, the Chippewa National Forest and the Leech Lake Band of Ojibwe, we're typically able to cover all the active territories on the forest annually, sharing our data at the end of each season."

The northern goshawk is designated as a Sensitive Species in the Chippewa and Superior National Forests: a designation that brings with it a special management emphasis to ensure their continued viability. No proposed actions potentially impacting goshawks are to occur in the forests without analysis of the significance of adverse impacts on the populations, habitat and viability of the species. "I don't

think there's any debate that goshawks need an element of mature forest, and they also need continuous forest," says Cable. "So, it's important to make sure that there are adequate tracts of that. And they benefit from being away from edges where other species, like great horned owls and raccoons, may present predation risks. They're also sensitive to disturbance, especially at certain points in the breeding cycle when they're more likely to abandon a nest. The Chippewa is a working forest, with managed vegetation and an active timber harvest program. We have both older and younger forest stands. The monitoring effort enables us to track the known goshawk territories, and before we do new management, we survey to detect whether there's anything we've missed, so we can see how populations are doing."

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**JEREMY CABLE, Monitoring and Survey Team Leader, Chippewa National Forest**

It's the role of U.S. Forest Service wildlife biologist Melissa Gabrielson to bring the MIST goshawk data to bear on decisions regarding proposed projects in the Chippewa National Forest. "The goshawk actually falls under two categories in our forest plan—a Sensitive Species and a management indicator—with extensive standards defined to maintain their viability," says Gabrielson. "This includes a nest buffer zone for both active and inactive nests, and a surrounding post-fledging area buffer zone."

In particular, guidelines call for prohibiting or minimizing activities that could disturb nesting pairs during the critical nesting season of March 1–August 30. Nest buffer zones apply to a 50-acre minimum (860-foot radius) of nests where high-quality habitat conditions are to be maintained, protected or enhanced. These conditions are defined as 100% mature forest (more than 50 years old) with greater than 90% canopy closure and large trees capable of supporting nests. Slightly different standards apply to the larger, 500-acre post-fledging zone, calling for greater than 60% of upland to be forested and greater than 70%

closed canopy. "Within that nest buffer zone, typically whatever the proposed activity is, you're not doing it," says Gabrielson. "If there is an activity proposed in the post-fledging zone—selective thinning, for example—it would have to take place outside of the goshawks' breeding season and serve to benefit the species by preserving high-quality habitat."

Gabrielson considers, "You could ask, is this too conservative? Are we playing it safe by giving them these large buffers? Extensive analysis went into the forest plan, and it's based on science and research showing that this is what the birds need. And we can see from the data that Jeremy and the monitoring team have diligently collected over the years that we still have those goshawk nests and those territories still exist. These spectacular birds are still on the landscape. We can't necessarily credit our actions as the reason, but that's what you want to see: we're maintaining the viability of a Sensitive Species in the context of a working forest."

Jeremy Cable now spends more time in the office coordinating monitoring than out in the field. But his hopes for

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**MELISSA GABRIELSON,**  
U.S. Forest Service Biologist



U.S. Forest Service Biologist Melissa Gabrielson






Black-throated blue warblers share the forested landscape.  
Photo by Sparky Stensaas

the goshawk have not changed. “I think it’s what we all hope for, which is stable, sustainable populations that don’t blink out and that continue into the future. The more that the different ownerships collaborate—the Forest Service, the MN DNR, the counties, the tribes—the more we work together, the more likely we are to create a landscape that produces what the country needs but at the same time ensures that the conditions are still there for these species.”

Nongame Wildlife Program biologist Gaea Crozier agrees. As a state species of Special Concern and Species in Greatest Conservation Need, the northern goshawk warrants thoughtful consideration in the MN DNR’s management of state-owned and managed lands.

“Fortunately, we’ve gained a better understanding of the species’ limiting factors in this region, including the conditions they require for successful nesting and during the 6-8 week period when fledglings are still dependent on the adults and learning to hunt.” MN DNR’s management guidelines for goshawks are linked to the Rare Species Guide (see the Selected Resources at the end of this story).

For now, in Minnesota, there are pairs of northern goshawks fiercely defending their vast territories in the state’s northern forests. By all accounts, they are good at it. But there’s only so much they can do on their own. 

**Conserving northern goshawk habitat benefits many Minnesota species, including these Species in Greatest Conservation need:**

- Boreal owl (species of Special Concern)
- Wood thrush
- Black-throated blue warbler
- Winter wren
- Philadelphia vireo
- Northern long-eared bat (federally Endangered)
- Big brown bat (species of Special Concern)
- Little brown bat (species of Special Concern)
- Tricolored bat (species of Special Concern)
- Silver-haired bat
- Four-toed salamander (species of Special Concern)
- Eastern red-backed salamander

# SELECTED RESOURCES

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Northern goshawk  
Photo by Liz Harper