MINNESOTA'S WILDLIFE ACTION PLAN
5-YEAR REPORT




DEPARTMENT OF NATURAL RESOURCES

DEPARTMENT OF NATURAL RESOURCES

ACKNOWLEDGMENTS

The Minnesota Nongame Wildlife Program wishes to thank Carrol Henderson, for his vision and leadership that built this program from 1977 into what it is today. We would also like to acknowledge the dedication of all the past and present nongame biologists, ecologists, researchers, surveyors, administrators, and partners from within and outside of the Minnesota Department of Natural Resources for their ongoing contributions to Minnesota's natural resources and wildlife diversity. In 2018, Cynthia Osmundson became the new leader of the Nongame Wildlife Program. Her vision includes continuing our rich natural resources legacy while broadening our reach through new and continued investments in partnerships, outreach, and scientific understanding.

The Nongame Wildlife Program protects and manages crucial habitats, conducts scientific research to better understand Minnesota's wildlife species and ecosystems, and forges connections between Minnesotans and native wildlife through outreach and education. We want to sincerely thank our many generous supporters who have financially contributed to the program over the years. Thanks to your help and support, we will continue to preserve and protect Minnesota's wildlife for years to come!

All photos MNDNR unless otherwise noted.

Right: Richardson's ground squirrel—
Minnesota species of special concern.

Far right: Yellow bumblebee on wild bergamot (bee balm).

Front cover photos, left to right:
Eastern tiger swallowtail butterfly.
Yellow-headed blackbird. Photo: Conner Maloney
Native mussels.
Emma Vanhdy (MNDNR) on a regal fritillary survey.

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In 1977, the Chief of the Minnesota Department of Natural Resources' Wildlife Division, Roger Holmes, recognized the agency's responsibility to manage and protect all wildlife, not just game species. Fast forward 43 years and the Nongame Wildlife Program is known for protecting wildlife diversity throughout Minnesota and beyond. Minnesota was one of the first states to create such a program and other states soon followed suit. As these programs grew, it became abundantly clear that a secure funding mechanism was needed to support this critical work for wildlife diversity. In 2000, Congress created the State and Tribal Wildlife Grant Program, which provides funding for states, commonwealths, territories, and tribes, enabling them to better address persistent conservation challenges for wildlife Species in Greatest Conservation Need (SGCN). To participate in the grant program each state is required to create a State Wildlife Action Plan which provides specific guidance on priorities for at-risk species and habitat conservation efforts. State Wildlife Grant funds, administered by the United States Fish and Wildlife Service, focus on preventing new federal listings of threatened and endangered species and conserving critical habitats for species in need.

Minnesota is half-way through our second State Wildlife Action Plan. The first plan, *Tomorrow's Habitat for the Wild and Rare* (2005) remains a foundational resource. This report highlights the successes and remaining challenges after five years of the second Plan, *Minnesota's Wildlife Action Plan 2015–2025*, as well as an overview of federal and state-matched funds used for implementation.

SPECIES IN GREATEST CONSERVATION NEED:

- SGCN are native animals, nongame and game, whose populations are rare, declining, or vulnerable to decline and are below levels desirable to ensure their long-term health and stability.
- Also included are species for which Minnesota has a stewardship responsibility.
- All state listed species and federally listed species that occur in Minnesota are automatically SGCN.
- Additional non-listed species are SGCN based on specific criteria and expert opinion.

The trumpeter swan is a hallmark nongame species in Minnesota and the greater Midwest, brought back from the brink of extinction.

FUNDING AND SUPPORT

This report is focused on summarizing the first five years of the 2nd edition of the *Minnesota's Wildlife Action Plan 2015-2025* which is administered by the Nongame Wildlife Program. Of course, the Nongame Wildlife Program also conducts and funds many wildlife activities beyond the Wildlife Action Plan, which are not covered in this report. The Wildlife Action Plan is supported by federal funds primarily from the State Wildlife Grant Program. These funds are available to help states proactively invest in conservation strategies for at-risk species. They're also matched by Minnesota state funds, which provide essential and required cost-share.

Piping plover, MN endangered species, federal endangered species.

The federal support for this work includes State Wildlife Grants, Competitive State Wildlife Grants (awarded to multiple states working together), and several endangered species grants, all of which are administered by the United States Fish and Wildlife Service (27 federal grants total; see Figure 1 on page 6).

Minnesota's contribution comes from a variety of sources, including: public donations on state tax forms (the loon line) and gifts to the Nongame Wildlife Fund; purchases of Critical Habitat license plates as part of the 'Reinvest in Minnesota' fund; and competitively awarded grants from the Minnesota State Lottery Environment and Natural Resources Trust Fund (see Figure 1B on page 6).

Monarch butterfly, MN SGCN and federal candidate species for listing.

BIRDS, BUTTERFLIES AND BATS (OH MY)

We have worked with many partners on many projects to implement the Plan. This report brings it all together for the first time and shows the progress we've made, as well as the work that remains. For example, take a look at the variety of animal groups we have worked on (see Figure 2 on page 7). By summarizing our efforts, we can see that the additional investment in insects is paying off, however other animal groups (such as amphibians and fish) might need more attention.

Northern long-eared bat in hand, MN species of special concern, federal threatened species.

HOW WE WORK | By the Numbers

FIGURE 1

FEDERAL AND STATE FUNDING SOURCES FOR WILDLIFE ACTION PLAN IMPLEMENTATION (2015–2020)

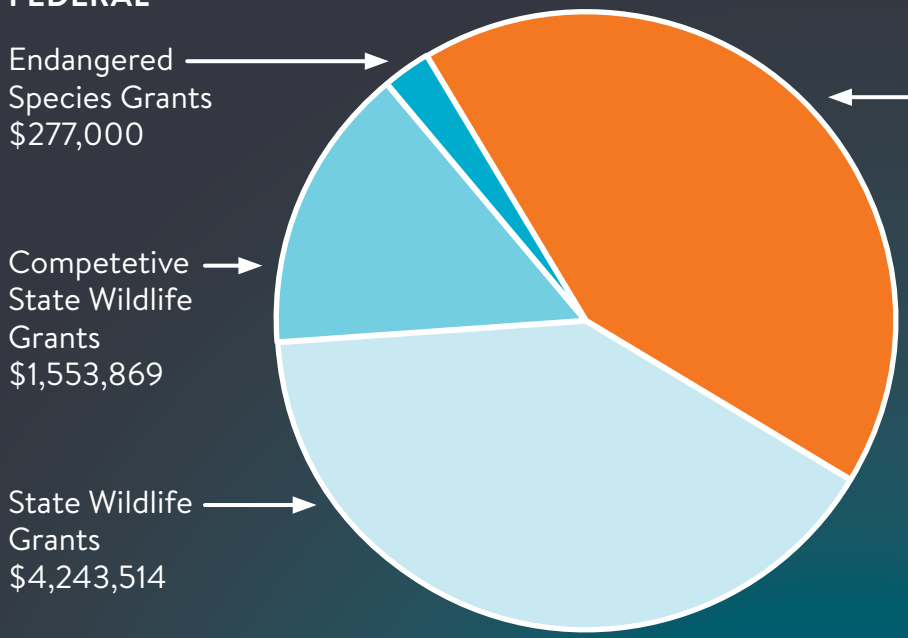


FIGURE 1B

BREAKDOWN OF MINNESOTA STATE MATCHING FUNDS BY PERCENTAGE OF **ALL** FUNDING SOURCES

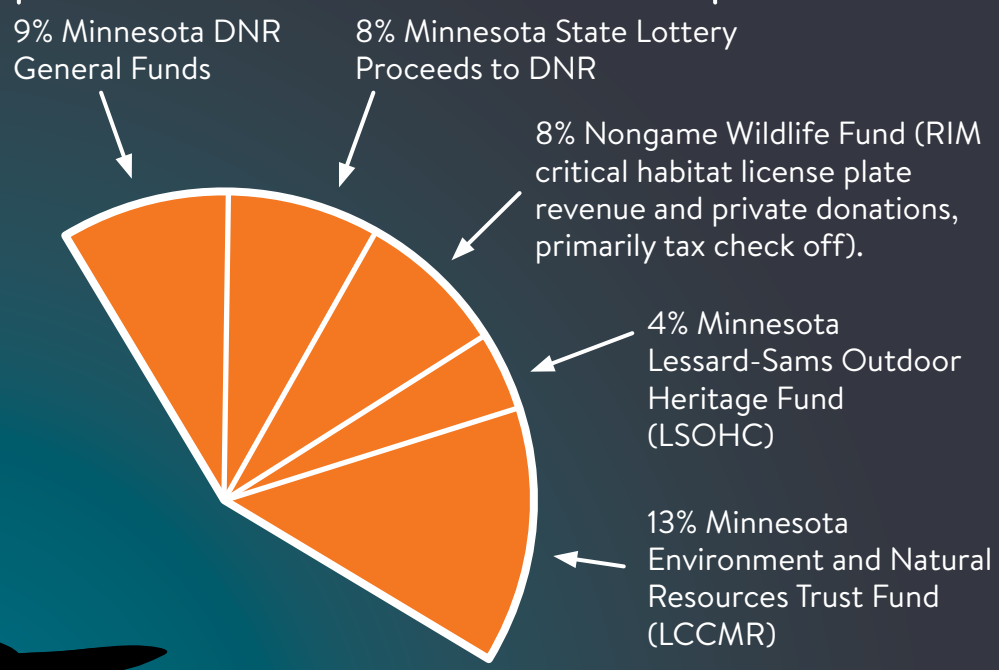
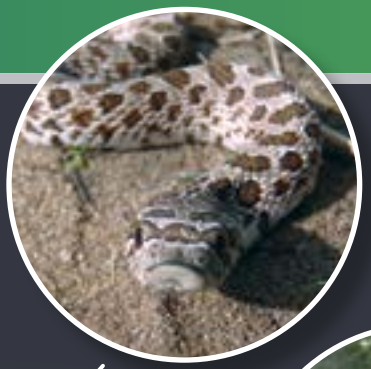
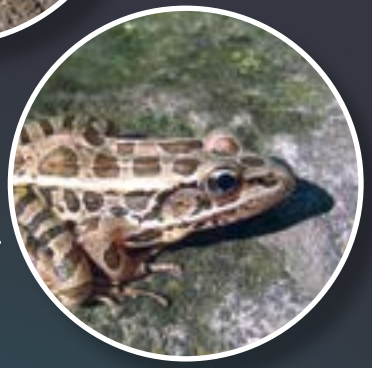


FIGURE 2
NUMBER OF GRANTS
BY TAXONOMIC FOCUS

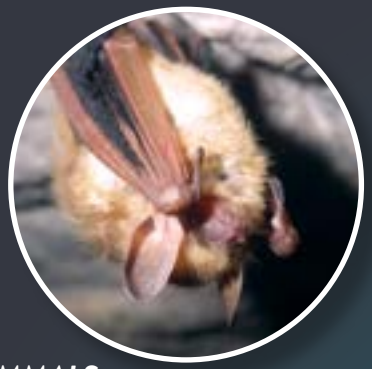
MUSSELS



REPTILES
turtles, snakes, skinks



AMPHIBIANS
frogs, toads,
salamanders



MAMMALS
bats, ground squirrels, mice, voles

BIRDS
prairie
songbirds,
common loons

INSECTS
bees,
butterflies,
tiger beetles

FISH

Photo ID:
Mammal—tricolored bat
Mussels—mussels
Reptile—plains hog-nosed snake
Amphibian—pickerel frog
Bird—upland sandpiper
Fish—plains topminnow
Insects—monarch caterpillar and bumblebee

FUNDING
FEDERAL: $1,696,435 | STATE: $724,236

Administrative tasks are not the most high-profile of all the work we do, but they are critical to providing a support network that facilitates the successful implementation of Minnesota's Wildlife Action Plan. Staff direct efforts to survey, study, and manage rare species; track accomplishments to monitor progress towards meeting the State Wildlife Action Plan goals; and manage budgets and reporting to ensure accountability. These efforts have developed a comprehensive structure for managing information on projects and planning for future work.

Coordination efforts have focused on enhancing communications and partnerships to support the Plan. We built a new accessible website to present the Plan, list SGCNs, and explain the development and use of the Wildlife Action Network (Figure 4 on page 9). Collaboration with partners led to the development of several strategies to implement objectives, leverage funds, and refine monitoring and adaptive management approaches. The Conservation Focus Area coordinator led the activation of four Conservation Focus Areas (Figure 3 on page 9), by fostering partnership among private landowners, public agencies (local, state, federal), and non-governmental conservation organizations. Currently active Focus Areas include the Prairie Coteau, Whitewater, Root River, and Brainerd Lakes Area, with more in the process of being activated.

Additional coordination work is focused on three specific objectives in the Wildlife Action Plan, which include: conserving pollinator populations and habitat, expanding public engagement through a new Community Science program, and elevating social media outreach. Each of these initiatives is led by a dedicated staff person who is currently developing programming.

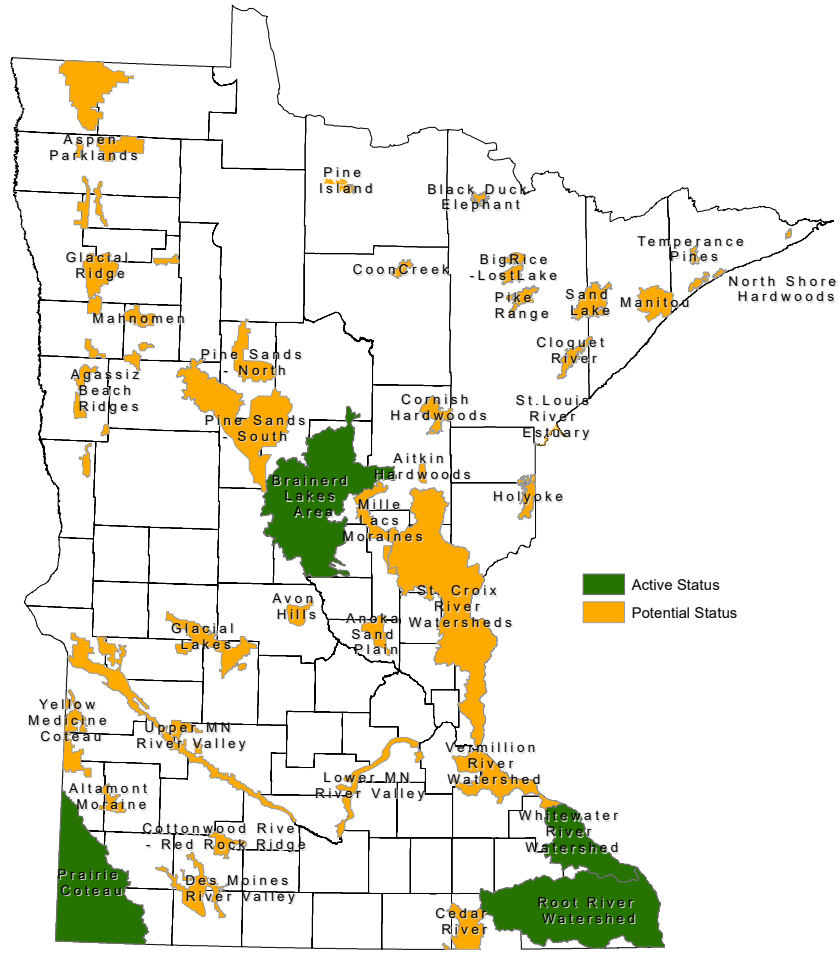
Continuing challenge: A constant challenge is the need to cultivate and maintain awareness of the concept behind the Wildlife Action Plan, the Wildlife Action Network and Conservation Focus Areas. By continuing to build shared goals, we can accomplish more on-the-ground improvements for SGCN.

PROJECT HIGHLIGHTS

- Improved accessibility to Minnesota's Wildlife Action Plan by updating website and distributing printed copies of the Plan.
- Completed seven projects to improve habitat for SGCN in four Conservation Focus Areas.
- Convened a team of staff experts and hired a coordinator to prioritize actions to protect, restore, and manage habitat for pollinators.
- Hired a program coordinator to plan and initiate the Community Science program.

FIGURE 3

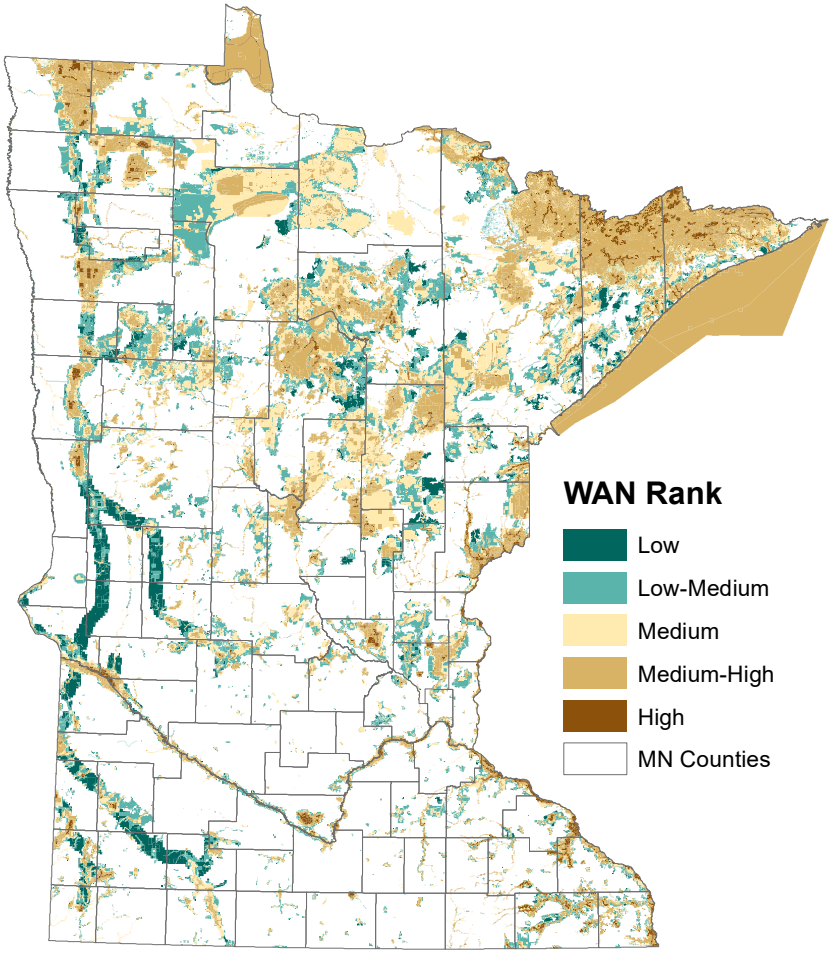
CONSERVATION FOCUS AREAS



Conservation focus areas (CFAs) are places with the need for and/or the opportunity to focus conservation activities with multiple partners to improve habitat for and populations of Species in Greatest Conservation Need.

FIGURE 4

WILDLIFE ACTION NETWORK



The Wildlife Action Network is composed of mapped terrestrial and aquatic habitats, buffers, and corridors that represent a diversity of quality habitats that support Species in Greatest Conservation Need (SGCN). See Appendix E of the MN State Wildlife Action Plan (2015) for additional details.

A mudpuppy in hand.

FUNDING
FEDERAL: $1,801,775 | STATE: $2,393,365

PRINCIPAL PARTNERS
Minnesota DNR only

PRIORITY SPECIES
- common loon *(Gavia immer)*
- common five-lined skink *(Eumeces fasciatus)*
- bullsnake *(Pituophis catenifer)*
- plains hog-nosed snake *(Heterodon nasicus)*
- crystal darter *(Ammocrypta asprella)*
- redside dace *(Clinostomus elongatus)*
- bluntnose darter *(Etheostoma chlorosoma)*
- warmouth *(Lepomis gulosus)*
- mudpuppy *(Necturus maculosus)*
- and other rare salamanders.

Underway for the past five years and continuing, this project has two complementary areas of emphasis: surveys for SGCN and data management. Surveys provide a baseline of SGCN distribution throughout the state. A milestone of this work was the completion of statewide surveys for rare animals by the Minnesota Biological Survey, marking the culmination of a 30 year-long effort, and completing the picture of animals present across Minnesota. Recent survey work in the final four counties provided several new records in northern Minnesota including new locations of rare mammals and birds, new county records of amphibians and reptiles, and significant gains in our knowledge of Lepidoptera (butterflies and moths), including several state records and species new to science.

A number of targeted SGCN were prioritized for surveys in the Wildlife Action Plan to build a foundation of information to understand their distribution, status, and conservation needs. Some results from this effort include:

- Resurveying prior locations for rare salamanders in light of habitat changes and climate concerns.
- Increasing our knowledge of the distribution and status of four SGCN fish in southeastern Minnesota.
  - » Redside dace are projected to persist in the Little Cannon River watershed for at least the next two decades and should remain a Species of Special Concern (SPC).
  - » Warmouth populations are highly isolated from each other, suggesting they remain a SPC.
  - » Crystal darter were not found after extensive searching, confirming their current state Endangered status.
  - » Historical locations were targeted for bluntnose darter surveys with no success. Bluntnose darters have not been found in the state since 2001. Conservation status changes are being considered.
- An extensive, statewide survey was conducted for the mudpuppy, a type of salamander that lives entirely underwater and whose distribution in Minnesota was not known. This secretive species fills a vital ecological role as a required host for the state endangered salamander mussel (see page 14).
- Assessing the distribution and habitat use of three SGCN reptiles (common five-lined skink, bullsnake, and plains hog-nosed snake) in the Minnesota River Valley to inform management of prairie and rock outcrop habitats for these rare species.

Continued on page 12

Continued from page 11

Of course, field surveys create large amounts of data that are carefully curated to ensure accurate entry into a centralized database and made available for research and conservation needs. Data from this grant, as well as other sources, were incorporated into Minnesota's Natural Heritage Information System, which provides a consistent storehouse of information to many users. Data managers created applications to enable biologists to collect data directly onto mobile devices, such as iPads, increasing data accuracy and efficiency. Data management specialists continuously work to create more effective and efficient ways to ensure these data are accurate and accessible to land managers, ecologists, conservation planners, and the interested public.

CONTINUING NEED

Cataloging and mapping data on rare species is an important ongoing task as we collect information critical for ensuring persistence of vulnerable animals and plants. These data require ongoing integration into established information systems, such as the web-based Rare Species Guide that provides detailed conservation and management information for SGCN and other species in Minnesota.

Pollinator team surveying in the field.

LOON LEGACY

Our foundation includes YOU! Minnesotans have contributed to our knowledge of common loons through the MN Loon Monitoring Program. Many dedicated volunteers have added to a long-term dataset tracking loon population levels in Minnesota. Information from this monitoring effort show our loon populations are stable, with loons observed on an average of 67% of the lakes surveyed over a 26-year period.

A loon with a chick on its back.

FUNDING
FEDERAL: $386,050 | STATE: $211,340

PRINCIPAL PARTNERS
Iowa Department of Natural Resources

PRIORITY SPECIES
- spectaclecase *(Cumberlandia monodonta)* (END)
- other native mussels

Native mussels are both the sentinels and the unsung heroes of our rivers and streams. Sensitive to slight changes in water quality, mussels are excellent indicators of environmental health. Acting as filters while they siphon (eat), mussels also improve water quality while creating nutrients for other aquatic life. Of the 297 known species and subspecies of freshwater mussels in North America, 213 are federally listed as either endangered, threatened, or of special concern. In Minnesota, 28 of our 51 native mussel species are listed as endangered, threatened, or of special concern, and three species have been extirpated (are now extinct) from Minnesota. Severe pollution and dams that block fish movement are widely responsible for these historic declines. Improvements from implementation of the federal Clean Water Act as well as watershed and stream restoration work are creating opportunities to reverse this trend. However, the complex lifecycle remains unknown for several native mussel species. The mussel larvae, called glochidia, must attach to the gills and/or fins of host fish to complete their lifecycle. Though some mussels are able to complete their lifecycle on multiple fish species, other mussels are host-specific, reliant on a single other species for their survival.

Biologists from the MNDNR's Center for Aquatic Mollusk Programs (CAMP) are working to identify hosts and have been able to successfully propagate about 10 different rare mussel species at the CAMP lab. The biggest breakthrough came after years of work at labs across the nation when CAMP biologists finally identified the host fishes for the federally endangered spectaclecase, which has been a huge advancement for their conservation. Reintroduction efforts of these successfully propagated native mussel species are focused on three main Minnesota River systems, the Cannon, Mississippi and Cedar, each on their way towards incremental water quality improvements thanks, in part, to a little added mussel.

CONTINUING NEEDS

Mussel recovery is a long term effort with three primary and continuing needs: Complementary water quality and habitat enhancement projects to ensure success for the mussels released back into the wild; follow up monitoring the response of reintroduced mussels; and continued distribution, status and trend surveys for mussels and their host species throughout their historic ranges.

Being invaded—zebra mussels on a threehorn wartyback native mussel.

Right: A mussel survey under way.

SPECTACLECASE MUSSELS

In Minnesota, the spectaclecase mussel is only known to occur in eight sites along an 85–mile reach of the St. Croix River. The viability of these remaining populations is jeopardized by a dam that blocks their hosts from reaching the most upstream populations and the introduction of non-native zebra mussels (Dreissena polymorpha) into the river. Zebra mussels can attach themselves in large numbers to the shells of native mussels, eventually causing death by suffocation. While the spectaclecase can be locally abundant, the colonial nature of this species makes it especially vulnerable to zebra mussel infestation. Other threats to spectaclecase mussels include reduced range of host fish, habitat modification, non-point and point source water pollution, and siltation.

FUNDING
FEDERAL: $87,116 | STATE: $33,334

PRINCIPAL PARTNERS
Wisconsin DNR and Minnesota State Parks

PRIORITY SPECIES
- Karner blue butterfly *(Lycaeides melissa samuelis)*
- Blanding's turtle *(Emydoidea blandingii)*
- sharp-tailed grouse *(Tympanuchus phasianellus)*

The Karner blue butterfly is a federally endangered pollinator that relies on oak and pine savannas across its historic Great Lakes range. In particular, the Karner blue butterfly requires wild blue lupine as a host plant for the development of its eggs and larvae. This project considered climate change impacts and had two main goals: 1) improving northern habitat for Karner blue butterflies and 2) public engagement on climate and pollinators.

Over 348,200 acres of potential habitat were mapped and used to prioritize 3,706 acres of state and private lands for habitat enhancement through mechanical maintenance and prescribed burns.

Concurrent to the habitat management actions, wildlife and vegetation response was monitored at the site with favorable results. Sharp-tailed grouse returned after 50+ years of absence and a variety of pollinators were found in the restored area. Karner blue butterflies were not observed, but they did move to newly created habitat in northern Wisconsin nearby. It takes time to build and maintain habitat for oak savanna dependent wildlife. Having available habitat at the northern edge of the Karner blue butterflies' range, well in advance of future climate impacts or species reintroductions, remains an important goal. Overall results from the habitat, monitoring and outreach activities were incorporated into a final Adaptive Management Plan for the Karner blue butterfly.

CONTINUING NEED
Maintaining existing barrens habitat, restoring potential habitat, planting wild blue lupine and monitoring for response to management are critical for this endangered butterfly and associated SGCN.

USFWS

Top: Adult Blanding's turtle showing characteristic yellow chin and throat.

Above: Karner blue butterfly.

Right: Lupine flower.

USFWS

FUNDING
FEDERAL: $150,000 | STATE: $150,000

PRINCIPAL PARTNERS
Iowa DNR, Iowa State University

PRIORITY SPECIES
- regal fritillary *(Speyeria idalia)*
- monarch butterfly *(Danaus plexippus)*

Minnesota's diverse prairie bees and butterflies (pollinators) need a variety of flowering plants. This project is working to restore and diversify native prairies in northern Iowa and southwestern Minnesota, providing islands of pollinator-friendly habitat amongst row crops by increasing the diversity of native wildflowers. Early season flowers such as prairie violet, prairie phlox, and prairie smoke are no longer common in prairies in this region, but these plants are needed by several pollinators. An important example is the regal fritillary, a special concern species in Minnesota. Regal fritillaries rely on prairie violets as larval hostplants (required for their eggs and larvae to develop). If we can increase the distribution and abundance of prairie violets in our restorations, we may see an increase in the number of regal fritillaries. One challenge with some of these flowering plants, however, is our capacity to acquire locally-adapted seed or plugs (seedlings). Limited quantities of these species are available because of their rarity, expense and challenges associated with growing them. This project builds regional capacity by growing these important species in production plots, thereby making them more available for prairie restorations.

Finally, we are monitoring butterflies and bumble bees at these restorations to measure pollinator response to habitat management.

CONTINUING CHALLENGE

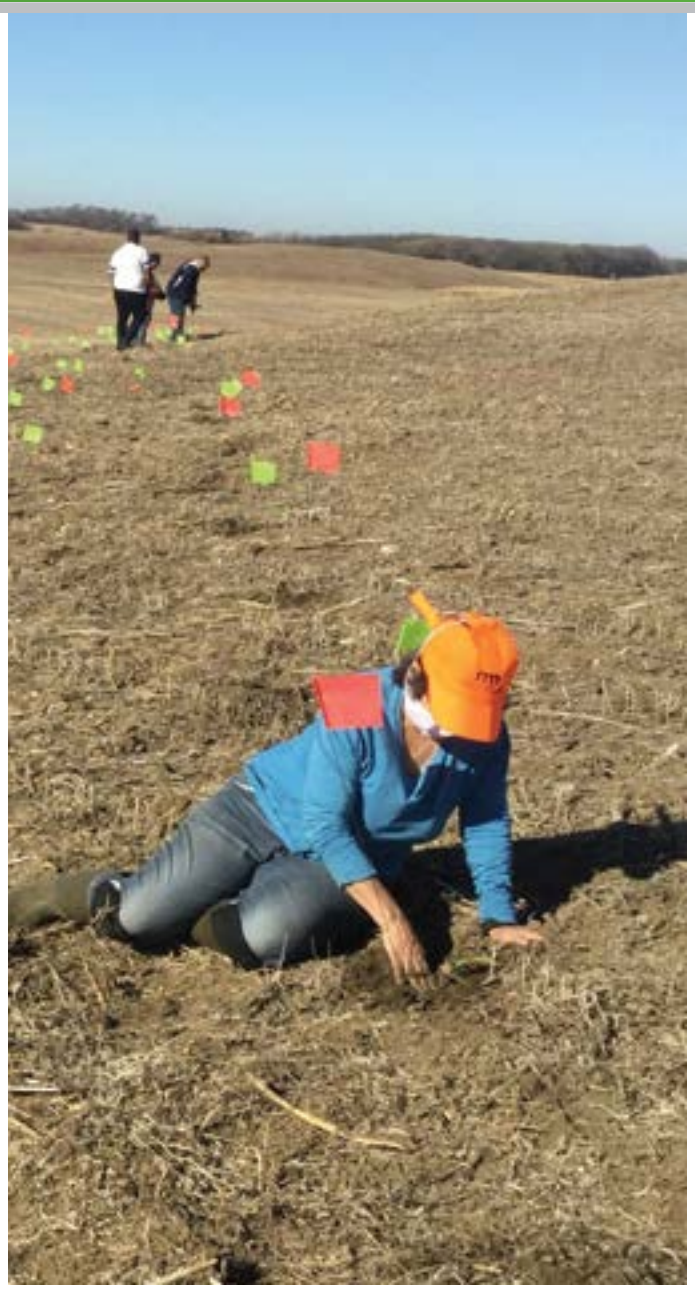
Today, less than two percent of Minnesota's native prairie remains. The near elimination of native prairie has inspired many efforts to protect and

PROJECT HIGHLIGHTS

- 1,100 plants of 48 species of native wildflowers were raised in production plots at Minneopa State Park and the Windom DNR office to be used in restorations designed to benefit pollinators.
- 3,792 plugs of 9 forb species were planted in a 73 acre restoration at String Lakes Wildlife Management Area to enhance pollinator habitat.
- 37 pounds of seed of 59 species (40 forbs) were planted in a restoration at String Lakes Creek State Park.
- 848 observations of bumble bees (8 species) and butterflies (23 species) provide baseline data to measure the pollinator response to restorations.
- 21 observations of regal fritillaries at three sites indicate populations that could respond to restorations.

restore this important habitat. Due to funding and seed availability challenges, prairie restoration projects often fall short of meeting goals for early-season and late-season blooming wildflowers that are critical to the survival of at-risk pollinators.

Prairie smoke flower.



Lisa Gelvin-Innvaer (MNDNR) planting plugs to improve pollinator habitat at String Lakes Wildlife Management Area.

Surveyor or surveyed? Regal fritillary on Emma Vanhdy's (MNDNR) hat.

FUNDING

FEDERAL: $750,000 | STATE: $593,722

PRINCIPAL PARTNERS

The Nature Conservancy, Iowa Department of Natural Resources, Wisconsin Department of Natural Resources

PRIORITY SPECIES

- eastern whip-poor-will *(Antrostomus vociferous)*
- brown thrasher *(Toxostoma rufum)*
- timber rattlesnake *(Crotalus horridus)*
- Blanding's turtle *(Emydoidea blandingii)*
- Leonard's skipper *(Hesperia leonardus leonardus)*
- dusted skipper *(Atrytonopsis hianna)*
- rusty patched bumblebee *(Bombus affinis)*

The Driftless Area landscape of southeast Minnesota supports a diversity of plants and animals unique to the Upper Midwest because of the varied topography that was untouched by the last glaciers to recede from the region. Our work across the landscape has helped increase habitat available for SGCN as well as improve connectivity between public and private lands. Collaboration with private land owners is critical to ensure the greatest benefit to SGCN, as private lands make up the majority of the Driftless Area. Minnesota partnered with both Iowa and Wisconsin on multiple competitive State and Tribal Wildlife Grants to successfully complete on-the-ground conservation work across the Driftless Area. Habitat improvement was accomplished through prescribed burning, conservation grazing, invasive plant control, inter-seeding restorations with milkweed and other forbs, and conducting prairie plantings.

CONTINUING NEED

Bluffland prairies, whether they occur on private or public lands, require disturbance to maintain open habitat. In the absence of natural processes such as wildfire, these prairies need continued clearing through prescribed burning, conservation grazing and habitat restoration efforts. In addition, monitoring wildlife responses to the restoration practices is critical to advance our understanding of how these management tools benefit focal species.

PROJECT HIGHLIGHTS (MINNESOTA):

- Improved and restored over 3,500 acres of public and private lands.
- Conducted over 150 one-on-one site visits with private landowners to provide technical information on SGCN management.
- Provided 13 public workshops on SGCN needs and habitat management.
- Our survey and monitoring efforts demonstrated that SGCN presence has increased on many improved and restored areas.

Timber rattlesnakes in rock.

MNDNR entomologist Jessica Petersen and Nongame Wildlife Technician Barb Perry surveying for pollinators.

SKIP TO THE RESULTS

Preliminary results from some of the pollinator response monitoring surveys conducted in 2019 have been encouraging; Leonard's skippers, a state listed species of special concern, were found at four restored prairies in the project area. Likewise, dusted skipper, a species that has disappeared from the western prairie range in Minnesota, was also found at multiple sites.

Leonard's Skippers at Weaver Dunes.

FUNDING

FEDERAL: $16,500.00 | STATE: $5,500.00

PRINCIPAL PARTNERS

Iowa DNR, Iowa State University, USFWS

PRIORITY SPECIES

- Topeka shiner *(Notropis topeka)*
- plains topminnow *(Fundulus sciadicus)*

This collaborative project between Minnesota and Iowa Departments of Natural Resources and the United States Fish and Wildlife Service has advanced conservation for prairie-stream dwelling fish like Topeka shiners (federally endangered and state species of concern) and plains topminnows (state threatened). These species depend on prairie stream oxbows, which are protected off-channel areas created by the natural meandering of streams and may only be connected to the main channel during high-water events. Oxbows are a high priority for conservation, having been greatly impacted by loss of surrounding prairie and hydrologic alterations such as channelization and dams.

Throughout southwest Minnesota, habitat inventories and hydrologic modeling were conducted to inform stream restoration projects. These efforts helped to provide technical input during the design process for three projects to remove or restore dams; when combined, these projects increased fish access to more than 100 miles of stream.

Another major outcome of this project was assisting with the restoration of Mound Creek in Blue Mounds State Park. The old, failed dam created a barrier to fish movement and degraded the surrounding reaches of stream. A large-scale floodplain and oxbow restoration project was designed to manage water flow and reestablish critical habitat. This area, known to historically harbor populations of both Topeka shiners and plains topminnows, now has eight restored oxbows.

In concert with other critical funding from Minnesota's Environmental and Natural Resources Trust Fund, the effectiveness of habitat restoration within the project area was assessed by surveying for Topeka shiners and plains topminnows. Initial results indicate that habitat restoration efforts have been successful, with Topeka shiners occupying a majority of restored oxbows within one year after restoration.

PROJECT HIGHLIGHTS

- We designed fish passages for three dams
- Mound Creek in Blue Mounds State Park was restored to provide fish passage and critical oxbow habitat for key fish species.
- Topeka shiners were documented using the newly restored oxbows.

Closeup of a Topeka shiner.

CONTINUING CHALLENGE

Monitoring of SGCN prairie fishes in these habitats is ongoing. These highly altered and degraded habitats are targets for intensive restoration efforts, and species' monitoring is an effective way to gauge restoration success. This information will be used to guide restoration and management by an array of partners who contribute to SGCN conservation in the Prairie Coteau Conservation Focus Area.

Topeka shiner monitoring.

FUNDING

FEDERAL: $50,000 | STATE: $62,420

PRINCIPAL PARTNERS

Wisconsin, Iowa,
University of Minnesota, Conservation Corps of Minnesota

PRIORITY SPECIES

wood turtle *(Glyptemys insculpta)*

Wood turtles, which are found along rivers and streams in eastern Minnesota, are stressed by a variety of a factors including loss of habitat connectivity and flooding from changes in land use and climate. Wood turtles need nesting habitat, foraging habitat, and hibernacula sites connected within the river corridor. Roads, trails, bridges, culverts, dams, and development fragment habitats and create obstacles to travel. When natural nesting sites are degraded or unavailable, female turtles nest along road shoulders where they are vulnerable to traffic.

To address habitat connectivity, we installed temporary road barriers to deter access to roads. We also created or restored nesting sites nearby as alternative, less risky, nesting opportunities. To reduce the impact of increased flooding, we created and restored nesting habitat in flood-safe locations. We also installed an electric fence to protect nests from predators on a restored nesting site.

We assessed the effectiveness of these conservation actions using field surveys, telemetry, and remote cameras. A long-term monitoring program was established and a population model was developed to allow us to assess the long-term effectiveness of the conservation actions on the population. This work continues under a new grant beginning in 2021. The information gained in this project was used in the development of the state's Minnesota Wood Turtle Conservation Plan that prioritizes strategies and targeted actions for wood turtle conservation over the next ten years.

CONTINUING CHALLENGE

There are many threats facing wood turtles including road mortality, nest flooding, predation, habitat destruction, and climate change. The cumulative result of these threats is a species that is declining across most of its range and is listed as a state threatened species and a candidate for federal listing.

PROJECT HIGHLIGHTS

- We created or restored 24 nesting areas above the flooding zone.
- One nesting area, protected from predators by electric fence, hosted 10–14 nests and produced as many as 85 hatchlings during 2017–2018.
- We installed road barriers in 4 locations to reduce mortality.
- Six adults were fitted with radio telemetry units and tracked to assess use of the restored nesting areas and effectiveness of the road barriers (this work was led by the University of Minnesota).
- Baseline data were collected at 16 monitoring sites.

Top: Wood turtles at Work: Nongame biologist Gaea Crozier with adult wood turtle.

Above: Hatchling wood turtle found in restored nesting area.

PROVIDING SAFE PASSAGE

Wood turtles and other native turtles continue to suffer from road mortality even where road barriers were erected. New designs for more effective barriers, such as extending them longer, using more sturdy materials such as half-culverts, or considering passages under bridges are needed. Wood turtles also lose many nests to predators. Nest success increased from 5% to 48% when predators were excluded, so protection of nests using electric fences will likely boost recruitment of young turtles in the future.

Blanding's turtle hatchlings on road.

FUNDING
FEDERAL: $523,407 | STATE: $281,835

PRINCIPAL PARTNERS
MNDNR—Divisions of Ecological & Water Resources, Parks & Trails, Fish & Wildlife; The Nature Conservancy, US Fish and Wildlife Service, University of Minnesota, University of Colorado at Boulder, US Geological Survey.

PRIORITY SPECIES
Prairie habitat and grassland dependent birds

Tallgrass prairies are one of the most imperiled habitats both locally and globally, and have more SGCN than any other habitat in Minnesota. Results from Minnesota's first Wildlife Action Plan emphasized the attention needed on prairie preservation, management, research, and monitoring. In particular, we lacked basic status and trend monitoring of prairie and animal populations—information necessary to help us improve our prairie function and wildlife populations.

In 2008, we initiated a long-term prairie status/trend monitoring effort called SPICE (Sustaining Prairies In a Changing Environment), which was designed to evaluate the effects of habitat fragmentation and climate change on Minnesota's remaining native prairie plant and bird communities. At the same time, we partnered with the Grassland Management Team (GMT) which focuses on reducing invasive species, improving prairie habitats and applying adaptive management. The GMT is a broad partnership (see Principal Partners above) and expands the SPICE efforts through sharing data and protocols, ideas, and resources. This collaboration allows us to better to inform prairie management.

These two efforts (SPICE and GMT) have been extremely beneficial. SPICE has added to our understanding of the substantial decline of grassland birds as it focuses on the interior of high quality and permanently protected native prairies. These results are similar to trends reported from the Breeding Bird Survey which is a roadside survey that crosses multiple habitats of varying quality, suggesting that factors other than habitat contribute to bird declines. While we have not seen a lot of change in prairie plants during the monitoring time period, the data improves our GMT modelling to help land managers best maintain or improve their prairie. Finally, researchers and graduate students at the Universities of Minnesota and Colorado have used these data to answer complementary questions about Minnesota's prairie, such as vegetation response and management effectiveness in the context of climate change.

CONTINUING NEED
This is a long-term monitoring effort, and we expect this information will become more important and useful over time as climate change becomes more pronounced. The large dataset available through these two efforts will lead to new research explorations that aid in our understanding in native prairie management and preservation. Pollinator monitoring of bees and butterflies begins in 2021 to further aid our understanding of prairie function.

Western meadowlark.

The bobolink used to be a common bird of the prairie landscape.

POWER OF PARTNERSHIP

The success of SPICE and GMT is the result of a team effort consisting of a dedicated core group, a project champion, land managers, ecologists, botanists, database developers, modelers, and statisticians. This team's success comes from our ability to draw on many skilled and knowledgeable professionals, and the multi-agency collaboration provides opportunities to help each other when one might find gaps in time, staff, or finances.

It takes a village...

From left, back row: Cody Okeson (USFWS), Fred Harris (MNDNR), Daren Carlson (MNDNR), Marissa Ahlering (TNC), Jonathan Cummings (UMass), Aaron Schwartz (UofCO), Mike Larson (MNDNR)
Front row: Hugh Ratcliffe (UofMN), Sara Vacek (USFWS), Jill Gannon (USFWS)

Many additional contributors not in photo but appreciated!

FUNDING
FEDERAL: $272,000 | STATE: $138,387

PRINCIPAL PARTNERS
ENTRF/LCCMR, Michigan, Wisconsin

PRIORITY SPECIES
- northern long-eared bat *(Myotis septentrionalis)*
- big brown bat *(Eptesicus fuscus)*
- little brown bat *(Myotis lucifugus)*
- tricolored bat *(Perimyotis subflavus)*

Several species of bats in Minnesota are state SGCNs, including the federally threatened northern long-eared bat, big brown bat, little brown bat, and tricolored bat. These bats are year-round residents in Minnesota, rearing pups in the summer and hibernating in caves and mines during winter. They face losses in forest and cave habitats as well as suffer from white-nosed syndrome, a devastating fungal disease. Minnesota DNR leads several bat research and conservation projects.

We have monitored the spread of white-nosed syndrome in Minnesota since 2011 when the fungus causing the syndrome *(Pseudogymnoascus destructans)* was documented in Minnesota. The first case of white-nosed syndrome was observed in 2015 and has since spread to 15 counties, confirmed though hibernacula surveys and public observation reports. We have observed substantial bat mortality typical of the disease at important hibernacula such as Soudan Underground Mine in St. Louis County and Mystery Cave in Fillmore County with overwintering population declines of 90% and 94% respectively.

In addition to winter declines, surveys indicate a widespread and steep decrease in numbers during the summer as well. Acoustic monitoring is done by recording ultrasonic bat calls at night when bats are foraging for insects. Results indicate declines of bats from 2015 to 2019, particularly in northeastern Minnesota. Similarly, counts of bats from maternity colonies also show declines. For instance, summer colony counts conducted in 2019 at Historic Forestville (Fillmore County) were down 87% from the highest count in 2016. We also conducted a collaborative study with funding from the Minnesota Environment and Natural Resources Trust Fund, which focused on preferred habitat of female northern long-eared bats. Over three years, 1,202 bats of eight species were captured by mist-netting. Eighty-nine adult female northern long–eared bats were fitted with radio transmitters and tracked so we could learn about habitat use, especially roost trees.

Minnesota, Michigan, and Wisconsin have worked together since 2014 on a Habitat Conservation Plan (HCP) to develop forest management guidelines for bat habitat conservation. The HCP will lead to authorization of incidental take during forest management while providing for conservation benefits to the cave-dwelling bat species over a 50-year period. This work will provide technical and regulatory guidance to members of the timber industry, other state agencies, private forest managers, other conservation partners, and the public.

Above: MNDNR biologist Melissa Boman conducts a bat exam.

Right: Little brown bat with white-nosed syndrome.

GOING TO BAT FOR THEM

By researching and monitoring bats, we documented impacts of disease and habitat loss to these species. We know they need our help now more than ever. We presented public education programs about bats to a wide variety of audiences, including nature centers, state parks, conservation groups, public library events, and youth groups. We also joined bat-related events at the Minnesota Valley National Wildlife Refuge during Bat Week, Science Night, Wildlife in the City, and the Minnesota Bat Festival.

Adam Maleski (MNDNR) instructing kids on how to find a bat with a transmitter.

WHERE WE ARE GOING | Keep On Keeping On

This report highlights the conservation work completed over the past five years under *Minnesota's Wildlife Action Plan 2015–2025.* All plans should be ambitious and this Plan is no different. **One of the primary features of the Wildlife Action Plan is that it is not just the DNR's plan; it is Minnesota's Plan and as such belongs to the entire conservation community and Minnesotans who care about the well-being of wildlife.** Numerous groups and people have made valuable contributions to the critical work identified in the Plan. We highlighted some in this report, but we have really only scratched the surface, considering all of the complementary efforts by others in Minnesota and throughout the region. We are confident participation by other organizations will only grow in years to come for conserving our Species in Greatest Conservation Need and the critical habitats supporting them.

Minnesota's Wildlife Action Plan 2015–2025 has three primary goals, as well as 19 objectives and multiple sub-objectives. Over the past five years, we have made a lot of progress, yet much more remains to be done. As illustrated in this report, we have focused on species-specific needs, habitat maintenance and enhancements, and assessing the impacts of conservation actions through species response monitoring. We are at an important time in terms of data management and analysis, because we completed county surveys statewide as well as a number of important surveys for particular species (mudpuppies for example). We continue to invest in improved systems and staff for data management and analysis to optimize future conservation efforts. Going forward, to balance the needs of our diverse wildlife, we will focus more projects on SGCN fish and insects, which lack data compared to other wildlife groups in our state.

Additional opportunities exist through continued engagement with the public, partners, and private landowners to increase conservation connections. Our efforts in Conservation Focus Areas are making progress with partners, from private land-owners to government agencies, and will continue. To better engage the public, we have hired a community science coordinator for the Nongame Wildlife Program. This position is critical in advancing Goal 2 of the Plan: Enhance opportunities to enjoy SGCN and other wildlife and to participate in conservation. We are looking forward to a future where the community participates in collecting valuable information about our state's diverse wildlife and helps discover new solutions to the many challenges that lie ahead. We have also emphasized communications and outreach regarding SGCN and their conservation needs through development of public engagement plans, enhanced postings on social media, and surveys to learn more about wildlife viewers and supporters in Minnesota.

Left: Prairie native plant communities and habitat restoration event with partners and practitioners.

Upper right: Nongame wildlife biologist Erica Hoaglund conducting public outreach.

Close up photo opportunity of a black and white warbler. Photo: Joanna Eckles

Twenty years ago, Congress recognized the need for further action to protect and conserve fish and wildlife. The creation of the State and Tribal Wildlife Grant Program was seminal in how Minnesota and other states and Tribes are able to manage for wildlife diversity.

Having completed the first 10 year Minnesota Wildlife Action Plan, we are now halfway through the 2015–2025 Plan. As you have seen in this report, we are actively pursuing collaboration and partnerships to leverage dollars; connect with people; expand habitat management, restoration and protection; research vulnerable wildlife; and monitor trends in wildlife populations. Over the next five years, we will continue projects to meet objectives and fill identified gaps. Soon we will undertake planning for the third Wildlife Action Plan (2025–2035).

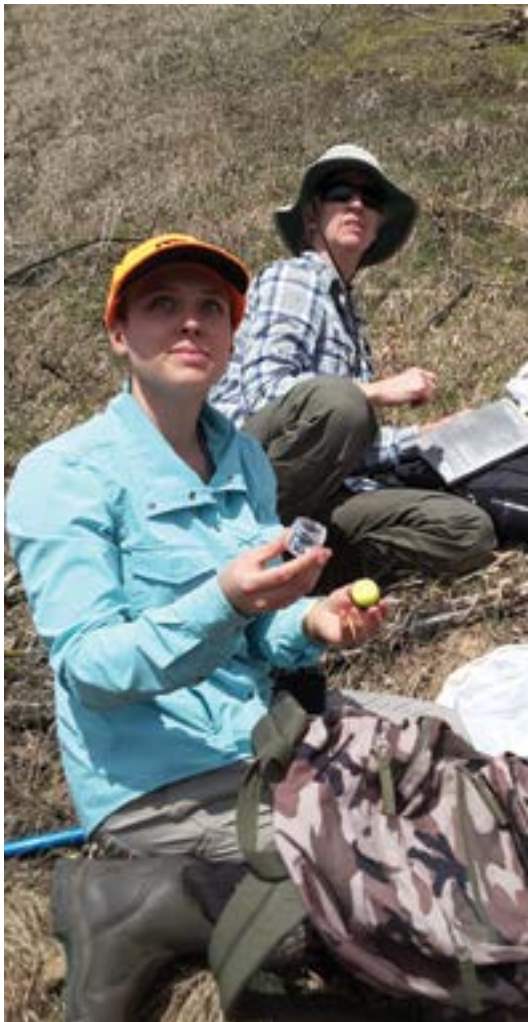
We expect future objectives will take us deeper into the understanding and conservation of nongame fish and the globally documented decline of insects, among other priorities. Habitat work will

Bald eagle. Photo: Thomas Demma

expand throughout the state, emphasizing effective approaches across the landscape. This will include continued and extra emphasis on understanding the effects of climate change and wildlife adaptability to ensure conservation of vulnerable species across all taxa.

Over the decades, Minnesota's successes with nongame wildlife species focused on iconic Minnesota wildlife species such as the bald eagle, trumpeter swan and peregrine falcon. Population recovery of these species is a great success story involving decades of work by the Program and its partners. It is also important to remember the less charismatic wildlife species such as beetles, butterflies, frogs, snakes, bats and voles, each of which have a role to play in a healthy ecosystem. In the words of noted conservationist and author Aldo Leopold, "Every part is good, whether we understand it or not… To keep every cog and wheel is the first precaution of intelligent tinkering." To maintain and enhance the natural world of Minnesota, we are committed to keeping "every cog and wheel," to sustain the health of rare wildlife populations over time.

Cynthia Osmundson,
Nongame Wildlife Program Leader



The Minnesota Nongame Wildlife Program is funded almost entirely through grants and donations. Community support in the form of tax form donations, monetary gifts, purchase of Critical Habitat License Plates, and volunteering, is foundational to the Nongame Wildlife Program and wildlife diversity in Minnesota. Your support is greatly appreciated.

Donations are tax deductible and matched dollar for dollar by the Reinvest in Minnesota (RIM) license plate fund.
https://www.dnr.state.mn.us/nongame/donate/index.html
So a $10 donation gives us $20 for protecting and preserving Minnesota's wildlife! Thank you.

Opposite page
Upper left: Bruce Lenning (MNDNR) conducting colonial waterbird surveys.
Middle: Dragonfly over leadplant at Touch the Sky Prairie, MN.
Upper right: Wood turtle close-up.
Lower left: Maddy Cochrane (U of MN) collecting wood turtle data.
Lower right: Nichole Gerjets and Barb Perry (MNDNR) conducting a bumblebee survey.

MINNESOTA

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