

POSTER PRESENTATION ABSTRACTS. MNTWS 2022 ANNUAL MEETING

POSTER PRESENTATION PROFESSIONAL

1. Exploring Detectability of Woodpecker Nests

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Some state, federal, and county agencies have various legal commitments to consider cavity dependent wildlife needs in their forest management activities, and to mitigate adverse effects. Woodpeckers are ecosystem engineers for cavity dependent wildlife and so understanding woodpecker nesting habits is critical for managing forests sustainably for cavity dependent wildlife. Active woodpecker nests are difficult to find except when nestlings are actively begging for food. Very little research has been conducted on nest detectability during the nestling begging stage. In this poster I explore distances at which nestlings can be heard, durations during the nestling stage that nestlings are vocal, how detectability changes with nestling age, and how habitat influences detectability from 28 nests of 6 different species.

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2. Characteristics of Woodpecker Nest Trees in Minnesota

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Some state, federal, and county agencies have various legal commitments to consider cavity dependent wildlife needs in their forest management activities, and to mitigate adverse effects. Woodpeckers are ecosystem engineers for cavity dependent wildlife and so understanding woodpecker nesting habits is critical for managing forests sustainably for cavity dependent wildlife. I collected data on nest tree species (n=141), diameters at breast height (n=107), and tree or stand ages (n=49 [28 in aspen]) from nests found incidentally or systematically from 1993-2021 for all nine woodpecker species that nest in Minnesota. Quaking aspen are the preferred nest tree for 5 species: yellow-bellied sapsucker (95.7%), hairy woodpecker (79.5%), northern flicker (75.0%), pileated woodpecker (71.4%), and downy woodpecker (57.9%). Mean diameters of aspen nest trees were 30.4-32.4 cm for yellow-bellied sapsuckers, hairy woodpeckers and northern flickers, and 24.2 cm for downy woodpeckers. Published aspen growth rates suggest it takes 60 years to grow aspen to 26 cm dbh and 70 years to 32 cm dbh. Measurements on actual nest tree age or data on stand age found that 46% of nests in aspen (n=28) were in trees or stands ≥ 60 years old, 71% were in aspen or stands ≥ 50 years old, and 82% were in aspen or stands ≥ 40 years old. Commercial aspen rotation ages of 40 years are unlikely to provide nesting sites to sustain a viable population of small-to-medium-sized nesting woodpeckers. Land managers and land owners should consider extending rotation ages and increasing reserve amounts in order to benefit cavity-dependent wildlife.

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3. Dispersion of Black-backed Woodpecker Nests Around an Apparent Communal Feeding Area

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At least 2, and up to 4, pairs of black-backed woodpeckers nested in upland red pine and jack pine stands in 2021 around a communal feeding area that consisted of about 5 ha (14.5 ac) of pines killed by flash-flooding in 2019 on DNR Forestry-administered lands. They also foraged in slash

rows left behind from thinning a red pine plantation in 2020. Stands used for foraging and nesting were 46-71 year-old jack pine and red pine plantation stands that resembled a savannah-like setting created through thinnings, fires, and adjacent clearcut harvests. In early fall, the dead pines were salvage logged with the intent of removing the long-horned beetles and replanting live trees. This creates a follow-up opportunity to study the response of nesting black-backed woodpeckers to the removal of an abundant food source in 2022. Management techniques that might benefit black-backed woodpeckers in this area include leaving slash from pine plantation thinnings in windrows, creating savannah-like landscapes, leaving clusters of dead trees for at least 2-3years before salvaging, and managing federal lands to provide older jack pine stands and clusters of dead trees (through intentional killing) as reserves in this sandy landscape of relatively young upland conifers.

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4. Minnesota National Forest Breeding Bird Monitoring Program

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The breeding bird communities of the western Great Lakes region have among the richest species diversity in North America. The diverse ecological setting of Superior and Chippewa National Forests is particularly important because they are located in the transition between boreal forest and eastern deciduous forest. Changes in climate, disturbance regimes, and land-use practices have led to significant changes in forest composition in the region which likely have a substantial impact on avian populations and communities. The Minnesota National Forest Breeding Bird Monitoring Project was established in 1995 to create a baseline inventory for local breeding bird assemblages, monitor population changes of species over time, and identify relevant bird-habitat associations. Currently, more than 350 stands within Superior and Chippewa National Forests are surveyed annually during the breeding season using standardized 10-minute point counts. Observers have detected more than 409,000 individual birds of 166 species during over 25,000 point counts during the 27 seasons of monitoring. 77 species were assessed for trends in at least one national forest in 2021. While the majority of species are showing stable or increasing trends, the consistent declines in certain species and species guilds are cause for growing concern. Specific examples include lowland conifer specialists, aerial insectivores, and species that require old growth forests. There are ample opportunities to apply this information towards adaptive forest management to conserve and improve breeding bird habitats and ensure the long-term conservation of Minnesota's biodiversity.

POSTER PRESENTATION GRADUATE STUDENT

5. Nestling Diet and Factors Influencing Nestling Condition and Post-Fledging Survival and Dispersal in Boreal Chickadees

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The boreal forests of North America and the hundreds of bird species that depend on it are at risk due to climate change and other anthropogenic factors such as logging and peat mining. In the face of climate change, informed forest management plans will play an important role in the conservation of vulnerable boreal bird species. Boreal Chickadees (*Poecile hudsonicus*) are permanent residents of Minnesota's boreal forested peatlands and are a species of conservation concern because of ongoing habitat loss, degradation, and fragmentation. Preserving and restoring quality breeding habitat is critical for Boreal Chickadee conservation, however there is a significant knowledge gap in some aspects of the breeding ecology of the species. To address this, we used nest boxes ($n= 369$) to assess differences in productivity across habitat types in the Red Lake Wildlife Management Area. During the 2021 breeding season, we collected fecal samples from nestlings to identify insects provisioned by the parents and conducted systematic insect surveys to quantify the differences in food availability (abundance and diversity) across sites. We monitored nests to quantify differences in nest success, nestling growth and provisioning rates across sites. We also used radiotelemetry to study the movement, survival, and cover-type selection of recently fledged Boreal Chickadees. I will present the methods and preliminary results from the 2021 field season, future plans for my research in 2022, and discuss how this data can be used to help identify high quality habitats and inform species conservation plans and forest management decisions.

POSTER PRESENTATION GRADUATE STUDENT

6. Golden-winged Warbler breeding ecology and habitat use

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Golden-winged warblers (*Chrysoptera vermivora*) is one of the most critically threatened birds in North America with a global population estimated at only 400,000 individuals of which 50% nest in Minnesota. Golden-winged Warbler rely on young forests and shrubby wetland habitat for breeding activities, however, there is a scarcity of knowledge associated with differences in quality provided by these two distinct habitats. Understanding differences in habitat-specific measures of demography (i.e., density, reproduction, and survival) is needed to prioritize and inform continued conservation efforts for this species. During the breeding season of 2021, we studied the breeding ecology of Golden-winged Warblers in the Chippewa National Forest, Minnesota. We mapped territories of singing males and located and monitored 18 nests in three habitat types: regenerating aspen, shrubby wetland, and regenerating hardwood. Nestlings ($n= 27$) from 10 broods were tagged and tracked using radio telemetry to assess survival and document habitat use during the post-fledging time period. The results from these data will help identify characteristics associated with high quality breeding habitats that can be used to guide forest management actions that maximize breeding season productivity for this imperiled species.

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7. Chippewa National Forest Hunter Walking Trail Breeding Bird Habitat Improvement Project

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Minnesota's managed forests provide critical habitat for hundreds of resident and migrant bird species. Forest management provides an important opportunity to conserve and cultivate critical habitat for species of management and conservation concern. Recent declines in upland game populations in the state have generated a renewed interest in using forest management to create habitats that not only support breeding adults but also those that maximize juvenile survival and increase recruitment into the populations. The Chippewa National Forest is planning a long-term habitat improvement project by implementing small-scale, frequent harvests (<5 acres, 5-year intervals) adjacent to hunter walking trails. Currently, there are more than 600 miles of hunter walking trails in Minnesota and maintaining and enhancing these areas as productive hunting grounds is a priority. The goal of this project is to create and maintain a long-term matrix of habitat in the region that is suitable for Ruffed Grouse while supporting additional game species such as American Woodcock and breeding forest birds. In the 2020 and 2021 breeding seasons we used a combination of line transect surveys and Autonomous Recording Units (ARUs) to survey breeding birds along more than 16,000 meters of hunter walking trails in the Chippewa National Forest before harvests are implemented. We detected over 80 species of breeding birds during the surveys and recorded approximately 24,000 ruffed grouse drum detections on ARUs. This data provides important insight to breeding activity of Ruffed Grouse and will provide baseline information that will allow us to make post-harvest comparisons on the impacts of this unique forest management technique.

POSTER PRESENTATION UNDERGRADUATE STUDENT

8. You are what you eat: Exploring the interplay between squirrel foraging dynamics and plastic pollution

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Urban sprawl fragments habitats and forces wildlife to inhabit human-dominated landscapes. Eastern gray squirrels (*Sciurus carolinensis*) and American red squirrels (*Tamiasciurus hudsonicus*) adapted behaviors to increase fitness in urban niches, including foraging from anthropogenic food sources. We hypothesize that squirrels forage from anthropogenic waste and inadvertently consume plastics that accumulate in the body. To assess the availability of anthropogenic food sources and their impact on local wildlife, we identified anthropogenic and organic food sources around campus and quantified microplastic content in urban and rural squirrels. We determined plastic content in the gastrointestinal (GI) tracts of squirrels by chemically digesting organs to extract microplastics (MPs), then characterized MPs by size, shape, and color. We observed and

analyzed intraspecies dynamics, including squirrels' nesting locations and primary food sources, using radio telemetry technology; we characterized behaviors via an ethogram. To quantify the plastic composition of anthropogenic food sources, we conducted waste audits from outdoor trash cans. Squirrel sightings, garbage locations, and nests were recorded using the GIS Field Maps application and spatially analyzed through ArcGIS software. We found microplastics present in both urban and rural squirrels, demonstrating the pervasiveness of microplastics in many environments. Our research highlights issues concerning plastic waste on campus and informs college policy to positively impact Concordia's local ecosystem.

POSTER PRESENTATION UNDERGRADUATE STUDENT

9. Evaluating prairie restoration success through small mammal community analysis

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As urban expansion converted wildlife habitats into agricultural and industrial land, native prairie lands were reduced to 1% of their original area. This increased habitat fragmentation and disrupted species dynamics and populations. Small mammals are vital to prairie ecosystems because they consume plant material and invertebrates, disperse seeds, and provide a source of food for larger species. Trapping of remnant and restored prairies provides data on small mammal density and diversity. Comparing population data between remnant and restored prairies can inform successful management and restoration practices. We trapped small mammals in various remnant and restored prairies in northwestern Minnesota from 2012 to 2021 with the goal to compare small mammal species diversity as well as to monitor populations of rare species. We hypothesized that there would be a difference in species diversity between restored and remnant prairies. We set two to three grids with 50 traps (alternating Small Sherman, Large Sherman, and Longworth) per grid. When a mammal was captured, we identified species, sex, and mass, and then marked for recapture. We collected body measurements and saliva samples from *Peromyscus* species for species identification. Our data analysis includes Simpson's Reciprocal Diversity Index, population trends, and species comparisons between restored and remnant prairies. Through our prairie surveys, we document occurrences of critically rare species, such as *Perognathus flavescens* and *Onychomys leucogaster*. Our findings will help inform future prairie management decisions.

POSTER PRESENTATION UNDERGRADUATE STUDENT

10. The Prevalence of Microplastics in North Dakota Waterfowl

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The United States Environmental Protection Agency (EPA) recognizes microplastics (less than 5mm in size) to be a growing threat to many organisms in ecosystems due to its high toxicity risk and the current lack of regulation. Therefore, studies focusing on the prevalence of microplastics have become more relevant and prevalent, and this study is one of only a few to investigate the presence of microplastic debris in waterfowl populations. Waterfowl gastrointestinal samples (N=102) were donated by a hunting guide operating out of Devil's Lake, ND, from the Fall 2020 season. To understand microplastic abundance and distribution within the gastrointestinal tract of waterfowl,

we separated samples by organ (proventriculus, gizzard, and intestine) and analyzed the gut contents under a microscope. Identified microplastics were enumerated and characterized by color, type, and length. We identified a total of 460 microplastics, 69.57% (320 particles) and 30.43% (140 particles) of which were found in dabblers and ground foragers, respectively. Waterfowl species varied; however, dabblers were dominated (77.5% of samples) by Mallards, and ground foragers were dominated (22.5% of samples) by Canada Geese. Microplastic abundance was significantly higher in ground foragers than in dabblers. Furthermore, within the ground foragers, microplastics were found to be more abundant in the proventriculus than the gizzard, with no significant difference between other organs. Within the subgroup of dabblers, the abundance of microplastics was significantly higher in the intestine than the proventriculus and gizzard. Findings of this study can be used not only to guide future research focused on the impacts of microplastics on waterfowl but also to establish foundation for conservation and policy making regarding microplastics.

POSTER PRESENTATION GRADUATE STUDENT

11. Abundance and Occupancy of Snowshoe Hare Predators on the Leech Lake Band of Ojibwe Reservation

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Wabooz (snowshoe hare [*Lepus americanus*]) are a culturally significant animal and an important food and fur source for the Leech Lake Band of Ojibwe (LLBO). Snowshoe hare populations on the reservation are declining; an ongoing study found 91% of all hare mortalities were caused by predation, primarily *gidigaa-bizhiw* (bobcat [*Lynx rufus*]), *ojiig* (fisher [*Pekania pennanti*]), and *waabizheshi* (American marten [*Martes americana*]). Snowshoe hare, American marten, and fisher are currently listed on the LLBO Threatened, Endangered, and Sensitive Species list. Research using culturally appropriate techniques is crucial to the future management and conservation of sensitive predator species on tribal land, and we evaluated two non-invasive monitoring techniques for long-term use by tribal wildlife managers. Sampling methods measured abundance and occupancy of bobcat, fisher, and American marten across the LLBO reservation; spatially explicit capture-recapture using remote cameras, and occupancy modelling using snow-tracking. We randomly established eight 5-km transects each divided into 1-km replicates (40 total) ≥ 1 km from marked roads. Transects were surveyed once between January-March 2021. Snow-tracking yielded detections of bobcat, fisher and marten at 5%, 23% and 20% of transect replicates, respectively. We randomly generated 40 camera locations stratified by landcover type (20 sites within white cedar cover type, 20 sites outside white cedar cover type) and ≤ 1 km from winter plowed roads. Each site included a baited platform and white-flash camera set ~ 1.5 m above ground for unique identification of fisher/marten, and one infrared camera at ground level for bobcat. Each camera site was active for 21 days between January-March 2021. Cameras yielded identifiable detections of 2 bobcat, 3 fisher and 0 marten, providing insufficient data for planned density estimates. These preliminary data will be combined with 2022 field season data to better inform the population management of snowshoe hare populations and their predators.