

ORAL PRESENTATION PROFESSIONAL

West Nile Virus Exposure and Infection Among Hunter-Harvested Ruffed Grouse Cohorts in a Stable Population

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West Nile virus (WNV) was introduced to North America two decades ago, but for many species, including Ruffed Grouse (*Bonasa umbellus*), the effects of WNV on individuals and populations remain poorly understood. Recent studies suggest the effect of WNV on Ruffed Grouse might vary among geographic regions, depending on habitat conditions. We studied WNV in Minnesota, US, during 2018–19, in a region known to have abundant Ruffed Grouse habitat and a population cycling around a stable long-term average. We worked with cooperating hunters to collect hearts, feathers, and blood on filter strips from birds harvested in the fall to examine exposure to the virus. We detected antibodies to WNV or a flavivirus (probably WNV) in 12.5% and 12.3% of birds in 2018 and 2019, respectively. However, we did not isolate the virus from any heart samples, indicating that exposed birds were not experiencing an active infection of WNV at the time of harvest. Our findings indicate that, although Minnesota Ruffed Grouse are exposed to WNV, some birds mount a successful immune response and survive. However, our sampling approach did not account for birds that might have become infected over the summer and died, so it is unknown how much WNV mortality occurred before the fall harvest. Birds lost to WNV over the summer could reduce the number of birds that hunters see in the fall, thus reducing the quality of their hunting experiences. Management options for mitigating WNV impacts and other stressors consist primarily of providing high-quality Ruffed Grouse habitat that produces birds in good condition that are more likely to recover from infection.

ORAL PRESENTATION PROFESSIONAL

Use of drones with thermal infrared to locate white-tailed deer neonates for capture

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Drones are growing in popularity and used to locate individual animals, estimate ungulate population size, and monitor endangered species. However, previous research has not used drones to locate individual wildlife with the intent of capture. Our goal was to assess the efficacy of using drones to locate neonatal white-tailed deer (*Odocoileus virginianus*) for capture. During spring 2019–2021, we used a drone equipped with thermal-infrared (TIR) and conventional multispectral red-green-blue (RGB) cameras to locate and confirm fawn thermal signatures in Minnesota’s southern farmland region. We confirmed 29, 71, and 75 fawn thermal signatures in 2019–2021, respectively. We further validated the drone methodology and began our fawn movement and survival study by capturing 75 fawns in 2021. We worked 201.5 person-hours (mean crew size of 4 people) that required 6.9 person-hours to locate each fawn in 2019, whereas we worked 145.7 person-hours (mean crew size of 4 people) that required 70% less effort and resulted in 2.1 person-hours to locate each fawn in 2020. We worked 233.5 total person-hours (mean crew size of 5 people) and required a mean 3.1 person-hours to capture each fawn during the first year of the fawn survival and movement study in 2021. Flight efficiency was highest at 60 m above ground level (AGL) with a speed of 9 m/s; however, diurnal use of drones made identifying fawn thermal signatures difficult as thermal loading of the environment quickly reduced the temperature differential between vegetation and signatures. We found TIR-equipped drones to be an efficient method to locate and subsequently capture fawns in open habitats in comparison to other methods such as vaginal implant transmitters (VITs), ground searches, or monitoring doe behavior. We recommend flying at night or in cloudy conditions to avoid false positives. This work is currently “in press” at the Wildlife Society Bulletin.

ORAL PRESENTATION ABSTRACT (Graduate Student)

Comparing unmanned aerial systems with conventional methodology for surveying a wild white-tailed deer population

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Unmanned aerial systems (UAS) have become increasingly popular for ungulate research; however, little is understood about how this novel technology compares to conventional methodologies for surveying wild populations. We examined the feasibility of using a fixed-wing UAS equipped with a thermal infrared sensor for estimating the population density of wild white-tailed deer at the Cedar Creek Ecosystem Science Reserve, Minnesota, USA. We conducted UAS thermal survey flights from March to April of 2018 and January to March of 2019. Fecal pellet-group counts were conducted from April to May in 2018 and 2019. We modeled deer counts and detection probabilities and used these results to calculate point estimates and bootstrapped prediction intervals for deer density from UAS and pellet-group count data. We compared results of each survey approach to evaluate the relative efficacy of these two methodologies. Our best-fitting model of certain deer detections derived from our UAS-collected thermal imagery produced deer density estimates ($\bar{X} = 9.40$, 95% prediction interval = 4.32–17.84 deer/km²) that overlapped with the pellet-group count model when using our mean pellet deposition rate assumption ($\bar{X} = 7.01$, 95% prediction interval = 4.14–11.29 deer/km²). Estimates from our top UAS model using both certain and potential deer detections resulted in a mean density of 13.77 deer/km² (95% prediction interval = 6.64–24.35 deer/km²); similar to our pellet-group count model that used a lower rate of pellet deposition ($\bar{X} = 10.95$, 95% prediction interval = 6.46–17.65 deer/km²). Overall, UAS yielded similar results to pellet-group counts for estimating population densities of wild ungulates; however, UAS surveys were more efficient and temporally sensitive. We demonstrated how UAS could be applied for regularly monitoring changes in population density. We encourage researchers and managers to consider the merits of UAS and how they could be used to enhance the efficiency of wildlife surveying.

ORAL PRESENTATION PROFESSIONAL

No country for old bears: attractive sinks and survival of Minnesota black bears

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American black bears (*Ursus americanus*) are legally hunted across most of their range, and this is their primary source of mortality. However, within this range, areas exist where hunting is prohibited, and such areas may serve as high-density sources of bears to buffer periods of over-hunting. We conducted a long-term (nearly 4 decade) study of cause-specific mortality of 392 radio-collared black bears in 4 study areas within Minnesota where we expected vastly different patterns of mortality. We hypothesized that bears would die predominantly from: (1) *hunting* in the Chippewa National Forest, due to heavily-forested, easily-accessible public land; (2) *vehicle collisions* along highways flanking a narrow un hunted military reservation; (3) *human-bear conflicts* in an agricultural landscape with <20% forest at the northwestern periphery of the bear range; and (4) *natural mortality* on a peninsula surrounded by large lakes within an un hunted national park. We also implemented an experimental test during the 2 most recent decades whereby hunters were asked to voluntarily refrain from shooting collared bears, which were readily identifiable by large, colorful ear tags. This experiment was designed to better discern dominant sources of mortality in the absence of hunting. Despite the natural differences in study sites, and our experimental protection of collared bears, hunting remained the dominant source of mortality at all sites and years. Bears living in the 2 un hunted sites were vulnerable to hunting when they left to feed at attractive sinks, such as hunters' baits or cornfields. Natural mortality ranged from 22% within the national park to only 3% in the heavily-hunted national forest. Our study showed that in Minnesota, where bears routinely make large seasonal movements in fall and where hunters use baits, there are no real sanctuaries from hunting, meaning that there are no high-density sources to mediate over-harvests.

ORAL PRESENTATION PROFESSIONAL

Utilizing Resource Selection Functions to Inform Winter Habitat Management Prescriptions for White-Tailed Deer in Northcentral and Northeastern Minnesota

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Advances in technology enhance our ability to understand seasonal wildlife-habitat relationships. The Minnesota Department of Natural Resources' new statewide whitetailed deer (*Odocoileus virginianus*) management plan aims to enhance its ability to maintain

regional deer numbers near population goals. Habitat management is a key component of this plan. Informed habitat management prescriptions, based on an improved understanding of optimal size, shape, and arrangement of forest stands and foraging sites and edge relationships will contribute to a more successful integration of long-term forest and habitat management strategies. The primary objective of this study is to use cutting-edge Global Positioning System (GPS) collar, remote sensing, and Geographic Information System technologies to classify and inventory habitat on deer winter ranges to facilitate fine-scale measurements of use of cover types at the stand level. During 4 winters from 2018 to 2021, 89 adult female deer were fitted with GPS collars on 2 study areas in northcentral and northeastern Minnesota. To better understand winter habitat use, we developed a resource selection function to determine habitat selection at different snow depths and across study sites with varying deer densities and habitat characteristics. Similarly, we used fine-scale measurements to examine how deer use the structure and arrangement of conifer cover and forage openings relative to varying winter characteristics. This increased knowledge will aid in formulating more effective long-term forest and habitat management prescriptions to best support population goals.

ORAL PRESENTATION-UNDERGRAD. STUDENT

Suitable Hosts for Minnesota's Fatmucket Mussel (*Lampsilis siliquoidea*)

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Conserving a mussel species depends, in part, on our knowledge of its life history needs. Certain fish species act as hosts for the parasitic larvae of unionid mussels, therefore, conservation efforts must include sustainable host fish management. A better understanding of the relationship that native *Lampsilis siliquoidea*, a rare species in parts of its range, has with fishes can assist natural resource managers in maintaining this mussel and its ecosystem services.

The purpose of this research was to expand our knowledge of the Fatmucket's breadth of host use by performing laboratory tests on previously untested fishes. Species from unstudied fish families, including Centrarchidae, Esocidae, Percidae, Cyprinidae, Catostomidae, and Gasterosteidae, were examined. Gravid *L. siliquoidea* were collected in May 2021 from Rice Creek, Ramsey County, Minnesota, and held in the laboratory. The majority of fishes were collected from the 7-county metro area between May and July. We used standard methods to identify suitable Fatmucket hosts.

Of the 14 fish species inoculated with Fatmucket larvae, 7 facilitated larval development. The variety of fish species shown to be suitable hosts for the Fatmucket mussel suggests

that additional hosts remain to be discovered. Conservation efforts will benefit from an improved understanding of the life history needs of *L. siliquoides*, including the re-establishment of this species in areas where it has been extirpated.

ORAL PRESENTATION PROFESSIONAL

Restoring Hybrid Cattail Infested Wetlands in Voyageurs National Park: What Have We Learned?

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Non-native hybrid cattails (*Typha x glauca*) are known to disrupt ecosystem balance by creating dense monotypic stands, displacing native species, and reducing biological diversity. Hybrid cattail is the dominant plant species in most large lake wetlands in Voyageurs National Park, MN. We initiated a restoration project in 2016 to reduce cattail abundance and restore wetlands to more diverse natural states. Lakes in Voyageurs National Park are designated as “Outstanding Resource Value Waters” where the use of herbicide is prohibited. Using 5 different treatment methods, we have treated a total of 75 acres of invasive cattails in Voyageurs National Park. We conducted pre- and post-treatment vegetation surveys of wetlands and compared percent vegetative composition for each treatment type. Total removal of cattail was the most effective treatment method for floating cattail mats with cattail being reduced from 98% composition to 0%. Underwater cutting of rooted cattail stands was also an effective method of removing cattail. We saw significant reductions of invasive cattail and increases in native vegetation from most treatment methods. Where remnant wild rice stands were present, we saw a significant increase in wild rice composition post cattail removal. Here we will present an overall project update, including project findings, management recommendations, and our direction of future work.

ORAL PRESENTATION PROFESSIONAL

Abundance and diversity of migratory shorebirds on Interstate Island

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The Great Lakes region is a critical stopover area for many shorebird species. Shorebirds that migrate through Minnesota are long-distance migrants that rely on quality stopover habitat for foraging, resting, and roosting to complete their migration. Interstate Island Wildlife Management Area is a six acre dredge spoil island that is located in the St Louis River Estuary, in the Duluth Harbor. High water levels caused significant loss of critical habitat on the island and restoration efforts were initiated by the Minnesota Department of Natural Resources to restore and protect the island. Although restoration efforts were targeted at sustaining the Common Tern colony, additional considerations were made for migratory shorebirds in the restoration design. We documented shorebird abundance and diversity on Interstate Island in an effort to understand how restoration efforts affected migratory shorebird stopover use. We conducted in-person surveys and deployed 16 camera traps in 2020 and 2021. We analyzed 16,110 camera trap frames and documented a total of 3,722 shorebird detections of 8 shorebird species. Our in-person surveys produced 530 shorebird detections, of 18 shorebird species. Spatial and temporal habitat use of migratory shorebirds within the context of the restoration of Interstate Island will be discussed.

ORAL PRESENTATION

Connecticut Warbler breeding ecology and habitat use in lowland conifer forests

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Connecticut Warblers (*Oporornis agilis*) are one of the least studied and most rapidly declining bird species in North America. Throughout much of its range, this species relies on lowland black spruce or tamarack forests, but our understanding of the biology of the species abruptly ends there. Connecticut Warblers are one of the most difficult species to

work with because of their largely inaccessible habitats and the extremely secretive nature of breeding females. We studied the breeding ecology of Connecticut Warblers in the Sax-Zim Bog (2019) and Red Lake Peatlands Wildlife Management Area (2020). We mapped territories of singing males, located and monitored 11 nests, tracked the post-fledging movements of individuals from five nests, and measured vegetation characteristics at fledgling locations. Post-fledging habitat use and survival remains unstudied for most songbirds, but knowledge of the microhabitats and space use of fledgling birds is critical as mortality rates peak during this life stage. In our study, both daily movements and those away from the nest were much smaller than those of similar species. Connecticut Warbler fledglings also preferred microhabitats with higher stem densities. Unlike many other species that use large areas of often disparate habitat after fledging, Connecticut Warblers appear to use the same habitats from adult arrival in the spring to juvenile dispersal in the fall. These results can be used by land managers to create, protect, and maintain habitat for this rapidly declining species.

ORAL PRESENTATION PROFESSIONAL

Secretive marsh bird abundance and tolerance to wetland restoration

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Secretive marsh birds depend on emergent vegetation to survive and breed. Voyageurs National Park wetlands have been inundated with the invasive hybrid cattail (*Typha x glauca*), an aggressive species that has become the dominant plant in most wetlands. To learn more about the populations of secretive marsh birds in the park and how they react to cattail removal, call-back surveys were performed between 2017 and 2021 (n=765). An update will be given on the abundance of secretive marsh birds (American Bittern, Black Tern, Least Bittern, Pied-billed Grebe, Red-necked Grebe, Sora, Virginia Rail, and Yellow Rail) in the park and preliminary analysis on the recent treatment sites to discuss the future of the study and how it can inform wetland management.

ORAL PRESENTATION PROFESSIONAL

On the Wrong Track: Why the Endangered Species Act is Not Enough

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In spite of millions of dollars and tremendous efforts on behalf of wildlife professionals and volunteers, endangered species are losing the survival battle. While iconic species have made some remarkable recoveries from the brink, most are doing poorly. Enacted in 1973, just a few years after the first Earth Day of 1970, we have added 126,000,000 people within the US. Far from being benign, it is us also far from being addressed by groups which are known for taking on the mantle of wildlife conservation. With that population increase comes a force all wildlife groups and their supporters must recognize as undermining their efforts to conserve, preserve and reintroduce species. Avoiding the issue of overpopulation and its continued growth is at the heart of our failure to truly protect every specie from the grasshopper sparrow to the Florida panther.

Instead of avoiding this admittedly tricky issue, we need to step up to the population plate in the name of all of the species in need of our help. Instead of side stepping what has become a 'quicksand' issue lined with the framing of social justice warriors, we need to create our own framing. We must put the future survival of innocent species squarely on the shoulders of this taboo subject, for climate change is only part of the story. Our bloated numbers and continued growth put all of our efforts as resource managers at risk of continued failure. This presentation is a call for a new way forward. Once we admit we have been going at this from a downstream perspective causing the spinning of our wheels and the lengthening of the Endangered Species list, we can create a new team of wildlife warriors with the promise of more success.

ORAL PRESENTATION PROFESSIONAL

What Drives Urbanization and Habitat Loss: Rising Population or Falling Population Density?

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In the United States and worldwide, habitat loss has long been acknowledged as the main driver of declining wildlife populations and reduced biodiversity. Conversion of rural land (both natural habitat and farmland) to urban or developed land is the leading cause of wildlife habitat loss and degradation in the USA. In a series of national, state, and regional studies on urban sprawl in the U.S. spanning two decades, researchers affiliated with NumbersUSA examined the relative contributions of the two fundamental factors that drive an increase in developed or urbanized land (sprawl): population growth and increasing per capita land consumption (or decreasing population density). Our findings contradict the conventional wisdom that falling population density – rather than population growth – is the principal cause of sprawl. In our first national-level study of the 100 largest U.S. cities

back in 2001, we found that while there was noteworthy variation between cities and regions, in aggregate, population growth and decreasing density each accounted for about half of sprawl. In the new century, as revealed in our most recent national-level study, while the pace of sprawl has slowed somewhat, the percentage of sprawl attributable to population growth has increased, now to about 70 percent or more. If current large population increases projected for 2060 and beyond for the U.S. are realized, development pressures on undeveloped natural habitats will increase immensely in the coming years.

ORAL PRESENTATION - PROFESSIONAL

MNTWS April 2021 diversity, equity, and inclusion membership survey results

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As MNTWS members, we saw diversity, equity, and inclusion (DEI) needs within our profession but recognized limited resources existed to prioritize any actions. During April 2021, we emailed a non-scientific survey to MNTWS members. Survey questions included: *'Have you experienced, witnessed, or heard about harassment or discrimination within the wildlife field? (Comment(s) optional)'*, *'Are you or your organization working on DEI efforts. Leave comments.'*, *'Why should DEI be included or left out of MNTWS?'*, *'Share your ideas to promote a welcoming chapter environment.'* We were encouraged by hearing from so many people (n = 66, representing roughly 40% of our paid membership) as survey response rates are usually much lower. Nearly all respondents answered the question of experiencing harassment or discrimination within the wildlife field with ≈90% hearing stories, ≈80% witnessing, and ≈55% experiencing it. Nearly 90% of respondents described why DEI should be included or left out of MNTWS efforts and about 60% shared widely varying ideas to promote a welcoming chapter environment. Approximately 35% of respondents had comments about their own DEI efforts; ≈65% had suggestions, which varied widely, for MNTWS; 45% appreciated and 9% were frustrated by efforts of the survey organizers. Based on the response rate, responses, and quantity of comments obtained in this survey, we believe there is significant interest among many MNTWS members regarding DEI issues. Many respondents raised important issues needing attention and ideas for solutions.

ORAL PRESENTATION PROFESSIONAL

**MINNESOTA STATE WILDLIFE MANAGEMENT AREA STEWARDSHIP –
A RETIRED WILDLIFE MANAGER'S PERSPECTIVE**

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Approximately 24 percent (12 million acres) of Minnesota's land are public of which 1.8 million is designated as State Wildlife Management Areas (WMAs). Classification and management intent for all state recreational units (14 in total) is designated in Minnesota's Outdoor Recreation Act (ORA, statute 86A). For WMAs specifically, 86A.05 subd. 8 frames purpose, resource and site qualifications, and administration as: *...shall be established to protect those lands and waters which have a high potential for wildlife production and to develop and manage these lands and waters for the production of wildlife, for public hunting, fishing, and trapping, and for other compatible outdoor recreational uses.*

While this designated WMA intent is fairly straight forward, actual management interpretation of this intent and related management direction can at times be complicated, compromised by other natural resource needs (i.e. timber, forage production) as part of an overarching Minnesota Department of Natural Resources (DNR) mission statement: *...to work with Minnesotans to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life.*

A WMA stewardship concern that has arisen in the last two plus years is the management of forest habitats through timber management as a tool to manage for desired wildlife populations and to replicate natural disturbance regimes Minnesota's forest wildlife have evolved with and adapted to. This presentation will discuss: state responsibility to manage WMA habitats as a public trust asset, historical review of past WMA forest habitat management policies and practices, timber mission creep, recent changes through implementation of the DNR's Sustainable Timber Harvest (STH) initiative, related professional (i.e. MNTWS's Sustainable Forest Ecosystems position statement) and public concerns with STH implementation, state statute and federal aid entanglements, and current citizen/user activism to address the management of WMA wildland habitats in Minnesota's second largest outdoor recreational system.

ORAL PRESENTATION PROFESSIONAL

An Update on the Pittman-Robertson Wildlife Restoration Program: Teaching an Old Dog New Tricks and Why it Matters to Wildlife Professionals

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Conservation of wildlife has two foundational characteristics, unique, science-based thinking, and the money that provides a platform for those ideas. President Roosevelt signed the Pittman-Robertson Wildlife Restoration (WR) Act into law over 80 years ago, and since its inception, it has provided the financial foundation for wildlife conservation in the United States. The Minnesota DNR received an average of \$20.7 million per year over the most recent 5-year period and \$360.7 million in total. The Act has relatively gone unchanged, receiving relatively minor amendments in the 1970s to provide additional taxes for hunter safety programs, and the 1980s to provide funds for United States' territories and create an investment fund. Due to large-scale societal changes, two major amendments have been added to the WR Act since 2019 providing additional latitude for hunter and recreational shooter recruitment, outreach, and shooting range construction. One major amendment to the WR Act is currently being reviewed and revised in Congress, Recovering America's Wildlife Act (RAWA). This talk will provide a primer for the WR Act and discuss recent and potential future major changes to the Act.