Department of Natural Resources
SCI-MIC Supported Research Projects

Progress Reports for 2018:

TITLE: Predator-Prey Project

The impact of predators on prey populations has been the subject of numerous scientific studies and has been debated at length by the public. There is agreement in the scientific community that the relationship between predators and prey is very complex and broad descriptive statements cannot be made. In some cases, predators limit prey populations and in other cases they do not. The relationship between predators and prey is influenced by a host of factors that can vary from place to place and over time. Factors that must be considered include the number of different prey species available, the number of different predators in the system, the relative density of predators and prey in the area, the response of predators and prey to changes in prey numbers, and the effects of weather and disease on predators and prey. Unfortunately, data from areas where predators prey predominately on white-tailed deer are limited yet results from Phase I of this study are helping to clarify these complex relationships.

White-tailed deer are an important species in Michigan providing many ecological, social and economic values. Most generally, factors that can limit deer numbers include food supply, winter cover, disease, predation, weather, and hunter harvest. Deer numbers fluctuate in relation to these limiting factors. Considerable research has been conducted demonstrating the effects of winter severity on white-tailed deer condition and survival and the importance of food supply and cover, particularly during winter, has been documented. While the role of predation on white-tailed deer survival has received some attention, many questions remain. A better understanding of the possible impact of predators on deer population dynamics requires information on the role of predation on white-tailed deer fawn survival and the extent to which predation is additive or compensatory with other causes of death. The predator-prey system is complex, so this project is simultaneously addressing the roles of various limiting factors (e.g., predators, winter weather).

To assess the role of predation on white-tailed deer fawns we are capturing and radio-collaring newborn fawns to estimate their survival and determine the causes of mortality. We are simultaneously assessing the effects of predation and winter severity and indirectly evaluating the influence of habitat conditions on fawn recruitment.

Phase I of the study occurred in the low snowfall zone of the Upper Peninsula and data analysis is underway. Preliminary results include:

- Over the 3 years, we captured and radio-collared 141 fawns and investigated 65 mortalities.
- We collected over 550,000 locations on GPS collared predators (bears, bobcats, coyotes, and wolves) and investigated almost 1,400 predator locations clusters for evidence of kill sites. These searches indicate that coyotes and bobcats are important predators of fawns.

- We found high pregnancy rates in adult does. This is important and useful to managers because pregnancy rates have not been measured in over 25 years and hunters have expressed concern that bucks are harvested too intensively and doe-to-buck ratios are unacceptably skewed.

- Estimating abundance of species such as coyotes and bobcat is difficult and rarely has been attempted. The howl survey/sonographic technique for estimating coyote abundance and the hair snare/genetic technique for estimating bobcat abundance we are using are showing good promise.
- Winter severity effects on nutritional condition of adult females influenced survival of adult females and fawns. However, adult female avoidance of interior lowland forests which had greater wolf use and commonly aging and over-browsed vegetation ostensibly reduced fawn recruitment through a lack of hiding vegetation and poorer forage. Also, by adult females raising fawns in habitats near roads, the predatory efficacy of coyotes on adult females and fawns increased. Although predation was the leading cause of deer mortality, winter severity affecting nutritional condition and resource use appeared to be most important factor precluding population increases. We suggest habitat management that increases landscape heterogeneity of early successional forests to enhance year-round browse to increase nutritional condition of adult females and hiding cover for fawns could improve population growth.

Phase II of the project (mid-snowfall zone) started in the summer of 2012, with the new study area located near the Michigamme Reservoir. Deer trapping in 2013 and 2014 resulted in 192 (140 female, 52 male) captures and 89 pregnant females received vaginal implant transmitters. In the first two years, 61 fawns were captured, radio-collared, and monitored. We have completed the fieldwork in Phase II and the graduate students are currently analyzing data and beginning to make comparisons with our findings from the low-snowfall zone study area.

This cooperative study investigating the role of predators, winter weather, and habitat on deer fawn survival in the Upper Peninsula beginning in 2009 with a planned completion date of 2021. In 2018, our collaborator, Dr. Jerrold Belant, accepted the Campfire Professor of Wildlife Conservation Endowed Chair position at the State University of New York's College of Environmental Science and Forestry (SUNY ESF), thus we have transferred the research grant from Mississippi State University to SUNY ESF.

You can find progress reports and links to technical publications from this research project on the project's new website:

https://campfirewildlife.com/projects/predator-prey/

The project also maintains a Facebook page that is updated with current activities and interesting observations from the field. Follow the link below to keep up with the latest news:

https://www.facebook.com/campfirewildlife/

Phase III of the project (high-snowfall zone) began in summer 2016. This past year, work continued analyzing and interpreting data from the mid-snowfall zone. This work continues our focus on disentangling complex interactions among deer, multiple predators, habitat, and weather in the Upper Peninsula. In the mid-snowfall study area, the study period aligned with a 4-year trend of deer population decrease. During this period, adult female deer densities decreased by 40% from 3.5 to 2.1 does/km^2. This provided an opportunity for insights into conditions that lead to deer population decline but did not allow a similar opportunity to observe conditions that lead to deer population growth. While temperature and snow conditions throughout winter influence deer winter survival, the timing of spring snowmelt appears to be

more important than early- and mid-winter weather patterns. Years with late spring snowmelt are likely to result in high deer mortality, even if conditions were mild during early winter.

The deer population decline appeared to be driven by both low adult female survival and low fawn recruitment. Poor survival in adult and juvenile age classes was proximally driven by high predation rates and appeared ultimately related to nutritional condition. In the case of adult female deer, most mortality occurred during late winter but heavier does were less likely to die, which suggests that summer/fall condition influences winter survival. In the case of fawns, condition at birth was important which indicates that doe condition during pregnancy influences early life fawn survival. Taken together, these conclusions support the hypothesis that severe winters weaken deer, and weak deer are more susceptible to predation and produce weak offspring which in turn have lower survival. Under this hypothesis, managers can expect predation rates of deer to vary considerably among years due to changes in weather, even if predator populations remain constant.

The most abundant predator species in the mid-snowfall zone study area were black bears and coyotes at 0.26 and 0.24 individuals/km^2, respectively. Wolves and bobcats were also present at densities of 0.03 and 0.04 individuals/km2, respectively. Predator species did not appear to contribute equally to deer mortality. Coyotes were the most important deer predator as a leading mortality source of both adult and juvenile deer. Wolves were a major predator of adult female deer but were the least important fawn predator, while bears were a major fawn predator but were not observed to kill any adult deer. Bobcats killed both adult and fawn deer but at low rates and were likely the least influential predator on the deer population. In combination, coyotes and wolves can affect white-tailed deer populations as coyotes can exploit unused areas within or near wolf territories to coexist and increase deer mortality more than may be expected.

We also continued fieldwork in the high-snowfall zone study area. In 2018, we captured and radio-collared 57 adult female and yearling deer and monitored an additional 32 adult female deer captured during 2017 for a total adult female sample of 99 individuals. We also captured and radio-collared 48 neonatal fawns. We detected pregnancy with ultrasound in 98% of adult (n = 57) and 50% of yearling (n = 12) females.

We captured 14 bear, 8 wolves, 1 bobcat, and 1 coyote which were fit with GPS collars. From 8 May to 28 August 2018 cluster sites were investigated for each species totaling 134 bear, 272 wolf, 39 bobcat, and 86 coyote clusters. Evidence of fawn predation was determined at 2 bear, 36 wolf, 12 coyote, and no bobcat cluster sites.

During black bear den checks and white-tailed deer trapping we hosted individuals from Michigan Department of Natural Resources (MDNR), Michigan State University, Michigan Technological University, 906 Outdoors (Discovering), Safari Club International Michigan Involvement Committee, ABC 10 News, WJMN-TV3 News, WLUC-TV6 News, Daily Mining Gazette, The Mining Journal, The L'Anse Sentinel, Into the Outdoors Education Network and other interested members of the public.

We attended several local sportsman's coalition meetings to discuss the project and improve awareness of project goals and activities. We hosted 23 and 19 undergraduate students from Purdue University (8 June) and Michigan Technological University (1 August) for demonstrations of detection dogs, carnivore immobilizations, fawn capture, vegetation surveys, and deer telemetry. We gave presentations to 17 classes at local public schools, reaching 378 students. We hosted 23 educators from the Michigan DNR Academy of Natural Resources-North for demonstrations of detection dogs, carnivore capture, and telemetry.

Partners: Safari Club International-MIC; Safari Club International Foundation; Northwoods Chapter Safari Club International; U.P. Whitetails Association, Inc., Menominee County Chapter; Wildlife Unlimited of Delta County; Ottawa Sportsmen's Club, Ontonagon Valley Sportsmen's Club, Plum Creek Timber Company, and Mississippi State University

Time Line and Budget: This project is being conducted in three snowfall zones in the UP with a total duration of approximately twelve years (2009-2021). Total project costs could exceed $3,000,000. Targeted 2019 funding request from SCI-MIC: $16,000.

TITLE: Wolf Population Management

The gray wolf has returned to its former range in the Upper Peninsula of Michigan (UP). Since 1989, the Department has monitored wolf population growth and range expansion. As Michigan's wolf population size increased and exceeded levels that required Federal and State agencies to protect the wolves under endangered species statutes, wildlife managers increasingly found themselves responding to wolf-related conflicts. This change in focus prompted the Department to update the state's wolf management plan. The Department revised the management plan again in 2015.

As the wolf population increased, the Department developed a program of research to aid in monitoring their recovery and management. An important component of this work has been the capture and tagging of wolves with radio collars to determine their survival, cause-specific mortality, movements, and pack and territory size. Over 400 wolves have been captured and radio-collared to provide this important information. We have completed the transition from deploying VHF collars to GPS collars that transmit data through satellites. The GPS collars provide more frequent and more accurate locations without the need and expense of aerial relocation flights. At the end of 2018 we were monitoring 32 GPS collared wolves.

In 2018, our research focus has been on continuing our comprehensive analysis of our wolf movement and survival data with Michigan Technological University. In addition to the survival analysis of wolves that we reported on last year, we investigated the form of density dependent habitat selection by wolves. We found that density dependent habitat selection of wolves recovering in the Upper Peninsula was most consistent with the ideal preemptive distribution. In this form of density dependent habitat selection, the first wolves to arrive in a new area select the best habitat. This finding has important implications as it suggests that wolf population density may not indicate the fitness value of their habitat. This finding also suggests that source-sink dynamics are likely to be operating in this population and managers need to consider these dynamics when designing a wolf harvest.

We also continued our assessment of wolf-livestock depredations with State University of New York, College of Environmental Science and Forestry. Our work on wolf-livestock depredation patterns demonstrated nonlinear relationships between cattle density, human density and proportion of agricultural lands with the occurrence of wolf-livestock depredations. Previous studies have always assumed these relationships were linear. The new approach has improved the accuracy of predicting depredations (90%). Identification of high depredation probability areas may allow preemptive deterrence techniques (e.g., lights, fladry, noisemaking devices) to be deployed and focus wolf education efforts. Wolves in the Great Lakes region are currently protected by the Endangered Species Act prohibiting lethal control by state authorities and regulated public harvest. Public harvest of wolves occurred in 2013 in wolf management zones

designed to reduce wolf-related conflicts and improved depredation probability maps may aid in administering future public harvests to reduce conflicts when state controlled wolf management returns.

The information collected from our sample of radio-collared wolves also continues to be critical to our bi-annual wolf abundance surveys. Most importantly, the movement information and identification of pack territories allows us to interpret winter track survey data to estimate wolf abundance. Without a doubt, estimates of wolf abundance are the most important piece of information we collect on this population. In 2018, we estimated a minimum of 662 (± 69) wolves in the Upper Peninsula. We estimated 139 packs with an average pack size of 4.8 animals. The wolf population has remained between 600-700 wolves since 2011.

Partners: Safari Club International-MIC, Michigan Technological University (MTU).

Timeframe and budget: Wolf population monitoring began in 1989 and work continues annually. Total annual costs in years without a survey are approximately $60,000 and annual costs increase to over $100,00 when a survey is conducted. The MTU project was completed in 2017 with a total cost of $135,000. The wolf-livestock depredation work is value-added with no direct costs.

TITLE: Deer and Northern Hardwoods in Michigan

White-tailed deer are arguably the most important terrestrial wildlife species to the economy of the Great Lakes region. About 700,000 hunters pursue deer in Michigan each year, spending an estimated 9.75 million hunting days and generating over $1 billion in revenue. In general, the hunting community equates high deer densities to an improved hunting experience, thus harvest season quotas and land management practices that reduce deer numbers attract considerable public criticism. However, high deer densities can have negative economic and ecological consequences. For example, deer have been implicated in the decline of desirable northern hardwood forests (like oak, yellow birch and hemlock) in Michigan through browsing of tree seedlings and saplings. In some areas, herbivory by deer (and potentially snowshoe hare) undoubtedly have negative impacts on forest regeneration, which ultimately impacts future forest composition. However, the explanation for the decline of northern hardwood forests in many areas of Michigan is likely more complex than just deer herbivory. Other factors like past forest management (e.g., selection silviculture), forest insect and disease outbreaks, and a rapidly changing climate are also implicated in the decline.

Northern hardwood forests are one of the most valuable timber types in Michigan, both economically and for wildlife habitat. The Michigan Department of Natural Resources (MDNR) and forest products industry are interested in evaluating innovative silvicultural approaches to ensure desirable hardwood tree regeneration while minimizing deer browsing impacts. The proposed project will evaluate innovative silvicultural approaches to forest management that alter deer behavior in northern hardwood management areas to reduce browsing affects on tree regeneration. The premise is that these innovative prescriptions can be used to help mitigate deer herbivory impacts, improve seedbed quality, and provide competitive advantages for desirable tree species. The ultimate goal of the research is to identify cost-effective silvicultural techniques that allow regeneration of diverse northern hardwood forests in the presence of deer at densities that offer hunters reasonable opportunities for success.

Progress (2018): All timber treatments on 141 30-acre sites distributed throughout Michigan are complete. These sites represent different combinations of site quality (i.e., tree growing potential) and deer densities (coarsely estimated). Post-treatment vegetation data were collected on all leave top treatment sites during the summer and fall of 2018. On a subset (n=24) of the 141 sites (stratified randomly selected; Fig. 1), we collected post-treatment data on wildlife use using trail cameras within and surrounding the sites, with an emphasis on deer. On average, we had 318 (NLP), 308 (EUP), and 280 (WUP) camera days for each site. We collected 100's of thousands of pictures that are currently being photo-tagged and archived for analysis.

We completed snow track surveys on all camera sites (n=48) January thru March 2018. Logging on some sites extended through June 2018, and we re-deployed cameras as logging ended with our first sites getting cameras back in January 2018. Cameras will remain on these sites for 1 year, and then rotate to new sites.

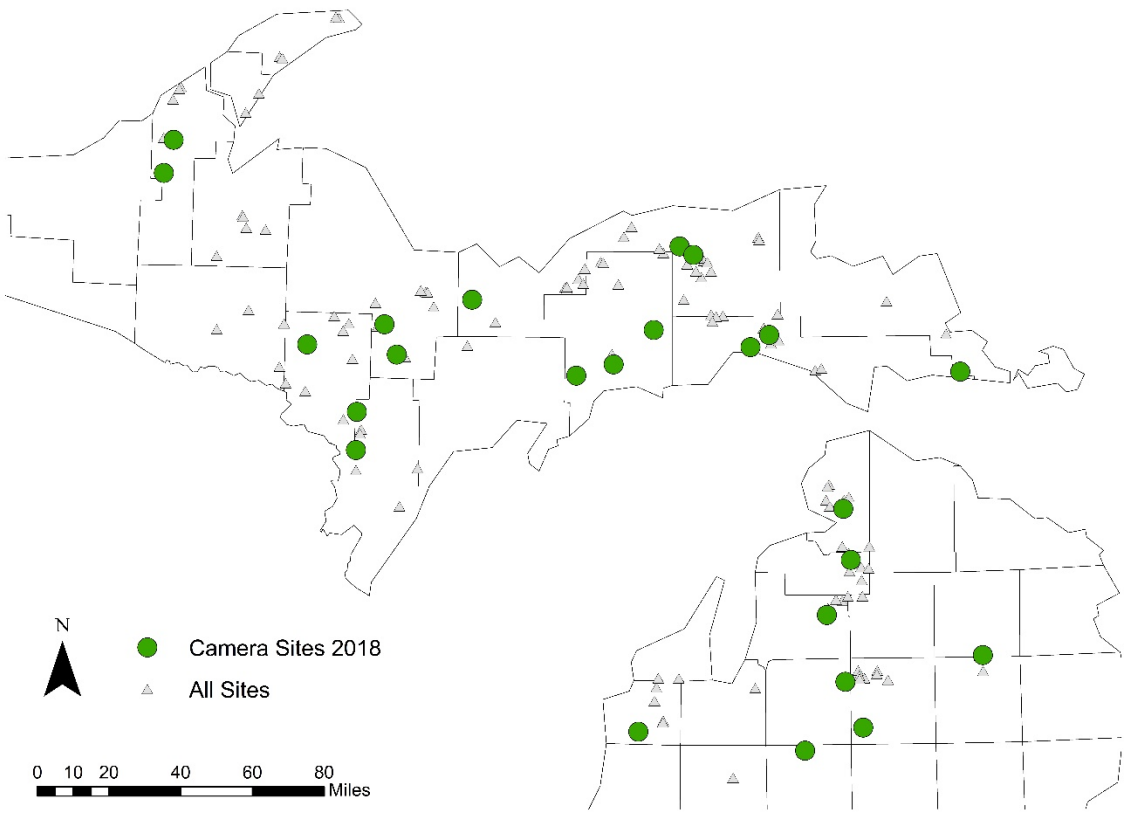

Figure 1. Locations of northern hardwood research sites that are being monitored for deer activity with remote cameras.

We used the 2017 SCI-MIC allocation to purchase a high-end recreational drone for measuring cover of downed wood and amount of scarified soil in our timber harvest areas. Recall that our two understory treatments included leaving treetops to deter deer herbivory and scarification

and herbicides to create optimal growing conditions for tree seedlings. For the leave treetops treatment, the only efficient way to measure the amount and distribution of material is through aerial survey. The drone will allow us to economically photo (during leaf off) our sites, giving us high-resolution imagery to quantify cover of woody debris. We will start our leaf off surveys this winter into spring.

Partners: Safari Club International-MIC, MDNR-Forest Resources and Wildlife Divisions, Michigan State University, Hancock Timber Resources Group, and GMO Renewable Resources

Timeframe and budget: Project started in the summer of 2016, with the first phase of the deer portion scheduled to end in the spring of 2021 (4+ years). The initial budget for deer work approved by MDNR-Wildlife Division was $283,777, with equipment costs projected to exceed that budget. The forest monitoring component of the project started in summer of 2016 and is projected to run for 10 years (the time frame required to ensure that tree regeneration is free to grow). The budget for forest monitoring from MDNR-Forest Resources Division is >$600,000.

TITLE: American Woodcock Nesting

American woodcock (Scolopax minor) breeding populations have been undergoing a long-term decline since 1968 (Cooper and Rau 2012). Existing habitat models for breeding woodcock may fail to capture important processes underlying declines in reproductive rates. Better understanding the relation between habitat/landscape attributes and reproductive success would assist managers in targeting habitat treatments to improve woodcock reproductive success. During 2018, the following work by objective was conducted towards achieving the study outcomes:

> Objective 1. Reproductive success - Estimate nesting density, nesting success and fledgling survival for woodcock in 2 distinct Michigan landscapes over a 3-year period.

During the 2018 field season (late March to late July) we located 27 different nests. Of these, 17 were monitored with cameras. We placed transmitters on 5 hens and 29 chicks. All hens went missing soon after being marked due to failed nests or broods and were not monitored further. The chicks were monitored until they died, moved out of range, or the transmitter stopped working. Most field work occurred in Roscommon County, particularly when tracking chicks, with additional work in Wexford, Missaukee, Clinton, Oakland, and Clare counties. We will use location and survival information from 2018 in conjunction with survival data from the 2017 field season to estimate nest and chick survival.

> Objective 2. Predator identification - Identify predators responsible for predation of woodcock nests and young.

Of the 17 nests that we monitored with cameras, we observed 3 occasions of raccoon predation and 1 occasion of weasel predation. We also observed the presence of coyotes and deer near nests, but no direct evidence of predation by these species. One nest was abandoned presumably due to high human activity in the area, and 2 were abandoned for unknown causes. Two nests with cameras failed, but the camera showed no evidence to confirm or disprove predation. In addition to the 17 nests monitored with cameras, we found 10 nests after they had already either hatched or been destroyed, which we determined by the shape and condition of the empty shells. Of the 27 total nests monitored, 11 were predated or failed for other reasons.

15 nests successfully hatched at least 1 chick, and 1 nest had an unknown fate. One nest in a highly-trafficked deer area was later abandoned, possibly due to high activity by other animals.

One of the transmitter-marked hens had a brood of 3 chicks that were all found dead of apparent weasel predation before they were of appropriate size to be marked with transmitters. Of the 29 chicks that were marked with transmitters, 8 were confirmed dead before the end of the field season. We confirmed that 4 of these chicks died of mammal predation but had insufficient information to determine the cause of death for the remaining 4 chicks. We did not necropsy chicks during this field season because few mortalities provided enough remains to allow for an investigation. Instead, we relied on the condition and puncture patterns of the remains of predated birds to decipher mammalian or avian predation.

> Objective 3. Linking reproductive rates to habitat - Link woodcock reproductive rates to vegetative and physical characteristics near nest sites and surrounding landscapes.

We measured habitat variables around 27 nest sites. These variables included ground and canopy cover, vegetation type, stem density, DBH measurements of trees to later calculate basal area, and distance of the nest to the nearest tree or clearing. In addition to these measurements, we performed the same measurements on random sites that were selected within a 200-meter radius of the nest location, in a random direction and distance from the nest. This paired design will enable comparison of sites that were used by the study animals and sites that were available in the bird's home range but not used. We will perform a use-availability analysis to assess differences between these sites.

The 29 marked chicks belonged to 19 different broods. We performed the same local habitat measurements on brood sites that we did on nesting sites and paired each of them to a random site. For each brood, we performed 3 different vegetation surveys: one in the 0—2-week age range before chicks were able to fly, one in the 2—4-week age range when chicks could fly but were still with their broods, and one when the chicks were 4+ weeks old and had left their broods. Of the 19 broods, we were able to perform all 3 vegetation surveys on 9 of them. We performed 2 vegetation surveys on 11 broods, and at least 1 vegetation survey on 16 broods. We were unable to perform vegetation surveys on 3 broods because chicks either died immediately after marking or were unable to be relocated.

Due to staffing changes and an increased focus on local habitat characteristics instead of landscape characteristics, we did not prioritize investigating woodcock reproductive rates in relation to the surrounding landscape.

Objective 4. Management recommendations - Make recommendations on landscape-dependent habitat management practices that efficiently target improvement in woodcock reproductive rates.

Graduate student, Ashley Huinker, presented preliminary findings in a talk titled "Microhabitat selection and reproductive success of American woodcock in Michigan" at the annual Great Lakes Waterfowl/Migratory Bird Partners' Meeting, Winous Point Marsh Conservancy, Port Clinton, Ohio.

Partners: Safari Club International-MIC, Michigan State University.

Time Line and Budget: This project started in 2016 and is scheduled to run through 2020. Total project cost is $490,000. No additional SCI-MIC funds are requested for this project in FY2019.

2018 Michigan Department of Natural Resources Research Project Request Descriptions

EXISTING PROJECTS REQUESTING FUNDING FOR 2019:

1. Predator-Prey Project (see description above; targeted 2019 funding request from SCI-MIC: $16,000)

2. Wolf Population Management (see description above; targeted 2019 funding request from SCI-MIC: $4,000)

3. Deer and Northern Hardwoods in Michigan (see description above; targeted 2019 funding request from SCI-MIC: $6,000)

NEW PROJECTS REQUESTING FUNDING FOR 2019:

TITLE: QUANTIFYING INDIVIDUAL AND POPULATION-LEVEL RESPONSES OF BLACK BEARS TO BAITING IN MICHIGAN

MANAGEMENT NEED AND APPLICATION: Concentrations of anthropogenic foods such as garbage, agriculture crops, introduced fruit-bearing trees, and bait sites can attract numerous wildlife species, including black bears. Intentional food subsidies for wildlife such as baiting occur extensively and can have important effects on species behavior, space use, and demography. Being opportunistic omnivores, black bears readily use baits placed by hunters to attract both bear and white-tailed deer. In a portion of northern Wisconsin, bear and deer baits provided more than 40% of the assimilated diet of bears. Previous research has shown that supplemental feeding enhances the physiological condition of bears which in turn can improve reproductive performance. This finding suggests that the predictable and easily obtainable bait in northern Wisconsin was at least partially responsible for the high black bear densities observed in that area. There is also evidence that areas with increased abundance of bears accustomed to eating anthropogenic foods can experience increase human-bear conflicts. As intentional feeding has resulted in both positive and negative effects on bear populations, it is an important issue for our bear management program.

Baiting black bears for hunting is a long-standing tradition in Michigan and many other jurisdictions in North America. During the past several regulations cycles there has been persistent interest by some hunters to expand bear baiting opportunities. Hunters have also recently proposed using diversionary feeding to manage bear-human conflicts in place of] the traditional approach of managing conflicts by reducing bear numbers. In addition, a proposed ban on deer baiting in the LP, if implemented, has the potential to influence bear demographics and bear-human conflicts in this region.

The goal of this work is to understand the impact of intentional food subsidies, and potential changes in those subsidies, on UP and NLP bear populations and to develop management recommendations for our bear harvest and conflict management programs.

Understanding the contribution of bait to black bear diets and how it potentially contributes to reproduction is important as it relates to the species ecology, population trends, and harvestable surpluses relative to population goals. A second benefit is to understand the effects of the deer baiting ban in the LP in response to chronic wasting disease beginning in 2019 on black bear populations. If baiting is as beneficial to black bear populations in Michigan as suggested for Wisconsin, the ban on deer baiting could influence black bear populations in the LP. Understanding the magnitude of this effect is important for long-term population monitoring and harvest management of bears in this region. A third benefit is to understand dynamics in bear-human conflicts relative to baiting. The loss of a consistent and high-quality food source (deer bait) in the LP during late summer and fall when bears consume the most food, could result in an increase in bear-human conflicts as a consequence of bears seeking alternative foods. Understanding the cause and mechanisms of change in bear-human conflicts is important for management.

PARTNERS: MDNR and State University of New York College of Environmental Science and Forestry (SUNY ESF).

TIMELINE AND BUDGET: This research will span 5 fiscal years beginning FY19 at an estimated total cost of $416,300. Targeted funding request from SCI-MIC: $4,000.

TITLE: Upper Peninsula Deer Movement

MANAGEMENT NEED AND APPLICATION: Chronic wasting disease (CWD) occurs in free-ranging white-tailed deer (*Odocoileus virginianus*) in the Lower Peninsula of Michigan, and in neighboring Wisconsin, where the disease is endemic. At the time this study began, wildlife managers had not documented CWD in the Upper Peninsula (UP) of Michigan, though CWD was detected in deer from three Wisconsin captive cervid facilities and two wild deer near the Michigan border. While it was not possible to predict if or when CWD would be found in the UP, preparations seemed prudent. On 18 October 2018 CWD was confirmed in Dickinson County's Waucedah Township in a 4-year-old free ranging adult female white-tailed deer that was shot in September on a crop damage permit about 6 km from the Michigan-Wisconsin border. A scientifically-based understanding of deer movements and estimates of population abundance is critical for developing management recommendations in response to CWD. Deer movements and abundance can influence the probability of disease occurrence, contact rates which can affect transmission rate, and geographic extent of an outbreak. Importantly, these data take time to gather and managers need this information to develop appropriate response plans.

During winter 2018 we captured deer (n = 207) in Stephenson box traps at 55 locations including feeding sites, along deer trails, or in timber sales in Little Girls Point (LGP), Lake Gogebic (LKG), and West Iron County (WIC) deer wintering complexes (DWC). We also trapped deer in East Middle Branch (EMB) DWC using Clover traps with the Michigan Predator-Prey study. We affixed a LifeCycle 330 GPS collar (Lotek Wireless Inc., New Market, Ontario, Canada) programmed to obtain a GPS location every 13 hours and attempt to transmit location data via the Global Star network every 26 hours, allowing data access using an online web service.

Overall, we captured and collared 245 and 190 deer, respectively. The age and sex of collared deer included 64 adult females, 29 adult males, 49 fawn females, and 48 fawn males. We achieved our goal of collared deer in each area, with 51 at LGP, 50 at LKG, 51 at WIC, and 38 at EMB.

Snow depths remained sufficiently deep (≥ 30 cm [>12 inches]) to inhibit deer from leaving the complexes until 25 April when deer began migrating. Though some deer did not migrate until 20 May, long after snow had melted across the region, most deer from LGP, LKG, and EMB migrated from their winter to summer ranges during late April. Many individuals in WIC, the western part of LGP, and the southern part of LKG appeared to be resident/non-migratory.

From these collared deer we observed spring migratory movements of up to 54 miles and note that the migratory movements are for the most part, directional. Movements of deer from these wintering complexes to their summer range encompass large areas, on average just over 360 square miles. But they were quite variable and ranged from 238 square miles all the way up to over 665 square miles depending on the wintering complex. We also observed some mixing of deer from different wintering complexes on the summer range. Together, these observations suggest that there would be a risk of transmitting CWD across very large areas because of this migratory behavior.

Of the deer collared along the Wisconsin border, 12 of the animals entered Wisconsin, and 8 of those 12 have established summer home ranges across the state line. One of the collared deer from the West Iron County complex came within 20 miles of one of the infected captive cervid facilities. These observations demonstrate that there is at least some risk of CWD entering the Upper Peninsula from Wisconsin simply by deer moving back and forth across the border.

The UP is somewhat unique in comparison to the Lower Peninsula in that the combination of high densities of deer in the wintering complexes and long-distance migrations increase the risk of CWD transmission across very large areas.

To estimate deer abundance on the respective summer ranges, we deployed 150 cameras in LGP, LKG, and WIC during July and retrieved the cameras in October. Cameras were triggered 84,450 times resulting in 253,350 images. Additionally, the Michigan Predator-Prey study deployed cameras (n = 52) in an array that partially covers the East Middle Branch wintering complex which will be used as a fourth population to estimate abundance. Cataloging and analysis of images are ongoing.

PARTNERS: Safari Club International-MIC, State University of New York College of Environmental Science and Forestry (SUNY ESF).

TIMELINE and BUDGET: The initial phase of this project is being conducted in the western UP with a duration of 4 years (2018-2021) with an estimated cost of $613,000. Targeted funding request from SCI-MIC: $4,000.

TITLE: UNDERSTANDING THE VALUE OF MICHIGAN'S STATE GAME AND WILDLIFE AREAS

MANAGEMENT NEED AND APPLICATION: Michigan's state game area (SGA) system provides habitat for a diversity of wildlife species, while simultaneously offering a space for wildlife-related recreation, including hunting, trapping, fishing, and wildlife viewing. While designated to provide for wildlife conservation and associated forms of wildlife-related recreation, prior assessments of the SGA system have found that these areas are also used for a diversity of non-wildlife related recreation as well, including but not limited to hiking, berry picking, mushroom hunting, cross-country skiing, camping, bicycling, and kayaking. Results of past assessments highlight the seasonal variability in recreational uses, as well as a potential tension between the intended use of the system for wildlife-related recreation and the actual use

that includes a diversity of recreation ostensibly not related to wildlife, particularly during the spring and summer months.

In 2015, the DNR formed the Blue Ribbon Advisory Group for Southern Michigan State Game Areas, tasked with proposing a new vision for the future of the SGA system and recommending strategies to achieve that vision. Among several recommendations, the group suggested the SGAs, as “community assets”, should “build trust through increased public accessibility…demonstrating benefits for all community members” (p. 14). In addition to the recommendations provided by the Blue Ribbon Advisory Group, WLD staff have further elaborated needs and concerns with respect to the SGA system. The foremost need identified is to characterize the recreational use on game areas in an efficient manner. WLD staff have little capacity to measure recreational use, and therefore must make well-reasoned assumptions about use in determining goals and objectives for SGA management. In addition, no systematic public input or involvement process has been carried out on the game areas, so staff are uncertain as to public expectations from the SGA system, and are therefore unable to gauge whether they are providing the benefits desired by users.

This research seeks to (1) characterize annual recreational use on SGAs by season, including estimating magnitude of visits, assessing primary and secondary purposes, assessing satisfaction of visitors, identifying distance traveled, and characterizing any recreational conflict between users, with special emphasis on potentially competing wildlife-dependent and non-wildlife dependent recreation ; (2) solicit user input on SGA management, including management goals, programs, amenities, and relevant good governance practices; (3) characterize the value of the SGA system to local communities; and (4) develop a protocol for assessing recreational use so data may be efficiently collected by field staff and analyzed by researchers.

This study is a pilot effort aimed at developing a protocol that may be used by managers desiring future game area use assessments. Two game areas will be selected for this study, one in the Southeast Region and one in the Southwest Region. The approach will include a combination of camera monitoring supplemented with in-person intercept surveys, administered via tablets with a fillable PDF as well as windshield mail back surveys. Results of this research will help game area managers to understand the value of the game area to users and to more effectively align management with user needs. In addition, through piloting the camera monitoring and survey protocol, we will be able to determine feasibility of the approach or modified approach as a protocol for future game area use assessments.

PARTNERS: MDNR

TIMELINE and BUDGET: This research will span 3 fiscal years beginning FY19. This is an internal MDNR project with a total estimated cost of $15,900**.** Funds are needed to purchase trail cameras and the targeted funding request from SCI-MIC: $2,000.