

## 2017 Michigan Department of Natural Resources Research Project Request Descriptions

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### Predator-Prey Project—Phase III

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 and the third winter of Phase II is starting.

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. This past year, we completed the fieldwork in Phase II and the graduate students are currently analyzing data from the past 3 years and beginning to make comparisons with our findings from the low-snowfall zone study area.

Phase III of the project (high-snowfall zone) began in summer 2016. We established our field housing, captured and collared black bears, established hair snare sites for bobcats and bears, and conducted surveys for white-tailed deer, coyotes, and beavers. Deer trapping will begin in early January 2017.

This cooperative study with Mississippi State University investigating the role of predators, winter weather, and habitat on deer fawn survival in the Upper Peninsula is one of the best-documented research projects conducted by the Michigan DNR. You can find progress reports and links to technical publications from this research project on the project's website:

<http://www.fwrc.msstate.edu/carnivore/predatorprey/index.asp>

There is also a link to the website on the SCI MIC website:

<http://www.scimic.org/projects.html>

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/MIpredprey>

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; and Mississippi State University

Time Line and Budget: This project is anticipated to be conducted in three snowfall zones in the UP with a total duration of approximately twelve years. Total project costs could exceed \$3,000,000.

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### **Gray Wolf Population Project**

The gray wolf has returned to its former range in the Upper Peninsula of Michigan (UP). Wolf population growth and range expansion have been monitored since 1989. In winter 2014, we estimated there were at least 636 wolves in the UP and a wolf survey will be conducted in 2017. As the wolf population increased, a program of research was developed to aid in monitoring their recovery and management. Over 400 wolves have been captured and radio-collared providing important information on distribution, movements, and pack and territory size. This information is critical to our annual population census. Population estimates are becoming increasingly difficult as the current technique relies on identification of individuals within discrete packs. We are beginning the transition from deploying VHF collars to GPS collars with a satellite link. The GPS collars should provide more robust data, better location accuracy, and reduce the flight time necessary to conduct surveys. Important work has been done on evaluating alternative approaches to estimating population size and a new sampling procedure, which will save us time and money has been implemented. We have also developed a model of wolf habitat use that predicts the amount and location of suitable habitat. Using data from collared wolves we are currently conducting a comprehensive analysis of wolf survival and dispersal rates. These estimates are necessary for modeling efforts designed to examine wolf population response to various management scenarios.

US Fish and Wildlife Service removed wolves in the Great Lakes Region from the Federal list of threatened and endangered species in January of 2012. However, on December 19, 2014, Federal District Court for the District of Columbia granted the Humane Society's motion for summary judgment and vacated the rule that delisted wolves in the Great Lakes Region. Wolves in Michigan are once again on the federal endangered species list.

Partners: Safari Club International-MIC, USDA-Wildlife Services, Michigan Technological University

Time Line and Budget: This project started in 1999 and will continue for at least five years following Federal delisting, and annual monitoring will likely be needed to support any potential Michigan wolf harvest seasons. Thus, we need to maintain a sample of radio-collared wolves. Total project costs are greater than \$800,000.

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## American Woodcock Nesting Research

American woodcock (*Scolopax minor*) breeding population indices in Michigan, the Central Management Unit, and range-wide suggest a long-term decline in woodcock abundance since 1968. Management responses to declining woodcock abundance included restricting harvest opportunities (i.e., reduce season lengths and daily limits: Cooper and Rau 2012) and promoting habitat management to increase early successional forests that benefit woodcock and other wildlife species associated with these habitats (e.g., ruffed grouse: *Bonasa umbellus* and golden-winged warbler: *Vermivora chrysoptera*). Although many biologists believe that loss of breeding habitat quality and quantity was responsible for woodcock population declines, there are many uncertainties that may affect woodcock management efficiency and effectiveness; at a continental scale, there is need to “improve understanding of migration, breeding, and wintering habitat quality for American woodcock”. Existing habitat models for breeding woodcock rely on correlates between presence/absence or abundance of animals on the landscape and these models may fail to capture important processes underlying declines in reproductive rates. We believe that the highest priority information needed to improve management of woodcock in the Great Lakes Region is better understanding the relation between woodcock breeding habitat characteristics and 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.

Available demographic information for woodcock supports the idea that declines in reproductive rates associated with changes in landscape-scale habitat characteristics have contributed to declining woodcock abundance. MDNR’s volunteer woodcock banding program has provided long-term estimates of woodcock survival with adult and juvenile survival being relatively stable while woodcock abundance was declining. Woodcock wings from a sample of hunters have been collected by the U.S. Fish and Wildlife Service (USFWS) since 1963 and an index to reproductive success derived from this sample (juveniles per adult females) suggest long-term decline in harvest age ratios. However, the relations between harvest age ratios and more direct measures of reproductive success (e.g., nesting success and brood survival) have not been tested. Woodcock nest early in spring and survival of nests have generally been high (43-67% nest success) and although survival of nests and young can be affected by weather, most nest losses result from predation. The degree to which predation rates and nesting success have changed and are tied to landscape characteristics is relatively unstudied; however, changes in landscape-scale habitat characteristics on breeding areas appear to have affected woodcock demographics as woodcock population trajectories varied among broad ecosystem types (i.e., bird conservation regions: BCR’s) with relative population stability in the Boreal Hardwood Transition compared to declines in the Prairie Hardwood Transition and other ecosystems.

### OBJECTIVES

- Estimate nesting density, nesting success and fledgling survival for woodcock in 2 distinct Michigan landscapes over a 3-year period.
- Identify predators responsible for predation of woodcock nests and young.

- Link woodcock reproductive rates to vegetative and physical characteristics near nest sites and surrounding landscapes
- Make recommendations on landscape-dependent habitat management practices that efficiently target improvement in woodcock reproductive rates.

Partners: SCI-MIC, Michigan State University.

Time Line and Budget: This project was initiated in the spring of 2015, but field work was delayed a year. The project is now scheduled to continue through 2019. Total project costs will exceed \$489,000 (including over \$170,000 in matching funds from Michigan State University).

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## **Mute Swan Research**

Mute swans (*Cygnus olor*) are not native to North America and distribution and abundance of this invasive species has increased significantly throughout the lower Great Lakes since their introduction in the mid-twentieth century. There is much concern about negative impacts of mute swans on native waterfowl, waterbirds, submerged aquatic vegetation, and wetland habitats. Given that the species is non-native, and projected ecological and social impacts could be large, the Mississippi Flyway Council and Michigan Department of Natural Resources (MDNR) established control policies and associated population reduction goals in the mid-1990s.

Swan abundance in Michigan has been monitored via MDNR's spring waterfowl survey, but despite initiation of control efforts focused on public lands in the core of the Michigan range, the mute swan population continued to grow rapidly through 2010. The MDNR reviewed existing policies and control programs in 2010 in consultation with Federal agencies, local governmental units, animal welfare groups, waterfowl hunting groups, conservation organizations, and other stakeholders. Part of the evaluation included critical review of population dynamics and levels of control needed to meet a short-term goal of population stabilization and long-term population goal of no more than 2,000 mute swans in Michigan by 2030.

Recent efforts to control mute swan population growth in Michigan were guided by a model predicting population response to natural and management-induced mortality. This model was based on available literature and mute swan models developed for other regions with the primary management alternatives being lethal take of different age classes or reproductive classes (i.e., experienced and inexperienced breeders), and nest/egg destruction. There is considerable uncertainty about reproductive parameter estimates, the subadult life cycle of mute swans, and the potential for age-varying breeding propensity in relation to breeding densities. Inaccurate estimates of vital rates can translate into unrealistic predictions about take of adult mute swans or levels of nest destruction required to meet objectives and this could result in delayed achievement of population goals, causing prolonged impacts to natural resources. Similarly, management efficiency may be compromised by a poorly parameterized

model and as mute swan numbers are reduced, it will be increasingly important to efficiently target cohorts that are contributing to reoccupation of breeding sites (e.g., 1-, 2-, and 3-year olds).

## **OBJECTIVES**

- Estimate age-specific survival, reproductive and recruitment rates of mute swans in Michigan
- Monitor seasonal movements and identify concentration areas of mute swans that can be targeted for management
- Modify existing population models to improve prediction of mute swan population responses to control efforts
- Simulate effects of alternative strategies for controlling mute swans and develop management recommendations

Partners: SCI-MIC, Michigan State University.

Time Line and Budget: This project was initiated in the fall of 2014 and is scheduled to continue through 2018. Total project costs will exceed \$487,000 (including approximately \$170,000 in matching funds from Michigan State University).

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## **Deer and Northern Hardwoods in Michigan- NEW PROJECT REQUEST FOR 2017**

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 (e.g., crop damage, deer vehicle collisions, disease transmission to domestic animals). For example, deer have been implicated in the decline of desirable northern hardwood forests 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, 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 system (e.g., selection silviculture), forest insect and disease outbreaks, and a rapidly changing climate are also likely implicated in the decline.

Northern hardwood forests are one of the most valuable timber types in Michigan and 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. Because deer are

such an economically valuable species to Michigan, aggressive population reduction outside of the recreational hunting season is not a socially or politically acceptable option. The proposed project will evaluate innovative silvicultural approaches to forest management that alter deer behavior in northern hardwood management areas to reduce browsing effects 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 (like oak, yellow birch, hemlock). 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.

Partners: MDNR-Forest Resources Division, Michigan State University, SCI-MIC, Hancock Timber Resources Group, GMO Renewable Resources

Time Line and budget: This 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 2016 and is projected to run for 10 years with a budget of >\$600,000.

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