Department of Natural Resources
SCI-MIC Supported Research Projects
2021 Progress Reports

Project Title - Deer and Northern Hardwoods in Michigan

Project Background - White-tailed deer are arguably the most important terrestrial wildlife species to the economy of the Great Lakes region. Historically, about 700,000 hunters pursued deer in Michigan annually, spending an estimated 9.75 million hunting days and generating over $1 billion in revenue. Although hunter numbers have declined in recent years (540,000 hunters in 2020), deer and deer hunting continue to generate considerable recreational and economic interests in Michigan. 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 tree species (like oak, yellow birch and hemlock) in Michigan through browsing of tree seedlings and saplings. In some areas, herbivory by deer undoubtedly has negative impacts on forest regeneration, which ultimately impacts future forest composition and deer habitat. However, the explanation for the decline of northern hardwood forest tree species 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. This project evaluates these 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. The 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 2021 - Recall that 140 30-ac sites, ranging from Grayling to the base of the Keweenaw Peninsula, were timber harvested in the winter of 2017-2018, so vegetation on the treatment sites is entering the 5th growing season in summer 2022. Post-treatment vegetation data were collected on the sites during the summer and fall of 2019. In 2020, approximately half of the sites were sprayed with herbicides to control competing vegetation and then scarified with heavy equipment to provide suitable germination substrate for light-seeded tree species (like birch).

On a subset (n=48; called camera sites) of the 140 sites, we continued to collect post-treatment data on wildlife use using trail cameras within and surrounding the sites, with an emphasis on deer. Twelve camera sites are permanently monitored for deer; the other 36 are sampled on a 3-year rotation (12 sites per year; 3 years to get through all 36 sites). In 2021, we removed 96 cameras from the 2020 rotation sites, and deployed them in the 2021 site subset (n=12). In spring of 2021, we completed the first full camera rotation among our sites. Hence, in 2022 we

start the second and arguably most important (because regenerating trees have grown into the browse zone) rotation of deer sampling. To date, we have collected >3 million pictures that are being photo-tagged and archived on an ongoing basis for analysis. Due to the large number of photos, we are using a machine learning algorithm to identify images with animals, and then manual quantification of images with animals. We constantly monitor the performance of the machine learning algorithm by conducting occasional checks of individual photos. Deer occupy every study site and as expected, intensity of deer use varies seasonally. We will use the photos to quantify residence time (i.e., how long the deer stays in front of the camera) and frequency of deer use. The prediction is that residence time and deer use will decline in treatments that are tougher for deer to move through (e.g., treatments where treetops were left as physical barriers to deer movement).

In 2021, we again collected tree survival data from our planting test in leave tops (i.e., tops from harvested trees specifically left to deter deer movement). Recall that we planted desirable browse species (i.e., red oak, yellow birch, paper birch, American chestnut; 4 of each) inside and outside of a treetop in shelterwood and seed tree treatments in the eastern Upper and northern Lower Peninsulas (8 sites). Trees were planted in a grid (1 foot spacing) in October thru November 2019. In August – October 2021 we monitored survival and browse activity on planted grids, with the prediction that trees inside of treetops will show less herbivory than those outside of treetops. We are seeing a clear treetop effect in these data, with “waste high” planted birches in tops but no birch outside of tops.

We used the 2021 SCI-MIC funding allocation to support camera data collection by purchasing camera batteries (which are swapped every 4-6 months to keep cameras running year around). We use lithium batteries for better performance during temperature extremes. Each time we swap batteries it costs approximately $1,500 so SCI-MIC support for this expense is greatly appreciated.

Partners - Safari Club International-Michigan Involvement Committee, MDNR-Forest Resources and Wildlife Divisions, Michigan State University, Hancock Timber Resources Group, the Rohatyn Group (formerly GMO Renewable Resources), National Council for Air and Stream Improvement (NCASI), and U.S. Fish and Wildlife Service.

Timeframe and budget - The Phase I (i.e., camera monitoring through the first rotation) budget for deer work approved by DNR was $283,777, and DNR approved another $184,176 for Phase II data collection (personnel and travel costs). Additionally, the National Council for Air and Stream Improvement (NCASI) committed $57,599 from 2020 – 2022 in support of personnel to assist with field data collection. Cost of lithium batteries to maintain our cameras for collecting data on deer use continue to be difficult to manage with current funding sources, and SCI -MIC’s support of that portion of the project in previous years has been a critical component of the study.