

NEW PROJECTS REQUESTING FUNDING FOR 2020:

TITLE: ORPHANED CUB PROGRAM

MANAGEMENT NEED AND APPLICATION: Bear cubs are typically born in January and are fully dependent on their mother until approximately 7 months-of-age. During this time of dependency, cubs sometimes become separated from their mothers and/or their mothers die leaving them orphaned. Sometimes these orphans are found by well-intentioned people and turned over to DNR. Removal of a few cubs annually from Michigan's bear population would have no effect on sustainability of bears, however; it has been repeatedly confirmed that euthanasia of orphaned cubs is not publicly accepted. Orphaned cubs less than approximately 4 to 6 months-of-age can be successfully placed with sows that have their own cubs. For this purpose, DNR maintains 6 to 8 radio-collared adult sows annually so they can serve as surrogate mothers for orphans.

Additionally, surrogate sows are used for training DNR staff in anesthetizing and handling bears, and they are incorporated into educational programs. For example, DNR has made available online curriculum for K-5 on the life history of Michigan bears and some of the information used for developing these materials originated from surrogate sows'. Occasionally, DNR allows stakeholders, reporters and politicians to accompany biologists on winter den checks to replace radio-collars. This is done in an educational setting and provides positive public relations. Lastly, although the number of sows maintained annually is not enough for conducting rigorous research, data from den checks collected over many years provides supplemental information on habitat use and reproduction valuable for monitoring the bear population.

PARTNERS: MDNR

TIMELINE AND BUDGET: This is an annual project. Targeted funding request from SCI-MIC: \$4,000.

TITLE: ADVANCING GENETIC ANALYSIS CAPACITY OF MICHIGAN DNR TO SUPPORT WILDLIFE DISEASE AND POPULATION MANAGEMENT

BACKGROUND: The Michigan Department of Natural Resources Wildlife Division proposes to purchase an Illumina MiniSeq Sequencing System (MiniSeq) to facilitate high-throughput genetic analyses for wildlife population health and management. This machine implements

recent technological advances in genomic science and will allow for the expansion of capabilities currently available through the Wildlife Health Section. For example, this machine will allow us to address needs for large-scale surveys and will facilitate genomic sequencing approaches to better address host-pathogen interactions. This machine harnesses cutting-edge technology to allow for many animals to be analyzed at a single time, both driving down costs for personnel time and consumables while producing high-quality digitized data readily available for analysis.

MANAGEMENT NEED AND APPLICATION:

Wildlife Disease Assessment

The DNR has received funding through the Michigan State University and Michigan DNR joint Wildlife Disease Initiative (\$233,697) and the Fish and Wildlife Multi-state Conservation Grants Program (\$143,000) for the development of a standardized, high-throughput genetic resource to inform white-tailed deer population and disease management. The end-product of this work will include a genomic panel designed specifically for wildlife managers to identify genetic variation in white-tailed deer relative to disease status. The panel will be faster, more universal, provide more information, and be less expensive than current methods being employed.

Once the panel is available, the DNR will be able to use the MiniSeq to gather genetic data to assess the susceptibility of deer to Chronic Wasting Disease (CWD), determine whether CWD or tuberculosis (Tb) positive deer are of local origin, resolve relationships among diseased animals, and determine how landscape features impact population connectivity and disease spread. These data could help inform decisions on several important management issues including: 1) delineation of deer management units to better align with disease presence and potential for spread in the local landscape, 2) identifying harvest regulations that could impact spread or prevalence of disease, 3) planning for long-term disease surveillance to align with the genetic potential for deer to harbor the disease without apparent symptoms, and 4) allocation of local population control augmentation efforts to maximize the potential to limit spread of disease.

Black Bear Population Monitoring

The Wildlife Division's black bear program is proposing a project to begin in FY2021 that could benefit from the MiniSeq for estimation of black bear populations in the Upper Peninsula (UP). Most Michigan black bears are found in the UP, and they have important biological, social, and economic impacts. Hunting is the primary tool for management of bear populations in Michigan. A black bear population estimate is critical to ensure the DNR can make appropriate harvest quota recommendations and evaluate the effects of previous harvests on the UP-bear population. A sound population estimate helps ensure bear populations remain at levels that provide sustainable harvest, minimize nuisance issues, and maintain a positive public perception of bears.

The DNR's current bear population estimation technique relies on a statistical modeling framework called statistical catch-at-age analysis (SCAA), which provides detailed, annual estimates of the bear population in the UP and northern Lower Peninsula (NLP). The SCAA models combine harvest composition and effort data provided by hunters to model changes in the bear population over time, scaling the population abundance estimate with information from periodic independent population estimates. Past research has indicated that without an independent population estimate about every 5 years, the UP SCAA model would overestimate

the bear population, which could affect the quota-setting process and potentially the bear population. Since 1990, the DNR has used a mark-recapture technique using the antibiotic tetracycline to estimate the UP-bear population. Due to recent changes in federal regulatory guidelines, the DNR can no longer conduct the tetracycline survey and is researching a replacement technique. The newly developed technique called close-kin mark-recapture (CKMR) shows promise, but the proposed methodology is dependent on a MiniSeq platform. The CKMR technique would allow the DNR to estimate the bear population in the UP based on genetic identification of parent-offspring pairs in the bear harvest. Using the CKMR technique could save the DNR at least 2,000 hours of staff time per survey year over the tetracycline survey and would provide estimates 1.5 years earlier than with the tetracycline survey. If successful, the DNR could also use the CKMR technique in the northern Lower Peninsula, replacing the current genetic mark-recapture survey and saving an additional 3,000 hours of staff time per survey year. In both cases, the DNR would use the CKMR-based population estimate as input for the SCAA models.

The MiniSeq platform would allow for the development of similar panels for other managed wildlife species as being done for deer and proposed for bear to assist the Department with high quality genetic data to inform management decisions.

PARTNERS: The DNR is partnering with Iowa State University, University of Wisconsin-Milwaukee, Texas A&M University- Kingsville, and the USGS National Wildlife Health Center on the deer panel project and proposes to partner with Michigan Technological University and at least one additional partner on the bear CKMR project.

TIMELINE AND BUDGET: Targeted funding request from SCI-MIC to cover the purchase of the MiniSeq is \$49,500. The genomic panel necessary to use the MiniSeq for the deer CWD project and funds to initiate the bear CKRM project will not be available until FY2021. Initial results from the deer CWD project would be available beginning no later than FY2023 and follow-up results on new requests would be available thereafter on a much shorter, as-needed timeline. The exact timeline of the bear CKMR project has not been determined, but final results would likely be available by FY2025.
