



GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
LANSING



DANIEL EICHENGER
DIRECTOR

December 22, 2022

REQUEST FOR PROPOSALS TO CONDUCT APPLIED WILDLIFE RESEARCH

Dear Researcher,

The Wildlife Division of the Michigan Department of Natural Resources (DNR) is soliciting proposals to conduct applied research focusing on specific wildlife management needs. A research need arises when there is a lack of information that impedes or is likely to impede wildlife management/restoration or the public benefit derived from Michigan's wildlife resources. We are only requesting proposals that address four priority research needs detailed in the attached list.

We anticipate awarding up to \$1.85 million in total to complete these research projects addressing our four priority needs. All proposals must contain the elements specified in this Request for Proposals (RFP) and be submitted by 11:59 pm on 10 February 2023. Successful proposals must result in applied technique recommendations that address these needs. Additionally, successful proposals must support the Wildlife Division's Mission:

To enhance, restore, and conserve the state's wildlife resources, natural communities, and ecosystems for the benefit of current and future generations.

Proposals will be evaluated based on the information provided in the proposal guidelines (Attachment A). Evaluation criteria will include but not be limited to, how the proposal meets the provided objectives, the benefit to the Department, applicant personnel qualifications, and cost. Proposals selected for funding will be used to cooperatively establish a grant agreement between the Wildlife Division and the successful applicant and will serve as the project work plan.

Funds for selected proposals will derive from federal Pittman-Robertson Wildlife Restoration Act (PR) funds that require a non-federal match. Successful applicants must provide a minimum of a 25% cost share that will be used to satisfy the Wildlife Division's nonfederal match requirement. As successful proposals become cooperative research projects with contributions from both the applicants and the DNR, **no payment of overhead costs (indirect costs) will be provided**. A waiver of the applicants' normal overhead costs, however, can be used to satisfy the 25% nonfederal match requirement.

Attached is the list of priority research projects we are requesting proposals for through this announcement. Proposals for projects that are not specifically designed to address one of these priorities will not be considered.

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RFP TIMELINE AND PROCESS:

ISSUE

This announcement and the open application period begin on 22 December 2022.

WHO MAY APPLY

This opportunity is open to institutions of higher education, i.e., colleges and universities. Other organizations and agencies can be involved with the research and may appear on the proposal; however, the Wildlife Division only has granting authority for research with colleges and universities. Therefore, the application, Principal Investigator(s), award dollars, and responsibilities for meeting grant agreement objectives, deliverables, and reports must be with a college or university. Researchers must also have a demonstrated ability to conduct graduate level research on applied wildlife conservation issues.

PROPOSAL SUBMISSION REQUIREMENTS:

- Due Date - 11:59 pm on 10 February 2023
- Proposal Topic – Proposals must address one of the following priority research needs (hyperlink is the application template for each title):

[Title 1](#): Estimating abundance of limited take furbearers

[Title 2](#): Managing the Socio-Ecological System for Human-Black Bear Interactions in the Northern Lower Peninsula

[Title 3](#): Ecological Functions and Services of Managed Wetlands

[Title 4](#): Evaluating Outcomes of Habitat Management on Southern Michigan State Game Areas

Proposals for projects that are not specifically designed to address one of these priorities will not be considered.

- Proposal Format – Formatting and section requirements are described in detail in the “Proposal Requirements” section. Templates in MS Word are also provided below to assist in completing proposals and ensuring all proposal elements are provided. Please submit your proposal **as either a single docx or pdf attachment**. We will consider proposals in other formats; however, other attachment types and large file size may interfere with our receiving your proposal correctly and timely.
- Submittal Method – Email your proposal to Jamie Fuller at FullerJ1@michigan.gov using the following subject line: **FY2023 WLD RFP – Title # and Submitter Name** (e.g., *FY2023 WLD RFP - Title 1 Stephen Beyer*). Please provide contact information in your submittal

email for the designated person we can contact should we have any problems with properly receiving your proposal.

- Confirmation Email – A confirmation email will be sent to the Submitter. If a confirmation email is not received, please contact Jamie Fuller at (517) 648-4222 to confirm receipt before the deadline.

PROPOSAL AWARDS:

- Proposals will be evaluated based on the following criteria:
 - The approach, timeline, and budget are realistic to achieve the objectives.
 - The sampling and data collection are at the appropriate temporal and geographic scales.
 - Proposed data analyses are appropriate for the desired inferences.
 - The Principal Investigators have the qualifications, education, experience, and resources to successfully complete the project.
- Proposal Award – Award of any project will be contingent upon available funding and is not guaranteed until a grant agreement is developed with successful applicants and issued by the Wildlife Division. Until the agreement is issued and a Delivery Order is released, the State of Michigan is not liable for any cost incurred by the successful applicant.
- Proposal Integration and Coordination – Each successful applicant will be assigned a Wildlife Division Principal Investigator (DNR PI) for their project. Proposals that demonstrate clear plans for integrating DNR PI with project staff or graduate students (e.g., committee membership) are particularly desired. Reporting requirements other than annual and ultimate project deliverables are determined by the DNR PI. The DNR PI is also responsible for verifying accomplishments and conditions before any award payments are made. The DNR PI is the contact person and coordinator for any other DNR staff that may be involved in the project.

AGREEMENT PERIOD

- Starting Date – we expect agreements to be in place by 15 April 2023.
- Once initiated, agreements follow the federal and Michigan fiscal years that begin on 1 October and end on 30 September. Agreements typically span multiple fiscal years, but rarely exceed six fiscal years. For those agreements that span a fiscal year, an annual performance report is required by 30 September of each fiscal year. For all agreements, a final report will be due by 30 September during the last year of the agreement. Depending on the complexity of the project, quarterly or bi-annual reports may be required.

- End Date – proposals typically end on 30 September of the last fiscal year covered by the agreement.

AGREEMENT TYPE

- Fixed Cost – Successful applicant invoices the Wildlife Division quarterly for $\frac{1}{4}$ of the annual agreement costs. Fourth quarter payment will be held until receipt of annual report or final report and all deliverables if final year of agreement.
- Matching Funds – Applicants must provide 25% of the total project award value in non-federal match funds. Applicants may use the waiver of indirect costs to satisfy this matching requirement.
- Indirect Costs – No payment of applicant's indirect costs will be allowed as part of any award. The waiver of indirect costs, however, can be used to satisfy the applicant's non-federal match.

USE OF FEDERAL FUNDS

Under the terms of our grant agreements, award recipients are considered vendors and are not expected to treat funds received as federally derived. Some policies and procedures required of the Wildlife Division as a recipient of federal funds, however, may be shared with the successful applicant. These conditions will be included in the grant agreement and primarily deal with developed projects and disposition of data and items with retained value as follows:

DISPOSITION OF DATA, DATASETS, EQUIPMENT, AND RESIDUAL SUPPLIES

- The successful applicant will provide all collected data, developed datasets and models, and other products developed under the grant agreement to the Wildlife Division at the conclusion of the award period.
- Any equipment purchased with funds from the successful applicant's grant agreement along with any unconsumed supplies will be returned to the Wildlife Division at the conclusion of the award period.

EXPECTATIONS FOR WORKING WITH THE WILDLIFE DIVISION

- Principal Investigators – Each successful applicant will designate a Principal Investigator to work with the Wildlife Division's Principal Investigator on aspects of study design, feasibility, needs for modification, and for meet reporting and deliverable requirements.
- Study Teams – Each project will have a small team (4-8) of Wildlife Division staff who are involved with and have a vested interests in incorporating the results of the research into management. Principal Investigators will be expected to meet with the Study Team at least twice per year to discuss implementation issues and to ensure study objectives are being adequately addressed. Study Teams will be involved in developing

management recommendations while assisting in ensuring results and recommendations are integrated throughout the Division.

- Other WLD Personnel – The Principal Investigator for the successful applicant, or their graduate students, may be requested to provide presentations and updates to Wildlife Division staff for training and update purposes.
- DNR personnel, DNR Director, and Natural Resources Commission – in some cases, the Principal Investigator may be requested to provide updates and findings to be used in setting policies and regulations.

ANTICIPATED AWARD AMOUNTS

The Wildlife Division has budgeted \$1.85 million to address 4 priority research needs. The total award that will be provided in aggregate for these research needs will not exceed \$1.85 million. There is no set minimum or maximum amount to be awarded per need, but we anticipate award amounts in the ranges as follows:

Priority Need	Anticipated Range of Award
TITLE 1: Estimating abundance of limited take furbearers	\$125,000-\$205,000
TITLE 2: Managing the Socio-Ecological System for Human-Black Bear Interactions in the Northern Lower Peninsula	\$250,000-\$500,000
TITLE 3: Ecological Functions and Services of Managed Wetlands	\$350,000-\$500,000
TITLE 4: Evaluating Outcomes of Habitat Management including Fire on Southern Michigan State Game Areas	\$400,000-\$650,000
Total Awards	\$1,850,000

PROPOSAL REQUIREMENTS:

The following provides instructions for each proposal section. We strongly recommend you download and use the appropriate project template from the following list:

[Title 1](#): Estimating abundance of limited take furbearers

[Title 2](#): Managing the Socio-Ecological System for Human-Black Bear Interactions in the Northern Lower Peninsula

[Title 3](#): Ecological Functions and Services of Managed Wetlands

[Title 4](#): Evaluating Outcomes of Habitat Management on Southern Michigan State Game Areas

Proposals must be a maximum of 10 pages, single-spaced with double space between paragraphs, 12-point font, and margins of 1 inch. The 10-page limit includes literature citations but excludes budget and investigator bio-sketches.

Be sure to carefully read the Statement of Work provided for the research need that your proposal is addressing. In particular, please make sure your proposal addresses the needs, objectives, expected application of results, and deliverables specified in the Statement of Work

The required proposal elements are as follows:

TITLE

The title number and name from the “FY 2023 RFP Priority Research Needs” section below will be the title name of your proposal.

APPLICANT INVESTIGATORS

Applicant Principal Investigator Name, Title, Department/Division, University/Institution Name, Phone Number, Email Address

Provide same information for any additional applicant investigators or co-Principal Investigators.

METHODS AND APPROACH

Please describe the approach for addressing each objective, including the methods and associated activities you will use. Enough detail is needed to determine the efficacy of your approach. This description will also be used to evaluate the appropriateness of the budget request. The information in this section is also used to determine compliance needs for the DNR’s federal grant if the activities could affect a federally listed species (ESA Section 7) or if the activities could affect a site eligible of cultural significance (NHPA and Section 106 Review).

SCHEDULE

Provide table or bulleted summary of major activities and milestones to be accomplished by each fiscal-year quarter. These activities and milestones should reflect the objectives, and in some cases subobjectives, that are included with each RFP below. Please indicate the objective or subobjective number in your schedule that will be addressed by each activity or milestone you have included.

STAFFING

For each person involved in the study, list their name, title, and organization along with one sentence explaining their expertise related to this study. If the person is unknown at the time of the proposal (e.g., post doc, grad student), still include the position by its title, e.g., PhD Student.

RESOURCES

This is an optional section that should be used to detail any unusual resources or new equipment needed to conduct this study.

If your proposal requires the use of cars, trucks or other vehicles, be sure to list your needs here. You will also be asked to provide a separate budget line for the anticipated rental, use, and fuel costs.

Other vehicle needs such as ATVs, snowmobiles, boats, etc. should be listed separately from cars and trucks. We have often been able to provide these but will need to account for these costs if we are unable to provide these in the future.

LOCATION

When applicable, describe the study location and site(s). Be sure to list the counties where field work would likely occur and include the anticipated impact area of the research project.

REFERENCES

Please provide a list of all references cited within the proposal. The authors can choose the format style for in-text citations and list of references, but that style should be used consistently throughout the proposal.

BUDGET

If using indirect costs as match, be sure to include your organization’s approved rate and have the Indirect Costs be balanced to zero by the matching funds category. Equipment are items that would cost more than \$5,000.

Cost Categories	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Totals
Salary and Benefits	\$0	\$0	\$0	\$0	\$0	\$0
Travel	\$0	\$0	\$0	\$0	\$0	\$0
Supplies	\$0	\$0	\$0	\$0	\$0	\$0
Equipment	\$0	\$0	\$0	\$0	\$0	\$0
Indirect Costs (00.0%)	\$0	\$0	\$0	\$0	\$0	\$0
Total Project Costs	\$ 0	\$ 0				
Matching Funds	(\$0)	(\$0)	(\$0)	(\$0)	(\$0)	(\$0)
Total Request	\$0	\$0	\$0	\$0	\$0	\$0

EQUIPMENT DETAIL

Need to include a budget justification – above, allow for including all the detail they are used to. For below, don’t provide too much explanation as it is confusing, have them put in their needs and then later we can decide if we can meet their vehicle/equipment needs. If needed, provide the following detail that sums to the equipment line above:

Equipment Type	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Totals
Cars and trucks Lease/purchase amount Fuel/Operating costs	\$0	\$0	\$0	\$0	\$0	\$0
ATVs, Snowmobiles, etc. Lease/purchase amount Fuel/operating costs	\$0	\$0	\$0	\$0	\$0	\$0
Other equipment Purchase costs > \$5,000 List items	\$0	\$0	\$0	\$0	\$0	\$0
Total Equipment	\$ 0	\$ 0				

BUDGET JUSTIFICATION

Provide a brief written description of the major items included in each cost category with an explanation of how they will be used to meet the RFP objectives (e.g., salary benefit is not supporting the Applicant PI, but rather funding 1 PhD student and 3 field technicians for the first 3 years of the project).

FY 2023 RFP PRIORITY RESEARCH NEEDS:

Title 1: Estimating abundance of limited take furbearers 1

Title 2: Managing the Socio-Ecological System for Human-Black Bear Interactions in the
Northern Lower Peninsula 4

Title 3: Ecological Functions and Services of Managed Wetlands 7

Title 4: Evaluating Outcomes of Habitat Management on Southern Michigan State Game Areas
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TITLE 1: ABUNDANCE ESTIMATORS FOR MICHIGAN FURBEARERS

STATEMENT OF WORK GIVEN

DNR INVESTIGATORS:

Dr. Dwayne Etter, Research Specialist and DNR PI, Lansing Customer Service Center, DNR Wildlife Division, (517) 284-4720, etterd@michigan.gov

Adam Bump, Furbearer and Upland Game Bird Specialist, Lansing Customer Service Center, DNR Wildlife Division, (517) 284-6157, bumpa@michigan.gov

Dr. Sarah Mayhew, Biometrician, Wildlife Disease Laboratory, DNR Wildlife Division, (517) 336-5036, mayhews@michigan.gov

NEEDS:

The Michigan Department of Natural Resource (DNR) limits harvest of 4 furbearers (American marten, bobcat, fisher, and river otter) with an annual bag limit. Presently, assessment of population status for these limited take species is through indices (i.e., harvest-effort) collected at broad spatial scales (e.g., Upper Peninsula). The DNR is interested in developing population estimators for all limited-take species in the Upper Peninsula and for bobcat and river otter in the Lower Peninsula. Furtakers harvesting these species are required to submit to DNR the date and location of harvest, animal sex, and a tooth is extracted for aging using cementum annuli techniques. Michigan DNR maintains annual harvest data (30+ years for river otter with 10 years of age data; 30+ years of harvest and age data for fisher and bobcat, 20+ years of harvest and age data for marten), and records of harvest regulations changes for limited take furbearers. Additionally, furtakers are surveyed annually to estimate harvest-effort. In 2010, these data were used to develop statistical population reconstruction (SPR) models for American marten and fisher. However, a subsequent preliminary investigation of SPR models revealed that they were highly sensitive to the number of years of data and suggested that the harvest-effort relationship may not have been appropriately structured and alone may not provide sufficient information for the model. Alternative model structures and auxiliary biological data may improve model accuracy and precision, and for American marten and fisher DNR may be able to provide localized radiotelemetry, camera trap, or other auxiliary data.

OBJECTIVES:

Objective 1. Model Feasibility

Assess existing datasets for the feasibility to produce models that estimate abundance of American marten, bobcat, fisher, and river otter in the Upper (all species) and Lower (bobcat and river otter) Peninsulas.

Objective 2. Model Development

If feasible, develop models to estimate abundance of American marten, bobcat, fisher, and river otter in the Upper and Lower Peninsulas that could be updated annually.

Objective 3. Model Documentation

Provide model documentation that includes all component equations, definitions for all variables and parameters, and a discussion of all assumptions including the sensitivity of the model to violations of the assumptions.

Objective 4. Auxiliary Data Sets

Evaluate the benefit of auxiliary data sets for improving model performance. Provide recommendations on collection of currently unavailable auxiliary data.

Objective 5. Recommendations

Recommendations for periodic future evaluation of model performance.

EXPECTED APPLICATION OF RESULTS

The ability to estimate abundance of limited-take furbearers would assist in recommending harvest regulations that will continue to provide recreational opportunity while maintaining sustainable populations. Estimates would also aid in evaluating long-term trends in furbearer abundance relative to changes in harvest regulations and in assessing potential influence of future regulations changes. Use of existing datasets to update models will ensure prioritization of appropriate collection of biological and furtaker data. Evaluating need(s) for collection of additional auxiliary data would further assist with prioritizing development of new research projects or surveys.

DELIVERABLES AND INFORMATION TRANSFER

- For each fiscal year of the project, excepting the final year, an Annual Performance Report will be provided to WLD by September 30. The report will detail progress made toward accomplishing the objectives using a template provided by WLD.
- A final report will be due at the end of the project that summarizes the work completed by Grant Agreement objectives including an explanation of any deviations from accomplishments by objective. Additionally, the report will include the final disposition of Grant Agreement deliverables. The management summary will include the major findings of the research, a discussion on the meaning of the findings, and resultant management recommendations for WLD.
- At the conclusion of the project all collected data, developed models and databases, purchased equipment, and remaining supplies will be provided to WLD.
- There may be other deliverables in the established Grant Agreement as needed and negotiated.

TITLE 2: MANAGING THE SOCIO-ECOLOGICAL SYSTEM FOR HUMAN-BLACK BEAR INTERACTIONS IN THE NORTHERN LOWER PENINSULA

STATEMENT OF WORK GIVENS

DNR INVESTIGATORS:

Dr. Tyler Petroelje, Research Specialist, Marquette Customer Service Center, DNR Wildlife Division, (906) 228-6561, petroeljet@michigan.gov

Dr. Emily Pomeranz, Human Dimensions Research Specialist, Lansing Customer Service Center, DNR Wildlife Division, (517) 281-4744, PomeranzE@michigan.gov

NEEDS:

The Northern Lower Peninsula of Michigan has experienced an increase in abundance and distribution of black bears (*Ursus americanus*; hereafter “bear”) for more than three decades, growing by about 70% in the last decade alone. The Michigan Department of Natural Resources Wildlife Division (DNR) manages bear populations to provide multiple ecological, social, and recreational benefits. The DNR must balance stakeholder interests wanting more bears for hunting and recreation (i.e., positive human-bear interactions) and nuisance problems that develop in agricultural and residential settings (i.e., negative human-bear interactions).

The Baldwin Bear Management Unit (BMU) encompasses 14,307 km² on the west side of the Northern Lower Peninsula (Fig. 1) and spans a diversity of landscape conditions found across Michigan including urban centers, residential sprawl, agriculture, and forested lands. Along with an increase in bear distribution (Fig. 2), the frequency and intensity of negative human-bear interactions have increased in the Baldwin BMU over the last decade. Many of these negative interactions are concentrated within two distinct categories: residential (e.g., bird feeding activities, improper trash storage) and agricultural (e.g., beekeepers, corn producers, orchardists). In Michigan, hunting is the primary tool for maintaining a sustainable bear population within social and biological limits, however we lack data to quantify stakeholder attitudes toward bears and to determine if harvest alone can be effective across fragmented landscapes (e.g., large tracts of private agricultural land, residential settings) to accomplish management goals. Research is needed to incorporate consideration for both the social and ecological mechanisms that drive human-bear interactions in the Baldwin BMU and identify the management actions that are most appropriate given stakeholder attitudes, an expanding bear population, and limited staff resources.

The DNR currently collects data that can serve as resources to assist with meeting the objectives of this need:

- Annual mandatory registration data from bear harvest including harvest location and date and bear sex and age.

- Annual estimates of population size for the Northern Lower Peninsula. Abundance or density estimates are unavailable at finer scales which may vary significantly within or across BMUs.
- Genetic capture-mark-recapture data at five-year intervals that could approximate abundance at the BMU-level.
- Catch-per-unit-effort data at the BMU-level that could reflect trends in bear abundance.
- Annual records of bear activity reports including location, context (e.g., residential vs. agricultural), and severity of complaints.
- Results of past DNR research projects including models identifying bear range, habitat, and gene flow



Figure 1. Michigan DNR Bear Management Units.

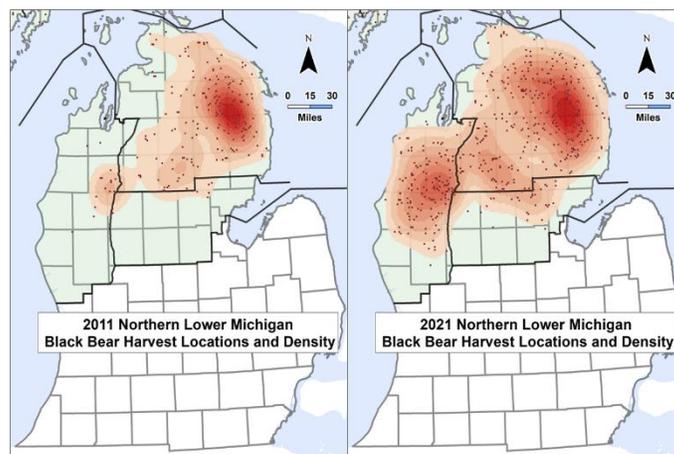


Figure 2. Harvest locations (red dots) and density (red polygons) for 2011 (left panel) and 2021 (right panel) demonstrating the expansion of the bear population across the past decade.

OBJECTIVES:

Objective 1. Assess Attitudes Towards Black Bears and Black Bear Management

To assess attitudes towards black bear and black bear management in the Baldwin Unit of the Northern Lower Peninsula (Fig. 1), including attitudes of 1) urban-rural interface residents (i.e., where urban/suburban development adjoins rural landscapes); and 2) agricultural producers (including beekeepers, orchardists, and corn producers). This objective includes the following sub-objectives:

- a. To identify impacts of black bears (i.e., the significant positive and negative outcomes produced by interactions among and between bears and people that stakeholders perceive as warranting management attention).
- b. To identify stakeholder attitudes towards black bears and bear-related impacts.
- c. To assess attitudes and behaviors towards current DNR management, outreach, and education efforts for managing black bears, including reducing negative bear-human interactions and enhancing positive ones.
 - i. To identify stakeholder behaviors and use of existing intervention tools for conflict reduction (e.g., electric fence use around apiaries, use of bear proof dumpsters, removal of bird feeders, etc.).
 - ii. This may include an evaluation of current outreach and education methods, messages, and channels.

Objective 2. Assess Management Effectiveness

To assess effectiveness of available management strategies for reducing negative black bear-human interactions. This includes the following sub-objectives:

- a. Quantifying the effectiveness of non-lethal actions to reduce negative black bear-human interactions (e.g., electric fencing, trap & relocate).
- b. Quantifying the effectiveness of lethal actions to reduce black bear-human interactions, including 1) public harvest and 2) targeted lethal removal (e.g., damage permits, euthanasia, etc.).
- c. Quantifying the relationship among black bear habitat suitability, density (at the appropriate scale), and bear-human interactions.

Objective 3. Interactions Recommendations

To provide recommendations for DNR to best address negative human-black bear interactions (i.e., conflict situations) while enhancing positive human-black bear interactions (including recreational opportunities).

- a. To provide recommendations for which management actions (e.g., education, outreach, non-lethal, lethal) are socially and ecologically effective for mitigating negative human-black bear interactions and in what contexts.
- b. To provide spatially explicit predictions which reflect the social and ecological conditions where management actions and investment would be most effective (e.g., where specific efforts to mitigate conflict are most appropriate, applicability to future areas where bear-human interactions may arise as the bear population naturally recolonizes).

Objective 4. Reports and Recommendations Dissemination

To synthesize and disseminate findings in a timely manner. This objective includes the following sub-objectives:

- a. To provide a final results report that includes an executive summary, introduction, methods, results, and management recommendations.
- b. To provide a brief summary document (not to exceed 2 pages) containing an overview of the project and highlighting management findings and relevant results.
- c. To provide all datasets and associated codebooks including all variables and equations, documentation of any weighting and imputation procedures as relevant, any associated survey or interview instruments, and documentation of any models including all equations and a discussion of all assumptions.

EXPECTED APPLICATION OF RESULTS:

A better understanding of stakeholder attitudes towards black bear impacts and management strategies, coupled with a better understanding of the social and ecological effectiveness of those management strategies, will allow the DNR to strategically target management interventions to best mitigate negative human-bear interactions while facilitating positive ones. With the rapid increase in frequency and intensity of negative human-black bear interactions in the Baldwin Unit, knowing which management tools to apply in which conflict context will result in better use of staff time and resources. In addition, as the DNR expects black bear populations to continue to increase in abundance, lessons learned through this research will allow the DNR to be proactive, equipped with a better understanding of the effectiveness of the management tools at our disposal.

DELIVERABLES AND INFORMATION TRANSFER:

- For each fiscal year of the project, excepting the final year, an Annual Performance Report will be provided to WLD by September 30. The report will detail progress made toward accomplishing the objectives using a template provided by WLD.
- A final report will be due at the end of the project that summarizes the work completed by Grant Agreement objectives including an explanation of any deviations from accomplishments by objective. Additionally, the report will include the final disposition of Grant Agreement deliverables. The management summary will include the major findings of the research, a discussion on the meaning of the findings, and resultant management recommendations for WLD.
- At the conclusion of the project all collected data, developed models and databases, purchased equipment, and remaining supplies will be provided to WLD.
- There may be other deliverables in the established Grant Agreement as needed and negotiated.

TITLE 3: ECOLOGICAL FUNCTIONS AND SERVICES OF MANAGED WETLANDS

STATEMENT OF WORK GIVENS

DNR INVESTIGATORS:

Dr. Emily Pomeranz, Human Dimensions Research Specialist, Lansing Customer Service Center, DNR Wildlife Division, (517) 281-4744, PomeranzE@michigan.gov

Dr. Barbara Avers, Waterfowl/Wetland Specialist, Lansing Customer Service Center, DNR Wildlife Division, (517) 284-4721, aversb@michigan.gov

Dr. Randy Knapik, Wetland Habitat Biologist, Lansing Customer Service Center, DNR Wildlife Division, (517) 282-7783, knapikr2@michigan.gov

NEEDS:

The Michigan DNR (DNR) is interested in understanding what ecological functions and services are provided by the current management strategies at our [intensively managed waterfowl hunting areas](#) (MWHAs). Ecosystem services include those benefits provided by natural systems, including provisioning, regulating, supporting, and cultural services (Baloffet et al. 2012). While wetlands may provide all categories of ecosystem services, the DNR is most interested in understanding those provisioning, regulating, and supporting services provided by managed wetlands. DNR uses varied intensive wetland management strategies (e.g., water management infrastructure) and agricultural practices at our MWHAs to achieve wetland habitat and hunting objectives. There is a need to understand the extent that our current management strategies are providing ecological functions and services expected of wetlands, and especially if water quality benefits are realized. These results will be used to evaluate our current strategies and to consider potential changes to habitat management strategies or infrastructure to improve water quality as well as other ecological functions and services. In addition, results will be used to communicate to a broad audience what health and quality of life benefits our management strategies and managed wetlands may be providing to society beyond already-acknowledged benefits including wildlife habitat and outdoor recreation.

For this project, we expect a multi-year assessment at two coastal MWHAs, [Shiawassee River State Game Area](#) (SGA) and [Pointe Mouillee State Game Area](#). Located in Saginaw County, Shiawassee River SGA is the DNR's largest MWA at over 10,000 acres, is recognized as an [Important Bird Area](#), and is a premier waterfowl hunting destination. The SGA and the adjacent Shiawassee National Wildlife Refuge are located in the Shiawassee Flats – a floodplain with five rivers converging to form the Saginaw River. Together, the state and federal lands contain approximately 20,000 acres in a Critical Flood Storage Area. Additionally, the Shiawassee Flats are influenced by coastal processes of Lake Huron. Shiawassee River SGA contains over 40 miles of constructed dikes, ditches, and levees resulting in 18 impoundments adjacent to other wetland restoration projects designed to intercept floodwater and provide wildlife habitat. Current management within impoundments varies between flooded agricultural crops, seasonally flooded moist soil, and semi-permanent marsh. This area is positioned to positively

influence downstream water quality and flooding but extent of realized benefits is unknown given current habitat management and infrastructure design. Located in Monroe and Wayne Counties in the western Lake Erie basin, Pointe Mouillee SGA is known for its excellent birding opportunities (designated as an [Important Bird Area](#)) and waterfowl hunting. It is 4,040 acres and maintains a portfolio of impounded wetlands with varying habitat management strategies. Pointe Mouillee contains over 24 miles of dikes and associated ditches used to manage water levels across the area. A rich history of wetland restoration, wetland management, and waterfowl hunting characterize this coastal wetland complex. Current management within impoundments varies between flooded agricultural crops, seasonally flooded moist soil, and semi-permanent marsh. Because of its shallow depth, warm waters, and excessive input of nutrients from the surrounding land area, western Lake Erie is particularly susceptible to harmful algal blooms and there are current regional initiatives addressing water quality. While the DNR recognizes that the results of this study will be most significant to these two managed areas, we expect a subset of recommendations to be applicable to management across our intensively managed wetlands.

OBJECTIVES:

Objective 1. Current Strategies and Provision of Services

Assess current DNR management strategies at Shiawassee River SGA and Pointe Mouillee SGA and their provisioning of ecological functions and services expected of wetlands, with an emphasis on water quality and hydrology benefits.

- a. At a minimum, assessment will examine: water quality indicators including nitrogen, dissolved oxygen, phosphorous, water clarity (nutrient inputs as well as sedimentation), pH, water temperature; soils; waterfowl and waterbird use and response; waterfowl and waterbird habitat; floodwater storage capacity (including water depth at impoundments); plant community; and others as appropriate and in accordance with project objectives.

Objective 2. Improvements and Monitoring

Provide recommendations for habitat management or infrastructure alterations to improve water quality and hydrology benefits at 1) Shiawassee River SGA and 2) Pointe Mouillee SGA while acknowledging and incorporating potential effects of future climate variation, as possible. This objective includes the following sub-objective:

- a. Develop a monitoring protocol for DNR to assess water quality and hydrology as well as associated management actions at Shiawassee River SGA and Pointe Mouillee with applicability to other DNR managed wetlands more broadly, as possible.

Objective 3. Dissemination of Results and Recommendations

To synthesize and disseminate findings in a timely manner. This objective includes the following sub-objectives:

- a. To provide a final results report that includes an executive summary, introduction, methods, results, and management recommendations.
- a. To provide an outreach briefing that includes a project summary and recommendations that the DNR may use to communicate results with the public and other stakeholders.
- b. To provide all datasets and associated codebooks including all variables and equations, documentation of any weighting and imputation procedures as relevant, and documentation of any models including all equations and a discussion of all assumptions.

EXPECTED APPLICATION OF RESULTS:

Long-term impacts include management of our state wetlands so that we maximize ecological benefits to society (e.g., water quality, flood mitigation, carbon sequestration, etc.) while meeting our waterfowl and hunting management goals. Societal concerns regarding ecosystem services present an opportunity to educate and build support for waterfowl and wetland conservation by quantifying and highlighting the benefits of wetland habitats to potential partners and find common ground for collaboration (NAWMP 2018). Short-term impacts are learning from our current management practices and evaluating potential changes that would benefit the public while meeting our goals.

Not completing this project would result in status quo management on our intensively managed wetland areas. This may result in continuing to use inferior management techniques that are not providing the full ecosystem service benefit of wetlands or continuing perform actions that are detrimental to water quality when managing wetlands. We will not have information to share with the public demonstrating the realized societal benefit of our managed wetlands beyond outdoor recreation and the expressing the sentiment that, “wetlands are good.” We also would continue to lack the information regarding the ecosystem functions and services of our managed wetlands that is necessary to justify current and future management actions on permit applications under the Voluntary Wetland Restoration program.

DELIVERABLES AND INFORMATION TRANSFER:

- For each fiscal year of the project, excepting the final year, an Annual Performance Report will be provided to WLD by September 30. The report will detail progress made toward accomplishing the objectives using a template provided by WLD.
- A final report will be due at the end of the project that summarizes the work completed by Grant Agreement objectives including an explanation of any deviations from accomplishments by objective. Additionally, the report will include the final disposition of Grant Agreement deliverables. The management summary will include the major findings of the research, a discussion on the meaning of the findings, and resultant management recommendations for WLD.

- At the conclusion of the project all collected data, developed models and databases, purchased equipment, and remaining supplies will be provided to WLD.
- There may be other deliverables in the established Grant Agreement as needed and negotiated.

TITLE 4: EVALUATING OUTCOMES OF HABITAT MANAGEMENT ON SOUTHERN MICHIGAN STATE GAME AREAS

STATEMENT OF WORK GIVEN

DNR INVESTIGATORS:

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NEEDS:

The DNR–Wildlife Division (WLD) manages State Game Areas (SGA) in southern Michigan to benefit wildlife and diverse public use, and WLD has developed master plans to guide habitat management for selected wildlife species on SGAs (<https://www.michigan.gov/dnr/things-to-do/hunting/where/state-wildlife-game-areas-list>). However, the effectiveness of habitat management actions to achieve SGA project goals and desires are untested. Fire is a frequently applied management tool used on SGAs to control invasive plants and set back succession in forests and savannahs. Michigan’s Wildlife Action Plan specifies using fire, “to mimic natural disturbance regimes to maintain species diversity and community structure” and “consider burning throughout the year or at varying times to increase plant diversity” (<https://www.michigan.gov/dnr/managing-resources/wildlife/wap/plan>). Wildlife Division is particularly interested in understanding outcomes of different habitat management actions that include fire to achieve a range of desired outcomes in forest and savannah habitats. Additionally, WLD lacks mechanisms for assessing acceptable ranges of outcomes for different types of management actions (i.e., seasonal burning, using fire in combination with other management actions). Wildlife Division needs easily collected, verified metrics for evaluating the outcomes of various types of habitat management on SGAs.

OBJECTIVES:

The goal of this project is to develop a system for determining the effects of management activities on Southern Michigan Game Areas through a system of easily collected metrics that can provide for long-term monitoring of the efficacy of our management efforts. This goal will be accomplished by addressing the following objectives.

Objective 1. Select Management Techniques

In cooperation with WLD, review desired plant and wildlife community change on selected SGAs, and develop a summary document outlining available forest management techniques that include fire, for meeting acceptable ranges of desired outcomes.

Objective 2. Apply Selected Techniques

In cooperation with WLD, develop and experimentally apply selected forest management techniques that include fire on selected SGAs.

Objective 3. Plant and Wildlife Community Changes

Experimentally evaluate desired plant and wildlife community change relative to applied forest management techniques.

Objective 4. Evaluation Metrics

In cooperation with WLD, develop easily collected, reliable metrics for evaluating plant and wildlife community response to forest management activities.

Objective 5. Collaborative Monitoring

In cooperation with WLD, develop recommendations for a collaborative monitoring program designed to document plant and wildlife community response to forest management activities including localized, consistently available resources and volunteers.

BENEFITS:

This project will provide recommendations to WLD for forest management activities on SGAs that meet acceptable ranges of desired outcomes for plant and wildlife community effects. Knowledge about acceptable ranges of outcomes for forest management will assist managers with annual and long-term planning. Developing reliable metrics for assessing habitat management actions will assist managers with evaluating project goals and desires. Metrics will further assist with evaluating whether forest management meets the needs of wildlife and SGA users. Although this research project would be specific to southern Michigan, some findings may be transferrable for management on state lands in northern Michigan.

LOGISTICAL CONSIDERATIONS:

Wildlife Division anticipates a minimum of 4-5 years to accomplish project objectives. Successful PIs will work collaboratively with staff from WLD's Biological and Social Sciences section, Facilities Operation Managers, and area biologists. WLD annually plans and when necessary, contracts habitat management on SGAs and controlled burns are applied cooperatively between WLD and the Forest Resources Division (FRD). Successful PIs will work collaboratively with WLD and FRD to select SGAs and management actions for experimental testing (Obj. 2). Applicants should assume that study areas will include a minimum of 2-3 SGAs within 250 miles round trip from Lansing, MI. Wildlife Division may be able to provide some transportation equipment (i.e., truck, trailer, ATV) for researchers for use specific to this project, but applicants should include anticipated costs for all transportation necessary to complete the project in their proposed budget. Additionally, several staff are fully licensed to operate drones possessed by WLD, and this equipment is available for use on this project. Wildlife Division will incur all costs of management actions (i.e., controlled burns, brush clearing) on SGAs and applicants should not include these costs in proposed budgets.

DELIVERABLES AND INFORMATION TRANSFER:

- For each fiscal year of the project, excepting the final year, an Annual Performance Report will be provided to WLD by September 30. The report will detail progress made toward accomplishing the objectives using a template provided by WLD.
- A final report will be due at the end of the project that summarizes the work completed by Grant Agreement objectives including an explanation of any deviations from accomplishments by objective. Additionally, the report will include the final disposition of Grant Agreement deliverables. The management summary will include the major findings of the research, a discussion on the meaning of the findings, and resultant management recommendations for WLD.
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- There may be other deliverables in the established Grant Agreement as needed and negotiated.