**Scope of Work**

**Project Title:** Milwaukee Estuary Area of Concern Fisheries and Aquatic Habitat

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**Proposed Work**

This is an extension of current efforts to assess the status of fisheries in the Milwaukee Estuary AOC. It builds upon fisheries survey work being completed by DNR and USGS, augmenting with existing data in areas not surveyed, assisting with survey work, and providing a GIS based tool for fisheries for the entire AOC that will assist in management action decisions. The collection of this data and development and utilization of the GIS-based tool will help us prioritize potential sites for fish habitat restoration in the AOC.

Ozaukee County Planning and Parks Department (Department) Staff will perform the following tasks:

1. ***Compile existing fisheries data, and prepare it for entry into the DNR fisheries database.***

The Department’s Fish Passage Program (Program) has collected fisheries monitoring data in the Milwaukee River Watershed and AOC since 2010 for the implementation of multiple Federal, State, local, and private grants. This monitoring has largely occurred under policies and procedures as identified under federally-approved Quality Assurance Project Plans (QAPP’s) and conducted by trained Department staff. Fisheries monitoring has included main-stem Milwaukee River electrofishing (both wadeable and non-wadeable reaches), tributary mark and recapture and occurrence surveys as part of fish passage impediment removal and or remediation projects and habitat restoration projects, and larval fish trapping on tributary streams using wooden box traps or quatrefoil traps. Per the QAPP’s, monitoring data is entered into the Program’s comprehensive database and has been shared with applicable granting agencies. This grant will support the compilation of all applicable Program fisheries monitoring data (both existing and data acquired during the project period) and preparation for entry into the WDNR’s fisheries management database by WDNR staff. Department staff will follow approved Quality Assurance/Quality Control (QA/QC) procedures for all data entry as documented in the QAPP. Information in this database is linked to the Surface Water Integrated Monitoring System (SWIMS) database and the WDNR and U.S. Geological Survey’s Wisconsin Aquatic Gap Program (Gap) database, which provides a dynamic, queriable, geographically referenced interface. Fisheries monitoring data must be specifically organized, formatted, and codified before WDNR staff can incorporate it into the WDNR’s fisheries management database. Specifically, each documented fish species must be converted to the appropriate WDNR species code (e.g., largemouth bass = W12). Observations such as length, tag given/found, mark given/found and any disease or injury indications will also be converted to WDNR standard codes. Additional information including survey date(s), waterbody type, type of gear used, mean stream width, station length, and station coordinates will be included so that each station can be included by WDNR as a new survey site in the database. Each survey site will have a station query and formatted data sheet for each unique sampling event. These attributes will allow for the data to be queriable and geographically referenced, ensuring compatibility with the overall database and existing data.

1. ***Conduct qualitative habitat assessments for use in the fish model***

Qualitative fish habitat rating assessments will be completed on the proposed project streams using the WDNR’s “Guidelines for Qualitative Physical Habitat Evaluation of Wadeable Streams” protocols for streams < 10 m wide (see field form attachment). These habitat assessments will be used in conjunction with the fisheries data layer (see task 4 below) for determining the overall habitat quality of the various stream reaches and potential for various target species occurrence.

Many reaches of the main AOC project rivers and streams (e.g., Milwaukee River, Menomonee River, Little Menomonee River, Kinnickinnic River) and immediate riparian areas have been permanently modified through development, contamination and other impairments, resulting in loss of high quality in-stream and riparian fisheries habitat. Several native Species of Local Conservation Interest (SLCI’s) and focal fish species for the AOC are phytophilic spawners (e.g. northern pike) or require access to other habitat features found in tributary streams to complete requisite life-cycle functions. As such, most large-scale habitat restoration enhancement work completed by Ozaukee County and other partners under AOC and GLRI-related funding have occurred in direct tributary and riparian areas to the main AOC project rivers and streams. The WDNR has developed a draft predictive fisheries model for main rivers and streams in Wisconsin, covering approximately 79 fish species. This model uses several variables including temperature, hydrologic models, land-use associations, and archived species occurrence data to predict both species occurrence and abundance. However, this is a coarse, state-wide model focused on larger rivers and streams and did not include any localized in-stream or other habitat characteristics (in particular, those characteristics indicative of high-quality spawning habitat) as a primary model variable or analysis of such habitat characteristics for validation of model outputs, particularly for tributary streams and riparian areas with a high ecological potential, which directly affect the ecologic productivity of the larger river and stream reach. Therefore, that data generated from this task will both refine the existing predictive model for the Milwaukee River AOC, develop a new fisheries model based on specific habitat variables (e.g. spawning requirements) that exist in the Milwaukee River AOC and validate the results of the models using the data and results of task 3 described below. The GIS modeling and data layer is further described under task 4 below.

The proposed target rivers and streams for this project will be selected from the entire riverine portions of the Milwaukee River, Menomonee River, and Kinnickinnic River within the Milwaukee Estuary AOC project area. The AOC project area includes the lower 5 km of the Milwaukee River downstream of North Avenue Dam, Cedar Creek downstream from Bridge Road to confluence with Milwaukee River, and the Milwaukee River and tributaries from confluence with Cedar Creek to former North Avenue Dam, including Lincoln Creek. It also includes the lower 4.8 km of the Menomonee River downstream of 35th Street, the Little Menomonee River from Brown Deer Road to confluence with Menomonee River, and the Menomonee River downstream from confluence with Little Menomonee River to 35th Street. The project streams for the habitat inventory surveys will be selected according to the QAPP protocol (< 10 m wide) from streams which are either perennial streams in Milwaukee County that fall within the project area watersheds or navigable and perennial streams in Ozaukee County that fall within the project area watersheds.

It is not feasible or practical to quantitatively assess all physical habitat parameters along the entire length of each project stream. As such, staff will utilize the “Guidelines for Qualitative Physical Habitat Evaluation of Wadeable Streams” protocols for streams < 10 m wide to complete habitat evaluations on sample locations within identified stream reaches. These protocols are routinely used by WDNR biologists in S.E. Wisconsin and the Milwaukee River Watershed and were recommended by WDNR for use on the Department’s ongoing impediment and habitat inventory projects on direct Lake Michigan tributary streams funded by the Wisconsin Coastal Management Program and WDNR River Protection Planning grants. These protocols which will be further refined and documented in the QAPP for this project. Specific stream reaches and sample locations will be selected using methodology suggested by WDNR staff and other fisheries experts. In order of priority, stream reaches will be selected based on:

1. Representation of stream order increases
2. Significant land use changes
3. Stream natural community changes
4. Adequate spatial representation
5. Where data would be useful (where potentials exist that could conceivably change the habitat scores for either negative or positive)

A qualitative habitat assessment at each identified sample location will then be used to approximate general habitat characteristics for each given stream reach. Approximately 37 qualitative habitat assessment inventories will occur on approximately 16 reaches in Ozaukee County on 8 tributary streams and 21 reaches in Milwaukee County on 11 tributary streams, representing 23.30 stream miles in Ozaukee County and 38.6 miles in Milwaukee County (see map attachment).

A number of metrics will be assessed including temperature, dissolved oxygen, stream discharge, percentage of fine sediment, cover for fish, pool area, bank erosion, riparian buffer width, width to depth ratio, and water clarity. Additional physical information may be collected as required to assess the potential to support the occurrence or reproduction of desirable fish species. Information collected through qualitative surveys will be used to rate general habitat characteristics at sampling sites from poor to excellent, providing an indication of the quality of habitat conditions representative of the corresponding stream reach, the main AOC project river or stream, and its potential to support the occurrence or reproduction of focal/SLCIs fish species as further described in task 4 below. In addition, the Department will review and incorporate additional qualitative or quantitative data acquired by WDNR or other sources, as applicable. The contractual budget includes services from Milwaukee Riverkeeper to assist with Task 2 field activities, if required.

1. ***Electrofishing surveys of tributary streams to the Milwaukee River in conjunction with qualitative habitat inventories***

The “Guidelines for Qualitative Physical Habitat Evaluation of Wadeable Streams” protocols were originally designed by WDNR Fisheries Research staff and intended to accompany fisheries surveys. Trained Department staff will conduct backpack electrofishing surveys at select stream reach sites (as site conditions allow) to document the presence of native and/or focal/SLCI fish species for qualitative habitat inventory and fisheries matrix validation and to inform the GIS-based fish model data layer. Survey efforts will generate data to determine total catch per unit effort, target species catch per unit effort, native species richness, Index of Biotic Integrity (IBI), and evidence of reproduction. County staff will enter and analyze the recorded data for the following:

• General site and stream conditions

• General weather conditions

• Date and time of electrofishing surveys

• Electrofishing backpack conditions and settings

• Number of fish, by species, captured per stream segment

• Number of YOY fish captured

• Total effort (length of stream segment) and catch rate (fish/day) of YOY and adult fish per stream

• Number of fish, by species, captured per stream segment

County staff will survey fish communities within the Project area using an HT-2000 Battery Backpack following “WDNR Guidelines for Assessing Fish Communities of Wadable Streams in Wisconsin” (WDNR 2001). These methods have been formalized in federally approved QAPP for multiple completed and ongoing Department projects and will be detailed in the QAPP for this funding. Surveys will take place as site conditions allow between late April and August 2017.

Stations for assessing fish communities in wadable streams are approximately 35 times the mean stream width. Electrofishing surveys will be completed as a team effort: one surveyor will wear the backpack and submerge the probe applying electrical current to the water and the other surveyor will follow closely to net fish affected by the current. Surveyors will walk upstream the length of the station, completing a single sampling pass through the stream. County staff will complete at least one single pass sampling survey.

All fish caught will be collected for species identification. Lengths of game fish (e.g. trout, esocid, smallmouth bass, largemouth bass), redhorse and sucker species will be measured. Any scars or lesions will be noted. Fish will be returned to the stream immediately after processing. Any fish that cannot be identified in the field will be collected as voucher specimens.

Completing comprehensive, multiple monitoring events at each stream reach to document both resident and migratory species occurrence is beyond the scope of this project. However, many of these stream reaches have likely never been monitored and this information will fill critical knowledge gaps about fisheries communities in tributary streams to the AOC, including significant, relative abundance data (e.g., catch per unit time, stream lengths, and water surface area). This funding and associated monitoring activities will be leveraged to obtain additional funds to support more comprehensive, subsequent fisheries monitoring activities.

1. *Develop a fisheries habitat matrix and utilize ESRI ArcMap to prepare a GIS data layer displaying habitat inventory results for use in habitat restoration management action planning.*

In 2010, the Ozaukee County Planning and Parks Department received Great Lakes Restoration Initiative funding administered through the U.S. Environmental Protection Agency (USEPA) and Wisconsin Coastal Management Program (WCMP) funding administered through the Wisconsin Department of Administration to complete and refine a Fish and Wildlife GIS-based Decision Support Tool (Tool). The Tool identifies native fish and wildlife focal and Species of Local Conservation Interest (SLCI) for planning, based on extensive research, data compilation and vetting, inventories and modeling, validation, and identifies critical habitats important to ensuring the survival of native fish and wildlife, especially SLCIs. The Tool enables planners and decision makers to identify and prioritize areas where the investment of limited conservation dollars will provide maximum benefit to the most critical fish and wildlife species based on species’ habitat requirements. It also provides partners with two key planning tools: 1) checklists of species diversity in the region with extensive rankings of species conservation status and information on their habitat requirements, and 2) GIS-based tools for mapping best value existing habitats and potential habitat restoration areas.

The proposed project activities under this funding will generally follow the two key planning tools identified under the Tool process to generate a fisheries and habitat association matrix specific for the AOC. The matrix will include a list of SLCI species and other “focal species” identified under the Tool development and by the Fish and Wildlife Technical Advisory Committee for the AOC as rows (target species). Primary habitat features will be represented as columns, and will include those features requisite for critical life cycle functions for each target species such as spawning, refuge, feeding, etc. These columns will generally reflect a combination of the information collected in the qualitative habitat assessments and applicable existing GIS layers as used in the Tool’s Wetland Wildlife Matrix (e.g., land cover type, various wetland classifications, etc.). The Department and local fisheries experts will then develop target species and habitat features associations on a ranked scale to populate the matrix. For example, northern pike are phytophilic spawners in streams and riparian wetlands that have a high degree of lateral connectivity and prefer cool to moderately warm waters in low gradient streams. As such, the association (score) for northern pike and these habitat features will generally be very high, but there will likely be a very low association for higher gradient streams with little submerged vegetation or wetland and floodplain connectivity. To the extent practical, each habitat feature will correspond with a GIS layer such that the user can reference which AOC project tributary stream reaches have the strongest associations with select target species for future project planning. These associations will further be validated through analysis of the fisheries monitoring data described under Task 3. The resultant GIS layers will help inform and refine the WDNR’s coarse, draft predictive fisheries model for larger rivers and streams, particularly for the AOC, through collection and analysis of in-stream tributary and riparian habitat assessments and fisheries data, which is critical to understanding the health and ecologic productivity (and potential) of the Milwaukee River AOC. The contractual budget includes services from Great Lakes Ecological Services, LLC, to assist with GIS data layer tasks under Task 4 as applicable.

**Project Location**

The overall project location will include select target streams and reaches within riverine portions of the Milwaukee Estuary AOC, which includes the following:

Milwaukee River

* Lower 5 km of the Milwaukee River downstream of North Avenue Dam
* Cedar Creek downstream from Bridge Road to confluence with Milwaukee River (Cedar Creek Superfund site)
* Milwaukee River and tributaries from confluence with Cedar Creek to former North Avenue Dam (including Lincoln Creek)

Menomonee River

* Lower 4.8 km of the Menomonee River downstream of 35th Street
* Little Menomonee River from Brown Deer Road to confluence with Menomonee River
* Menomonee River downstream from confluence with Little Menomonee River to 35th Street

Kinnickkinnic River

* Lower 4 km of the Kinnickinnic River downstream of Chase Avenue

Specific project tributary streams are included on the attached map.

**Budget**

|  |  |
| --- | --- |
|  | **Total cost** |
| Personnel Staff Hours x rate (**See below breakout**) | $32,078 |
| Fringe Benefits\* | 12,867 |
| Equipment **(In-kind match – Ozaukee County)** | 0 |
| Supplies (list items/type of items) – See below listing

|  |
| --- |
| Supplies Listing: |
| LR44 Batteries (4 pack) for handheld multi-parameter meter |
| meter tape |
| rite in rain paper |
| pens/pencils |
| replacement parts for flow meter |
| fishing gloves |
| printing |
| flagging tape |
| pin flags |
| replacement parts for DO meter |

 | $505 |
| Contractual (e.g. MRK, GLES) Includes GIS modeling support from Great Lakes Ecological Services to assist with Task 4 activities and fieldwork support from Milwaukee Riverkeeper to assist with Task 2 activities (as applicable)  | $3,000 |
| Other (Travel @$0.54 / mile) Travel expenses are for completion of field work by all Department staff, estimated at approximately 2 round trips for each site from the Ozaukee County Administration Building in Port Washington | $550 |
| **Total Direct Cost** | **49,000** |
| Indirect cost (%) **(In-kind match – Ozaukee County)** | **0** |
| **Total Cost** | **$49,000** |

\*Fringe rates vary by employee based on health insurance coverage. See table below for details.



**Timetable**

January – February 2017

* Begin compiling existing fisheries data
* Quality Assurance Project Plan (QAPP) development
* Finalize project streams and representative sample reach locations
* Preliminary habitat assessment (orthophoto) reviews
* Preliminary fish habitat GIS layer/database creation
* Draft initial fish/habitat association matrix

January – March 2017

* Continue compiling and providing existing fisheries data to WDNR
* Finalize QAPP
* Continue habitat assessment (orthophoto) reviews
* Continue fish habitat GIS layer/database creation
* Compile habitat assessment data
* Consult with fisheries experts and finalize fisheries/habitat association matrix

April – June 2017

* Initiate qualitative habitat assessments and fisheries monitoring activities
* Continue compiling and providing existing and newly-acquired fisheries data to WDNR
* Continue fish habitat GIS layer/database creation

June - September 2017

* Complete qualitative habitat assessments and fisheries monitoring activities
* Continue compiling and providing existing and newly-acquired fisheries data to WDNR
* Finalize GIS layer/database creation
* Validation of fisheries/habitat association matrix and GIS layer/database using fisheries monitoring data
* Final reporting and presentations to WDNR and to Milwaukee AOC Fish and Wildlife Technical Team.

|  |  |
| --- | --- |
| **Deliverables** | Deadline |
| 1. Quarterly Reports – Reports will be submitted by April 1, July 1, October 1 and January 1. Reports will identify amount expended per quarter, activities conducted, and planned activities for the following quarter, along with identification of any issues encountered (including delays or deviations from the original schedule or other setbacks) during the time and how they were addressed. Reports should be submitted to WDNR Project Manager.
 | April 1, July 1, October 1 and January 1 |
| 1. Qualitative Fish Habitat Rating Assessments – Approximately 37 stream habitat inventories will be completed on selected reaches of project streams throughout the AOC for incorporation into the fisheries modeling effort. Copies of the fish habitat rating assessments will be submitted in electronic format, which includes location information (i.e. lat/long, decimal degrees, etc.). Acceptable formats include, Microsoft Access, Microsoft Excel, or ArcGIS geo-database.
 | Sept. 30, 2017 |
| 1. Fisheries Sampling – Electrofishing will be completed in conjunction with qualitative fish habitat rating assessments at selected stream reaches as site conditions allow.
 | Sept. 30, 2017 |
| 1. Fisheries Data – Existing fisheries data and fisheries data acquired as part of this project will be compiled and formatted appropriately for inclusion in the DNR fisheries database.
 | Sept. 30, 2017  |
| 1. Fisheries Habitat Association Matrix and Fish Habitat GIS Layer/Database – Finalized upon completion of qualitative fish habitat rating assessments, fisheries sampling, and validations.
 | Sept. 30, 2017 |
| 1. Presentations to Fish and Wildlife Tech Team - Prepare a presentation and report final findings upon completion of the project in person at a minimum of two meetings to the Milwaukee AOC Fish and Wildlife Technical Team.
 | Upon completion |
| 1. Final Report – Upon completion of the project, a final grant report will be prepared documenting: project title; project manager with any changes in project management identified; reporting period start date and end date; project budget and total funds expended; review of the deliverables completed; information about each deliverable organized in accordance with the deliverables listed in the above scope of work; for any of the deliverables that were not completed, please provide an explanation and describe any barriers to completing the project; elements of the project that worked especially well or were most successful; any aspects of the project that could be improved.
 | Sept. 30, 2017 |
| 1. Quality Assurance Documentation – Prepare appropriate quality assurance project plan or documentation as required for approval by DNR and/or EPA QA staff.
 | Prior to commencing work. |