
Name of Organization: USGS

Type of Organization: Federal Agency

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Project Title: Evaluating Restoration of Fish Access to Tobico Marsh

Project Category: Habitat (Ecological) Protection and Rest

Rank by Organization (if applicable): 0

Total Funding Requested (\$): 105,676 **Project Duration:** 2 Years

Abstract:

Tobico marsh is an 818 Ha coastal wetland that adjoins Saginaw Bay, Lake Huron. While formerly important as a spawning and nursery habitat, it has been isolated hydrologically through construction of a variety of engineered structures. Removal of these impediments and restoration of natural flow regime is planned for winter 2001- 2002. We propose to take advantage of this project to make before-and-after comparisons of the fish community. We will determine status of the fish community before restoration, how adult fish respond to the restored ecosystem, and if the restored habitat contributes juvenile fishes to Saginaw Bay. Additionally, current management practices that restrict access by common carp will be in place at the beginning of the study so that confounding effects of common carp disturbance will not present. Tobico marsh is an ideal location for this study because it represents a historically important wetland that supported northern pike. The restoration allows before-and-after comparisons of the fish community, and the system is amenable to experimental manipulation. Results will be useful in evaluating restoration techniques in coastal wetlands throughout the Great Lakes.

Geographic Areas Affected by the Project

States:

- | | |
|--|---------------------------------------|
| <input type="checkbox"/> Illinois | <input type="checkbox"/> New York |
| <input type="checkbox"/> Indiana | <input type="checkbox"/> Pennsylvania |
| <input checked="" type="checkbox"/> Michigan | <input type="checkbox"/> Wisconsin |
| <input type="checkbox"/> Minnesota | <input type="checkbox"/> Ohio |

Lakes:

- | | |
|---|------------------------------------|
| <input type="checkbox"/> Superior | <input type="checkbox"/> Erie |
| <input checked="" type="checkbox"/> Huron | <input type="checkbox"/> Ontario |
| <input type="checkbox"/> Michigan | <input type="checkbox"/> All Lakes |

Geographic Initiatives:

- | | | | | |
|--|----------------------------------|-------------------------------------|--------------------------------------|---|
| <input type="checkbox"/> Greater Chicago | <input type="checkbox"/> NE Ohio | <input type="checkbox"/> NW Indiana | <input type="checkbox"/> SE Michigan | <input type="checkbox"/> Lake St. Clair |
|--|----------------------------------|-------------------------------------|--------------------------------------|---|

Primary Affected Area of Concern: Saginaw River, MI

Other Affected Areas of Concern:

For Habitat Projects Only:

Primary Affected Biodiversity Investment Area: Saginaw Bay

Other Affected Biodiversity Investment Areas:

Problem Statement:

Restoration of lost or degraded wetland spawning habitats is an important issue in the Great Lakes because coastal marshes are thought to sustain biodiversity and contribute recruits to open-lake fisheries. Loss of these habitats has been identified as a lakewide impairment of beneficial use, and has resulted in extirpation of northern pike and muskellunge, and declines in other game and non-game species. Consequently, restoration of degraded wetlands is an important management goal.

The most common restoration technique is to reconnect wetlands that experienced hydrological isolation from the lakes through construction of road crossings, levees, and water control structures. These impediments restrict access by wetland spawning fish, but their removal allows fish to enter the reconnected waterway for spawning. However, while it is known that adult fish respond quickly by entering reconnected marshes in large numbers, it is not known if restored marshes increase production of juvenile fishes because no before-and-after comparisons have been performed. Another confounding factor is the presence of common carp, which overwhelm marsh habitats during spring spawning and appear to nullify potential benefits of reconnection. To date, virtually all attempted restoration studies did not anticipate problems with common carp, and added common carp control to the experimental design only after the fact.

Tobico marsh is an 818 ha semi-impounded wetland that adjoins Saginaw Bay, Lake Huron. It has been hydrologically isolated through a variety of engineered structures, but removal of these impediments and restoration of natural flow regime is planned for winter 2001- 2002 pursuant to settlement of litigation between General Motors Corporation, U.S. Fish and Wildlife Service (USFWS), and other interested parties. USFWS will supervise the restoration which is designed to restore access to Saginaw Bay fishes, particularly northern pike. We propose to take advantage of this project to make before-and-after comparisons of the restoration. We will determine: 1) how adult fish respond to the restored ecosystem, 2) if the restored habitat contributes juvenile fishes to Saginaw Bay, and 3) how control of common carp influences these processes. Current management practices that restrict access by common carp will be in place at the beginning of the study so that confounding effects will not present. Tobico marsh is an ideal location for this study because it represents a historically important wetland that supported northern pike, and the system is amenable to experimental manipulation. All flow passes through culverts that allow complete control of fish access and permit experimental manipulation of the system. Furthermore, since restoration has not yet begun, we can examine how isolation has influenced the fish community, what is gained or lost when the system is reconnected to Saginaw Bay, and whether carp control practices have any influence on recruitment. This site is also ideal for evaluation of restoration because Tobico marsh is situated adjacent to urban areas associated with Bay City, Michigan, Bay City State Park, and a State Game area. Local residents and park managers have a vested interest in habitat quality within Tobico, and there is strong local interest in restoration and management of this area.

This proposal is tied closely to regional (USFWS) and local (Bay County) initiatives designed to initiate ecological protection and restoration projects- in this case, a management plan for Tobico marsh that was developed by a focus group of stakeholders. The management plan was developed by Bay County pursuant to the Saginaw Bay National Watershed Initiative. For Lake Huron, it directly addresses concerns regarding connection between coastal marshes and the fishery by assessing contribution of recruits to Saginaw Bay. Saginaw Bay has been identified as a primary affected biodiversity investment area, and we will determine if marsh restoration has potential to enhance biodiversity in a historically diverse fish community.

Proposed Work Outcome:

We will sample Tobico Marsh during spring, summer, and fall of 2001 and 2002. Sampling during 2001 will provide pre-restoration information, and document how isolation has affected the fish community. Reconnection of the marsh to Saginaw Bay and installation of common carp barriers will occur during Winter, 2001-2002. Sampling during 2002 will provide post-restoration information about the fish community.

We will sample Tobico marsh during spring, summer and fall. Spring sampling will be designed to generate information about spawning, and will use a census rather than survey technique. Because all water flow in and out of the marsh must pass through flow restrictions at culverts, we can install a temporary sampling weir that will trap fish for identification, counting, and re-release into the system. Common carp control will be implemented by installing vertical grates with 5 cm gaps. This barrier has been shown to pass moderately sized game fishes while excluding about 95% of all adult common carp. We will use a two stage design to determine which fish species (and sizes) can pass the barrier, and which ones are excluded, but only fish surmounting the barrier will be allowed to enter the system. This method will allow accurate counts of numbers and species of fish using the marsh for spring spawning, and determine timing and magnitude of spawning runs. Summer and fall surveys will be designed to measure: 1) abundance of permanent marsh residents and 2) production of young-of-the-year fishes that could recruit to Saginaw Bay. Electrofishing transects will be established above and below the common carp barriers, and we will also compare in-situ abundance with samples taken outside the marsh in Saginaw Bay proper.

One other experiment is possible, depending on lake water level. If marsh water levels are high enough, fish may have access to the uppermost portion of the marsh. If this occurs, we can install a second weir that would exclude carp completely from this area, and we will be able to compare fish recruitment in areas common carp are abundant, present in low numbers, and completely absent.

This study will allow us to determine how fish use a restored coastal marsh, and if coastal marshes have the potential to generate recruits for open-lake fisheries. It will also allow us to evaluate the efficacy of common carp control. Presently, control of common carp appears to be mandatory, and barriers composed of vertical grates show great promise, but this method has not been tested rigorously in the field. In particular, it is not known how large game fishes respond to the barriers, if indeed they are present. Our proposed design will allow comparison of recruitment under conditions of high and low common carp abundance, and we will be able to measure effects of complete exclusion of common carp if marsh water levels are adequate. Results will be applicable to future restoration projects throughout coastal areas of the Great Lakes.

Project Milestones:	Dates:
Project Start	10/2000
Install sampling weir	02/2000
Pre-restoration sampling begins	03/2000
Restoration of natural flow regime	01/2001
Post-restoration sampling begins	03/2001
Sampling ends	09/2001
Report submitted	03/2002
Project End	05/2002

Project Addresses Environmental Justice

If So, Description of How:

Project Addresses Education/Outreach

If So, Description of How:

This project is not designed to carry out education/outreach directly, but results will be made available to the Saginaw Bay Visitor's Center at Bay City State Park for development of an exhibit on restoration efforts and their results. In addition, professional presentations and a manuscript will aid in disseminating the results of this project.

Project Budget:

	Federal Share Requested (\$)	Applicant's Share (\$)
Personnel:	59,570	49,000
Fringe:	4,800	0
Travel:	12,000	0
Equipment:	3,000	0
Supplies:	1,500	0
Contracts:	0	0
Construction:	3,000	0
Other:	0	0
Total Direct Costs:	83,870	49,000
Indirect Costs:	21,806	0
Total:	105,676	49,000
Projected Income:	0	0

Funding by Other Organizations (Names, Amounts, Description of Commitments):

U.S. Fish and Wildlife Service has allocated up to \$500,000 to remove outdated and non-functional water level control structures and install box culverts at road crossings in Tobico Marsh. Jeff Schaeffer has been working with USFWS personnel on the restoration, and USFWS can provide a letter of coordination on request. All construction associated with restoration will be carried out using funds from the Saginaw Bay settlement. Funds requested pursuant to this proposal will be used exclusively for evaluation of the restoration.

Description of Collaboration/Community Based Support:

The proposed project represents a collaboration between USFWS (Lansing, MI field office), USGS Great Lakes Science Center (Ann Arbor, MI), and the University of Michigan School of Natural Resources and Environment (Ann Arbor, MI). Dr. James Diana of SNRE is a nationally recognized expert on Esocids, particularly northern pike, and will coordinate and supervise student research associated with this project. Our budget is designed to provide support for one graduate student, and several undergraduate research assistants and technicians.

This research is not directly associated with a specific community group; however, many aspects of the proposed restoration/evaluation plan were recommended by a focus group consisting of adjacent landowners, personnel from Michigan Department of Natural Resources, Bay County, Bangor Township, the Bay County Drain Commission, Bay City State Park, Tobico Audubon Club, and the V.P. Anderson Foundation. These groups will be informed about the restoration process, and will probably be involved with the plan in some way. They will also be briefed on our research and any outcomes we generate.