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**Name of Organization:** USGS-Great Lakes Science Center

**Type of Organization:** Federal Agency

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**Project Title:** Evaluation of Lake Sturgeon Habitat in the Genesee River

**Project Category:** Habitat (Ecological) Protection and Rest

**Rank by Organization (if applicable):** 0

**Total Funding Requested (\$):** 28,350 **Project Duration:** 1.5 Years

**Abstract:**

Lake sturgeon (*Acipenser fulvescens*) is an ecologically and economically valuable fish species. Historically abundant in Lake Ontario, this large, primitive, macroinvertevore has virtually disappeared due to overfishing and habitat degradation. Management and restoration of any threatened species requires careful reassessment of the habitats in which the species was once common. The Genesee River is one of the major tributaries to Lake Ontario and part of the Rochester Embayment Area of Concern. River water quality has improved significantly in the past 20 years. Initial steps in the assessment of the potential for restoration of a Genesee River sturgeon population will include verification of current population status (probably extirpated) and evaluation of the suitability of current river habitats for all life stages. One powerful tool of lake sturgeon management is the experimental stocking of juveniles. Measurement of post-stocking survival and habitat use by hatchery reared fish will provide valuable information for assessment this management tool and habitat suitability for juveniles in the Genesee River. Lake sturgeon is a species targeted for restoration and enhancement throughout the Great Lakes Basin.

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**Geographic Areas Affected by the Project**

**States:**

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|------------------------------------|-------------------------------------|--------------|
| <input type="checkbox"/> Illinois  | <input checked="" type="checkbox"/> | New York     |
| <input type="checkbox"/> Indiana   | <input type="checkbox"/>            | Pennsylvania |
| <input 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 type="checkbox"/> Huron    | <input checked="" 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:** Rochester Embayment, NY

**Other Affected Areas of Concern:**

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***For Habitat Projects Only:***

**Primary Affected Biodiversity Investment Area:** Not Applicable

**Other Affected Biodiversity Investment Areas:**

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**Problem Statement:**

Sturgeon species, which historically have been an important component of native fish communities and have supported lucrative fisheries, are in serious decline throughout the world. Loss of large, long lived species has been observed to be a characteristic of stressed ecosystems. Lake sturgeon (*Acipenser fulvescens*) is listed as either locally threatened or endangered across the majority of its range. Lake sturgeon has been identified as a target species for restoration and enhancement of self-sustaining populations in Lake Ontario by the U.S. Fish and Wildlife Service (USFWS) and the New York State Department of Environmental Conservation (NYSDEC). The stated goal of the NYSDEC is to "reestablish lake sturgeon as a viable, self-sustaining component of the fish community in New York State to the point of it no longer being classified as threatened." Sound conservation theory recommends that multiple populations of species in danger be maintained. Lake sturgeon restoration to areas where they were historically abundant is considered essential to overall Great Lakes management goals of restoring native fish communities and improving ecosystem function.

The Genesee River, one of the major tributaries to Lake Ontario and part of the Rochester Embayment Area of Concern has had its water quality improve significantly in the past 20 years. In an account of the early history of the Genesee River, monster sturgeon existed in the lower Genesee River in the 1830's. The improvement in water quality has created a window of opportunity for lake sturgeon restoration and enhancement in this river. The Genesee River is thus considered by the NYSDEC as an excellent candidate for restoration of a self-sustaining lake sturgeon population through stocking.

Successful species restoration requires an assessment of any remnant population and the evaluation of the availability and quality of habitat for all life stages of the threatened species over multiple years. A spring and summer of 1999 preliminary survey of possible sturgeon presence and sturgeon habitat found no sturgeon and the presence of probable suitable sturgeon habitat as rated by the Lake Sturgeon Habitat Suitability Model produced by Ontario Hydro.

This study will include extensive population assessment and habitat evaluation. In addition we will add a rigorous evaluation of one lake sturgeon management tool, juvenile stocking. Evaluation of post-stocking survival and habitat use by hatchery reared fish is essential for any efficient stocking program. Critically needed are studies that generate information that will aid in producing juvenile sturgeon that are best adapted to survive in the wild.

This research is focused on lake sturgeon population assessment, habitat use, and restoration in Southern Lake Ontario tributaries but results will be applicable to many historic sturgeon waters. Results of this research in the Genesee River will provide information and validation of methods needed for the next step in restoration and enhancement of lake sturgeon in Lake Ontario, which may include evaluations of the feasibility of sturgeon restoration or enhancement in other New York waters including the Oswego and Black Rivers.

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**Proposed Work Outcome:**

The objectives/steps in this research are: (1) complete assessment of the status of any possible lake sturgeon population in the Genesee River, (2) assessment of the quality and suitability of Genesee River habitat for lake sturgeon by using a habitat suitability index model (HSI) developed for lake sturgeon, (3) measurement of habitat use by stocked juvenile lake sturgeon, (4) verification of the predictions of the sturgeon HSI model through the monitoring of habitat use by stocked juveniles.

In the Genesee population assessment will continue by using gill nets during the spawning season and other seasons. It is necessary to perform assessment in multiple years because in populations with low numbers of large adults, females may not enter the spawning habitat every year and may be elusive in other areas. Detectability of a rare fish species requires knowledge of its probable habitat and synthesis of all presence reports. In addition, habitat suitability estimates are essential for any restoration project. A habitat suitability index model has been developed for lake sturgeon. To use this model to predict the extent of habitats suitable for a self-sustaining sturgeon population in the Genesee the following data will be collected: substrate type, water depth, water velocity, and water temperature. In addition, as an environmental quality variable and as a measure of food availability, the composition and densities of the benthic macroinvertebrate community may be measured based on the results of a 1999 habitat assessment. Global Positioning Systems (GPS) will be used to map the sampling locations in the river. Physical and biotic data will be entered into the HSI model to produce a longitudinal profile map of the distribution of suitable sturgeon habitats in the river.

The small self-sustaining population found in the Niagara River below Niagara Falls will be used as the source population for the juvenile stocking experiment. Adult fish will be collected using methods developed by LGLFRO. Beginning in April 2000 and through the spawning season, setlines and nets will be used to capture adult fish. All sturgeon caught will be placed in an aerated holding tank until biological measurements can be obtained. Fork length, total length, weight, and girth will be recorded, and sturgeon will be tagged. In addition, a pectoral spine and one-half square inch of fin tissue will be obtained for age estimate and genetic analysis, respectively. Genetic analysis will be conducted as part of an ongoing evaluation of genetic variation in wild fish being coordinated by LGLFRO. Fish will be evaluated for their ripeness and individuals with developing gametes will be held in net pens until spawning. Spawning induction and gamete collection will follow standard procedures developed for lake sturgeon.

Sturgeon will be reared through the summer at the NYSDEC Onieda Fish Cultural Station in Constantia NY, which is currently producing small numbers of sturgeon. Survival and growth rates in the hatchery will be followed. At least 1,500 marked fish will be stocked into the Genesee River in October 2000. The juveniles will be 8 to 10 inches long when released. A standardized mark / recapture protocol will be followed during the recapture/habitat use phase of the project. Gill netting will be conducted intensively in the 2 weeks after stocking and frequently into the late fall. Presence and habitat use evaluation will also be conducted during the spring and summer and fall of 2001. Predictions of the juvenile habitat use will be made before stocking using a habitat suitability index model for lake sturgeon developed by Ontario Hydro. Habitat parameters including depth, velocity and substrate characters will be collected in each location fish are recaptured. A gastric lavage technique developed for characterizing sturgeon diet will be used on a subset of captured individuals. Coordination of predicted habitat use and measured habitat use will be tested. Habitat use measured in the fall of 2000 will be used to refine the habitat use predictions for the spring and summer 2001 sampling.

This study will provide information about this at risk species critically needed by fisheries managers. The results will include data on survival of hatchery reared fish, habitat use by these fish after stocking, and data on juvenile habitat parameters that will be used to help test and refine the existing habitat suitability index model for lake sturgeon. The results will aid in the multi-agency and multi-national efforts to understand this species of concern, assess management plans, and help to formulate more effective management plans.

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<b>Project Milestones:</b>	<b>Dates:</b>
Start: Release Juveniles	09/2000
Habitat & Juvenile Evaluation + Report	11/2000
Spring Habitat and Sturgeon Survey	04/2001
Summer Habitat and Sturgeon Survey	07/2001
Habitat & Sturgeon Survey + Report	10/2001
Possible release of Juveniles	10/2001
Spring Habitat & Sturgeon Survey	04/2002
End, Report & Juvenile Habitat Paper	05/2002

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Project Addresses Environmental Justice

**If So, Description of How:**

Project Addresses Education/Outreach

**If So, Description of How:**

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**Project Budget:**

	<b>Federal Share Requested (\$)</b>	<b>Applicant's Share (\$)</b>
<b>Personnel:</b>	9,500	18,000
<b>Fringe:</b>	0	0
<b>Travel:</b>	1,500	1,000
<b>Equipment:</b>	2,500	500
<b>Supplies:</b>	3,000	500
<b>Contracts:</b>	0	0
<b>Construction:</b>	0	0
<b>Other:</b>	6,000	0
<b>Total Direct Costs:</b>	22,500	20,000
<b>Indirect Costs:</b>	5,850	0
<b>Total:</b>	28,350	20,000
<b>Projected Income:</b>	0	0

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

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**Description of Collaboration/Community Based Support:**

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This research project is a collaboration between the U.S. Fish and Wildlife Service, Lower Great Lakes FRO, the New York State Department of Environmental Conservation, and the U.S. Geological Survey Tunison Laboratory of Aquatic Science. Chris Lowie (USFWS) will be the lead scientist coordinating Genesee River sturgeon assessment, the capture of ripe adults from the Niagara River, and the collection of gametes. Local volunteer labor will participate in the capture of Niagara River fish. USFWS will provide support equipment and personnel for the evaluation of stocked fish presence and habitat use in the Genesee River.

Webster Pearsall (NYSDEC) will be the lead scientist coordinating the rearing of sturgeon at the NYSDEC hatchery and release of juveniles into the rivers. NYSDEC will provide support equipment and personnel for the population assessment, habitat assessment, and evaluation of stocked fish presence and habitat use.

Dawn Dittman (USGS) will be the lead scientist coordinating the assessment of sturgeon habitat quality in the Genesee River and evaluation of stocked fish presence and habitat use. USGS will provide support for the collection of Niagara River adults and production of juveniles.