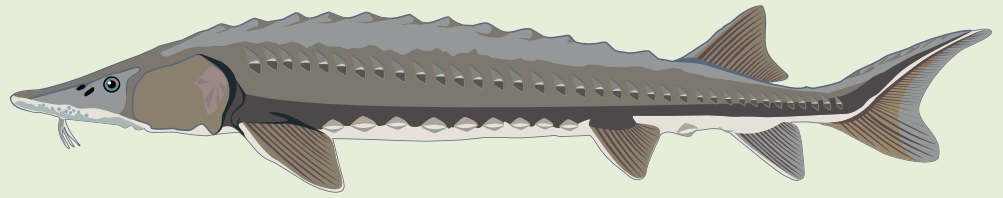




**HURON-ERIE
CORRIDOR
INITIATIVE**



ENHANCED NATIVE FISH REPRODUCTION IN THE DETROIT RIVER: BENEFITS OF THE BELLE ISLE STURGEON HABITAT RESTORATION PROJECT

In 2004, with funding from Great Lakes Fishery Trust, MDEQ, and DTE Energy, Michigan Sea Grant led a consortium of federal, state and private groups in the construction of three lake sturgeon (*Acipenser fulvescens*) spawning reefs in the waters off Belle Isle in the Detroit River. Findings from this project have demonstrated that although lake sturgeon have yet to spawn at the site, the project has already provided many benefits, including enhanced fishery productivity in the river.

ENHANCED REPRODUCTION AND IMPROVED UNDERSTANDING OF THE FISH COMMUNITY

The constructed spawning reefs have greatly enhanced fish use of the area and have directly enhanced reproduction by 14 native fish species. Before construction of the spawning reefs only two species of fish were collected in the study area. After construction, 20 species of fish were collected there, including 14 native fish species in spawning-ready condition or hatched from eggs we collected.

Lake sturgeon will likely spawn successfully on one or more of the constructed beds in the future. The catch of a spermiating lake sturgeon in the study area during the time of optimum water temperature for spawning lake sturgeon showed that lake sturgeon in spawning condition were attracted to the constructed spawning beds at the right time. The catch of a 4-foot immature lake sturgeon less than a month later reinforced that conclusion and scientists expect that lake sturgeon will spawn successfully on the constructed beds in the future.

Walleye are spawning near Belle Isle. In 2004 fertilized walleye eggs were discovered in the study area. This was the first evidence of walleye spawning in the Detroit River. In 2005, scientists confirmed that both walleye and white sucker spawned over a 20-ha area of sandy shoal at the head of Belle Isle. This shoal is the first active natural spawning ground found to date in the Detroit River.

Endangered northern madtom are present. In 2006, the identity of the small, stout catfish that had been caught in the



study area since 2003 was confirmed as the northern madtom (*Noturus stigmosus* Taylor), a globally-rare, critically imperiled fish that is listed as endangered in Michigan and endangered (not regulated) in Ontario and Canada.

Restoration of native fish is limited by lack of spawning habitat. The speed at which fish found and used the constructed beds for successful reproduction suggests that restoration of many native fish populations

in the Detroit River is limited by reproductive habitat.

INCREASED KNOWLEDGE OF NATIVE FISH HABITAT RESTORATION TECHNIQUES

Modern coal cinders are preferred by spawning fish.

Significantly more fish eggs were collected on the cinder bed than on the limestone or cobble beds, indicating many native fish prefer to spawn on coal cinders.

Large anchor-stone causes infilling of constructed spawning beds. Use of large anchor-stone on the leading, upstream edge of constructed spawning habitat at Belle Isle led to sediment infilling among the limestone and rounded-rock, diminishing the ability of these substrates to protect fish eggs from displacement and predation.



The same substrates can be used by different fish in chronological sequence. The same spawning substrates were used in chronological sequence by a wide variety of spawning fishes, in response to changes in water temperature.

The design criteria of where and how to build sturgeon spawning habitat was generally correct. Although scientists

have not yet found evidence of lake sturgeon spawning on the constructed habitat, spawning-ready sturgeon were caught in the area during spawning season. We expect lake sturgeon to spawn successfully in the study area in the future.



MANAGEMENT IMPLICATIONS

The Belle Isle study has provided valuable lessons for management of the Detroit River fishery. The project:

Scientists should locate and design spawning reefs to maximize potential encounters between adult fish and the reproductive substrates.

Pre-construction fish use of the Belle Isle study area was minimal. In a spawning habitat restoration project currently underway for Northeast Fighting Island (NEFI), scientists found that lake sturgeon, lake whitefish, and walleye move over the proposed site during much of the ice-free period of the year. To maximize encounters between adult lake sturgeon and the reproductive substrates, the NEFI reefs were designed to span the entire width of the river channel at depths of optimum sturgeon use.

- Justifies closure of Michigan and Ontario waters of the Detroit River to possession of lake sturgeon

- Demonstrates that the potential exists for restoration of lake sturgeon
- Enabled managers to locate walleye spawning grounds near Belle Isle and protect them from dredging and waste discharges
- Brings managers one step closer to understanding the recipe for successful construction of native fish spawning grounds

CONCLUSION

Adequate, suitable water and substrate quality now exists near Belle Isle for successful reproduction by 14 native fish species, including walleye and lake whitefish. The Belle Isle project is enhancing the reproduction and survival of these fish in the Huron-Erie Corridor and in Lake Erie.

COMMON NAMES OF ALL FISH (OR FRY HATCHED FROM EGGS) COLLECTED IN THE STUDY AREA

Common name	Hatched from eggs	Spawning-ready adults	Other age
Lake sturgeon		■	
Lake whitefish	■		
Northern pike		■	
Emerald shiner	■		
Quillback	■		
White sucker	■	■	
Northern hog sucker	■	■	
Silver redhorse	■	■	
Shorthead redhorse	■	■	
Trout-perch	■		
White perch		■	
White bass		■	
Rock bass		■	
Yellow perch	■		
Walleye	■	■	
Northern madtom			■
Smallmouth bass			■
Logperch			■
Round goby			■
Gizzard shad			■

PRE- AND POST-CONSTRUCTION FISH USE

Before Construction:

Two species: white sucker sac-fry (1) and walleye (136 eggs),
No spawning-ready adults

After Construction:

Twenty species: See table at left.

- 10 species of spawning-ready adults
- 10 species of sac-fry hatched from eggs collected.
- 14 species of native fishes in spawning-ready condition or hatched from eggs we collected.

Fish and egg catch data and sac-fry hatched, by year, was tabulated with the increases in these variables from that found in 2003 and 2004, before construction of the spawning beds:

Year	Gill nets	Minnow traps	Setlines	Eggs	Sac-fry
2003	0	16	0	1	1
2004	NA	NA	NA	137	11
Mean:	0	16	0	69	6
2005	106	241	1	4776	952
2006	218	159	2	854	522
Mean:	162	200	1.5	2815	737
Increase:	162-fold	12.5-fold	1.5-fold	41-fold	123-fold

Contacts:

Jen Read, jenread@umich.edu, (734) 936-3622
Sandra Morrison, smorrison@usgs.gov, (734) 214-9393