

## **BELOW THE SURFACE – RESTORING AN URBAN RIVER**

By Lynn Vaccaro and Stephanie Ariganello

**Restoration Projects are ramping up all over the Great Lakes. What does restoration look like? How do we know what works, where to begin and when to stop?**

Consider the waters that lie between Lake Huron and Lake Erie. It is a stretch that includes the St. Clair River, Lake St. Clair and the Detroit River. It is a passageway, a corridor from the blue wilds of Lake Huron to the warmer shallows of Lake Erie. Before Europeans first came to the area in the 1600s, vast marshes and swamps lined waterways abundant with waterfowl, fish, mussels and mammals.

Today, three million people and far less flora and fauna live within the Huron-Erie Corridor. Former expanses of wetlands have been drained and developed. Shorelines are armored with metal and concrete pilings. The river bed has been blasted to create shipping channels and tributary rivers have been dammed.

The corridor is a great example of the need for and challenges of environmental restoration.

### **What is Restoration?**

In the most familiar sense, restoration is to bring something – say a piece of furniture – back to its former glory. But because ecosystems are so complex and so dynamic, there is no clear snapshot of what a restored habitat should look like. According to the Environmental Protection Agency (EPA), ecological restoration involves renewing natural areas that have been lost or degraded, and reclaiming their functions and values as vital ecosystems.

Efforts to rehabilitate spots around the region recently received a major boost from the federal government, administered through the EPA. The Great Lakes Restoration Initiative has funneled \$475 million into a diverse suite of projects, including several led by Michigan Sea Grant and its partners.

On paper the regional restoration goal is simple: to address the most significant environmental problems and restore the health of the Great Lakes ecosystem. But defining a truly healthy ecosystem is not straightforward, and success requires a wide range of programs, careful planning, long-term commitment, and sound science to guide the work. All of these are components of restoration.

### **A Restoration Case Study: Sturgeon in the River**

Many years ago Bruce Manny, a biologist with the U.S. Geological Survey (USGS) Great Lake Science Center, was drawn to studying the Huron-Erie Corridor by a mysterious native fish – the lake sturgeon.

Lake sturgeon is the largest and most long-lived fish in the Great Lakes. They were once incredibly abundant throughout the region. Settlers began harvesting the fish in the 1880s in such high numbers that by the early 1900s, populations dramatically crashed. That overharvesting, pollution, the changing riverscape and the sturgeon lifecycle itself – they take decades to mature – have contributed to a precarious population.

“When I started working in southeast Michigan, lake sturgeon had this ethereal quality,” Manny said. “They were so rare and so strange that if they were ever caught, the pictures made it into every local newspaper – it was a really big deal.”

By the 1990s, people were pessimistic about the future of native sturgeon. Although adult sturgeon were occasionally caught in the Detroit River, most people believed the population was close to gone. However,

Manny heard that small lake sturgeon were occasionally caught in western Lake Erie. He began to wonder if a group of sturgeon was still returning to the river to spawn. It was a glimmer of hope and he ran with it. For the past 20 years, he has been studying lake sturgeon to determine what environmental improvements could help populations recover in the Great Lakes.

To learn more, see: [sturgeon](#)

## **An Experiment**

Years of field work revealed that three areas still exist in the Huron-Erie Corridor where adult sturgeon gather to spawn – two in the St. Clair River and one just off Zug Island in the Detroit River. From these and other studies, Manny and fellow scientists developed an idea of what attracts romantically inclined sturgeon.

They found that sturgeon in the corridor prefer deep water and rocky reefs where crevices protect the eggs and fast-moving currents provide a steady supply of oxygen. Construction of shipping channels had long destroyed many of the natural rocky reefs that were attractive to spawning native fishes, including sturgeon. In two of three known spawning sites, fish were depositing eggs on piles of coal cinders dumped in the river by shipping barges, apparently because there were no better options.

Manny, a team of USGS scientists, Michigan Sea Grant and many other partners joined together to conduct an experiment. They set out to encourage more sturgeon spawning by constructing appealing habitat.

In June of 2004, the team constructed a series of reefs just upstream of Belle Isle in the Detroit River, using three different types of rocks. By most accounts, the reefs worked beautifully. The outcome was a little surprising. Many different types of native fishes showed up to reproduce. Whitefish spawned on the reefs – a first in over 80 years in the Detroit River.

But, there were no sturgeon.

## **New and Improved**

Clearly the artificial reef was an accepted spawning spot for some fish species. But where were the sturgeon? Manny and his team believed they just had not found the Belle Isle reefs. So, they revised the strategy and decided to place future reefs as close as possible to areas known to be sturgeon hangouts and to build even larger reefs so they would be easy to find.

More research was conducted. Movements of tagged adult sturgeon that seemed ready to spawn were monitored. They congregated in an area of particularly fast moving water just north of Fighting Island on the Canadian side of the Detroit River. This would be the site of the next project.

In 2008, Manny and his team created another series of rocky reefs that were each four times larger than the Belle Isle reefs. Within a year, the USGS team caught sturgeon near the reefs so ready to spawn they were leaking sperm. Even as the restoration team celebrated this accomplishment, they began wondering what would happen to the eggs and larval fish.

Ed Roseman, a biologist at the USGS Great Lakes Science Center, collected some of the eggs and carefully raised the young sturgeon in tanks in his lab in Ann Arbor.

“With Ed’s help we’ve begun to understand what happens to fish larvae after they emerge,” said Manny. “For the first weeks of their lives they are at the mercy of the current, so we need to make sure the larvae will float into hospitable nursery areas, such as wetlands.”

## **The Next Stage**

Manny and his team are using everything they have learned about sturgeon to develop a third reef project, which will be constructed in the St. Clair River during spring 2011. With grants from the Great Lakes Restoration Initiative, Jennifer Read, Assistant Director of Michigan Sea Grant is leading the reef construction work, while Manny and his team will study the fish community before and after building the reef.

“When we first started this work 10 years ago, our thinking was more one-dimensional; we wanted to build a safe place for sturgeon to deposit their eggs,” said Read. “But now we’ve come to see habitat restoration as a real multi-dimensional problem. To create a sustainable sturgeon population we need to think about the needs of the eggs, the larvae, the juveniles and the adults, and this involves thinking beyond the river,” said Read.

That “beyond the river” approach includes rigorous monitoring to help the restoration team determine if sturgeon reproduction and survival was successful. It is a critical piece to the restoration – from a wider perspective, monitoring is crucial in understanding how one specific project fits into a larger restoration effort.

## **The End?**

In restoration, there is no finish line. Like the sturgeon spawning reefs projects, most restoration efforts focus on controlling a specific threat such as invasive species or improving a natural area to achieve a particular outcome. While ecological restoration is still a young science, more work is being done to unify restoration efforts. With the national restoration initiative focused on the Great Lakes, people in the region will likely hear more about projects in their communities. Further Michigan Sea Grant restoration initiatives will be profiled in *Upwellings* next year.

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