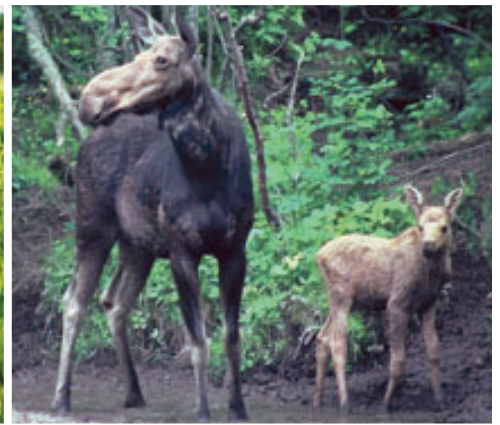


Great Lakes Restoration Projects Producing Results for People, Communities

MARCH 2013



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March 2013

Prepared for the Healing Our Waters–Great Lakes Coalition
by Jeff Alexander

Report design and layout
by Tuan Do Graphic Design

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Program helps boaters stop spread of invasives

Stop Aquatic Hitchhikers!™ Campaign

**BASED AT THE
UNIVERSITY OF MINNESOTA
SEA GRANT PROGRAM
IN DULUTH, MINNESOTA**

PROJECT SUMMARY

Minnesota Sea Grant is expanding its highly successful Stop Aquatic Hitchhikers!™ program. The program educates boaters and anglers about how to prevent the spread of invasive species.

DESCRIPTION

Zebra mussels and other aquatic invasive species that were imported to the Great Lakes by transoceanic freighters and other sources have caused billions of dollars of economic and ecological damage. Minnesota Sea Grant's Stop Aquatic Hitchhikers!™ has worked to slow the spread of invasive species by educating boaters about the importance of washing their boats after every outing. Dirty boats can carry invasive species from one waterway to another. Sea Grant's program uses a variety of tools—billboards, signs, cards, presentations, Web sites and social media—to educate boaters about the need to combat invasive species. The program began in Minnesota but has since spread across the Great Lakes basin. The program received a \$1.5 million Great Lakes Restoration Initiative grant in 2010 to expand outreach efforts. That grant helped the campaign educate more than 10 million people about the need to clean boats. In 2012, Minnesota Sea Grant received a \$400,000 grant to expand the program. The new effort will use social media and education to teach people how to prevent the spread of aquatic invasive species via 15 different pathways. Sea Grant will produce 30 new or improved outreach products that could be seen by 7 million people in 40 communities. The program could help efforts to develop similar programs in other parts of the country.



**STOP AQUATIC
HITCHHIKERS!**

Prevent the transport of nuisance species.
Clean all recreational equipment.
www.ProtectYourWaters.net



Zebra mussels on a boat prop. Boats can spread aquatic invasive species.

APPROXIMATE COST

\$1.9 million from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Aquatic invasive species

KEY PARTNERS (PUBLIC AND PRIVATE)

University of Minnesota Sea Grant, U.S. Environmental Protection Agency and more than 1,000 other businesses, industry groups, universities and non-profit organizations

RESULTS AND ACCOMPLISHMENTS

The first phase of the campaign, which received a \$1.5 million Great Lakes Restoration Initiative grant in 2010, was seen by 10 million people across the Great Lakes basin. The latest GLRI grant of \$400,000 is expected to help the campaign reach another 7 million people.

WEB SITE

www.protectyourwaters.net

Waukegan Harbor on the road to recovery



DESCRIPTION

Decades of industrial activity along the shores of Waukegan Harbor caused extensive pollution, leaving what was once called the “world’s worst PCB mess.” PCB contamination of sediments in the harbor on Lake Michigan was discovered in 1975; federal officials said the Outboard Marine Corp. caused the pollution. The contaminants poisoned fish and wildlife, ruined fish and wildlife habitat and caused beach closings. In the 1980s, the U.S. Environmental Protection Agency declared a 100-acre parcel adjacent to the harbor a federal Superfund site. The polluted harbor also landed on a list of 43 Great Lakes Areas of Concern. OMC dredged some of the toxic sediments in 1992, but federal officials determined that the cleanup was incomplete. The EPA’s work at the site accelerated in 2012, when the agency made the Waukegan Harbor cleanup a priority.

APPROXIMATE COST

\$48 million, \$2 million of which came from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Toxic sediment, contaminated fish and wildlife that prompted consumption advisories, loss of fish and wildlife habitat and beach closings

KEY PARTNERS (PUBLIC AND PRIVATE)

U.S. Environmental Protection Agency, Illinois Environmental Protection Agency and the city of Waukegan

TYPES OF JOBS CREATED

Chemists, toxicologists, biologists, dredge operators, truck drivers, wastewater treatment technicians and general laborers

RESULTS AND ACCOMPLISHMENTS

The dredging of contaminated sediments, scheduled for completion in late 2013, is one of the last steps in a long effort to clean up the harbor and redevelop Waukegan’s waterfront. Federal officials hope to remove the harbor from a list of Great Lakes Areas of Concern in 2014.

WEB SITE

<http://1.usa.gov/Y5xNDK>

Waukegan Harbor Cleanup

WAUKEGAN, ILLINOIS

PROJECT SUMMARY

A cleanup one of the most contaminated harbors in the United States recently took a huge step forward, when the federal government began dredging 175,000 cubic yards of toxic mud from the bottom of Waukegan Harbor, near Chicago.



Waukegan Harbor. (Great Lakes Commission photo)



New park on Lake Erie protects critical wildlife habitat

Lake Erie Bluffs Park

LAKE COUNTY, OHIO

PROJECT SUMMARY

The Great Lakes Restoration Initiative provided funding for a land purchase that established the 139-acre Lake Erie Bluffs Park, an ecologically significant site in Ohio that is home to 20 rare plant and animal species.



The beach at Lake Erie Bluffs Park. (Lake Erie Metroparks photo)

DESCRIPTION

Lake Erie Bluffs is a county park on the shores of Lake Erie in northeast Ohio. The 139-acre parcel provides public access to a gorgeous stretch of natural beach. The site is also ecologically significant. It provides habitat for 20 rare species, including the bald eagle, least flycatcher, purple sand grass and the inland sea rocket. The site was targeted for development but the project never materialized. Lake County officials then worked with other government agencies and private land trusts to acquire the site. The park meets one of the goals of the Great Lakes Restoration Collaborative. The collaborative, a presidential task force established in 2004, identified nine priorities for restoring the Great Lakes, including “a need for significantly more habitat conservation and species management.” Lake Erie Bluffs permanently protects wetlands, meadows and coast and natural shoreline that provides habitat for fish and wildlife and contributes to the overall health of the Great Lakes.

APPROXIMATE COST

\$2.3 million, \$1.6 million of which came from the Great Lakes Restoration Initiative



The park offers stunning views of Lake Erie. (Lake Erie Metroparks photo)

RESOURCE CHALLENGES ADDRESSED

Public access to the Great Lakes, preservation of coastal wetlands and meadows that provide valuable fish and wildlife habitat

KEY PARTNERS (PUBLIC AND PRIVATE)

U.S. Environmental Protection Agency, National Oceanic and Atmospheric Administration, Ohio Department of Natural Resources, Lake County Soil & Water Conservation District, the Trust for Public Land and the Clean Ohio Fund

RESULTS AND ACCOMPLISHMENTS

Lake Erie Bluffs permanently protects 139 acres of natural Lake Erie shoreline, which includes meadows, wetlands and other features that provide habitat for 20 rare species of plants and animals. The park also increases public access to Lake Erie.

WEB SITE

<http://bit.ly/Mm5T4a>



A clamshell dredge removes contaminated sediment from the lower Sheboygan River. (U.S. EPA photo)

DESCRIPTION

Historic pollution left PCBs and heavy metals in bottom sediments and surface soils along parts of the Sheboygan River and Sheboygan Harbor in Wisconsin. The contaminants degraded water quality, tainted fish, damaged fish and wildlife habitat and posed public health threats. The contamination, much of which came from the former Tecumseh Product Co., earned the river a spot on the list of 43 Great Lakes Areas of Concern and made the river a black eye for the city of Sheboygan. A cleanup of contaminated soils and groundwater at the former Tecumseh Product facility

was completed in 2005. In 2012, the U.S. EPA contributed \$50 million from the Great Lakes Restoration Initiative to speed a cleanup of the lower Sheboygan River and Harbor. During the 2012 project, crews dredged 50,000 cubic yards of contaminated sediment and restored fish and wildlife habitat in and along the lower river.

APPROXIMATE COST

\$62 million, \$50 million of which came from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Polluted river bottom sediments, contaminated fish and wildlife, fish consumption advisories, degraded fish and wildlife habitat, and threats to human health

KEY PARTNERS (PUBLIC AND PRIVATE)

U.S. Environmental Protection Agency, Wisconsin Department of Natural Resources, city of Sheboygan, Sheboygan County, Wisconsin Department of Transportation and the University of Wisconsin-Extension

TYPES OF JOBS CREATED

Dredge operators, heavy equipment operators, general laborers, biologists, chemists, toxicologists and aquatic ecologists

RESULTS AND ACCOMPLISHMENTS

Crews dredged 16,158 cubic yards of contaminated sediment in the lower Sheboygan River and 34,390 cubic yards of contaminated sediment in the inner harbor. The dredging was one of the final steps in a long process to get the Sheboygan River delisted as a Great Lakes Area of Concern. The cleanup made the river and harbor cleaner, deeper and bolstered economic development efforts in Sheboygan.

WEB SITE

<http://1.usa.gov/YiCuzZ>

Sheboygan River and Harbor Cleanup

SHEBOYGAN, WISCONSIN

PROJECT SUMMARY

The 2012 dredging of 50,000 cubic yards of contaminated sediment in Wisconsin's Sheboygan River was one of the final steps in a long process to clean up the river and get it removed from the list of Great Lakes Area of Concern.



The Sheboygan Inner Harbor, where the river flows into Lake Michigan. (Great Lakes Commission photo)



Repaired pump injects new life into large wetland

Nayanquing Point Coastal Wetland Project

NEAR BAY CITY, MICHIGAN

PROJECT SUMMARY

The replacement of a failed pump structure at the Nayanquing Point State Wildlife Area in eastern Michigan has restored a large wetland, improved wildlife habitat and increased waterfowl hunting opportunities.

Nayanquing Point, along the shores of Lake Huron's Saginaw Bay. (Michigan Sea Grant photo)

DESCRIPTION

The state of Michigan has the most Great Lakes coastline of any state, but it has lost 70 percent of its coastal wetlands over the past two centuries, according to government data. The losses are significant because wetlands filter pollutants and provide valuable habitat for fish, wildlife, insects and birds. Nayanquing Point State Wildlife Area in Bay County, Michigan, spans about 1,400 acres of Great Lakes coastal wetlands along Lake Huron's Saginaw Bay. Nayanquing Point provides valuable habitat for migratory birds that pass through the region every spring and fall. The failure of a pump structure in the wildlife area hampered the state of Michigan's ability to control water levels to provide the maximum amount of habitat for birds. Ducks Unlimited worked with the Michigan Department of Natural Resources and other organizations to obtain a Great Lakes Restoration Initiative grant in 2010 to redesign and repair the pump structure. The project, which was completed in 2012, allows wetland managers from the Michigan Department of Natural Resources to manipulate water levels within a 298-acre East Marsh and on the adjacent 150-acre C Field. Those sites are managed to provide high quality waterfowl hunting opportunities.

APPROXIMATE COST

\$192,862 from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Loss of wildlife habitat in a degraded wetland

KEY PARTNERS (PUBLIC AND PRIVATE)

Ducks Unlimited, the Michigan Department of Natural Resources, Michigan Duck Hunters Association and the U.S. Environmental Protection Agency's Great Lakes Restoration Initiative

TYPES OF JOBS CREATED

Engineers, plumbers and pipefitters, general laborers and biologists

RESULTS AND ACCOMPLISHMENTS

The project provided more and better habitat for waterfowl and other wetland dependent species, and increased hunting opportunities at Nayanquing Point.

WEB SITE

<http://bit.ly/JZvSeh>





DESCRIPTION

Frog Bay Tribal National Park opened in August 2012. Located along Lake Superior near Bayfield, Wisconsin, it is the first tribal national park in the United States. The Red Cliff Band of Lake Superior Chippewa owns about half the land within its 14,000-acre reservation in northern Wisconsin, but the tribe didn't own one of the most ecologically valuable and culturally important parcels along the Lake Superior coast. The 88-acre site now known as Frog Bay Tribal National Park is home to a primordial boreal forest that is globally significant, according to the Wisconsin Department of Natural Resources, and abuts Frog Bay and the Frog Creek estuary. The park features a lush forest and is home to numerous species of fish, birds and wildlife. The site also is culturally significant for the Red Cliff Tribe, whose members once harvested wild rice from the Frog Creek estuary. Wisconsin resident David Johnson, who owned the 88-acre parcel and wanted it to be preserved in its natural state, worked with the Bayfield Regional Conservancy to convert his private property into a tribal national park that is open to the public.

APPROXIMATE COST

\$488,000 from the National Oceanic and Atmospheric Administration's Coastal Estuarine Land Conservation Program. The Great Lakes Restoration Initiative provided funding for the NOAA grant. David Johnson donated half of the value of the land.

RESOURCE CHALLENGES ADDRESSED

The potential loss of boreal forest; and the preservation of wild rice and other natural features that are ecologically important and culturally significant to the Red Cliff Tribe

KEY PARTNERS (PUBLIC AND PRIVATE)

The National Oceanic and Atmospheric Administration, the U.S. Environmental Protection Agency, David Johnson, the Red Cliff Band of Lake Superior Chippewa and the Bayfield Regional Conservancy

RESULTS AND ACCOMPLISHMENTS

The project preserved a globally significant forest and a quarter-mile of pristine Lake Superior shoreline; increased public access to Lake Superior and the Apostle Islands; and protects water quality in Lake Superior's Frog Bay.

WEB SITE

<http://bit.ly/TOWgvO>

Frog Bay Tribal National Park

BAYFIELD, WISCONSIN

PROJECT SUMMARY

A federal grant helped establish the nation's first tribal national park along the shores of Lake Superior, near Bayfield, Wisconsin. The Frog Bay Tribal National Park, which preserves 88 acres of boreal forest and a quarter-mile of pristine shoreline, opened in August 2012.



Frog Bay Tribal National Park features a quarter-mile of pristine Lake Superior shoreline. (Native American Tourism of Wisconsin photo)



Michigan's first "green road" protects water quality

Urban Stormwater Management Using Low Impact Design

WHITEHALL, MICHIGAN

PROJECT SUMMARY

A half-mile of city street in West Michigan that was transformed into the state's first "green road" will reduce the volume of polluted stormwater that reaches White Lake, which is a Great Lakes Area of Concern.



Bio-swales along Lake Street filter pollutants out of stormwater before the water reaches White Lake. (Prein & Newhof photo)

DESCRIPTION

White Lake is a major tributary to Lake Michigan and one of 43 Great Lakes Areas of Concern. Historic industrial pollution contaminated lake bottom sediments, tainted fish and harmed water quality in the lake, located in West Michigan. Several industrial cleanups years have dramatically improved conditions in the lake. Government officials are now working to reduce the volume of polluted stormwater that drains off the land and into White Lake. The city of Whitehall, with financial support from the Great Lakes Restoration Initiative, recently completed Michigan's first "green road." The city transformed a 2,800 linear feet of Lake Street from a traditional paved roadway into a state-of-the-art stormwater collection system that uses pervious pavers, rain gardens and bio-swales to capture and repeatedly filter stormwater runoff from 60 acres of streets and industrial land near White Lake. The filtered stormwater is then channeled into wetlands that were created at the site of a former tannery on the lakeshore. The project, which uses green infrastructure to trap and filter stormwater, will reduce the volume of polluted water entering the lake. Whitehall city officials hope the project becomes a model for other communities looking to reduce stormwater runoff.

APPROXIMATE COST OF PROJECT

\$1 million. The Great Lakes Restoration Initiative provided \$381,760, which covered half of the construction costs.

RESOURCE CHALLENGES ADDRESSED

Stormwater runoff and water quality in White Lake

KEY PARTNERS (PUBLIC AND PRIVATE)

City of Whitehall, U.S. Environmental Protection Agency, and the Prein & Newhof engineering firm

TYPES OF JOBS CREATED

Engineers, surveyors, landscape designers, pipefitters, heavy equipment operators and general laborers

RESULTS AND ACCOMPLISHMENTS

The stormwater collection systems installed under and along Lake Street capture stormwater runoff from 60 acres of streets and industrial properties, thereby reducing the volume of pollutants that reach White Lake.

WEB SITE

<http://bit.ly/11Nr0mm>

Pervious pavers capture stormwater runoff and direct it into rain gardens, bio-swales and wetlands that absorb water and filter out pollutants. (Prein & Newhof photo)





DESCRIPTION

Moose are one of the most cherished and threatened wildlife species in Minnesota. The moose population in northwestern Minnesota decreased over the past 20 years, from more than 4,000 animals to fewer than 100. Scientists fear climate change could cause a similar decline in the moose herd in northeastern Minnesota, on the uplands along Lake Superior. Researchers have counted more than 7,000 moose in northeastern Minnesota in recent years, but scientists have recently observed higher mortality among moose that have been fitted with radio collars. The increased mortality has been tied to climate change. Scientists at the University of Minnesota-Duluth are leading an effort to sustain the moose population in northeastern Minnesota by restoring foraging habitat that the animals need to survive. Researchers are also developing habitat guidelines that will help private property owners and public land managers provide the best possible habitat for the animals. A grant from the Great Lakes Restoration Initiative allowed researchers to restore 200 acres of moose foraging habitat near wetlands and evaluate whether moose are using another 800 acres of previously restored foraging habitat. Initial results indicated that moose are using the restored foraging habitat. The GLRI project is part of a larger, decade-long effort to better manage moose habitat. The hope is that improved habitat management activities will prevent a major decrease in the moose population in northeastern Minnesota.

APPROXIMATE COST

\$193,432 from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Loss of moose foraging habitat, climate change adaptation

KEY PARTNERS (PUBLIC AND PRIVATE)

University of Minnesota-Duluth, U.S. Environmental Protection Agency, Minnesota Zoo and the Boulder Lake Environmental Learning Center

TYPES OF JOBS CREATED

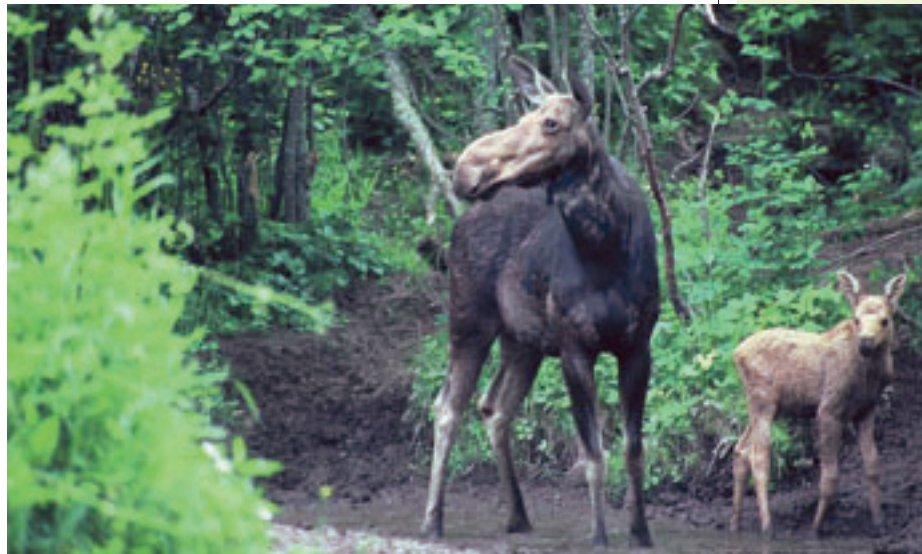
Biologists, ecologists, data technicians and general laborers

RESULTS AND ACCOMPLISHMENTS

Moose are actively using 1,000 acres of restored foraging areas, which could help the animals survive climate change.

WEB SITE

<http://www.nrri.umn.edu/moose/>



An adult moose and calf in northern Minnesota. (Photo by Ron Moen, University of Minnesota-Duluth)

Restoring Moose Foraging Habitat in Lake Superior Uplands

LAKE COUNTY, MINNESOTA

PROJECT SUMMARY

Scientists have restored 1,000 acres of moose foraging habitat near Lake Superior and are working on other wildlife management activities in an effort to sustain the moose herd in eastern Minnesota.



Important lake trout hatchery is back in service

Allegheny National Fish Hatchery Renovation

WARREN, PENNSYLVANIA

PROJECT SUMMARY

The Allegheny National Fish Hatchery re-opened in 2012, seven years after a deadly fish virus and infrastructure problems forced the facility to shut down. The renovated facility, which can produce 1 million native lake trout annually, is the only hatchery dedicated to supporting struggling lake trout fisheries in Lake Erie and Lake Ontario.



The Allegheny National Fish Hatchery. (U.S. Fish and Wildlife Service photo)

DESCRIPTION

From 1974 until 2005, the Allegheny National Fish Hatchery produced as many as 1.3 million lake trout annually for lakes Erie and Ontario. The hatchery was closed and all the fish were destroyed in 2005 after fish there tested positive for a highly contagious and incurable virus. The hatchery was decontaminated but major infrastructure problems were discovered during the decontamination process. Those problems prevented the resumption of fish production, which led to major renovations. During the renovations, lake trout from hatcheries in other states were trucked to lakes Erie and Ontario. Because there are no self-sustaining populations of lake trout in the lower Great Lakes, hatcheries are critical to maintaining the fishery. Improvements at the Allegheny National Fish Hatchery could lead to self-sustaining lake trout populations in lakes Erie and Ontario.

APPROXIMATE COST

\$1.7 million, most of which came from the American Recovery and Reinvestment Act and the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

The 2005 closure of the only hatchery dedicated to producing lake trout for Lake Ontario and Lake Erie meant fewer fish in the lakes and hampered efforts to restore self-sustaining populations of the native fish species

KEY PARTNERS (PUBLIC AND PRIVATE)

The U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency's Great Lakes Restoration Initiative and the William T. Spaeder Co., the general contractor on the project

TYPES OF JOBS CREATED

Construction workers, engineers, plumbers, biologists and general laborers

RESULTS AND ACCOMPLISHMENTS

The renovated hatchery will provide a reliable supply of native lake trout for lakes Erie and Ontario and bolster efforts to create self-sustaining lake trout populations in those lakes. The first batch of lake trout reared at the hatchery will be released in the lakes in May 2013.

Fish raised in the hatchery will support the struggling lake trout populations in lakes Erie and Ontario. (U.S. Fish and Wildlife Service photo)



WEB SITE

<http://www.fws.gov/northeast/allegheny/>



A sea lamprey clings to a rock. Without costly control programs, sea lamprey would decimate the \$7 billion Great Lakes fishery. (Great Lakes Fishery Commission photo)

DESCRIPTION

The sea lamprey is a non-native, eel-like fish that invaded the upper Great Lakes in the 1940s and decimated native fish populations. Sea lampreys attach to lake trout, whitefish and other desirable fish species and suck out bodily fluids. The Great Lakes Fishery Commission spends about \$20 million annually to control sea lamprey populations all five Great Lakes. In 2011-2012, scientists working for the commission developed new ways to trap sea lamprey in the St. Mary's River, which links Lake Superior

to Lake Huron. The St. Mary's is home to the largest population of sea lamprey in the Great Lakes basin, with about 26,000 of the invaders. A project funded by the Great Lakes Restoration Initiative revealed that altering the flow of the St. Mary's River through water level control structures enabled biologists to capture and kill about 400 additional sea lampreys each year. That number was significant because each female sea lamprey can produce between 30,000 and 100,000 eggs annually. Reducing the sea lamprey population bolsters populations of native and desirable fish species in Lake Huron.

APPROXIMATE COST

\$228,000 from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Control of an aquatic invasive species that attacks native fish species

KEY PARTNERS (PUBLIC AND PRIVATE)

Great Lakes Fishery Commission, Brookfield Renewable Power, International Joint Commission, U.S. Army Corps of Engineers, Cloverland Electric Cooperative, Michigan Department of Natural Resources, Ontario Ministry of Natural Resources and Environment Canada

TYPES OF JOBS CREATED

Biologists, wildlife technicians and professional scuba divers

RESULTS AND ACCOMPLISHMENTS

Scientists captured and killed an additional 400 sea lamprey in the St. Mary's River, which will prevent thousands of the invaders from attacking desirable fish in Lake Huron. The research findings, which revealed that lamprey traps work better in fast flowing water, will improve efforts to trap and kill sea lamprey in other Great Lakes tributaries.

WEB SITE

<http://www.glfc.org/pubs/fs9.htm>

Enhanced St. Mary's River Sea Lamprey Control

SAULT STE. MARIE, MICHIGAN

PROJECT SUMMARY

A new way of trapping sea lamprey in the St. Mary's River enabled scientists to kill more of the invasive species, which will bolster desirable fish populations in Lake Huron.



Sea lamprey captured in a trap. New trapping techniques could reduce its population in the Great Lakes, which would reduce fish kills from sea lamprey attacks. (Great Lakes Fishery Commission photo)



Large trees placed in stream to create new fish habitat

Au Sable River Large Wood Great Lakes Project

**NEAR MIO, MICHIGAN,
IN THE HURON NATIONAL
FOREST**

PROJECT SUMMARY

The 2012 helicopter-assisted placement of 126 large pine trees in a two-mile stretch of the Au Sable River created new fish habitat in one of the Midwest's premier trout streams and capped a 10-year program that placed 1,200 trees in a 10-mile stretch of the river.



(Above) A stretch of the Au Sable where the trees were placed in the river. The trees blend in with the river and create new habitat for fish and other aquatic life. (U.S. Forest Service photo)

(Right) A heavy lift helicopter was used to place 1,200 large trees in the Au Sable River. (U.S. Forest Service photo)

DESCRIPTION

The Au Sable River, in northern Michigan, is one of the Midwest's premier trout streams. The river flows through the Huron National Forest and into Lake Huron. Past activities, such as logging and the construction of dams, reduced the amount of large, woody debris in portions of the river. After a study showed that downed trees in the river restored aquatic habitat and blended in with the natural surroundings, the U.S. Forest Service in 2002 began using a heavy lift helicopter to place 1,200 whole trees in a 10-mile stretch of the river. The project culminated in 2012 with the placement of 126 trees in the Au Sable River below Alcona Dam. It demonstrated that placement of whole trees in a river was an effective way to restore more natural conditions in rivers situated in forested settings.

APPROXIMATE COST

\$171, 600, \$52,800 of which came from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Altered stream flow, sedimentation and loss of fish habitat in a blue ribbon trout stream

KEY PARTNERS (PUBLIC AND PRIVATE)

U.S. Forest Service, the Michigan Department of Natural Resources, Huron Pines Conservation District and the U.S. Environmental Protection Agency's Great Lakes Restoration Initiative

TYPES OF JOBS CREATED

Foresters, loggers, helicopter pilot, general laborers and ecologists



RESULTS AND ACCOMPLISHMENTS

Placing trees in the Au Sable River created new habitat for fish and other aquatic life and restored more natural conditions in the river.

WEB SITE

<http://1.usa.gov/T8OBZG>



DESCRIPTION

Houghton Falls is a natural area comprised of a scenic pre-Cambrian sandstone gorge that extends to the Lake Superior coast. The site affords stunning views of the Apostle Islands. Dense woods in portions of the natural area provided habitat for a variety of wildlife. According to the Wisconsin Department of Natural Resources, the waters off Houghton Point serve as a fish nursery and habitat area for Chequamegon Bay, which is a popular fishing destination. The Bayfield Regional Land Conservancy partnered with the Town of Bayview and the Trust for Public Land to acquire the property with the help of a Coastal Estuarine Land Conservation Program grant from the National Oceanic and Atmospheric Administration and the Knowles Nelson Stewardship Fund of the Wisconsin DNR. The Town of Bayview now owns the property and the Bayview Regional Land Conservancy holds a conservation easement on the land to ensure permanent protection and public access to the site.



Houghton Falls features a sandstone gorge that was carved by a stream that flows into Lake Superior. (Bayview Regional Land Conservancy photo)

APPROXIMATE COST

\$2,832,600, half of which was provided by the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Preservation of wildlife habitat on land and fish habitat in Lake Superior

KEY PARTNERS (PUBLIC AND PRIVATE)

The Bayfield Regional Conservancy, Trust for Public Land, the Town of Bay View, the National Oceanic and Atmospheric Administration and the U.S. Environmental Protection Agency

RESULTS AND ACCOMPLISHMENTS

The acquisition preserved an ecologically significant natural area and guaranteed public access to the area, which has long been popular with hikers, birders and other outdoor enthusiasts.

WEB SITE

<http://bit.ly/RifgTX>

Houghton Falls Natural Area

BAYVIEW, WISCONSIN

PROJECT SUMMARY

The Town of Bayview, Wisconsin, joined forces with two land conservancies to preserve 77 acres of ecologically significant land known as Houghton Falls, which includes 2,200 feet of shoreline along Lake Superior's Chequamegon Bay.



Artificial reefs provide new habitat for lake sturgeon

Lake Sturgeon Reef Construction

DELTA IN THE ST. CLAIR RIVER, NORTH OF DETROIT, MICHIGAN

PROJECT SUMMARY

The installation of rocky reefs in the St. Clair River delta created 40,000 square feet of spawning habitat for lake sturgeon, which is expected to bolster the population of this iconic Great Lakes fish species.

DESCRIPTION

The St. Clair River was historically a haven for a lake sturgeon and other fish species but overfishing, pollution and dredging of the river bottom destroyed much of the spawning habitat. A project led by Michigan Sea Grant is re-establishing lake sturgeon spawning habitat in the St. Clair River. Sea Grant is overseeing the installation of nine rocky reefs in the river. The project will create 40,000 square feet of fish spawning habitat in the St. Clair River delta and connect to 14 square miles of nursery habitat in the delta. The project is designed to increase the number of lake sturgeon and other native fish species living in the river. Creating new fish habitat will also advance efforts to get the St. Clair River delisted as a Great Lakes Area of Concern. The rock reefs will help several native species that are considered threatened or endangered in Michigan, including lake sturgeon, mooneye, the northern madtom catfish and river redhorse sucker. Walleye also will benefit from the reefs. The reefs were constructed in the middle channel of the St. Clair River delta, away from shipping lanes.

APPROXIMATE COST

\$1.1 million, most of which was provided by the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Loss of spawning habitat for lake sturgeon, the largest fish in the Great Lakes



A sturgeon swims over a spawning bed in the St. Clair River. (Michigan Sea Grant photo)

KEY PARTNERS (PUBLIC AND PRIVATE)

Michigan Sea Grant, U.S. Geological Survey, Michigan Department of Natural Resources, U.S. Fish & Wildlife Service, the University of Michigan, National Oceanic and Atmospheric Administration, SmithGroup JJR and the Michigan Wildlife Conservancy

TYPES OF JOBS CREATED

Biologists, ecologists, barge operators, heavy equipment operators and general laborers

RESULTS AND ACCOMPLISHMENTS

The first reef is already attracting lake sturgeon to the St. Clair River Delta. Scientists will continue to study the area to determine if the reefs are increasing the lake sturgeon population in the river.

WEB SITE

<http://1.usa.gov/ToFC5i>



DESCRIPTION

The Mill Pond Dam in Campbellsport, Wisconsin, was a community icon for more than 150 years. But when the aging wooden structure that created the pond began to falter, the community had a choice: spend up to \$500,000 to repair the dam or allow state and federal agencies to remove it. Village residents voted in 2009 to remove the dam instead of repairing it. The National Oceanic and Atmospheric Administration provided a \$684,519 grant from the Great Lakes Restoration Initiative to study fish populations in the river before and after dam was removed. The Wisconsin Department of Natural Resources provided another \$50,000 for the project. Removing the dam gave fish and other aquatic life access to the uppermost 25 miles of the Milwaukee River. The project also restored wetlands that were submerged under the millpond since 1846. The project is expected to increase fish and wildlife populations in that stretch of the river.

APPROXIMATE COST

\$684,000, much of which was provided by the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Lack of fish passage, loss of wetlands, fragmentation of a river ecosystem, sedimentation and abnormal warming of water temperatures

KEY PARTNERS (PUBLIC AND PRIVATE)

Village of Campbellsport, Wisconsin Department of Natural Resources, the National Oceanic and Atmospheric Administration and the U.S. Environmental Protection Agency's Great Lakes Restoration Initiative program

TYPES OF JOBS CREATED

Excavators, general laborers, biologists, landscape architects and landscapers

RESULTS AND ACCOMPLISHMENTS

The project opened fish passage throughout the uppermost 25 miles of the Milwaukee River. It also restored about 22 acres of wetlands and 3,000 feet of free flowing river, which restored the river's natural flow and provided more habitat for fish and wildlife.

WEB SITE

<http://bit.ly/RuTUBP>

The river after the dam was removed. (Wisconsin Department of Natural Resources photo)



Campbellsport Millpond Dam Removal

CAMPBELLSPORT,
WISCONSIN

PROJECT SUMMARY

The removal of a 165-year-old dam in Campbellsport, Wisconsin, opened fish passage in the uppermost 25 miles of the Milwaukee River and restored 22 acres of wetlands.



A postcard shows the dam in 1908. (Village of Campbellsport photo)



Grant adds huge parcel to Lake Superior natural area

Bete Grise Wetlands Acquisition

KEWEENAW COUNTY,
MICHIGAN

PROJECT SUMMARY

The Great Lakes Restoration Initiative helped a Michigan conservation district add 1,475 acres of ecologically significant wetlands to the Bete Grise Preserve along Lake Superior.

The Bete Grise Preserve along Lake Superior.
(Keweenaw Land Trust photo)

DESCRIPTION

The Bete Grise Preserve is located near the tip of the scenic Keweenaw Peninsula in Michigan's Upper Peninsula. The state of Michigan long ago identified Bete Grise as one of the highest quality dune swale wetland systems remaining in the Upper Great Lakes. It is also a beautiful, remote area on the shores of Lake Superior. In the 1990s, International Paper targeted the site for an upscale residential development. A five-year fundraising effort by several conservation groups resulted in the National Oceanic and Atmospheric Administration in 2004 providing a \$1.4 million grant to purchase 1,104 acres of property and preserve the site as a natural area. In 2010, the National Oceanic and Atmospheric Administration used money from the Great Lakes Restoration Initiative to grant to Houghton Keweenaw Conservation District another \$1.7 million to add more than 1,475 acres to the Bete Grise Preserve.

APPROXIMATE COST

\$1.7 million

RESOURCE CHALLENGES ADDRESSED

Coastal dune ecology, biological diversity and preservation of coastal wetlands

KEY PARTNERS (PUBLIC AND PRIVATE)

Houghton Keweenaw Conservation District, National Oceanic and Atmospheric Administration, U.S. Environmental Protection Agency, The Nature Conservancy, Keweenaw Land Trust, South Shore Association, U.S. Fish & Wildlife Service, Michigan Department of Environmental Quality and the Michigan Department of Natural Resources

RESULTS AND ACCOMPLISHMENTS

The grant from NOAA and the GLRI added 1,475 acres to the Bete Grise Preserve, which will protect in perpetuity one of the highest quality dune and wetland complexes in the upper Great Lakes.

WEB SITE

<http://www.keweenawlandtrust.org/special-betegrise.php>



Program works to undo the Great Lakes chemical brew



DESCRIPTION

Researchers have found pharmaceuticals—including painkillers, hormones and anti-depressants—in a majority of U.S. surface waters that have been tested, including the Great Lakes and its tributaries. Improper disposal of pharmaceutical and personal care products, known as PPCPs, is a problem because many of the chemical compounds in those products pass through wastewater treatment systems. Those compounds can affect water quality and harm fish and wildlife. Scientists have already found freshwater fish with both male and female sexual characteristics in streams and rivers across the U.S. and in the Great Lakes. Low levels of painkillers and antidepressants have been detected in drinking water supplies across the Great Lakes basin. Sources of PPCPs include personal medications, illicit drug use, veterinary drugs, agribusiness, pharmaceutical manufacturing and residues from hospitals.

APPROXIMATE COST

\$530,759 from the Great Lakes Restoration Initiative, awarded to the Sea Grant programs in Pennsylvania, Illinois, Indiana, New York and Ohio

RESOURCE CHALLENGES ADDRESSED

Contamination of surface waters and drinking water sources due to improper disposal of pharmaceutical and personal care products (PPCPs)

KEY PARTNERS (PUBLIC AND PRIVATE)

U.S. Environmental Protection Agency, U.S. Geological Survey and Sea Grant programs in Pennsylvania, Illinois, Indiana, New York and Ohio

TYPES OF JOBS CREATED

Laboratory technicians, law enforcement personnel, chemists, communications specialists

RESULTS AND ACCOMPLISHMENTS

More than 2 million pills were collected at drug drop-off events in the five states. On one day in October 2011, officials in Lorain County, Ohio, collected 1,300 pounds of pharmaceutical and personal care products. The Sea Grant programs also distributed information about improper disposal of PPCPs to more than 700,000 residents in the Great Lakes region.

WEB SITE

http://seagrant.psu.edu/publications/fs/undo_chemical_brew.pdf

Undoing the Great Lakes Chemical Brew

PENNSYLVANIA, ILLINOIS,
INDIANA, NEW YORK AND
OHIO

PROJECT SUMMARY

Sea Grant programs in five Great Lakes states worked with law enforcement agencies to reduce the quantity of prescription medications that are washed down sinks and toilets, thereby reducing the risk of biologically active compounds in drugs contaminating lakes, rivers and drinking water sources.

Dose of Reality

Remedies to keep everyday chemicals out of waterways



New York Sea Grant developed this flier to educate people about the dangers of washing medications down sinks and toilets.



Scientists working to curb bird die-offs

Saving Great Lakes Shorebirds

**SLEEPING BEAR DUNES
NATIONAL LAKESHORE,
EMPIRE, MICHIGAN**

PROJECT SUMMARY

Scientists have established a water-quality monitoring program in an effort to reduce Type E botulism outbreaks that have killed thousands of birds in recent years at Sleeping Bear Dunes National Lakeshore.

Foreign quagga mussels are contributing to botulism outbreaks that have killed thousands of shorebirds at Sleeping Bear Dunes National Lakeshore, including loons and the federally endangered piping plover. (National Park Service photo)

DESCRIPTION

Quagga mussels that invaded the Great Lakes in the 1990s have fueled massive algae blooms, which contributed to outbreaks of Type E botulism that have killed more than 80,000 shore birds since 1990. Sleeping Bear Dunes National Lakeshore, where the federally endangered piping plover nests, has been among the hardest hit areas. Scientists are studying what triggers the botulism outbreaks in an effort to reduce bird die-offs in the future.

APPROXIMATE COST

\$2.1 million, \$1.9 million of which came from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Invasive species, water quality, fish contaminants and botulism outbreaks that kill shorebirds

KEY PARTNERS (PUBLIC AND PRIVATE)

Common Coast, Michigan Tech University, Northern Michigan University, Northwestern Michigan College, Science Museum of Minnesota, U.S. Geological Survey, National Park Service, U.S. Environmental Protection Agency and the University of Wisconsin-Milwaukee

TYPES OF JOBS CREATED

Biologists, toxicologists, science technicians, boat captains and deckhands, hydrographic survey technicians and university research assistants



RESULTS AND ACCOMPLISHMENTS

Scientists have established a comprehensive water quality monitoring station and mapped coastal areas at Sleeping Bear Dunes where Type E botulism outbreaks are likely to occur. The research is aimed at improving water quality and reducing bird die-offs.

WEB SITE

<http://1.usa.gov/ObE4Q2>



Roxana Marsh before the cleanup removed tons of contaminated sediment that clogged the wetland and harmed fish and wildlife habitat.

DESCRIPTION

The Grand Calumet River is one of 42 Great Lakes Areas of Concern. It flows 13 miles through the heavily industrialized cities of Gary, East Chicago and Hammond, Indiana, before flowing into Lake Michigan via the Indiana Harbor and Ship Canal. The river and harbor—which drain an area that is home to 57 severe pollution sites and wastewater treatment plants that still discharge untreated sewage into the river—contain between 5 million and 10 million cubic yards of contaminated sediment. About 150,000

cubic yards of that polluted sediment washes out of the river and into Lake Michigan annually. The river bottom was fouled by a witch's brew of toxic wastes, including oil and grease, heavy metals, PCBs, according to government records.

APPROXIMATE COST

\$52 million. Cleaning up the entire Grand Calumet River and Indiana Harbor and Ship Canal will cost more than \$100 million.

RESOURCE CHALLENGES ADDRESSED

Contaminated sediment, tons of which washes into Lake Michigan; loss of native fish species and other aquatic life, loss of wetlands and fish and wildlife habitat; and invasive plant species that clogged the river

KEY PARTNERS (PUBLIC AND PRIVATE)

The U.S. Environmental Protection Agency's Great Lakes National Program Office, the U.S. Fish and Wildlife Service, Indiana Department of Environmental Management and the Indiana Department of Natural Resources

TYPES OF JOBS CREATED

Biologists, ecologists, toxicologists, chemists, environmental engineers, dredge operators and truck drivers

RESULTS AND ACCOMPLISHMENTS

Since last year, crews working for the U.S. EPA and Indiana Department of Environmental Management have dredged 232,000 cubic yards of toxic sediment from the west branch of the Grand Calumet and the 19-acre Roxana Marsh. Workers also removed several acres of the invasive reed Phragmites. In February, workers began depositing a layer of clean sand, clay and fabric on the river bottom that will serve as a cap atop 345,000 cubic yards of contaminated sediments that will be left behind. The sand and clay cap will isolate the remaining pollutants from the river and allow the waterway to heal.

WEB SITE

<http://1.usa.gov/5TCXkS>

Grand Calumet River Cleanup

EAST CHICAGO, INDIANA

PROJECT SUMMARY

A Great Lakes Restoration Initiative cleanup is transforming one of America's most polluted rivers, which has long been a major source of toxins entering Lake Michigan.



Roxana Marsh after the cleanup, which created acres of new habitat that is already attracting fish and birds. (U.S. Environmental Protection Agency photos)



National Park ferry discovers ballast water solution

Preventing Spread of Harmful Organisms in the Great Lakes

HOUGHTON, MICHIGAN AND ISLE ROYALE NATIONAL PARK

PROJECT SUMMARY

The first permanent ballast water treatment system on a Great Lakes freshwater ship was installed on the M/V Ranger III, which ferries visitors from Houghton, Michigan, to Isle Royale National Park in Lake Superior. The treatment system will keep the ship from transporting invasive species between Isle Royale and the port at Houghton.

DESCRIPTION

Ocean freighters have imported 58 aquatic invasive species to the Great Lakes since 1959, when the St. Lawrence Seaway gave ocean ships access to the lakes. Zebra mussels and other invaders that snuck into the Great Lakes in the ballast water tanks of ocean freighters have caused billions of dollars in damage and triggered profound, undesirable changes in the lakes' ecosystems. Discovered in the 1980s, the problem of ships transporting invasive species around the world in ballast water tanks spurred international efforts to solve the problem. While the U.S. government was developing ballast water treatment standards, officials at Isle Royale National Park worked with scientists at Michigan Technological University and Hyde Marine to develop their own solution. They developed a system that disinfected ballast water in the Ranger III's tanks. "The installation of the ballast treatment system on the Ranger III is a milestone in Great Lakes protection history," said Isle Royale National Park Superintendent Phyllis Green. "We are pleased to dedicate the first permanent ballast treatment installation on a freshwater ship in the Great Lakes." The treatment system, which uses ultraviolet light and filters to kill organisms in the ballast water, will prevent the Ranger III from transporting invasive species between the port in Houghton and the port on Isle Royale.

APPROXIMATE COST

\$500,000 from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

The spread of aquatic invasive species

KEY PARTNERS (PUBLIC AND PRIVATE)

National Park Service, U.S. Environmental Protection Agency, Michigan Technological University, Hyde Marine, Fraser Shipyard, Schwartz Boiler, Northern Machining and Repair, Inc., and the Grand Portage Band of Lake Superior Chippewa Indians

TYPES OF JOBS CREATED

Chemists, biologists, marine engineers and general laborers

RESULTS AND ACCOMPLISHMENTS

The ballast water treatment system will prevent the M/V Ranger III from transporting aquatic species between Isle Royale and the port at Houghton, Michigan. Currently, there are invasive species in Houghton that have not yet invaded Isle Royale, and vice-versa.

WEB SITE

<http://1.usa.gov/OdsJaY>



The M/V Ranger III passes by Michigan Technological University, where scientists helped develop the ship's ballast water treatment system. (Michigan Tech photo)

War on invasive plants restores a famous bog



Non-native cattails dominated the bog before treatments began.



Removing invasive cattails left the bog a barren landscape.

DESCRIPTION

The Cowles Bog Wetland Complex is comprised of 205 acres of land at the western terminus of what was once known as the Great Marsh. Formed about 4,000 years ago, the Great Marsh was an open body of water comprised of one watershed, which flowed to Lake Michigan through Dunes Creek. Over time the Great Marsh evolved from an open water body to a diversity of wetland types inclusive of conifer swamp, wet prairie, fen, bog, sedge meadow and marsh. Urbanization and commercial development changed the wetland complex from an area rich in plant diversity to one overrun by non-native cattail and other invasive plant species that ruined fish and wildlife habitat. The Indiana Dunes National Lakeshore is working to restore the Cowles Bog Wetland Complex to increase native plant and animal diversity, create more habitat, protect the beaches and improve Lake Michigan's water quality by reducing and controlling polluted runoff. Fully restoring this large ecosystem will take 10 to 15 years.

APPROXIMATE COST

\$1.6 million, \$800,000 of which came from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Invasive species, loss of fish and wildlife habitat, nearshore water quality

KEY PARTNERS (PUBLIC AND PRIVATE)

National Park Service, U.S. Environmental Protection Agency, the Dune Acres Civic Improvement Foundation, Shirley Heinze Land Trust, Indiana Lake Michigan Coastal Program, Friends of Indiana Dunes, the Town of Dune Acres, The Nature Conservancy, Indiana Dunes Environmental Learning Center and numerous volunteers

TYPES OF JOBS CREATED

Biologists, botanists and general laborers

RESULTS AND ACCOMPLISHMENTS

To date, crews have restored 55 acres of Cowles Bog by replacing invasive plants with native species and restoring natural water flow in the marsh, which filters pollutants out of surface water before it reaches Lake Michigan.

WEB SITE

<http://1.usa.gov/L2DQH8>

Cowles Bog Wetland Complex Restoration Project

INDIANA DUNES NATIONAL
LAKESHORE, CHESTERTON,
INDIANA

PROJECT SUMMARY

Removing invasive plant species and restoring the natural flow of water is restoring natural functions and creating new fish and wildlife habitat at the Cowles Bog wetland complex, a nationally recognized natural feature along the Lake Michigan coast, near Chicago.



Covering the bog with native plant species will help restore natural functions in the wetland.



Fish benefitting from artificial reefs in Lake Huron

Thunder Bay Fish Spawning Reefs

**LAKE HURON'S
THUNDER BAY,
IN ALPENA, MICHIGAN**

PROJECT SUMMARY

Thirty artificial fish reefs were installed in Lake Huron's Thunder Bay, creating new fish spawning habitat in an area that was damaged by cement kiln dust from a nearby factory.



Biologists are shown netting fish on the artificial reefs. Whitefish and other native species are spawning on the reefs. (National Oceanic and Atmospheric Administration photos)

DESCRIPTION

Over the course of several decades, cement kiln dust (CKD) from a nearby cement factory in Alpena, Michigan, leached into Lake Huron. The cement kiln dust destroyed an area of fish spawning and rearing habitat that was used by lake trout, lake whitefish and other reef spawning fishes. In 2002, the CKD pile was capped and a retaining wall was constructed to prevent further CKD leaching. Six rock reefs were constructed in Thunder Bay in 2010 with limestone cobble donated by the Lafarge Cement Plant. Another 24 reefs were constructed during the summer of 2011, creating a total of two acres of new fish spawning habitat. Although the project was focused on lake trout, other reef-associated fishes—including lake whitefish, walleye and smallmouth bass—are expected to benefit from the new reefs.

APPROXIMATE COST

\$1.4 million

KEY PARTNERS (PUBLIC AND PRIVATE)

The Michigan Department of Environmental Quality; the Michigan Department of Natural Resources; the National Oceanic and Atmospheric Administration; the U.S. Fish and Wildlife Service; U.S. Army Corps of Engineers; DLZ Michigan, Inc.; Ellen Marsden from the University of Vermont; the Thunder Bay National Marine Sanctuary and Underwater Preserve; the city of Alpena; and the Lafarge Cement Plant in Alpena



Crews deposit tons of limestone in Lake Huron's Thunder Bay to create new fish spawning habitat on the lake bottom.

RESOURCE CHALLENGES ADDRESSED

Loss of fish spawning habitat for several native fish species

TYPES OF JOBS CREATED

Biologists, barge operators, technicians and general laborers

RESULTS AND ACCOMPLISHMENTS

Lake trout and whitefish are already spawning on the artificial reefs, which will increase fish populations in Thunder Bay and Lake Huron.

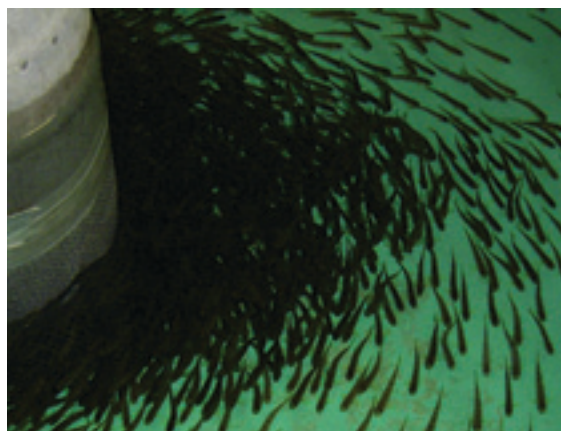
WEB SITE

<http://bit.ly/LYwUua>



DESCRIPTION

Historically, the Lake Ontario population of Atlantic salmon represented the largest freshwater population of salmon in the world. Overfishing and loss of spawning habitat has since led to their extirpation. A state-of-the-art fish culture facility built at the USGS Tunison Laboratory of Aquatic Science is helping scientists develop effective rearing and stocking techniques for Atlantic salmon and bloater (a type of herring). Bloaters are a food source for Atlantic salmon. The first release of



Tiny Atlantic salmon swim in the USGS laboratory, where they are raised before being released into Lake Ontario tributaries. (U.S. Fish and Wildlife Service photos)

hatchery-reared salmon occurred in fall 2011, with plans to release the first “Lake Ontario strain” salmon in 2016. Bloater release was scheduled to begin this year. The project is a critical first step in restoring a resilient native fish community in Lake Ontario, which will strengthen the local ecosystem and the local economy.

APPROXIMATE COST

\$2.1 million from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Restoration of extirpated and/or severely reduced native Great Lakes fish species. The USGS program will also advance scientific understanding of how to rebuild wild populations of native fish species.

KEY PARTNERS (PUBLIC AND PRIVATE)

U.S. Geological Survey, New York State, Canadian and Native American tribal officials around Lake Ontario

TYPES OF JOBS CREATED

Fish culturists, engineers, general contractors, excavators, plumbers, electricians and steelworkers

RESULTS AND ACCOMPLISHMENTS

About 65,000 Atlantic salmon were released in Lake Ontario tributaries in September 2011. Another 8,000 fall fingerling salmon were released in St. Lawrence River tributaries in October 2011 in partnership with the St. Regis Mohawk Tribe. The USGS hatchery is also rearing lake herring and bloater, which will be released into Lake Ontario and the St. Lawrence River.



Improving Strategies to Restore Aquatic Habitats and Species

U.S. GEOLOGICAL SURVEY'S
TUNISON LABORATORY OF
AQUATIC SCIENCE IN
CORTLAND, NEW YORK

PROJECT SUMMARY

The U.S. Geological Survey is taking an innovative approach to simultaneously restoring two native fish species—Atlantic salmon and bloater—at different levels of Lake Ontario's food web.

The finished product of the fish rearing project, a beautiful Atlantic salmon.



Cleanup removes mercury from a Michigan lake

Muskegon Lake and Division Street Outfall Sediment Cleanup

MUSKEGON, MICHIGAN

PROJECT SUMMARY

A dredging project removed 43,000 cubic yards of contaminated sediment from the bottom of Muskegon Lake and advanced efforts to remove the lake from a list of 43 Great Lakes Areas of Concern.



This photo illustration shows the 46 acres of Muskegon Lake where contaminated sediments were removed and covered with clean sand.

DESCRIPTION

Historic pollution discharges into a storm sewer that drained into Muskegon Lake, which flows into Lake Michigan, deposited tons of mercury and petroleum compounds on the lake bottom. The pollutants contaminated fish, destroyed habitat and contributed to Muskegon Lake being named a Great Lakes Area of Concern in the late 1980s. The tainted sediments contaminated fish, prompting consumption advisories. The dredging near the Division Street outfall was the second major sediment removal project in the Muskegon Lake Area of Concern. The EPA recently completed a \$10 million project that removed 95,000 cubic yards of contaminated sediment from Ruddiman Creek, a tributary of Muskegon Lake. Those cleanups will bolster efforts to get the lake delisted as a Great Lakes Area of Concern.

COST OF PROJECT

\$12 million, most of which came from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Contaminated sediments laced with mercury, which contributed to fish consumption advisories; and the loss of fish habitat

KEY PARTNERS (PUBLIC AND PRIVATE)

The U.S. Environmental Protection Agency, Michigan Department of Environmental Quality, Muskegon County and the city of Muskegon

TYPES OF JOBS CREATED

Barge and dredge operators, truck drivers, biologists, chemists, toxicologists and general laborers

RESULTS AND ACCOMPLISHMENTS

Removed 43,000 cubic yards of sediment contaminated with mercury and petroleum compounds from Muskegon Lake, which will reduce fish contaminants. The project cleaned up 46 areas of the bottom of Muskegon Lake, a popular fishing and boating lake in west Michigan.

WEB SITE

<http://1.usa.gov/JQRvQL>



A dredge removes contaminated sediment from the bottom of Muskegon Lake. (U.S. Environmental Protection Agency photo)

Lake Erie watersnake saved from extinction



DESCRIPTION

The Lake Erie watersnake was driven to the brink of extinction in the 1990s by residents of the Lake Erie islands who considered it a nuisance and killed thousands of the snakes. Development also destroyed much of the watersnake's natural habitat. The federal government placed the watersnake on the Endangered Species list in 1999. That listing prompted the development of a recovery plan, which established population goals for the species, made it illegal to kill or harm the snakes and protected its habitat. Intensive education and outreach programs increased public awareness of the snake, its plight and its role in Lake Erie's ecosystem. Those efforts built public support for protecting the snakes—which aren't poisonous but will bite when threatened—and even landed the snakes a spot on the Discovery Channel's "Dirty Jobs" show.



On the brink of extinction in the 1990s, the Lake Erie watersnake's population now numbers close to 12,000. (U.S. Fish and Wildlife Service photo)

APPROXIMATE COST

\$3.7 million, \$241,000 of which came from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Recovery of an endangered species and loss of wildlife habitat

KEY PARTNERS (PUBLIC AND PRIVATE)

U.S. Fish and Wildlife Service, Ohio Department of Natural Resources, Ohio Environmental Protection Agency, Northern Illinois University, Lake Erie Islands Chapter of the Black Swamp Conservancy, Western Reserve Land Conservancy, Put-in-Bay Township Park District, the Cleveland Museum of Natural History, and The Ohio State University Stone Laboratory

TYPES OF JOBS CREATED

Biologists, clerical staff and general laborers worked on the project

RESULTS AND ACCOMPLISHMENTS

The Lake Erie watersnake population is approaching 12,000 snakes. In 2011, it became just the 23rd species—joining the bald eagle, American alligator and the peregrine falcon—to be removed from the federal Endangered Species list. About 300 acres of the watersnake's inland habitat and 11 miles of shoreline also were protected.

WEB SITE

<http://1.usa.gov/JduoOf>

Lake Erie Watersnake Recovery

PUT-IN-BAY, OHIO

PROJECT SUMMARY

The Lake Erie watersnake, a subspecies of the Northern watersnake found only on Lake Erie's islands, was brought back from the brink of extinction. With the watersnake's population nursed back to nearly 12,000 animals, it became just the 23rd species to be taken off the federal Endangered Species list.



The Lake Erie watersnake is found only on Lake Erie's islands.



Huge source of PCBs removed from Milwaukee River

Milwaukee River and Lincoln Creek Sediment Cleanup

MILWAUKEE, WISCONSIN

PROJECT SUMMARY

The dredging of 140,000 cubic yards of contaminated sediment from Milwaukee's Lincoln Creek and the Milwaukee River channel removed the largest source of toxic PCBs in the river, which will reduce contaminant concentrations in fish.



DESCRIPTION

Historic pollution contaminated parts of the Milwaukee River estuary with PCBs and other toxins that pose health threats to aquatic organisms, wildlife and humans. The contaminated sediments prompted warnings urging people to limit their consumption of fish caught in the river; the pollutants also were the main reason the

Milwaukee River estuary was listed as a Great Lakes Area of Concern. In 2008, state and federal agencies began working on a plan to clean up the contaminated river bottom sediments, which were located in Milwaukee and nearby Glendale. The first phase of the cleanup, completed in January 2012, removed nearly 10,000 dump trucks of contaminated material that contained 5,000 pounds of polychlorinated biphenyls (PCBs) and 4,000 pounds of polyaromatic hydrocarbons (PAHs). Crews also restored native fish and wildlife habitat where the cleanup took place, stabilized stream banks and re-shaped the bottom of the river channels. More dredging could take place after scientists complete a study characterizing the extent of contaminated sediments remaining in the river and creek. Any cleanup activities resulting from that study would take place in 2013.

APPROXIMATE COST

\$24.6 million, \$16 million of which came from the Great Lakes Restoration Initiative and \$8.6 million from the Wisconsin Department of Natural Resources

RESOURCE CHALLENGES ADDRESSED

Contaminated sediment, fish consumption advisories and the loss of fish and wildlife habitat

KEY PARTNERS (PUBLIC AND PRIVATE)

U.S. Environmental Protection Agency, Wisconsin Department of Natural Resources and Milwaukee County Parks

TYPES OF JOBS CREATED

Toxicologists, ecologists, biologists, excavators and other heavy equipment operators, general laborers and chemists

RESULTS AND ACCOMPLISHMENTS

Removed about 140,000 cubic yards of sediment contaminated with polychlorinated biphenyls and polycyclic aromatic hydrocarbons.

WEB SITE

www.epa.gov/glla/lincolnpark/index.html



The cleanup transformed parts of Lincoln Creek and the Milwaukee River. The photo above shows a stretch of river that was walled off so that contaminated sediments could be dredged from the channel. The photo below shows a restored oxbow after the cleanup was completed. (U.S. EPA photos)



DESCRIPTION

The sea lamprey is an eel-like, parasitic fish that snuck into the Great Lakes between 1825 and 1930 through manmade canals. The invaders wiped out much of the lake trout population in the Great Lakes by the late 1940s. Since 1954, the Great Lakes Fishery Commission has been controlling sea lamprey populations with chemicals, barriers and the release of sterile male lampreys. Those efforts have reduced the sea lamprey population by 90 percent in most areas of the lakes, but the battle to keep the monstrous invaders in check will continue indefinitely. The barrier in Trail Creek, a tributary of Lake Michigan, will reduce the sea lamprey population by blocking access to spawning habitat. Desirable fish species will be able to leap over or bypass the sea lamprey barrier.

APPROXIMATE COST

\$1.6 million from the federal Water Resources Development Act

RESOURCE CHALLENGES ADDRESSED

Invasive species and threats to Great Lakes fish populations. The blood sucking sea lamprey is the biggest threat to the \$7 billion Great Lakes fishery. A single lamprey consumes up to 40 pounds of fish during its time in the lakes.

KEY PARTNERS (PUBLIC AND PRIVATE)

Indiana Department of Natural Resources, the Great Lakes Fishery Commission, the U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers

TYPES OF JOBS CREATED

Civil engineers, ecologists, heavy equipment operators and general laborers

RESULTS AND ACCOMPLISHMENTS

The barrier will prevent tens of thousands of sea lamprey from spawning in Trail Creek and feeding in Lake Michigan. The barrier also eliminates the need for chemical treatments of Trail Creek, which will free up financial resources that fishery managers can use to fight sea lamprey elsewhere in other Great Lakes tributaries.

WEB SITE

<http://www.glfc.org/lampcon.php>



Trail Creek Sea Lamprey Barrier

MICHIGAN CITY, INDIANA

PROJECT SUMMARY

A barrier installed in northern Indiana's Trail Creek will reduce the number of sea lamprey in Lake Michigan, where the blood-sucking invaders prey on fish.



(Above) The barrier on Trail Creek will keep thousands of sea lamprey from killing Lake Michigan fish. Each lamprey consumes up to 40 pounds of fish during its time in the lake. Lamprey attach to fish and suck their blood and other bodily fluids. (Great Lakes Fishery Commission photos)

(Left) This sea lamprey barrier on Trail Creek will prevent the invader from spawning in the creek. Other fish will be able to bypass the barrier.



Project turns pollution site into natural playground

Hog Island Inlet/Newton Creek Habitat Restoration

SEVERAL SITES IN SUPERIOR, WISCONSIN, AT THE HEADWATERS OF LAKE SUPERIOR

PROJECT SUMMARY

Restoration of fish and wildlife habitat on Hog Island is transforming a Great Lakes Area of Concern into a haven for anglers, fish and wildlife, including the federally endangered piping plover.



Wild rice was absent from the inlet when the project began. A fenced area was installed to protect the new wild rice plants.

DESCRIPTION

Sediment contamination and the loss of fish and wildlife prompted federal officials in 1987 to declare the St. Louis River a Great Lakes Area of Concern. Hog Island, Hog Island Inlet and Newton Creek are located in the St. Louis River estuary, located between Superior, Wisconsin, and Duluth, Minnesota. Federal officials spent \$6.3 million to dredge 50,000 cubic yards of contaminated sediment from Newton Creek and parts of Hog Island Inlet in Wisconsin. Once that cleanup was complete, government agencies and local conservation organizations set out to restore fish and wildlife habitat on the island, the inlet and Newton Creek. The habitat work underway will restore 64 acres of wetlands and coastal habitat at several sites in this area. The project is advancing efforts to restore ecological function and biological diversity to a previously contaminated portion of the harbor. Restoring fish and habitat will bolster efforts to get the St. Louis River de-listed as a Great Lakes Area of Concern.

APPROXIMATE COST

\$630,000 from the National Oceanic and Atmospheric Administration's Great Lakes Habitat Restoration Program. Matching cash and in-kind services exceeded \$300,000.

RESOURCE CHALLENGES ADDRESSED

Loss of fish and wildlife habitat, degraded water quality, habitat degraded by invasive species and the loss of recreational opportunities

KEY PARTNERS (PUBLIC AND PRIVATE)

The Great Lakes Commission, Douglas County Land Conservation Department, National Oceanic and Atmospheric Administration, University of Wisconsin, Superior, Wisconsin Department of Natural Resources, City of Superior, Wisconsin, Great Lakes Indian Fish and Wildlife Commission, U.S. Fish and Wildlife Service, U.S. Natural Resources Conservation Service, U.S. Environmental Protection Agency and the St. Louis River Alliance

TYPES OF JOBS CREATED

Biologists, ecologists, landscapers, heavy equipment operators and general laborers

RESULTS AND ACCOMPLISHMENTS

Local anglers have said fishing has improved in the Hog Island inlet, Newton creek and Allouez Bay. Sixty-four acres of wetland and associated shoreline habitat are being restored on Hog Island and in Hog Island inlet. Among the improvements: more than eight acres of invasive plants were removed, 18 acres of native, vegetative buffers were planted and more than 20 acres of wetlands were restored. The work provides habitat for fish and migratory birds, including the federally endangered piping plover.

WEB SITE

<http://bit.ly/r8y8GP>



Native wild rice is now thriving in the inlet. Wild rice has ecological and cultural significance for Native Americans.



Severe pollution in the lower Ashtabula River prompted health officials to warn anglers to limit their consumption of fish from those waters.

in 1997 warning anglers to limit their consumption of fish caught in that stretch of the river. The Ashtabula River RAP/Partnership in 1988 began working to bring about a cleanup of the beleaguered river.

APPROXIMATE COST

\$61.5 million, \$1.5 million of which came from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Contaminated sediments, loss of fish and wildlife habitat, contaminated fish, and shoals that prevented ships from reaching parts of the harbor.

KEY PARTNERS (PUBLIC AND PRIVATE)

The Ashtabula River RAP/Partnership; the U.S. Environmental Protection Agency, which provided \$30 million for the cleanup; the Ashtabula Port Authority, which contributed \$23 million; the Ohio Environmental Protection Agency, which contributed \$7 million; and the U.S. Army Corps of Engineers, which provided \$15 million to deepen a stretch of river adjacent to the cleanup to improve navigation

TYPES OF JOBS CREATED

Dredge operators, truck drivers, heavy equipment operators, chemists, toxicologists, biologists, ecologists and general laborers

RESULTS AND ACCOMPLISHMENTS

The cleanup removed 630,000 cubic yards of contaminated sediment that contained more than 25,000 pounds of hazardous polychlorinated biphenyls and other toxic compounds. The project improved water quality and deepened the river channel, making the lower Ashtabula suitable again for maritime commerce, fishing and recreational boating. A habitat restoration project slated for completion in 2012 will create 1,500 feet of prime fish habitat in the lower two miles of the river, which will bolster populations of muskellunge and northern pike.

WEB SITE

<http://epa.gov/glla/ashtabula>

DESCRIPTION

The Ashtabula River is one of Ohio's most significant rivers, a biologically rich tributary of Lake Erie that supports 88 fish species. Decades of unregulated industrial and municipal waste discharges blanketed the last two miles of the river bottom with a layer of toxic mud that contaminated aquatic life and disrupted navigation. The lower river was declared a Great Lakes Area of Concern in 1985 and the Ohio Department of Health posted signs

Ashtabula River Cleanup And Habitat Restoration

ASHTABULA, OHIO

PROJECT SUMMARY

A sediment cleanup and habitat restoration project have restored the lower two miles of the Ashtabula River and advanced efforts to get it de-listed as a Great Lakes Area of Concern.



Cleaning up the lower river has made it a more attractive place for boaters and anglers. (U.S. Environmental Protection Agency photos)



Innovative project boosts sturgeon population

Kalamazoo River Streamside Sturgeon Rearing Unit

FENNVILLE, MICHIGAN

PROJECT SUMMARY

The lake sturgeon population is being nursed back to health in a Michigan river after decades of decline. An innovative fish-rearing facility allowed biologists to release 100 sturgeon in the Kalamazoo River in 2011.



Sturgeon eggs captured in the Kalamazoo River were raised in this streamside fish-rearing facility. The fish were raised in water pulled from the river, which will allow them to imprint on the Kalamazoo River.

DESCRIPTION

Lake sturgeon are massive, prehistoric creatures whose ancestors roamed Earth's waters when dinosaurs were the planet's dominant species. The fish, which can reach eight feet long and weigh nearly 200 pounds, can live more than 50 years. Lake sturgeon were abundant in the Great Lakes and tributaries until the early 1990s, when overfishing reduced populations by more than 90 percent. Fewer than 100 sturgeon were in the Kalamazoo River when volunteers and government officials launched a program to harvest the fish's eggs and raise new generations of the massive creature. Sturgeon eggs collected from the Kalamazoo River were raised in a streamside fish-rearing facility. Raising the fish in water taken from the river allowed sturgeon to imprint on that particular river, where they will eventually return to spawn. The Kalamazoo River project, one of several such efforts in the Great Lakes, could increase the sturgeon population throughout the lakes.

APPROXIMATE COST

\$220,000 from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED

Decline of lake sturgeon population, loss of fisheries habitat and overfishing in the 20th century that nearly eliminated the species from Great Lakes waters

KEY PARTNERS (PUBLIC AND PRIVATE)

Michigan Department of Natural Resources (DNR), U.S. Fish and Wildlife Service, the Kalamazoo Chapter of Sturgeon for Tomorrow and the Match-e-be-Nash-She-Wish Band of the Pottawatomi Indians of the Gun Lake Tribe



Biologists in 2011 released 100 baby lake sturgeon into the Kalamazoo River. (U.S. Fish and Wildlife Service photos)

TYPES OF JOBS CREATED

Biologists, plumbers, electricians and general laborers

RESULTS AND ACCOMPLISHMENTS

The U.S. Fish and Wildlife Service in 2011 released 100 small sturgeon in the Kalamazoo River. More sturgeon raised in the streamside fish-rearing facility will be released every year. Because female lake sturgeon don't reproduce until they are 18-20 years old, scientists won't know how for years well the fish-rearing

program worked. They already know that it is possible to raise the fish with human assistance, an achievement that is expected to stave off the elimination of sturgeon from the Great Lakes.

WEB SITE

<http://kazoosturgeon.org>



This culvert in Troutmere Creek was above the average water level, which prevented fish passage. (U.S. Fish and Wildlife Service photos)

DESCRIPTION

Troutmere Creek is a tributary of the Marengo River, which is part of the Bad River Watershed of Lake Superior. A perched culvert in the town of Marengo prevented trout from passing under the road and reaching two miles of the creek upstream of the road crossing. The U.S. Fish and Wildlife Service worked with local and state agencies to open two miles of the creek to trout and other fish species. Two rock weir structures were installed below the culvert to

raise the water level inside the existing structure in order to facilitate fish passage. The Marengo and its tributaries are high quality trout streams. Anglers from near and far visit the watershed to fish its productive waters.

APPROXIMATE COST

\$14,700 funded by the American Reinvestment and Recovery Act

RESOURCE CHALLENGES ADDRESSED

Fish passage, sedimentation, and fish spawning habitat

KEY PARTNERS (PUBLIC AND PRIVATE)

The Ashland County Land and Water Conservation Department, Bad River Watershed Association, Town of Marengo, Wisconsin Department of Natural Resources, and the U.S. Fish and Wildlife Service's Ashland Fish and Wildlife Conservation Office. A local landowner allowed the weirs to be built on his property.

TYPES OF JOBS CREATED

Heavy equipment operators and biologists

RESULTS AND ACCOMPLISHMENTS

The work gave trout access to two miles of prime habitat in Troutmere Creek. Assessments have not been completed, but the project is expected to improve fish populations by creating access to more habitat and reducing sedimentation, which buried some gravel beds where trout spawn.

WEB SITE

<http://1.usa.gov/xgQssF>

Troutmere Creek Fish Passage/ Road Crossing

MARENGO, WISCONSIN

PROJECT SUMMARY

A low-budget fish passage project will reap significant dividends for a Wisconsin trout stream. Though it cost less than \$15,000, the project gave fish access to two miles of invaluable spawning habitat in Troutmere Creek, a tributary of the Marengo River.

Two rock weirs on the downstream side of the culvert elevated water levels, which provided fish passage to two miles of the creek upstream of the road crossing.





Removing dams boosts trout population

Flowing Well Trout Farm Restoration Project

KALKASKA, MICHIGAN

PROJECT SUMMARY

Removing several dams from a defunct fish farm in northern Michigan restored natural conditions in 37 miles of a trout stream, which increased the native brook trout population.



The north branch of the Manistee River before the dams were removed. (Conservation Resource Alliance photos)

DESCRIPTION

The Flowing Well Trout Farm, built in the mid-1900s, erected 12 small dams to create fish rearing ponds. The dams, built in the North branch of the Manistee River and the Flowing Well Creek, diverted the natural flow of a trout stream, caused unnaturally high water temperatures, blocked fish passage and disrupted the natural movement of sediment and woody debris in the river.

APPROXIMATE COST

\$626,000

RESOURCE CHALLENGES ADDRESSED

Fish passage, excessive warming of water temperatures, fragmentation of a river ecosystem, the loss of wetlands and the loss of fish spawning habitat

KEY PARTNERS (PUBLIC AND PRIVATE)

The Michigan Department of Natural Resources Fisheries Division, U.S. Fish and Wildlife Service, Great Lake Restoration Initiative, Elliott Donnelly Chapter of Trout Unlimited, Paul Young Chapter of Trout Unlimited, Sustain Our Great Lakes grant (administered by the National Fish and Wildlife Foundation), U.S. Department of Agriculture and the Conservation Resource Alliance's River Care program

TYPES OF JOBS CREATED

Biologists, ecologists, environmental engineers, civil engineers, truck drivers, excavators, project monitors and administrative support personnel

RESULTS AND ACCOMPLISHMENTS

The project restored natural conditions in 37 miles of a trout stream, increased the native brook trout population, lowered water temperatures, eliminated sediment buildup, removed the risk of dams failing and restored 100 acres of wetlands.

WEB SITE

www.rivercare.org

The north branch of the Manistee River after the dams were removed.





DESCRIPTION

Brook trout historically lived in rivers and streams across New York, but their distribution and abundance were severely reduced by competition from other species, the loss of fish habitat, and the fragmentation of rivers. In Clear Creek, excess stream channel erosion and sediment inputs, in-stream barriers, elevated water temperatures and competition from non-native fish species restricted brook trout to a few tributaries in the watershed.

The U.S. Fish and Wildlife Service and other organizations used a combination of approaches to restore 1,200 linear feet of in-stream habitat and re-establish fish passage over a sheet-pile grade control structure, which reconnected six miles of trout habitat in Clear Creek.

APPROXIMATE COST

\$106,211

RESOURCE CHALLENGES ADDRESSED

Stream bank erosion and sedimentation, the loss of in-stream habitat and deep pools that trout favor

KEY PARTNERS (PUBLIC AND PRIVATE)

U.S. Fish and Wildlife Service, New York Department of Environmental Conservation, Trout Unlimited – Western New York Chapter, Trout Unlimited – Red House Brook Chapter, Seneca Trail Resource Conservation and Development Council and the Great Lakes Restoration Initiative

TYPES OF JOBS CREATED

Ecologists, biologists, excavators and truck drivers

RESULTS AND ACCOMPLISHMENTS

The project begins to restore prime habitat in a section of stream where trout were once abundant by restoring natural stream function. The New York Department of Environmental Conservation maintains 5.5 miles of easement along Clear Creek, along the project site, to support recreational fishing. An additional 1,200 linear feet of habitat will be restored immediately downstream of the completed project during summer 2012.

WEB SITE

<http://1.usa.gov/zeldR8>



Before the restoration project: Excess stream bank erosion and sediment deposition. (U.S. Fish and Wildlife Service photo)

Clear Creek Habitat Restoration Project

FREEDOM, NEW YORK

PROJECT SUMMARY

Stabilizing eroding stream banks and improving fish passage in New York's Clear Creek could improve the trout stream by reducing the amount of sediment washing into the waterway. The project is part of a growing effort to help New York reclaim its heritage as a state teeming with healthy trout streams.



After the restoration: Improved natural stability of the stream channel. (U.S. Fish and Wildlife Service photo)



Healing Our Waters®–Great Lakes Coalition
<http://www.healthylakes.org/>

More than 120 organizations representing millions of people are uniting to restore one of America's greatest natural wonders—the Great Lakes. The coalition seeks to stop sewage contamination, shut the door on invasive species, and restore wetlands and other damaged habitat, each of which is an essential component of restoring the health of the Great Lakes. For more information, contact:

JEFF SKELDING
Campaign Director
202-797-6893
skeldingj@nwf.org

CHAD LORD
Policy Director
202-454-3385
clord@npca.org

JENNIFER HILL
Field Director
734-887-7104
hillj@nwf.org

JORDAN LUBETKIN
Communications
Director
734-887-7109
lubetkin@nwf.org

CELIA HAVEN
Program Coordinator
734-887-7123
havenc@nwf.org

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