

Wisconsin Great Lakes Restoration Projects Producing Results for People, Communities

SEPTEMBER 2013



Wisconsin Great Lakes Restoration Projects

BAYFIELD
Frog Bay Tribal National Park

ASHLAND
Whittlesey Creek Debris Project

GREEN BAY
Shoreline Protected by Barrier Island
Fox River Phosphorous Pilot Project

PIERCE
Mashek Creek
Property Acquisition

SHEBOYGAN
Sheboygan River Cleanup

JACKSON
High School Wastewater Wetland

BELGIUM
A Migratory Flyway on
Lake Michigan

NEWBURG
Lake Sturgeon Imprinting Project

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Healing Our Waters®–Great Lakes Coalition
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:

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Floating Islands Provide Habitat in the Milwaukee River

MILWAUKEE, WISCONSIN



Floating islands along the industrialized corridor of the Milwaukee River have provided fish, such as smallmouth bass and green eared sunfish, habitat and a way to navigate upstream.



PROJECT NAME: Floating Island Habitats

DESCRIPTION: A project along the Milwaukee River aims to increase success of fish spawning by providing habitat. The sides of wild streams are often sloping with plenty of plant cover for small fish to rest and feed in. Steel bulkheads that line rivers in urban areas are void of plant life, and provide little or no shelter for young fish as they travel along the channel. About 80 percent of native Great Lakes fish rely on wetland ecosystems for part of their lifecycle, but especially in urban areas along the Great Lakes, these ecosystems no longer exist. A new technology tries to mimic the conditions in wetlands that benefit small, young fish as they make their way from the stream to the lake. Researchers are installing small containers filled with wetland plants and soil that

are attached to steel bulkheads along the river. The containers float up and down with the changing water level. The plant communities also support life on the bottom of the food chain, thereby also providing food for the young fish that shelter in the plant life.

APPROXIMATE COST: About \$175,000, with \$110,000 from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED: Lack of shallow water habitat, unsafe for small fish to navigate upstream, lack of food for fry fish

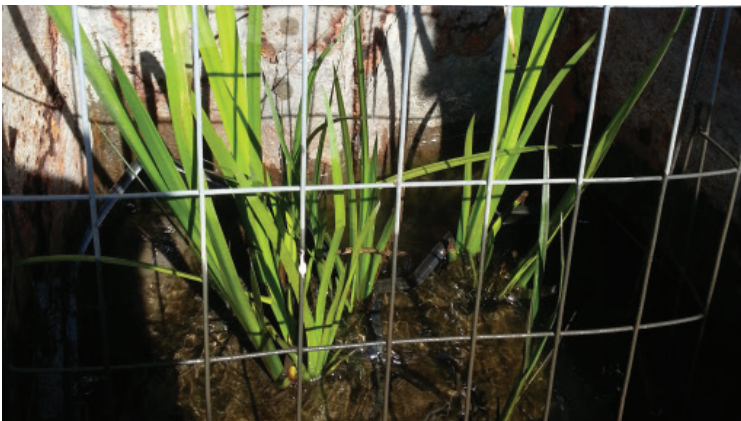
KEY FUNDING PARTNERS (PUBLIC AND PRIVATE):

Great Lakes Restoration Initiative, Fund for Lake Michigan, Groundwork Milwaukee, Marek Landscaping, Milwaukee Community Service Corps, Milwaukee Metropolitan Sewerage District, Southeastern Wisconsin Regional Planning Commission, and Wisconsin Department of Natural Resources

TYPES OF JOBS CREATED: Ecologists, engineers, general laborers, and fisheries biologists

WEBSITE: <http://mareklandscaping.com/projects/stewardship/gateway-spawning-gils/>

RESULTS AND ACCOMPLISHMENTS: The floating habitats have allowed fish to return to the Milwaukee River and find food and shelter. Biologists have seen large mouth bass and green eared sunfish more frequently in the river. In addition, ducks, muskrats, birds, and frogs all take advantage of the small simulated shoreline habitat. In addition to these small floating containers, larger versions of the idea are being implemented—*islands*. The engineered islands are larger versions of the containers, at about 80 feet long in six segments, and will be easier to remove from the water during the winter when the freeze/thaw cycle of the ice makes it difficult for the floating mechanism in the containers to work.



A close-up view of the floating habitat containers. These habitats simulate the nearshore ecosystem, allowing small fish, biofilm, frogs, and other wildlife to thrive. Photo courtesy of Marek Landscaping.



Newly installed floating island. Larger than the floating habitat containers, these islands are easier to maintain, all while providing the same services to wildlife. Photo courtesy of Marek Landscaping.

Forest Beach Migratory Preserve: A Flyway Replaces the Fairway

BELGIUM, WISCONSIN



Turning a 116-acre golf course into a nature preserve has allowed migratory birds a place to shelter along the coast of Lake Michigan.



PROJECT NAME: A Migratory Flyway on Lake Michigan

DESCRIPTION: A former golf course near the shore of Lake Michigan has been turned into a migratory preserve for the many birds that use the Lake Michigan Flyway. The Forest Beach Migratory Preserve is 116 acres, with a mix of hardwood forest with seasonal ponds, prairie, and constructed wetlands. The land trust that owns the site has removed invasive species and is encouraging native plants to thrive. Besides restoring natural habitat to the former golf course, the preserve aims to introduce vegetation to protect the water quality of Lake Michigan through natural filtration. Wetlands and space for ephemeral ponds absorb stormwater, filter pollutants, and provide other vital services. They also are a habitat for migratory birds, reptiles, and insects. Educational facilities and a trail system encourage people to learn more about migratory birds and the importance of their habitats. The site of the former golf course has been returned to a more natural state—benefitting both people and wildlife.

APPROXIMATE COST: \$2,900,000 with some funding from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED: Excess nutrient run-off, excessive water use from the golf course, lack of habitat for migratory birds

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): Great Lakes Restoration Initiative, U.S. Fish and Wildlife Service, Ozaukee-Washington County Land Trust, Ozaukee County, Wisconsin Department of Natural Resources, Wisconsin Waterfowl Association, Riveredge



A summer intern helps relocate a snapping turtle as part of a pond restoration effort. Amphibians and reptiles were relocated temporarily while a pond was drained and reconstructed by the U.S. Fish and Wildlife Service. Photo courtesy of the Ozaukee Washington Land Trust.

Nature Center Bird Club, SciTech Adventures, Lake Road Properties, Wisconsin Society for Ornithology, Cederburg Science, LCC., Great Lakes Ecological Services, LCC., EC3 Environmental Consulting Group, Inc., Pheasants Forever, and many neighbors and volunteers

TYPES OF JOBS CREATED: Research scientists, seasonal staff, college interns, management contractors, signage contractors, planters, pond construction workers, invasive species management; project also benefitted local nurseries, hardware stores, and suppliers of herbicides for invasive plants

WEBSITE: <http://owl.org/visit-our-preserves/forest-beach-migratory-preserve>

RESULTS AND ACCOMPLISHMENTS: The Forest Beach Migratory Preserve has already recorded 230 bird species using the site, a number that exceeds expectations. Nine different habitat types on site provide shelter for at least 80 rare or declining bird species that use the Lake Michigan Flyway each year. Birds such as the black-billed cuckoo, eastern meadowlark, solitary sandpiper, and golden-winger warbler are using the habitats provided. Converting the land into a preserve prevented 10 tons of fertilizers, insecticides, and pesticides from being applied to the landscape. In addition, nearby towns and villages that were having issues with their well-based water supply found their water replenished thanks to the preserve. Formerly, the golf course was extracting 20 million gallons per year to water its grounds and this use of water was directly competing with nearby municipal water needs.

Sheboygan River Delisted as a Great Lakes Area of Concern

SHEBOYGAN, WISCONSIN



The 2012 dredging of more than 400,000 cubic yards of contaminated sediment in Wisconsin's Sheboygan River, coupled with the restoration of fish and wildlife habitat, completed a lengthy cleanup that allowed the river to be removed from a list of Great Lakes Areas of Concern.



PROJECT NAME: Sheboygan River Cleanup

DESCRIPTION: Historic pollution left PCBs, PAHs and heavy metals in bottom sediments and surface soils along parts of the Sheboygan River 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. and Camp Marina Manufactured Gas Plant, 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. In 2012, the U.S. EPA contributed about \$55 million from the Great Lakes Restoration Initiative to

speed a cleanup of the Sheboygan River Area of Concern. During 2012, crews removed over 425,000 cubic yards of contaminated sediment and restored fish and wildlife habitat in and along the lower river.

APPROXIMATE COST: \$83 million was spent on the cleanup in 2011 and 2012, with the Great Lakes Restoration Initiative providing \$55 million of that amount

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 FUNDING PARTNERS (PUBLIC AND PRIVATE):

Great Lakes Restoration Initiative, Wisconsin Department of Natural Resources, City of Sheboygan, Sheboygan County, and Wisconsin Department of Transportation and the University of Wisconsin-Extension

TYPES OF JOBS CREATED: Dredge operators, heavy equipment operators, general laborers, biologists, engineers, chemists, toxicologists, and aquatic ecologists

WEBSITE: <http://yosemite.epa.gov/opa/admpress.nsf/0/5F4A7804D70B628B85257B8A0060B1F2>

RESULTS AND ACCOMPLISHMENTS: Crews dredged 730,000 cubic yards of contaminated sediment over the course of the project from the Sheboygan River and restored over 70 acres of fish and wildlife habitat along a 2.5-mile long corridor. The dredging and habitat restoration resulted in the Sheboygan River being de-listed as a Great Lakes Area of Concern. The cleanup also bolstered economic development efforts in Sheboygan.



The Sheboygan River cleanup. Photo courtesy of the Environmental Protection Agency.



Streamside Rearing Facility Helps Restore Lake Sturgeon

NEWBURG, WISCONSIN

The lake sturgeon may be able to return to the Great Lakes in greater numbers thanks to this sturgeon rearing facility that has introduced more than 7,400 of the native fish back to the Lakes.

PROJECT NAME: Lake Sturgeon Imprinting Project

DESCRIPTION: Around 1800, sturgeons were abundant in the Great Lakes and used the Milwaukee River as a spawning ground. By 1850 a dam was put into the Milwaukee, about 5 miles from Lake Michigan, and this prevented adult sturgeon from making it upstream to their spawning grounds. For the last 150 years, the spawning success of the lake sturgeon has been on the decline as their upstream spawning habitats, in places like the Milwaukee River, have been decimated. These fish spawn in small rivers or estuaries and imprint on the place they were born, returning to spawn in the same location at reproductive maturity. The Milwaukee River lake sturgeon streamside rearing facility uses this biological signal to help maximize the probability lake sturgeon will return to successfully spawn. The facility,

operated by both the Wisconsin DNR and the Riveredge Nature Center, provides a safe space adjacent to their natural environment and uses river water for the incubators. The hope is that the sturgeon will imprint on the natural space and return to spawn. The main goal of this project is to support lake sturgeon populations so they may once more flourish naturally.

APPROXIMATE COST: \$200,000

RESOURCE CHALLENGES ADDRESSED: Lake sturgeon blocked from accessing their spawning habitat in the Milwaukee River, restoring populations of lake sturgeon to the Great Lakes

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): Great Lakes Fisheries Trust, Wisconsin Department of Natural Resources, U.S. Fish and Wildlife Service, Riveredge Nature Center, volunteers. University of Wisconsin Stevens Point, and U.S. Geological Survey

TYPES OF JOBS CREATED: Fish biologists, construction workers, and general laborers

WEBSITE: <http://dnr.wi.gov/topic/fishing/lakemichigan/LakeSturgeon.html>

RESULTS AND ACCOMPLISHMENTS: Since 2003, the Milwaukee River lake sturgeon streamside rearing facility has been operating to help the population of lake sturgeon regain strength in the Great Lakes. The Wisconsin Department of Natural Resources has stocked 7,400 sturgeons into the Great Lakes population through the Milwaukee River program. Since sturgeons take between 10 years and 20 years to reach maturity, the success of the project is just starting to be assessed, but researchers have begun spotting tagged sturgeon in the Milwaukee River.



Lake Sturgeon in the Streamside Rearing Facility at four months old. Photo courtesy of the Wisconsin Department of Natural Resources.



Tribal elders blessing the release of lake sturgeon into the Milwaukee River in 2007. Photo courtesy of the Wisconsin Department of Natural Resources.

Campus Stormwater Discharge Reduced Due to Green Landscaping

MILWAUKEE, WISCONSIN



Three students determine the volume and contours of a swale in the spiral garden. Understanding the volume and other aspects of a swale allows engineers and landscape architects to calculate the positive impact the bioswale can have during a heavy rain event—helping to slow and absorb water as it flows through the depression. Photo courtesy of Jim Wasley.



The native prairie green roof on top of the Sandburg Commons. Green rooftops can absorb rainwater, slowing the time it takes for the water to reach the sewer system and helping the sewer cope with heavy rain events. Photo courtesy of Jim Wasley.

The University of Wisconsin at Milwaukee has installed green rooftops, bioswales, and other natural landscaping projects that have led to a dramatic decrease in the water the campus discharges into the Milwaukee sewer system.



PROJECT NAME: University Decreases Runoff

DESCRIPTION: The University of Wisconsin at Milwaukee has been reworking their campus to reduce stormwater discharge. Seven buildings on campus have green roofs incorporated into their design, including a Wisconsin native dry-prairie, one with solar panels in the landscape, and a vegetable garden used by a campus café. These green roofs will absorb water and heat more effectively than traditional roofs ever could, while benefitting wildlife by providing habitat. A 5,000 square foot spiral garden on campus catches rainwater drainage from some of the green roofs and other traditional rooftops to decrease runoff into Lake Michigan. The garden and two cisterns that double

as fountains at the end of it slow the flow of water, allowing it more time to seep into the ground. The presence of native plants also slows the progress of the water, increases the absorption of the landscape, and filters nonpoint source pollution that collects on the rooftops and in the nearby parking lot.

APPROXIMATE COST: Between \$2,000,000 and \$2,500,000, with some funding from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED: Excess runoff and erosion, nonpoint source pollution, energy use and maintenance costs, lack of wildlife habitat in urban spaces

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): Great Lakes Restoration Initiative, Milwaukee Metropolitan Sewerage District, University of Wisconsin at Milwaukee, and WE Energies

TYPES OF JOBS CREATED: Landscape designers, biologists, university research assistants, construction workers, truck drivers, and general laborers

WEBSITE: <http://www4.uwm.edu/pps/Sustainability/CampusInit/green-roofs.cfm>

RESULTS AND ACCOMPLISHMENTS: The spiral rain garden in combination with the green rooftops are estimated to reduce average stormwater runoff into the city's sewerage system by 97 percent. This impact is in part due to a large area of impervious surface whose runoff was diverted into the spiral rain garden, providing the space and time for water to absorb into the landscape instead of running off into Lake Michigan.



A Community Effort Cleans Up the Kinnickinnic River

MILWAUKEE, WISCONSIN

Restoring Milwaukee's Kinnickinnic River is helping to reduce flooding risks, improve public safety, provide a home for fish and wildlife, and bring families back to their neighborhood river.



PROJECT NAME: Kinnickinnic River Naturalization

DESCRIPTION: The south side neighborhoods that border the

Kinnickinnic River in Milwaukee are in the middle of a transformation that is improving the health of the River and the neighborhood. The Kinnickinnic River was placed into a concrete channel in the 1960s, and had a long history of overflowing these artificial banks. The River was also seen more as a dangerous and polluted liability and less as a resource that would draw people to enjoy it. To address these problems, organizations serving Milwaukee's south side in conjunction with the Milwaukee Metropolitan Sewerage District, came up with a plan. First and foremost, the river would need to be returned to a more natural, meandering state, allowing for flood events on the banks of the river, and providing habitat for aquatic life. To accomplish this, 56 houses immediately adjacent to the stream channel have been purchased and demolished to make room for the expanded riverbanks, and another 27 are planned for acquisition. Secondly, nearby residents needed to better understand their role in improving and protecting their neighborhood river. They have begun by leading neighborhood cleanups, installing rain gardens and rain barrels to capture stormwater—keeping it from directly running into the Kinnickinnic. Currently, 40 residents have installed rain gardens and swales in their yards to slow rainwater, and the Sewerage District has donated 100 rain barrels to collect rain for later use.

APPROXIMATE COST: \$93,000,000, with some funding coming from the Great Lakes Restoration Initiative



BEFORE: This picture of the Kinnickinnic River is representative of what the river looked like before the naturalization effort expanded the banks of the river, allowing it to meander. Photo courtesy of the Sixteenth Street Community Health Center.



AFTER: This portion of the Kinnickinnic River is fully naturalized. It can now manage floodwaters while being a beautiful amenity to the neighborhood. Photo courtesy of the Sixteenth Street Community Health Center.

RESOURCE CHALLENGES ADDRESSED: Flooding, natural river flow with pools and riffles, access to nearby outdoor recreation, understanding of how people impact the health of the watershed

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): Great Lakes Restoration Initiative, American Recovery and Reinvestment Act, Milwaukee Metropolitan Sewerage District, Fund for Lake Michigan, Wisconsin Coastal Management Program, Sweetwater, Southeast Wisconsin Watershed Trust, Sixteenth Street Community Health Center, Greater Milwaukee Foundation, Groundwork Milwaukee, and Southside Organizing Committee

TYPES OF JOBS CREATED: Construction workers, general laborers, landscapers, lawn construction, landscape architects, and rain garden installation experts

WEBSITE: <http://sschc.org/kinnickinnic-river-rehabilitation-and-neighborhood-plan-overview/>

RESULTS AND ACCOMPLISHMENTS: More work is yet to be done, but so far an aging bridge that restricted the flow of the Kinnickinnic was restructured, the downstream channel has been widened and concrete has been removed. Neighborhood residents have implemented active stormwater management practices such as using rain barrels and planting rain gardens, and designed and built a pocket park next to the river. Because of these changes, more aquatic life has returned to the river, flood risks have been reduced, residents will have new green space near the channel to enjoy the Kinnickinnic, and a neighborhood has a better understanding of how they impact their watershed.

Large Woody Debris Restores Whittlesey Creek

ASHLAND, WISCONSIN



Placing logs and other large woody debris in Whittlesey Creek in Wisconsin has restored a more natural flow to the river and provided habitat for fish and wildlife.



PROJECT NAME: Whittlesey Creek Debris Project

DESCRIPTION: Fallen trees and logs might not seem like a good thing to have in a creek, but they provide a valuable service for the habitat. During heavy rains and floods, the wood gives shelter to aquatic life, catches and filters gravel and sediment, and creates a more complex flow of water with pools and riffles. Too much sediment was finding its way into the Whittlesey Creek, a tributary to the Chequamegon Bay of Lake Superior. Engineered log jams introduced to the creek in 2011 and 2012 helped restore natural habitat and filter sediment. The placement of the logs helped to increase the complexity of the channel, creating a variety of habitats for micro- and macroinvertebrates,

such as crayfish, beetles, snails, and dragonfly larvae. Fish health is being monitored to understand which populations have benefited from the project.

APPROXIMATE COST: \$44,000 with some funding from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED: Lack of habitat for a variety of aquatic life, too much sediment build up throughout the river

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE):

Great Lakes Restoration Initiative, U.S. Fish & Wildlife Service, Bayfield County Land and Water Conservation Department, Wisconsin DNR, Trout Unlimited, Northland College, and U.S. Fish and Wildlife Service Youth Conservation Corps

TYPES OF JOBS CREATED: Construction workers, heavy equipment operators, hydrologists, scientists, and general laborers

WEBSITE: <http://www.fws.gov/fieldnotes/regmap.cfm?arskey=14407>

RESULTS AND ACCOMPLISHMENTS: Adding 210 logs to the Whittlesey Creek has restored the streambed to a more natural state and created a variety of habitats. The addition of woody debris has filtered sediment, protected fish eggs, and stopped macroinvertebrates from being smothered. This debris has also allowed pools and riffles to form, expanding the type of habitat available to aquatic life.



Workers position a log in the stream channel, which will help prevent sedimentation and provide habitat for fish and wildlife. Photo courtesy of Inter-Fluve, Inc.



Logs placed at intervals throughout the stream collect other woody debris, adding to the complexity of the channel. Photo courtesy of Inter-Fluve, Inc.



Hank Aaron Trail in the Menomonee River Valley Hits a Home Run

MILWAUKEE, WISCONSIN

Once a railroad yard for the Milwaukee Road, the land adjacent to the Menomonee River in Milwaukee has been restored to a more natural state, allowing wildlife to return and providing the public with outdoor recreational opportunities.



PROJECT NAME: Menomonee River Restoration

DESCRIPTION: The Hank Aaron Trail is a 12-mile long trail along the Menomonee

River that has combined prairie restoration, stormwater management, and habitat to help improve water quality, while providing a recreational opportunity for the public. A former railroad yard for the Milwaukee Road and other brownfield sites along the Menomonee were slowly eroding into the river, degrading water quality and providing little habitat for local wildlife. By restoring the land, the river has also benefited through erosion control. The installation of managed wetlands helps filter and absorb the rainwater that falls on the land, reversing erosion and limiting the pollution in the river. The north side of the river hosts a new industrial park with ponds to filter runoff before it enters the Menomonee. Uncontaminated slag from the old brownfield site has been turned into a park on the south side of the river. Pathways along the trail allow the public to enjoy the outdoor space, by biking, running, skating, or just leisurely walking.

APPROXIMATE COST: \$26,000,000 with some funding from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED: Brownfield site pollution, erosion, sedimentation in the river, lack of river habitat

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): Great Lakes Restoration Initiative, American Recovery and Reinvestment Act, the City of Milwaukee Redevelopment



A bird's eye view from fall 2012 of the old Milwaukee Road rail yard during restoration, now reconstructed into the Three Bridges Park along the Hank Aaron Trail. Photo courtesy of the Redevelopment Authority for the City of Milwaukee.

Authority, Wisconsin Department of Natural Resources, Wisconsin Department of Transportation, and Menomonee Valley Partners

TYPES OF JOBS CREATED: Construction workers, hydrologists, fisheries experts, engineers, environmental consultants, structural engineers, road builders, landscapers, fencing contractors, masons, general laborers, and industrial park employees

WEBSITE: <http://dnr.wi.gov/topic/parks/name/hankaaron/>

RESULTS AND ACCOMPLISHMENTS: The Menomonee has had its riverbanks restored, preventing erosion from adding sediment to the river. Boulder clusters have also increased the complexity of the river, allowing a variety of aquatic habitats to form. Native prairie plants have been returned to the park, while invasive species like Crown Vetch and Purple Loosestrife are being eradicated. Wetlands and a river lawn flood plain have been installed to absorb and filter the water from flooding events.

Project Protects Valuable Bird Habitat

PIERCE, WISCONSIN



A land purchase in northeastern Wisconsin increased public access to the Lake Michigan shoreline and protected valuable bird habitat.



PROJECT NAME: Mashek Creek Property Acquisition

DESCRIPTION: The National Oceanic and Atmospheric Administration worked with the Wisconsin Department of Natural Resources to acquire a parcel of land where Mashek Creek flows into Lake Michigan. The property includes 1,700 feet of Lake Michigan shoreline and 1,400 feet of frontage on both sides of Mashek Creek. Wooded areas on the site provide stopover habitat for neo-tropical migratory birds and raptors that move along the shores of Lake Michigan. Salmon and steelhead migrate into the creek from Lake Michigan, creating fishing opportunities. The acquisition provided the first public parcel along the shores of Lake Michigan in Kewaunee County. The land buy protected

the site's ecological values and provided new recreational opportunities and educational programs.

APPROXIMATE COST: \$1.1 million. The National Oceanic and Atmospheric Administration and Wisconsin Department of Natural Resources each contributed \$398,000 toward the purchase price. The Great Lakes Restoration Initiative provided the NOAA funds.

RESOURCE CHALLENGES ADDRESSED: Loss of migratory bird habitat, public access to the Lake Michigan shoreline

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): Wisconsin Department of Natural Resources and the National Oceanic and Atmospheric Administration

TYPES OF JOBS CREATED: Property appraiser, mortgage broker, and land acquisition specialists

WEBSITE: http://www.regions.noaa.gov/great-lakes/great_lakes-restoration-initiative/habitats/

RESULTS AND ACCOMPLISHMENTS: The purchase increased public access to the Lake Michigan shoreline while protecting an ecologically valuable parcel of coastline, forest and Mashek Creek.



The confluence of Mashek Creek and Lake Michigan. Photo courtesy of the National Oceanic and Atmospheric Administration.



Green Infrastructure Resurrects Polluted Beach

MILWAUKEE, WISCONSIN



A view of Bradford Beach after the renovations. Photo from Flickr/Kwong Lee Cheng.

A coalition of more than 20 government agencies, businesses, and community groups developed and implemented a \$705,500 plan for reducing bacterial pollution at Bradford Beach, a Lake Michigan beach on Milwaukee's north side.

PROJECT NAME: Bradford Beach Stormwater Management Project

DESCRIPTION: For decades, stormwater that fell on parts of Milwaukee was collected in pipes and discharged onto the shoreline at Bradford Beach, a 27-acre county park on the Lake Michigan coast. The downside of that approach to stormwater management became apparent in 2004, when elevated concentrations of *E. coli* bacteria in the sand and water forced health officials to close the beach on numerous occasions. The beach became known as Milwaukee's dirtiest, the public abandoned it and the recurrent pollution tarnished the image of Milwaukee's waterfront. Cognizant of the beach's important role in shaping Milwaukee's identity, officials from the city, county and Milwaukee Metropolitan Sewerage District partnered with researchers at the University of Wisconsin's Great Lakes WATER Institute to identify the cause of the bacterial pollution and find solutions. Scientists discovered that urban stormwater discharged onto the beach, along with a large population of seagulls, was causing bacterial pollution in the sand and water.

The county hired the engineering firm AECOM to design a series of rain gardens that were installed around the stormwater discharge pipes and parking lot at the beach. The gardens absorb and filter the stormwater, which helped lower bacteria concentrations in the sand and adjoining waters of Lake Michigan. The county also used dogs to scare away the seagulls, thereby reducing the quantity of bacteria-laden bird feces on the beach. When the bacteria problem was resolved, the county hired lifeguards and opened a concession stand to lure the public back to Bradford Beach.

APPROXIMATE COST: About \$1,000,000

RESOURCE CHALLENGES ADDRESSED: Persistent bacterial contamination, excessive run-off

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE):

Milwaukee County's Public Works and Parks departments, the engineering firm AECOM, Wisconsin Department of Natural Resources, the City of Milwaukee, the Milwaukee Metropolitan Sewerage Agency and the Great Lakes WATER Institute. Several corporations supported the project, including MillerCoors, which donated \$500,000 for ongoing park maintenance.

TYPES OF JOBS CREATED: Biologists, landscape architects, construction workers, and general laborers

WEBSITE: <http://www.bradfordbeachjam.com/welcome.html>

RESULTS AND ACCOMPLISHMENTS: Bradford Beach is now one of the most popular beaches in the greater Milwaukee area. It is a hotspot for beach volleyball, hosting numerous recreational leagues and professional tournaments. The beach also hosts concerts and numerous other events, making it a popular destination for families and beachgoers of all ages. In 2009, Bradford Beach earned the coveted Blue Wave certification from the Clean Beaches Council. The national award is given to America's healthiest beaches. The resurrection of Bradford Beach was evident on a hot Sunday afternoon in May 2010. With temperatures in the 80s, thousands of Milwaukee residents flocked to the beach, creating a traffic jam that forced the Milwaukee County Sheriff's Department to close the road leading to the park for a period of time.

Wetland Wastewater Treatment Facility Helps Protect the Great Lakes

JACKSON, WISCONSIN



The Kettle Moraine Lutheran High School replaced an old septic tank with an engineered wetland to filter their wastewater, thereby removing excess nutrients from the water supply and creating a habitat for local wildlife.

PROJECT NAME: High School Wastewater Wetland

DESCRIPTION: Wetland environments are known as natural filtration systems, removing or capturing nutrients to prevent algal blooms downstream. The Kettle Moraine Lutheran High School has harnessed this power of wetland biology to naturally filter the wastewater from the school. The engineered wetland system uses a mix of bacteria populations, a solar powered nitrate pump, and windmill for aeration, as well as wildflower and prairie grasses to digest and filter the nutrients from human waste. This process makes the water safe by the time it enters the ground water. After flowing through the school's wetland, the water makes its way through the Jackson Marsh, then the Milwaukee River, and finally into Lake Michigan. Besides being an effective way of preventing excess nutrients from entering the watershed, the engineered wetland is used by the teachers as a hands-on lesson about the water cycle and water quality. Students of all ages—not just those attending the high school—are educated about the importance of wetland ecosystems and the roll they play in filtering water.

APPROXIMATE COST: \$20,000

RESOURCE CHALLENGES ADDRESSED: Excess nutrients in the water cycle, lack of habitat for wildlife, old septic tank in need of replacement

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): Kettle Moraine Lutheran High School, Toyota TAPESTRY, and Wisconsin Focus on Energy



A windmill and solar panel stand in the constructed wetland. The solar panel provides power to run monitoring equipment, while the windmill aerates the aerobic bacteria tank that processes the effluent. Photo courtesy of Tom Mellon.



A close up of the line that carries oxygen generated by the windmill to the appropriate bacteria tank. Some of the wildflowers on site can also be seen in this photo. Photo courtesy of Tom Mellon.

TYPES OF JOBS CREATED: Construction workers, truck drivers, heavy equipment operators, biology teachers, environmental engineers, and general laborers

WEBSITE: <http://www.kmlhs.org/home/environmental-initiatives/waste-water-treatment>

RESULTS AND ACCOMPLISHMENTS: By using an engineered wetland to treat wastewater, the Kettle Moraine Lutheran High School has improved water quality and increased community understanding of the importance of wetland ecosystems. The wetland has also created a space on campus for waterfowl, amphibians, and even beavers to live. In 2012, they upgraded their system by adding a vertical flow wetland, which allows already treated water to percolate through sand and plants to be further cleaned. About 10 percent of this water is redirected for further treatment, decreasing the likelihood that excess nutrients will find their way into the Great Lakes. The filtration system works so well that in about 25 years the water filtered by this wetland would be drinkable.



Cat Island Restoration Project Restores Native Fish Populations

GREEN BAY, WISCONSIN

A former barrier island chain off the coast of Green Bay is being rebuilt to protect wetlands and habitat, allowing native fish like bluegill and largemouth bass to return.

Island chain will also provide a productive use for 30-50 years of dredged sediment.

APPROXIMATE COST: \$34,000,000, with \$1,500,000 coming from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED: Sedimentation in the water, erosion from waves, strong impact of storm events, loss of barrier island

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): Great Lakes Restoration Initiative, Port of Green Bay, Brown County, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish & Wildlife Service, Wisconsin Department of Transportation, Wisconsin Department of Natural Resources, Lower Fox River/Green Bay Natural Resources Trustee Council, University of Wisconsin Sea-Grant, University of Wisconsin-Green Bay and 14 port terminal operators, Wisconsin Department of Transportation Harbor Assistance Program, and Natural Resources Damages Assessment

TYPES OF JOBS CREATED: Dredging operators, biologists, restoration ecologists, construction workers, landscape architects, and general laborers

WEBSITE: http://www.co.brown.wi.us/departments/page_3795c0025217/?department=2c960fb409b5&subdepartment=69127804d809



PROJECT NAME: Shoreline Protected by Barrier Island

DESCRIPTION: The Cat Island chain off of Green Bay used to protect the coast from punishing waves and storm events. Starting in the late 1960s, high lake levels and storms started to erode the island chain. By the 1970s, the three islands that comprised Cat Island were submerged. Work has begun to restore these islands, which once protected 1,400 acres of wetlands along the coast. Restoring this island chain will help restore this habitat. A wave barrier, ranging between four and eight feet in height, has been built on the old outline of the Cat Island chain to calm the waters nearshore. Now, thanks to calmer and clearer waters, bluegill, largemouth bass, and pumpkinseed fish will all have an easier time returning to their natural habitat. After the 6.8 mile long wave barrier has been fully constructed, sandy sediment dredged from the harbor will be used to fill in the island area. The Cat

RESULTS AND ACCOMPLISHMENTS: The restoration of natural nearshore habitat has allowed bluegill, largemouth bass, and pumpkinseed fish to return. On the island chain, nesting water birds, shorebirds, and other invertebrates will benefit from the newly constructed land. By protecting the nearshore waters, the island chain will also provide fish nursery habitat.



The outline of Cat Island, prior to the wave barrier being constructed. Photo courtesy of the Army Corps of Engineers.



The wave barrier connected to the outline of Cat Island, June 2013. The fully constructed shell for the island chain will protect the wetland habitat on shore. Photo courtesy of the Army Corps of Engineers.

Removing Culverts, Dams, and Obstacles Restores Passage to River

OZAUKEE COUNTY, WISCONSIN



Removing dams, culverts, and other obstructions along the upper Milwaukee River has reconnected more than 100 miles of streams, allowing native fish like northern pike to return to parts of the river they had been cut off from.



PROJECT NAME: Ozaukee County Fish Passage Program

DESCRIPTION: The stretch of the Milwaukee River near the villages of Thiensville and Grafton had tributaries clogged with invasive plants and low culverts preventing aquatic species from easily traveling upstream. A dam across the river outside of Grafton was also impeding the natural flow of the water and aquatic life. The historically connected riparian zone had been fragmented until Ozaukee Planning and Parks department developed a plan of action. While lower portions of the Milwaukee River have been significantly altered through urban development, the portion in Ozaukee County had more intact spawning habitat and other high quality habitat relatively preserved. The parks department removed over 180 impediments to fish and wildlife passage—including two dams—which helped reconnect more than 100 stream miles. Fish returned to places where, for years, they have been blocked from swimming.

APPROXIMATE COST: \$8,000,000 with some funding from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED: Invasive plant species, blocked natural river flow from culverts and dams

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): Great Lakes Restoration Initiative, National Oceanic and Atmospheric Association, Wisconsin Department of Natural Resources, Wisconsin Department of

Administration, U.S. Fish and Wildlife Service, Ozaukee County Land and Water Management, Milwaukee Audubon Society, National Fish and Wildlife Foundation, Fund for Lake Michigan, and Great Lakes Fisheries Trust

TYPES OF JOBS CREATED: Construction workers, conservation corps workers, office workers, general laborers, educators, and biologists; all total, 62,000 paid labor hours created under this program

WEBSITE: http://www.co.ozaukee.wi.us/planningparks/PlanningParks_Fish_Passage.htm



The Ozaukee County Highway Department installs a fish passage culvert near Daly Lake on the Riveredge Creek. Shady Lane Road crosses this creek, causing the need for the culvert. Photo courtesy of the Ozaukee County Planning and Parks Department.



This aerial photo of the Mequon-Thiensville Dam shows an example of a nature-like fishway that flows to the side of the dam, allowing fish passage without removing the dam. Photo courtesy of Stantec.

RESULTS AND ACCOMPLISHMENTS: Fish and other aquatic life have been able to move throughout the river, thanks to the removal of two large dams and over 180 smaller impediments. Other dams remaining in the area now have natural fish passageways to connect the upper and lower parts of the river. Other portions of the river and its tributaries are being returned to an increasingly “wild,” or meandering, state which is better for the health of aquatic life. This state will help northern pike and other native fish as meandering rivers are a more suitable habitat for them. Floodplains were constructed or identified, to help prevent floodwaters from reaching communities along the river.



Farmers' Fields Transformed to Help Wildlife and Water Retention

NEAR FRANKLIN, WISCONSIN



One of the wetland sites in the Big Muskego Lakes Wildlife Area, pictured in September 2012, that is helping to reduce flooding, while providing a home to wildlife. Photo courtesy of the Conservation Fund.



A view from the pier in Dumke Lake, in the Big Muskego Lakes Wildlife Area. Photo courtesy of the Conservation Fund.

Restoring habitat on the site of former Wisconsin farmland has helped reduce run-off, created a home for wildlife and created outdoor recreation for people in the community.

PROJECT NAME: Muskego Lakes Wildlife Area

DESCRIPTION: Flooded farmland will cause manure, fertilizer, and sediment to flow off the land into nearby river systems. Increased nutrients in the watershed can cause algal blooms, and too much sediment can block up a river. The Big Muskego Lakes Wildlife Area has taken former agriculture fields that experienced flooding and returned them to a mix of prairie habitat, wetland areas, and forested land. A conservation easement on the property means that it will be permanently managed in a way that protects this environment. Returning the land to a mix of habitats not only helps prevent flooding and nutrient build-up downstream, but it also provides habitat for wildlife not often found in southern Wisconsin. With 25 acres of grassland prairie and 23 acres of wetlands, the Big Muskego Lakes Wildlife Area

provides a habitat for wildlife, a buffer to absorb floodwaters, and a beautiful recreation area for people in the community.

APPROXIMATE COST: Over \$1,000,000 from the Wisconsin Department of Natural Resources, over \$1,000,000 from the Milwaukee Metropolitan Sewerage District, and \$10,825 from the U.S. Fish and Wildlife Service

RESOURCE CHALLENGES ADDRESSED: Flooding in agricultural areas, nutrient run-off, sediment loading, lack of grasslands habitat in southern Wisconsin

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): Milwaukee Metropolitan Sewerage District, The Conservation Fund, the Wisconsin Department of Natural Resources Knowles-Nelson Stewardship Program, and the U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program

TYPES OF JOBS CREATED: Construction workers, maintenance workers, surveyors, general laborers, and local plant nursery staff

WEBSITE: <http://dnr.wi.gov/topic/lands/WildlifeAreas/bigmuskego.html>

RESULTS AND ACCOMPLISHMENTS: The Big Muskego Lakes Wildlife Area has restored multiple habitat types, diversifying options for wildlife and reducing nutrient and sediment loading into nearby rivers. Wetlands on the 274-acre property, as well as Dumke Lake, mitigate the flood potential from storm events. In total, the Wildlife Area has the ability to absorb and hold about 18 million gallons of water on site thereby moderating flood risk and sequestering nutrients and sediments that could otherwise harm the Great Lakes.

Project Helps Reduce Runoff on a Dairy Farm

NEAR GREEN BAY, WISCONSIN



Runoff from dairy farms with high nutrient levels can cause algal blooms, but the Brickstead Dairy is working to reduce the amount of nutrients that enter surface water to protect water quality.

these conservation practices will also greatly improve the soil health and soil quality on the farm.

APPROXIMATE COST: \$3,000,000 for the entire 20,000-acre pilot project with some funding from the Great Lakes Restoration Initiative

RESOURCE CHALLENGES ADDRESSED: High nutrient levels in the water, high sediment levels in the water, algal blooms

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE):

Great Lakes Restoration Initiative, Natural Resources Conservation Service, Brown County Land and Water Conservation Department, Outagamie County Land Conservation Department, Calumet County Land and Water Conservation Department, Manitowoc County Soil and Water Conservation Department, Winnebago County Land and Water Conservation Department, U.S. Geological Survey, Wisconsin Department of Natural Resources and the Wisconsin Department of Agriculture, Trade and Consumer Protection

TYPES OF JOBS CREATED: Design, engineering, and construction services

WEBSITE: <http://www.nrcs.usda.gov/wps/portal/nrcs/site/wi/home/>



PROJECT NAME: Fox River Phosphorous Pilot Project

DESCRIPTION: Fertilizer and manure runoff from farms is a major cause of poor water quality in the Great Lakes, especially in the Lower Fox River in Wisconsin. To address this issue, the Natural Resources Conservation Service is focusing Great Lakes Restoration Initiative funding in the Lower Fox River watershed. In 2012, the program worked with farmers on over 20,000 acres of agricultural land. Nutrient management plans and cover crops on 4,000 acres have improved water quality, allowing aquatic life to return. One such farm, Brickstead Dairy, with NRCS assistance, is installing grassed waterways, basins to control water and catch sediment, cover crops as well as other a number of other practices that will prevent soil loss, reduce runoff, and improve water quality. Installation of

RESULTS AND ACCOMPLISHMENTS: Nutrient management plans on Brickstead Dairy are improving water quality, allowing aquatic life to return. Cover crops have been planted on 100 acres, which hold soil in place during the winter, further preventing sediment loss into nearby lakes and rivers. Over three miles of grassed waterways are planned—these will slow the speed of runoff, allowing the water to slowly absorb into the soil and preventing any excess nutrients or sediment in the runoff from reaching streams. Edge-of-field and in-stream monitoring stations have been installed to measure the water quality improvements as a result of implementation of conservation practices.



Brickstead Dairy has planted cover crops on over 100 acres to prevent erosion, holding nutrients in the soil and keeping them out of nearby waterways. Photo courtesy of the USDA-NRCS.



Grassed waterways are a key practice to intercept runoff and trap sediment from cropland. The Brickstead Dairy will be installing over three miles of grassed waterways using Great Lakes Restoration Initiative funding. Photo courtesy of the USDA-NRCS.



Dredging Cleans up a River, Revitalizes Neighborhood

MILWAUKEE, WISCONSIN

State and federal agencies joined forces to complete a \$22 million cleanup project that resulted in the removal of 167,000 cubic yards of toxic mud from the bottom of the Kinnickinnic River, on Milwaukee's south side.

PROJECT NAME: Kinnickinnic River Cleanup

DESCRIPTION: Years of abuse and neglect caused a bend in the Kinnickinnic River to become a collection spot for toxic mud, garbage, sunken boats and other refuse. The accumulation of contaminated sediments and garbage made that part of the river unsightly and non-navigable. In the late 1990s, property owners and business leaders began lobbying for a cleanup of the filthy bend in the Kinnickinnic River. Over the course of several years, business leaders and local government officials joined forces with state and federal agencies to draft a cleanup plan. The goal was to create a more navigable river, spur the development of new waterfront businesses and revitalize the riverfront for the surrounding neighborhood.

APPROXIMATE COST: \$22,000,000

RESOURCE CHALLENGES ADDRESSED: Contaminated sediment, congested and trash-filled waterways, unsightly area

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): U.S. Environmental Protection Agency, Army Corps of Engineers, city of Milwaukee, Port of Milwaukee, Milwaukee's Business Improvement District #35 and the Wisconsin Department of Natural Resources. The EPA contributed \$14.3 million toward the cleanup; the state of Wisconsin provided the other \$7.7 million, using money from a state bond that was part of the Governor's Growing Milwaukee Initiative. Federal cleanup funds came from the Great Lakes Legacy Act, a program created in 2002 to remove toxic sediments from dozens of sites around the Lakes.

TYPES OF JOBS CREATED: Heavy-equipment operators, general laborers

WEBSITE: <http://www.epa.gov/glla/kk/index.html>

RESULTS AND ACCOMPLISHMENTS: Over the course of four months in 2009, crews dredged 167,000 cubic yards of contaminated sediment from the river bottom. The dredging removed more than 14,000 pounds of toxic chemicals from the river, which flows into Lake Michigan. The dredging also restored safe navigation to the stretch of river that had long been avoided. The cleanup pumped new life into the riverfront community. An abandoned factory was razed to make way for a 40,000 square foot office complex and existing marinas added new docks and moorings. The cleanup increased property values along the river and gave rise to one of the Great Lakes' most eccentric microbreweries—the Horny Goat Brewing Co. The brewery, which opened in 2009, includes a large patio that allows patrons to dine along the river with outdoor fire pits, sand volleyball courts, and a concert stage. In 2010, the website OnMilwaukee.com declared the Horny Goat's deck to be Milwaukee's best patio. The website's dining guide said the patio is often packed on summer nights and "the view of the river from just about anywhere on the patio is spectacular and worth a visit."



BEFORE: The Kinnickinnic River prior to the clean up, with refuse clearly visible and blocking the waterways. Photo courtesy of the Environmental Protection Agency.



AFTER: The Kinnickinnic River after clean up, with a clear and aesthetically pleasing waterway. Photo courtesy of the Environmental Protection Agency.

A City Reconnects to its River

RACINE, WISCONSIN



A view of the Root River marina looking towards Racine and Lake Michigan. Photo courtesy of the Root River Council.



A couple enjoys kayaking down the Root River as a train uses the trestle to cross into town. Photo courtesy of the Root River Council.

Stabilizing the river banks, removing invasive species, installing rain gardens and adding a park along the Root River has improved the health of the river, while providing public access.

PROJECT NAME: Restoring the Urban Root River

DESCRIPTION: The Root River runs through the town of Racine, Wis., into Lake Michigan, and for the early life of the town the river was used by industry, heavily developed, and its water quality degraded. With the decline of the industrial economy, the town has reimagined its relationship with the river. Newly added green spaces and parks on either side of the river allow the public to enjoy the space, provide habitat for wildlife, and stabilize the riverbanks to prevent erosion. Thick grasses on either side of the riverbank prevent the aggressive colonization of geese. Waterfront property that currently consists of brownfield sites or abandoned industrial buildings will be actively redeveloped with the hopes of increasing

community enjoyment of and involvement in the river. With more people appreciating and benefitting from the river, the Root River Council hopes there will be an increased understanding of the importance of keeping the river healthy. Future goals include installing more rain gardens, permeable pavement, green rooftops, and rain barrels.

APPROXIMATE COST: \$3,500,000

RESOURCE CHALLENGES ADDRESSED: Lack of access to the river, unused industrial buildings, degraded near-shore habitat

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE): National Oceanic and Atmospheric Administration's Wisconsin Coastal Management Program, City of Racine Community Development Block Grants, S.C. Johnson Fund, and Wisconsin Department of Natural Resources

TYPES OF JOBS CREATED: Construction workers, park designers, heavy equipment operators, engineers, and general laborers

WEBSITE: <http://rootrivercouncil.org/>

RESULTS AND ACCOMPLISHMENTS: The health of the Root River has been improved by removing invasive species, installing rain gardens, and plantings that prevent erosion. Buckthorn and non-native honeysuckle used to line the riverbanks, doing very little to stop erosion. These species were removed and native plants were used to stabilize the riverbank. Holding ponds and basins have been installed beside the river to slow runoff and filter out sediment before the water makes its way into the main channel. Both of these changes have improved water quality. The rain gardens that are currently installed around the city also contribute to water quality by slowing the rate at which water enters the river and allowing plants to absorb some of the excess nutrients in the stormwater that would otherwise cause algal blooms in the water. In the future the community hopes to focus on repurposing old industrial buildings to keep up the momentum that is bringing the city of Racine back to its river.



Lake Superior Home to the First Tribal National Park

BAYFIELD, WISCONSIN



Frog Bay Tribal National Park features a quarter-mile of pristine Lake Superior shoreline. Photo courtesy of the Native American Tourism of Wisconsin.



A view as you enter the Frog Bay Tribal National Park. Photo from Flickr/Lake Superior Adventures.

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

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.



PROJECT NAME: Frog Bay Tribal National Park

DESCRIPTION: Frog Bay Tribal National Park opened in August 2012. Located

along Lake Superior near Bayfield, Wis., 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

APPROXIMATE COST: \$488,000, which came 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 FUNDING 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

WEBSITE: <http://www.brcland.org/frog-bay-tribal-national-park.html>

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.

A Brewery Complex Renewed with Blue Ribbon Practices

MILWAUKEE, WISCONSIN



The former Pabst Blue Ribbon Brewery is being turned into a sustainable neighborhood that follows best stormwater management practices and is now able to absorb 75 percent of the stormwater that falls on the site, in the process preventing 85 percent of the pollutants in the stormwater from reaching the city's drains.

PROJECT NAME: Sustainable Brewery Redevelopment

DESCRIPTION: The old, abandoned Pabst brewery complex is being given new life. The 25-acre site of the former brewery is being repurposed into a neighborhood with hotels, apartments, offices, and bars. The buildings that could not be repurposed were removed, but 95 percent of the materials were recycled or reused. The stormwater that falls on the complex is directed to filtration areas under the site where it drains more slowly so as not to overwhelm the sewer system. Other features include porous pavement, bioswales, and tree lawns

open enough to accommodate the full height of mature trees, thereby minimizing tree culling. Once buildings are purchased the owners must disconnect them from the city sewerage system and redirect the water flow from the rooftops into the retention areas on site.

APPROXIMATE COST: \$1,700,000 for the total project; to date \$1,000,000 has been spent

RESOURCE CHALLENGES ADDRESSED: Brownfield site with contaminated soil, low water absorption, high levels of runoff

KEY FUNDING PARTNERS (PUBLIC AND PRIVATE):

Milwaukee Metropolitan Sewerage District, City of Milwaukee Department of Public Works, Zilber Ltd., State of Wisconsin, and National Park Service Historic Building Tax Credit Program

TYPES OF JOBS CREATED: General laborers, construction workers, hydrologists, landscape architects, engineers, and architects

WEBSITE: <http://www.thebrewerymke.com/index.htm>

RESULTS AND ACCOMPLISHMENTS: The instillation of swales, rain gardens, and large underground water holding tanks that drain slowly has decreased the rate rainwater enters the Milwaukee stormwater system. The Brewery site now absorbs 75 percent of the annual rainfall and through these features it is able to remove 85 percent of the pollutants in the water. The goal is to create a sustainable neighborhood with housing, commercial space, and mixed-use buildings.



In the renovated neighborhood, bioswales filter water into a 250,000 gallon reservoir below ground, delaying flood water from entering the town's stormwater system. The native plants are also both drought and salt tolerant—important in a cold climate where salt builds up in the streets over the winter. Photo courtesy of Zilber Ltd.



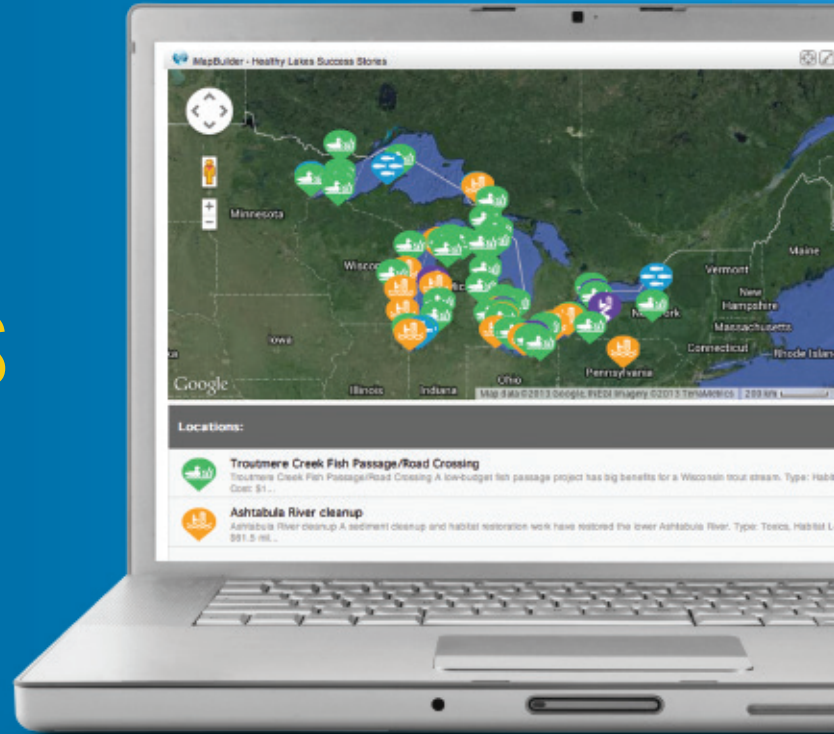
The Blue Ribbon Lofts, an apartment complex, which is part of the sustainable redevelopment projects that are helping to reducing runoff. Photo courtesy of Zilber Ltd.

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The Healing Our Waters—Great Lakes Coalition has documented 100 restoration success stories—tales of reclaimed rivers and restored harbors, clean beaches and rejuvenated waterfronts.

Those stories are on a new interactive map at: WWW.HEALTHYLAKES.ORG/MAP

You can also let us know about success stories near you. Contact Jordan Lubetkin at lubetkin@nwf.org or 734-887-7109.



Muskego Lakes Wildlife Area. Photo courtesy of the Conservation Fund.



Lake Sturgeon Imprinting Project. Photo courtesy of the Wisconsin Department of Natural Resources.



(Above and Below) Migratory Flyway on Lake Michigan. Photo Courtesy of the Ozaukee Washington Land Trust.