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Pool 8



from **Engineering With Nature: An Atlas, Volume 2.**

by US Army Engineer Research and Development Center



Brownsville, Minnesota, United States

An interagency effort combining hydraulic, geotechnical, and biotechnical expertise. Pool 8 is part of the Upper Mississippi River System, a nationally significant ecosystem and a crucial part of the Mississippi River's commercial navigation network. Conditions across the 15,400-hectare pool deteriorated in the decades following completion of Lock and Dam 8 around 1939. This created an environment for amplified wave action, inundation of the floodplain, altered hydraulics, and intensified ice action that degraded aquatic and terrestrial habitat across the pool. To combat these effects, the U.S. Army Corps of Engineers (USACE)–St. Paul District used dredged sediment to reconstruct a series of islands in Pool 8. Construction first began in 1989 as part of the Upper Mississippi River Restoration Program; and over the course of three phases, the district and its project partners restored more than 182 hectares of habitat. The team designed the new islands to reduce the factors that had previously caused the erosion, resulting in improved water clarity and increased growth of aquatic vegetation. The new islands benefit fish, waterfowl, and other wildlife and create a beautiful new location for ecofriendly recreation.

Article cover: A 2010 aerial image shows the series of islands reconstructed from dredged sediments. (Photo by Wisconsin Department of Natural Resources)

Producing Efficiencies

The project team modeled the islands after historic conditions. A two-dimensional hydraulic model of measured flow rates and water-surface elevations along with historic information on island configuration helped to maximize habitat in the Lower Pool 8 design. To divert the flow of wind and water, the team built the islands with a sand base, rock features to provide erosion resistance, and fine sediment to act as topsoil. Sand berms provide substrate for willow trees, rock groins stabilize the sand berms, and other vegetation provides further island stabilization. The team used these techniques to stabilize nearly 16 kilometers of shoreline.



A well-established seed island has formed due to sediment accumulation in the deposition zone behind a wildlife loafing structure, or large woody debris, in 2010.

(Photo by USACE St. Paul District, Eastern Area Office)

Using Natural Processes

The new islands restored the river to a more natural hydrologic regime, creating physical conditions that sustain aquatic ecosystems and benefit fish, mussels, and other aquatic and wetland taxa. Dredging in backwater areas provided fine sediments for topsoil and also created deep waters for overwintering fish. Berms captured this hydraulically dredged sediment without violating water quality standards, and these containment areas were transformed into wetlands. The use of grasses, shrubs, trees, and legumes stabilized the islands, and the creation of seed islands allows growth through natural deposition processes. The combination of these processes provided valuable habitat for migratory birds and other terrestrial species.



A rock vane and loafing structure integrated into a newly constructed island in 2011.

(Photo by USACE St. Paul District, Eastern Area Office)

Broadening Benefits

The Upper Mississippi River Restoration Program agency partners conducted surveys to quantify the benefits of the project, demonstrating the improved environment and more sustainable ecosystem that resulted. New fish populations are developing in the project areas, which support recreational opportunities such as local fishing tournaments. Dabbling and diving ducks, such as the canvasback (*Aythya valisineria*), among other migratory waterfowl, have benefited from the new growth of rooted floating and submerged aquatic vegetation as a food source. Also, beneficial use of dredged sediment helped manage material and ease overcapacity at existing placement areas.



Pelicans seeking refuge provided by a seed island.
(Photo by USACE St. Paul District, Eastern Area Office)



A rock and log sill installed in the river to increase the flow in the area during flood events.
(Photo by USACE St. Paul District, Eastern Area Office)

Promoting Collaboration

The Upper Mississippi River Restoration Program is a unique, long-term partnership that has fostered collaboration among five states and seven Federal agencies since 1986, and the Pool 8 islands project is one of over 70 ecosystem restoration projects built under this collaboration during that time. The St. Paul District worked with a number of partners to complete this major restoration, including the U.S. Fish and Wildlife Service, the Wisconsin Department of Natural Resources, the Minnesota Department of Natural Resources, the U.S. Geological Survey, and the public.



A rock sill redirects water during high-flow events.
(Photo by USACE St. Paul District, Eastern Area Office)



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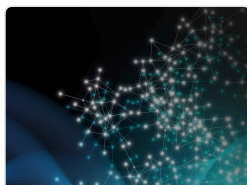
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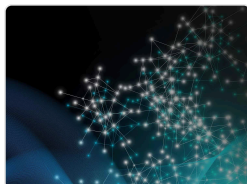
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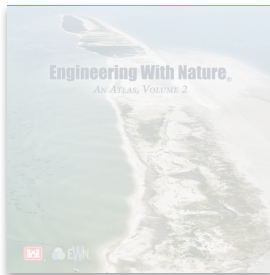
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