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Duluth 21st Avenue West Demonstration Project



from **Engineering With Nature: An Atlas, Volume 1.**

by **US Army Engineer Research and Development Center**



Superior Harbor, Duluth, Minnesota, United States

The U.S. Army Corps of Engineers (USACE) Detroit District (LRE) initiated a three-year pilot project in 2013 to use federal navigation channel dredged sediment to contribute to the restoration of shoreline habitat. The restoration area is located in the 21st Avenue West Channel Embayment of the Duluth-Superior Harbor, at the border of the states of Minnesota and Wisconsin. Strategically placing dredged sediment in three different locations in the 21st Avenue West Channel Embayment over a three-year period supports the restoration of shallow-bay aquatic habitat, aiding in the delisting of the St. Louis River Estuary as an Area of Concern (AOC). The St. Louis River Estuary was so designated under the 1987 Great Lakes Water Quality Agreement. Various parties (USACE, the U.S. Environmental Protection Agency (USEPA), and the states of Wisconsin and Minnesota) are remediating and restoring the estuary, thereby eliminating beneficial use impairments (BUIs)—a change in chemical, physical, or biological integrity that would impair a Great Lakes system—so the estuary can be removed from the list, or delisted. BUIs in the SLRE include degradation of benthos and loss of fish and wildlife habitat.

Producing Efficiencies

The objective of this effort was to identify and develop low-cost, shallow-water dredged material placement methods, utilizing both engineered and natural processes that maximize the habitat value of the dredged material used for AOC habitat restoration projects. Finding cost-effective approaches for material handling that achieve the desired habitat is critical for development of future shoreline habitat restoration projects in the Great Lakes.

Cost-effective engineering methods for shallow-water placement of dredged material that maximize habitat value were identified for future habitat restoration projects. A shallow-water placement/estuary hydraulic model was developed and validated during this project. The model can be adapted and applied to other habitat restoration projects in the St. Louis River Estuary AOC and to other habitat restoration projects in the Great Lakes.

Using Natural Processes

A pilot-scale demonstration project was constructed at the study site over a three-year period starting in 2013, to evaluate alternative engineering approaches for achieving a variety of habitats that promote colonization by desired submerged and emergent aquatic plants, macroinvertebrates, and fish species. Current circulation patterns at the study site were analyzed to determine optimal placement of sediment for natural sediment transport processes to develop and promote creation of a diverse shoreline habitat.





Article cover and above: Installed turbidity curtain across 21st West Avenue embayment during the pilot project dredging event in 2013. The sediment being dredged is mechanically offloaded through a transfer box before being hydraulically placed inside the silt curtain (yellow line) to create shallow water habitat. Surface turbidity is visually apparent both inside (right) and outside the silt curtain due to dredging activities and other sources of turbidity in the harbor.

(Photos by USACE)

Broadening Benefits

The strategic placement of dredged sediment is producing greater environmental benefits for invertebrate, fish, and submerged aquatic vegetation communities compared to previous practices. This project is applying innovative engineering approaches for constructing shallow water habitat designed to restore submerged and emergent aquatic vegetation that improves fish and wildlife habitat. These benefits will likely lead to increased recreational fishing opportunities and direct support of local economies.



The USACE Manitowoc Crane and Tug John R. Asher were used to create shallow water habitat.

(Photo by USACE)

Promoting Collaboration

The USACE LRE and U.S. Army Engineer Research and Development Center Environmental Laboratory successfully completed the project in cooperation with other federal, state, and local stakeholders. The project was conducted in cooperation with the USEPA, U.S. Fish and Wildlife Service, the states of Minnesota and Wisconsin, the city of Duluth, and Duluth Seaway Port Authority.



The James R. Barker arriving in Duluth, MN.

(Photo by USACE Detroit District)



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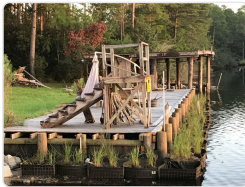
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3min pages 244-247



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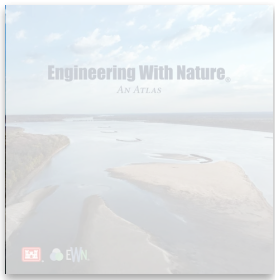


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