Nature-Based Shorelines
On Wisconsin's Great Lakes Coasts

[Adam Bechle/Wisconsin Sea Grant]

[WCMP/WI Civil Air Patrol]

[Marek Landscaping]

Adam Bechle

Coastal Engineering Outreach Specialist

Wisconsin Sea Grant

Wisconsin Coastal Management Program

SEWRPC Serving the counties of Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha

National Oceanic and Atmospheric Administration · NOAA · U.S. Department of Commerce

College of Engineering, University of Wisconsin–Madison

Sea Grant, University of Wisconsin

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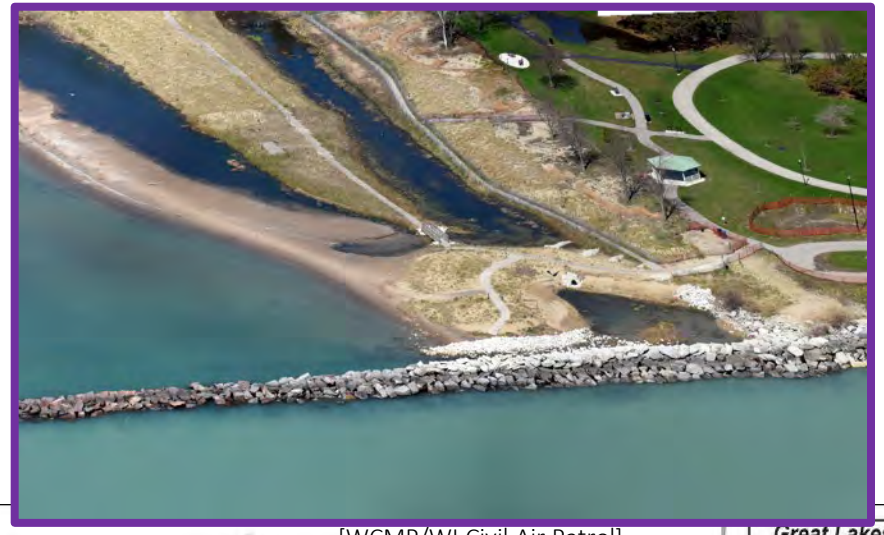

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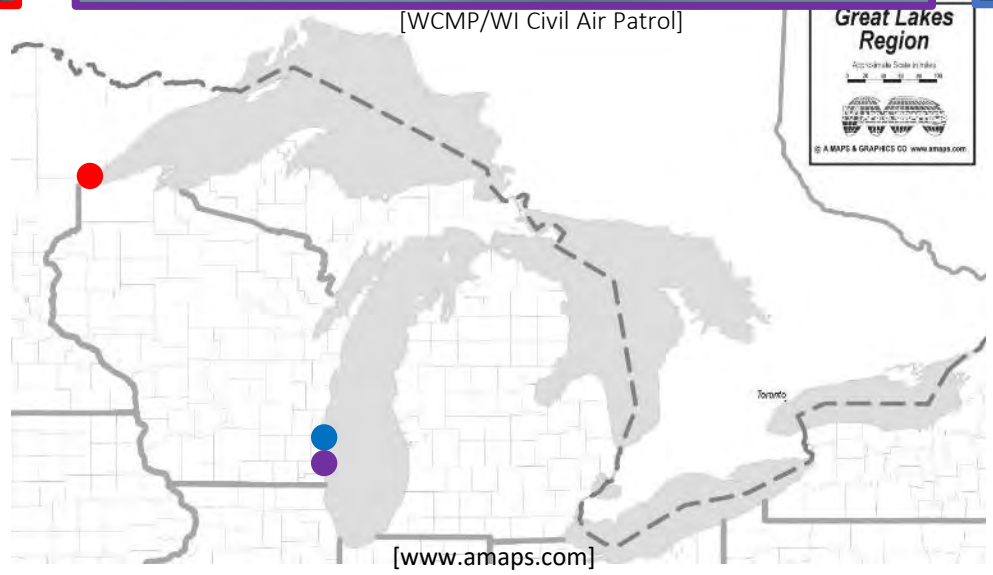
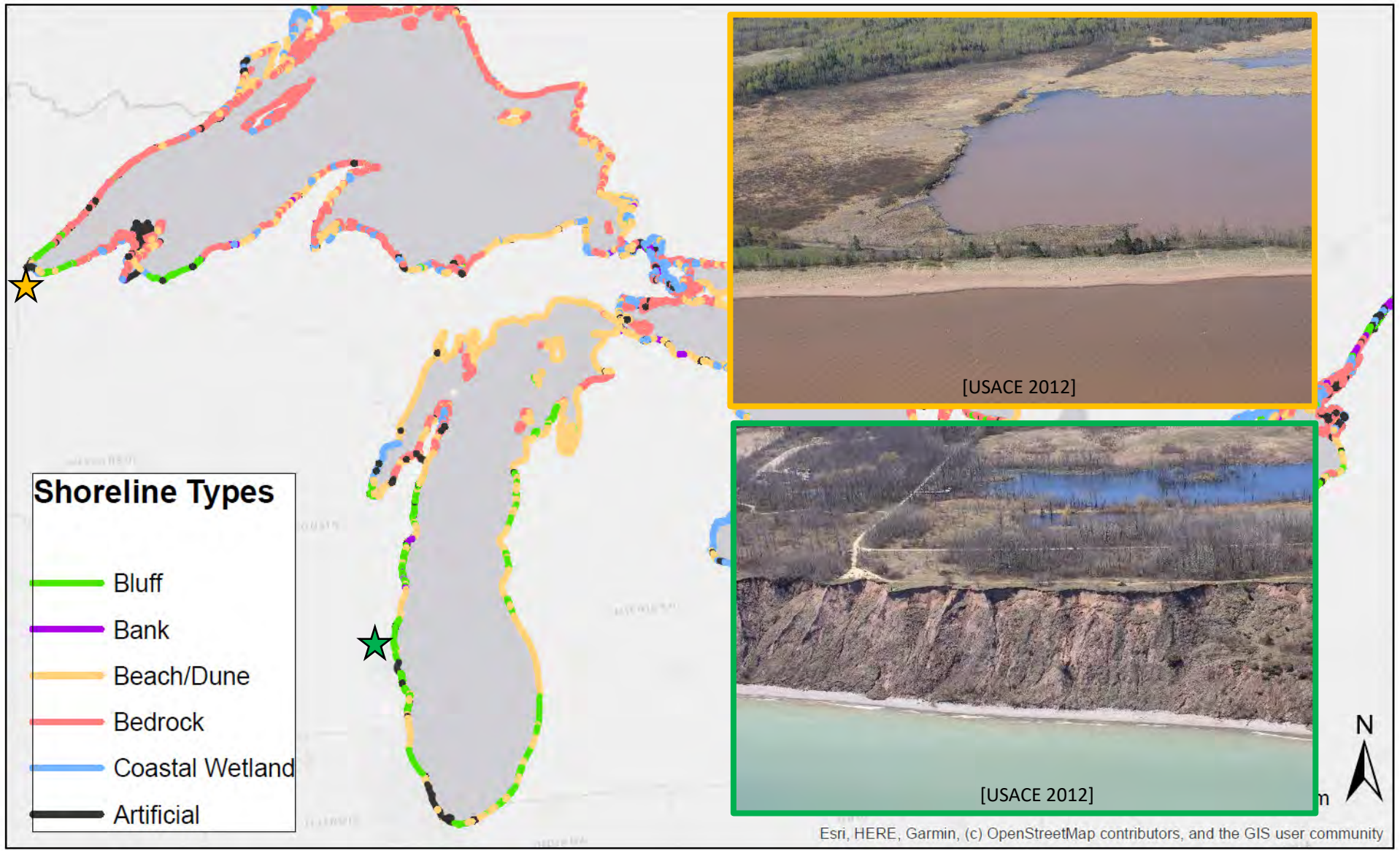


[www.amaps.com]

Wisconsin's Geologic Setting



[Adapted from NOAA GLERL Shoreline Classifications, Lee et al., 1998]

Increasing Shoreline Armoring

WISCONSIN PUBLIC RADIO
Wisconsin and the World. npr

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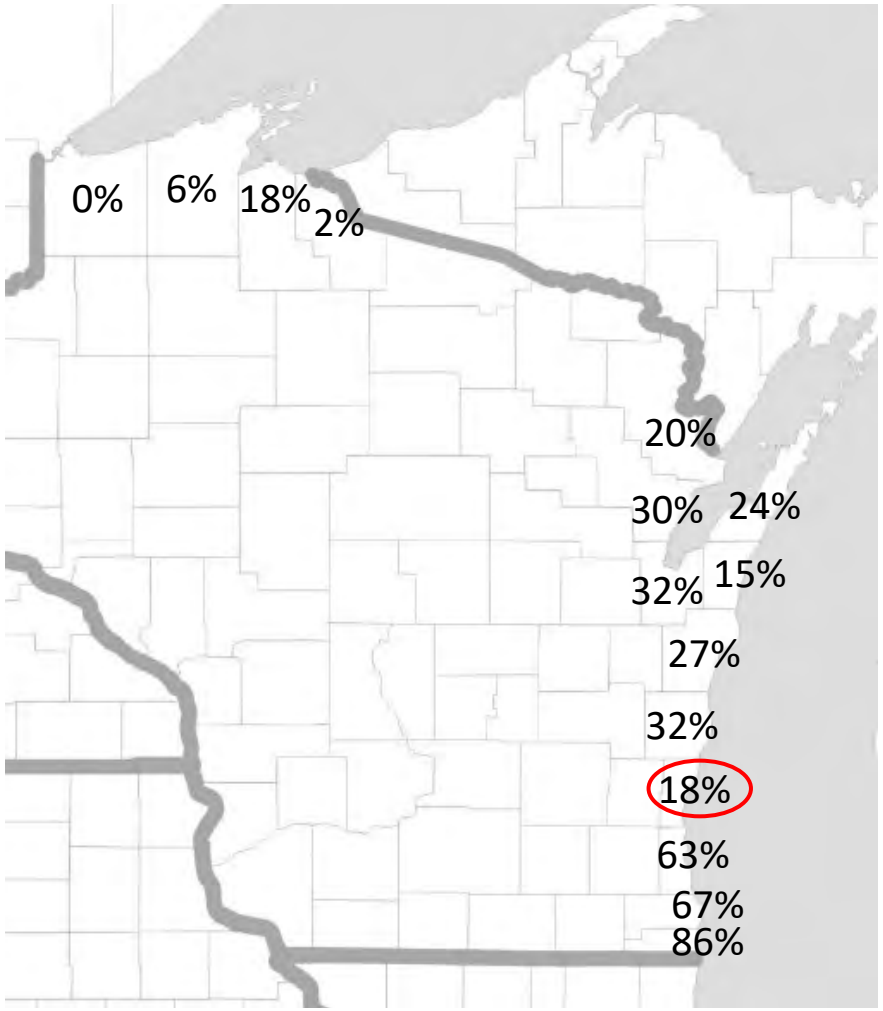
In 2007, the Concordia University Wisconsin, in Mequon, Wis., finished fortifying a 130-foot bluff and building a 2,700-foot-long rock wall to buffer waves. The $12 million project was among the largest built along Lake Michigan in Wisconsin. Neighboring landowners soon noticed changes to their property. The project has accelerated erosion on downstream properties from around 9 inches to more than 7 feet per year. *Coburn Dukehart / Wisconsin Watch*

15 years later, Wisconsin university's massive Lake Michigan seawall frustrates downstream neighbors

[https://www.wpr.org/15-years-later-wisconsin-universitys-massive-lake-michigan-seawall-frustrates-downstream-neighbors]

2007/2008



[www.amaps.com]

sis by Mickelson and Stone [2012]

Coastal Resilience Needs in Wisconsin

Listened to concerns and hopes of the public and local officials

[Gregory Shaver/Racine Journal Times]

[Deidre Peroff/Wisconsin Sea Grant]

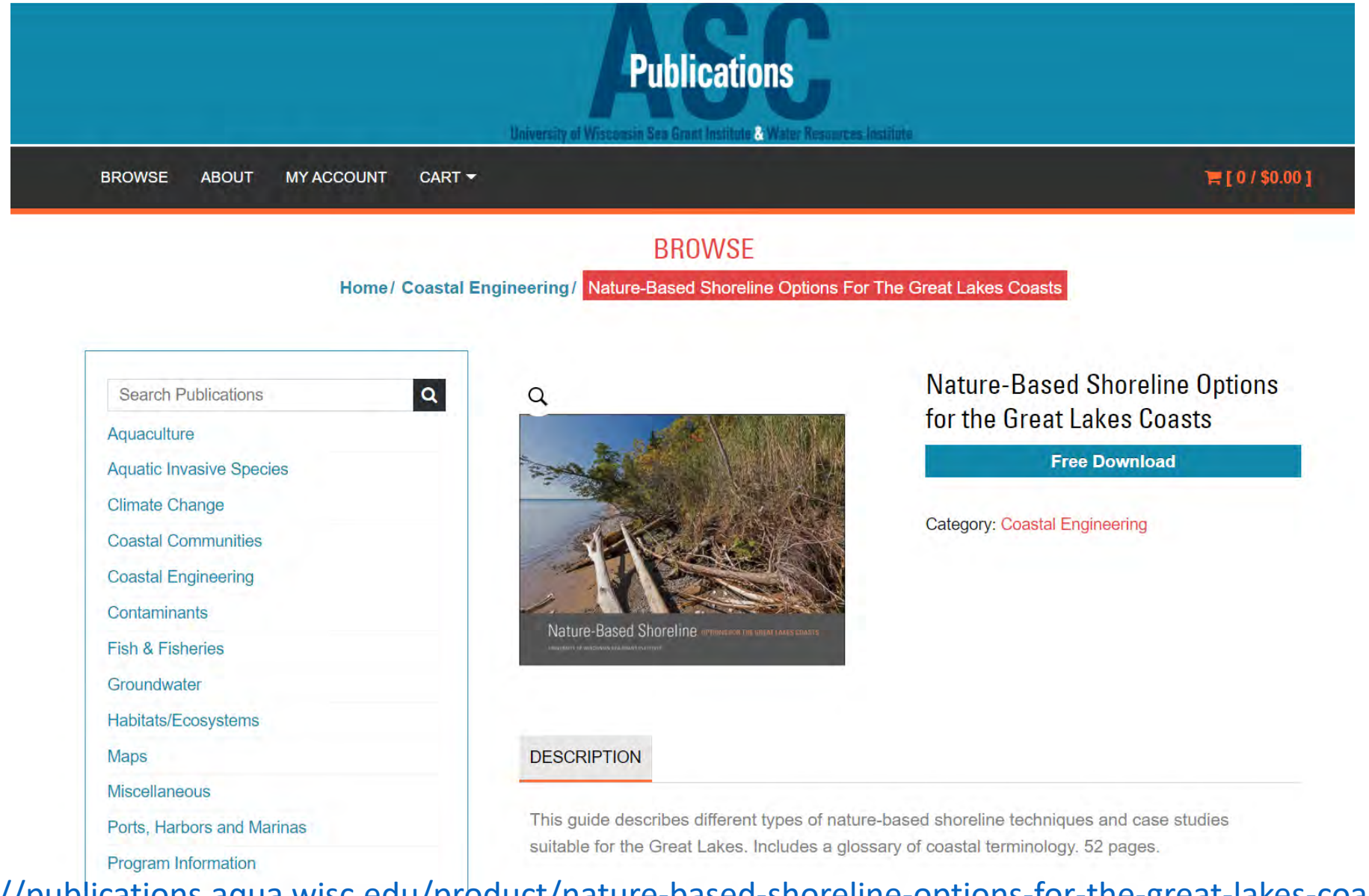
[Deidre Peroff/Wisconsin Sea Grant]

Interest in “greener” options but need more information

- Options suitable to their site
- Potential adverse impacts
- Habitat as a co-benefit
- Applicable examples

Nature-Based Shorelines use or mimic natural features to stabilize the coast

Great Lakes Nature-Based Shorelines



https://publications.aqua.wisc.edu/product/nature-based-shoreline-options-for-the-great-lakes-coasts/

NBS Techniques Summary

Vegetation

Native vegetation planted on the shore to reinforce sediments with its roots, dissipate wave energy and slow erosive runoff and wind.

Nourishment

The placement of clean sediment, often sand, on beaches, dunes or in nearshore waters to replace lost sand or build dunes.

Slope Stabilization

Regrading or reinforcing an eroding or failing bluff, bank or dune to a stable slope to allow vegetation to establish.

Edging

The placement of coir logs, wood or stones at the toe, or base, of the shoreline to prevent erosion and allow vegetation to establish.

Sill

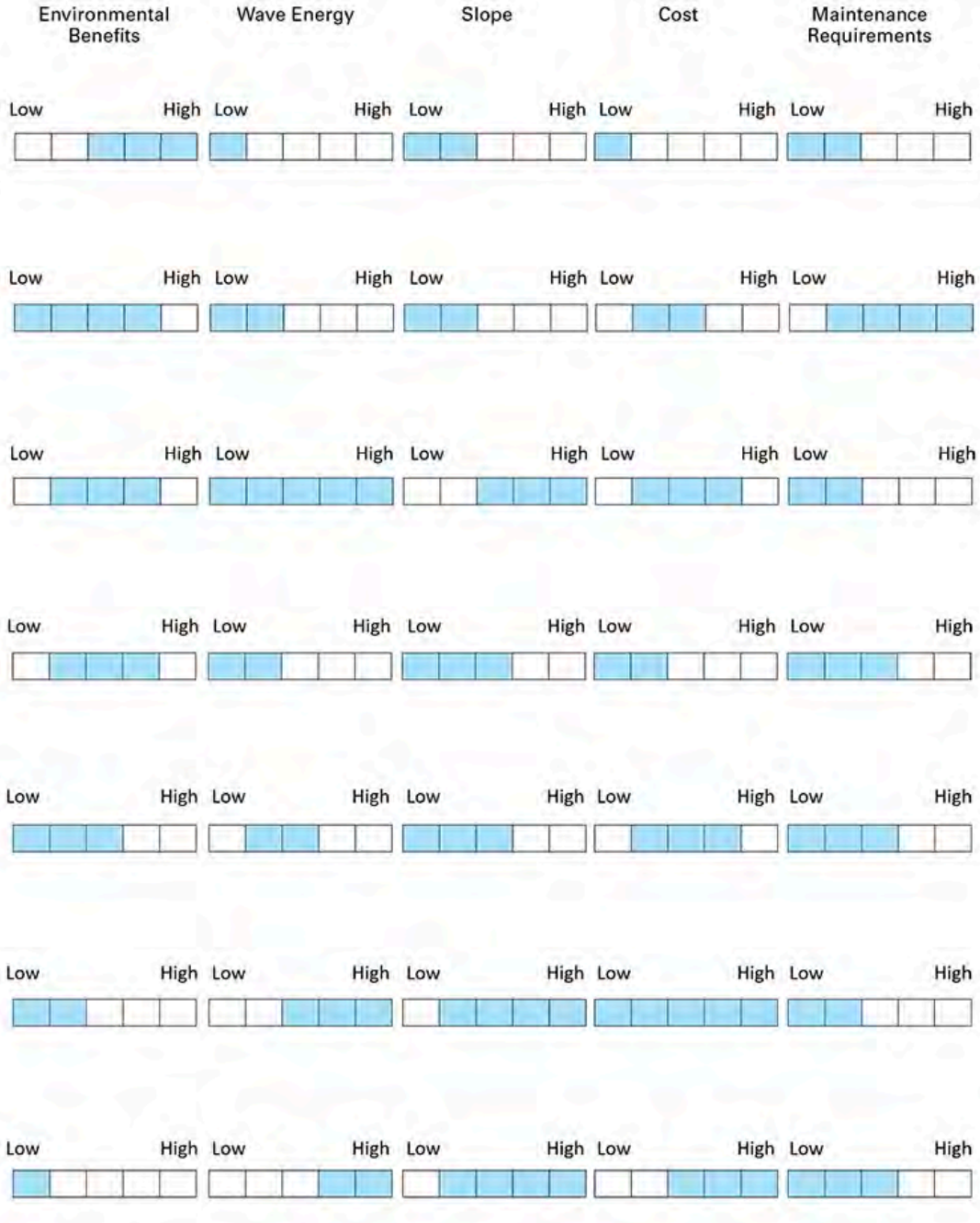
A low-profile structure located in the water just off the shoreline to dissipate wave energy and create an area of protected natural marsh.

Ecologically Enhanced Hard Armoring

Vegetation, textured surfaces or other features added to conventional hard armoring structures to provide habitat and other benefits.

Hard Armoring

Rock, concrete or steel structures placed along the shoreline to slow erosion such as revetments, seawalls, groins and breakwaters.



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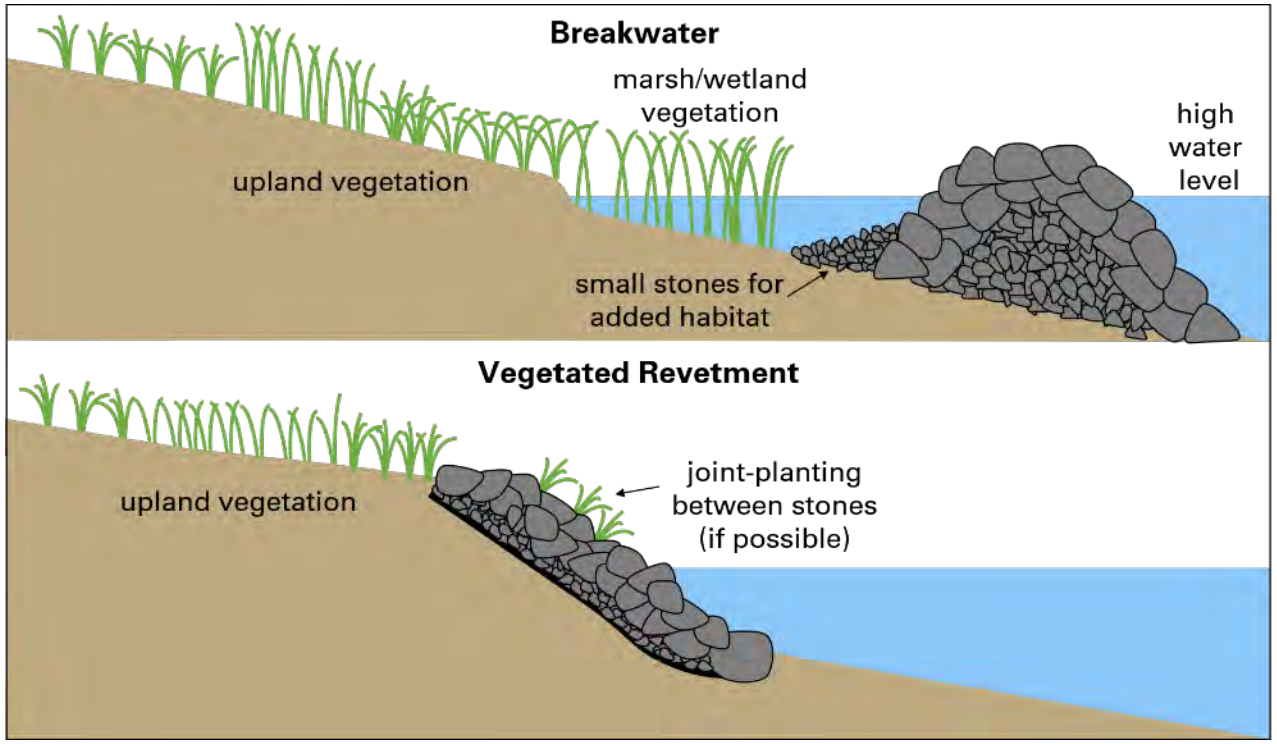

Case Study

Samuel Myers Park

Racine, Wisconsin

Capt. Dennis Carr

Sam Myers Storymap

6 West Sand Dune

With the assistance of the Great Lakes Community Conservation Corps, approximately 20,000 dune grass plants were planted on the west dune. It took about three years for these grasses to fully establish.

Maintenance for the sand dune includes invasive species management such as Blue Dune Lyme Grass, Spotted Knapweed, Black Locust, and other common weeds.

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https://storymaps.arcgis.com/stories/5ed4e3f8e204401e9f522fbe2b8ea7c7

Sam Myers Storymap

8 West Wetland

The majority of stormwater runoff that is not captured by other infrastructure on site drains to this location. This constructed wetland can hold 200,000 gallons of water during a storm event. The wetland mimics a naturally occurring interdunal wetland and is groundwater fed.

Over 90 species of plants can be found in the constructed wetlands and they bloom throughout the year. More than 236 species of birds have been observed at Sam Myers in addition to painted turtles, Blanding's turtles

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Sam Myers Storymap

9 Dry Prairie

This area of the Park is planted with dry environment, prairie species. The dry prairie helps to infiltrate stormwater.

The area was first planted by volunteers and the Great Lakes Community Conservation Corps in 2015. It takes approximately 3 years for the plants to establish. Since the initial planting, vegetation has naturally recruited in this zone.

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Dredged spoils from the yacht club were

https://storymaps.arcgis.com/stories/5ed4e3f8e204401e9f522fbe2b8ea7c7

Sam Myers Storymap

4 Storm Damage

A storm event in January of 2020 caused damage to the Park. A combination of strong, easterly winds, storm surges, near-record high water levels, and low ice coverage caused 15-foot waves to overtop the breakwater and flood the parking lot and embayed area of the Park.

The storm displaced stones up to four tons in size from the breakwater, filled in the eastern wetland with sediment and covered the footbridge, eroded a large dune on the eastern side of the Park, and

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Issue with FEMA Disaster Declaration – Is natural infrastructure “infrastructure”?

Wisconsin Point

[www.amaps.com]

[Adam Bechle/Wisconsin Sea Grant]

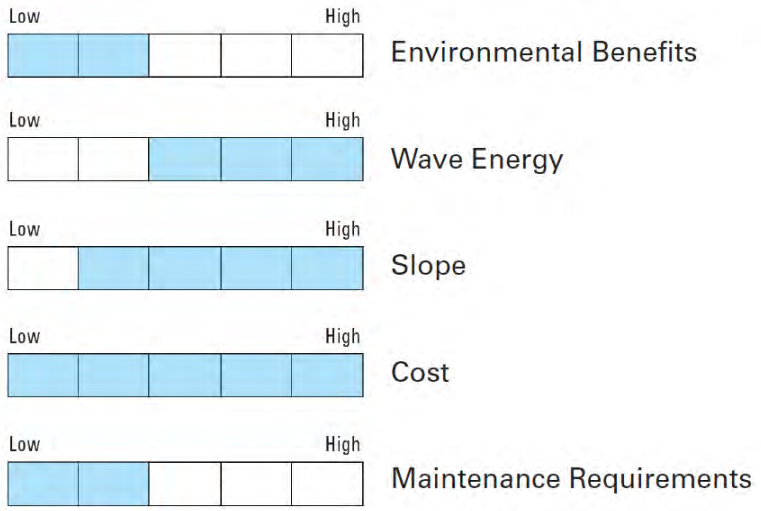
Image © 2022 TerraMetrics
Image NOAA

Google Earth

Imagery Date: 5/27/2021 46°42'05.23" N 91°59'04.83" W elev 0 ft eye alt 26108 ft

Nature-Based Shorelines Outreach Challenges

- Suitability of Options
  - Specific wave environment, costs, etc.
- Habitat Benefits
  - What makes good nearshore habitat?
- Permitting
  - Weighing lakebed encroachment vs. habitat benefits
- Risk tolerance
  - Acceptable level of erosion
- Water Safety Concerns



[Integrated Forecast-Nowcast Operation System- Milwaukee]