

## How Wisconsin Sea Grant Benefits From the NOAA Digital Coast

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May 31, 2018

The NOAA Digital Coast (<https://coast.noaa.gov/digitalcoast/>) is a collection of data and tools with associated training and case studies designed to apply technology to guide decision-making about the coastal issues facing the nation. Wisconsin Sea Grant utilizes the Digital Coast to support its mission of providing research, outreach and education for the sustainable use of Great Lakes resources. In particular, the Digital Coast is useful for the Sea Grant focus areas of building more resilient coastal communities and promoting healthy coastal ecosystems.

As of May 2018, there are over 2,100 data sets accessible through the Digital Coast. The most valuable data for our work on the Great Lakes includes land cover mapping for six time periods from 1985 to 2016 and elevation data for the land and water along the coastline. The land cover data has allowed us to assess growth and change for all of Wisconsin's coastal communities, while the elevation data has been critical for several projects ranging from mapping *Cladophora*, a nuisance algae that washes up on the shores of Lake Michigan, to valuing and visualizing harbor infrastructure vulnerable to water levels that could exceed the typical range found on the lakes.

There are 68 tools presently in the Digital Coast. Of those, five are specific to the Great Lakes, while another 44 can be applied to coastal issues in the Great Lakes region. Some of the Great Lakes-specific tools are described below. Of the more general tools, we find both the Land Cover Atlas and CanVis very useful. The atlas provides detailed summaries of land cover change at the county level, while CanVis is a photo simulation tool. Photo simulations of historic and future water levels have been used to promote design of coastal infrastructure that is more resilient to coastal storms.

Three staff from Wisconsin Sea Grant serve on the state Coastal Hazards Work Group led by the Wisconsin Coastal Management Program. The work group was formed in the mid-1990s to address coastal erosion and flooding hazards driven by high water levels on Lakes Michigan and Superior. This is accomplished through applying technical tools, providing education and outreach, and cooperating with coastal communities and other agencies. The Digital Coast is invaluable as a source of data and tools to support this mission.

In 2014, Wisconsin Sea Grant and the NOAA Office for Coastal Management collaborated on an important project related to the Digital Coast. This involved research by Prof. Robert Roth of the Geography Department at the University of Wisconsin-Madison to provide advice to NOAA on development of the Lake Level Viewer (<https://coast.noaa.gov/llv/>) – a map-based tool for visualizing the flooding and exposed land caused by variable water levels on the Great Lakes.

The Lake Level Viewer was adapted from the successful Sea Level Rise Viewer application in the Digital Coast (<https://coast.noaa.gov/slr/>). Our collaboration had the “win-win” of promoting research to improve the effectiveness of map-based visualization tools, while also helping NOAA build a more effective Lake Level Viewer as a result of input from those who would use the tool.

The NOAA Digital Coast Partnership (<https://coast.noaa.gov/digitalcoast/about/>) is made up of several organizations that serve as constituents for the data and tools in the Digital Coast. Examples include the Association of State Floodplain Managers (based in Madison, Wis.), The Nature Conservancy and the American Planning Association. Wisconsin Sea Grant worked closely with the partnership on the Great Lakes Coastal Resilience Planning Guide (<http://greatlakesresilience.org>). The guide helps local officials in Great Lakes communities address existing hazard-related threats, as well as the effects of climate change. Our outreach tells us that communities benefit from case studies on innovative practices in coastal management. Wisconsin Sea Grant staff recently co-authored a case study on economic valuation of port infrastructure in Toledo, Ohio. Other case studies in the Planning Guide relevant to Wisconsin include visualizing coastal flooding and lake level changes in Green Bay, communicating long-term bluff erosion to prevent unsustainable development in Ozaukee County, prioritizing locations for potential wetland restoration in Sheboygan County, and enabling coastal communities such as Port Washington to prevent drowning deaths.

Wisconsin Sea Grant has invested in development of a Wisconsin Coastal Atlas (<http://wicoastalatlans.net>) – an innovative Web resource that helps people better understand coastal issues, share coastal data and inform decision-making about sustainable use of the Great Lakes. Much like the Digital Coast, the atlas serves as a gateway to decision-support tools relevant to Great Lakes management and provides access to educational resources about coastal issues in Wisconsin. Staff from both Wisconsin Sea Grant and the NOAA Office for Coastal Management participate in the International Coastal Atlas Network, which seeks to share knowledge and experience among atlas developers and connect atlases to address coastal issues that span political boundaries.

Wisconsin Sea Grant hopes to see continued growth and development of the NOAA Digital Coast and will continue to utilize its geospatial data and decision-support tools. We hope that continued support for the Digital Coast will help fill gaps we experience in Wisconsin in coastal topographic and bathymetric elevation data, especially for critical coastal resources such as Green Bay, Chequamegon Bay and the St. Louis River Estuary.