



# Climate vulnerability assessment: Great Lakes shorelines

**Introduction:** Climate change may bring higher temperatures, variable precipitation, and more frequent intense storms. This document provides a broad summary of potential impacts of climate change, and may provide a foundation for conservation planning in the face of an uncertain future.

## Erosion, ice cover and hydrology

Increased erosion may be the biggest risk to shoreline communities. Extreme storms and associated wave action are expected to increase. Storms in winter could be particularly problematic if less ice cover buffers the shoreline. High winds may also exacerbate dune blowouts and sand loss in general. In addition, wetlands associated with Great Lakes Ridge and Swale complexes are anticipated to be highly vulnerable to small changes in hydrology.

in both abundance and toxicity under higher CO<sub>2</sub> levels; it can also outcompete more conservative native plants. Finally, complex feedback mechanisms between invasive zebra and quagga mussels and phosphorus increase the growth of Cladophora algae, which fouls beaches and has been linked to botulism outbreaks that affect shorebirds. Warmer water, longer growing seasons, and an increase in phosphorus-laden storm run-off could exacerbate this issue.



Jeff Kiessel

More frequent intense storms could increase erosion along Great Lakes shorelines



DNR File

Phragmites is problematic along Great Lakes shorelines.

## Invasive and aggressive species

Non-native invasives like Phragmites and Lyme grass can quickly take over following disturbance. Sedimentation and excess nutrients from extreme storms favor non-native invasive and weedy species, which may be particularly problematic in wetlands near river mouths. Poison ivy, while native, is a nuisance to many people and is expected to increase

## Vulnerable species

Many of the specialized plants that dominate Great Lakes shorelines, such as marram grass, are also found along the eastern seaboard and may be less vulnerable to changes in temperature than to changes in water levels and erosion. However, some species, like northern white-cedar, an important component of Great Lakes Ridge and Swales, require cool, moist conditions and are expected to experience long-term declines in suitable habitat.

# Natural community vulnerability assessments

In 2014, the Wisconsin DNR conducted eight vulnerability assessment workshops across Wisconsin to evaluate the impacts and adaptive capacity of over 50 natural communities to climate change. At two workshops, a panel of experts reviewed the vulnerability of Wisconsin's Great Lakes shorelines, the results of which are summarized in the table below.

## Adaptive capacity

Many species of shorelines are already adapted to periodic disturbance and droughty conditions, occur across a relatively wide geographic range, and have good dispersal abilities. Proximity to the Great Lakes will also provide a buffer to high temperatures.

## Managing for uncertainty

Changes to Great Lakes water levels driven by climate will have a major impact on all shoreline communities. Projections on future water levels are still uncertain, however, and average water levels may be slightly higher or somewhat lower compared to contemporary levels.

Year to year variability and cyclical fluctuations will likely still occur, and management that plans for variability will help maintain healthy shoreline communities. Actions such as the following are “win-win,” in that they represent sound practices regardless of potential climate change impacts. These and other similar actions can be found in Wisconsin's Wildlife Action Plan on the Wisconsin DNR website.

Vulnerability to Climate Change	
Bedrock Shore	Moderately High
Great Lakes Alkaline Rockshore	Moderately High
Great Lakes Barrens	Moderate to Moderately High
Great Lakes Dunes	Moderate to Moderately High
Great Lakes Ridge & Swale Complex	High
Interdunal Wetland	Moderate to Moderately High

## Win-Win actions:

- **Approach non-native invasives strategically:** Develop a plan by making maps and setting feasible objectives, prevent invasions by following BMPs, control new invasions as early as possible, slow their spread when control isn't feasible, and conduct regular monitoring.
- **Revegetate** disturbed or eroded areas by installing boardwalks, manually reseeding or replanting, or allowing sensitive areas to naturally recover.
- **Implement** practices to reduce shoreland and bluff erosion on Great Lake shorelines, maintain natural long-shore sand movement, and minimize new artificial shoreline structures like permanent piers, breakwalls, seawalls, rip-rap, jetties, etc.



For more information visit [dnr.wi.gov](http://dnr.wi.gov) and search keyword “natural communities”

