Great Lakes Legislative Updates 3

a fact sheet series from the Michigan Sea Grant College Program

Great Lakes Coastal Wetlands

Great Lakes coastal wetlands are an endangered species, victims of the past century's drainage projects for development and agriculture. Less than half the extensive wetlands once edging Great Lakes shores remain today.

The human economy has been both helped and hurt by this transformation of wetlands to dry lands. Space for farms, homes, highways, businesses, and factories has been created, but many of the benefits wetlands provide—flood control, pollution control, and erosion control—have been destroyed.

Coastal wetlands are the foundation of the Great Lakes food web, providing habitats where myriad species breed, grow, feed, and rest. As wetlands have disappeared, wild creatures ranging from regal tundra swans to tiny zooplankton have suffered.

National Picture

Nationally, the 48 contiguous states have lost 50 percent of their original wetlands, both coastal and inland, to development and agriculture. Although state and federal legislation regulates wetland drainage, the loss continues at the rate of 800 acres each day. This rate equals 300,000 acres per year, or 470 square miles. Many groups try to slow this loss, often through buying up wetlands for waterfowl habitat. They also seek to strengthen wetland legislation, sometimes in conflict with economic interests seeking to weaken wetland protection laws.

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. . . remain today.

Great Lakes

The hand of humanity has dramatically altered the Great Lakes coastal ecosystem, and no coastal landscape has been more affected than wetlands. Tens of thousands of acres have been destroyed to make room for waterfront businesses and homes. Only 48,000 acres remain. These remnant wetlands provide crucial wildlife habitat and other benefits.

Wetland Benefits

The short-term economic benefits of draining wetlands are clear and quantifiable. The long-term drawbacks are less obvious, but are becoming more evident as problems proliferate. When wetlands are drained, the following wetlands benefits are lost.

Pollution Control. Wetlands are nature's no-cost pollution control facilities. Abundant wetland microorganisms and vegetation convert some chemicals into harmless substances and absorb others. Thus, streams and runoff carrying pesticides, herbicides, or industrial pollution leave the wetland in a purer state than when entering.

Flood Control. Wetlands are also nature's flood control structures, catching and storing runoff, then releasing it slowly. The Midwest floods of 1993 were much worse because of wetland loss. Iowa, for example, had lost 90 percent of its wetlands prior to the '93 floods. With so few wetlands remaining, the torrent coursed unchecked to fill and overflow the rivers.

Erosion Control. Great Lakes coastal wetlands protect property in low-lying coastal regions against erosion, especially during high lake levels or stormy weather, by buffering

developed land and structures from the pounding waves.

Global Warming Control. Coastal wetlands are among the most productive ecosystems on the continent, rivaling tropical rain forests in their density of plant and animal populations. All this organic material in wetlands stores carbon dioxide, a potential cause of global warming.

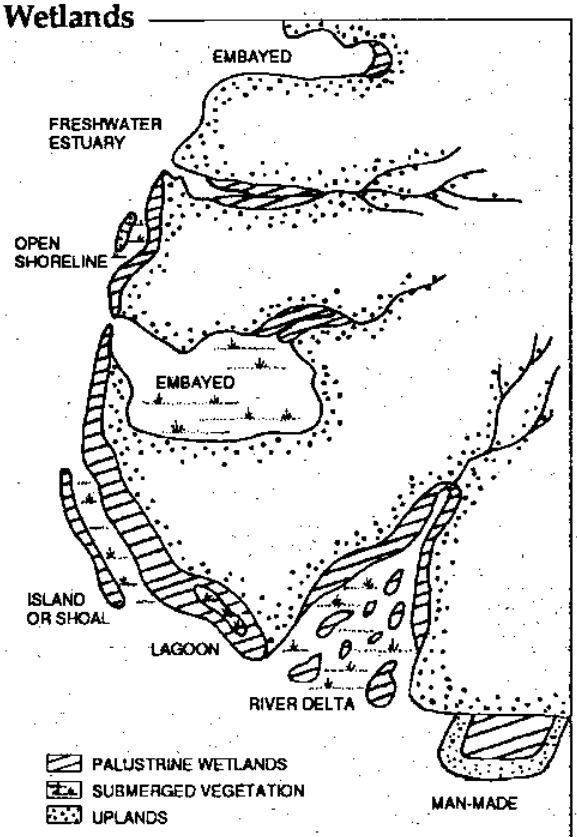
Wildlife Habitat. Half of the threatened and endangered plant and animal species in the Great Lakes region depend on wetlands at some point in their life cycle. Wetlands sustain many other animals as well and nurture the human spirit by providing wild places for hunting, fishing, nature study, and other outdoor recreation.

Complex Ecosystems

Great Lakes coastal wetlands are highly complex ecosystems. The interactions among their components—water, soils, topography, plants, and animals—are more extensive and intertwined than the human mind can grasp. Also, coastal wetland water levels fluctuate constantly, rising and falling in predictable annual cycles, and unpredictably in irregular multi-year, weekly, and daily cycles. Thus, Great Lakes coastal wetlands are ecosystems of marvelous intricacy.

Great Lakes Coastal Wetlands

Embayed wetlands and river delta wetlands have the most diverse habitats, including swamp forests, wet meadows, and cattail marshes. These are called *palustrine* habitats. Embayments and deltas also contain open water with submerged vegetation. Freshwater estuaries, which stretch upstream as far as lake level changes reach, are also quite diverse. Lagoons are very quiet areas protected from lake waves, while shoal wetlands are quite exposed to wind and waves and have mostly submerged vegetation. Lagoons, shoals, and man-made diked wetlands have the least diverse habitats.



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Lake Level Changes Make Coastal Wetlands Unique

Great Lakes wetlands are storm-driven ecosystems. Storm waves, wind set-up (steady wind pushing lake water toward the lee shore), and seiches (slow back-and-forth sloshing of the lake after the wind stops) cause water levels to change constantly. This subjects wetland vegetation to alternating inundation and exposure and reverses the flow of water back and forth through the wetlands, washing in and sweeping out sediments, nutrients, microorganisms, and fish.

These alternating water levels are reminiscent of tidal ebb and flow in saltwater estuaries, but they are not predictable like the tides, since they occur irregularly depending on capricious Great Lakes weather.

In addition, long-term lake level fluctuations (caused by excessive precipitation or drought) subject wetlands to overall higher or lower levels over several-year cycles. Aquatic plants may perish during low levels, causing habitats to change. Then higher levels will reverse the process.

Both the short-term and long-term rise and fall of the restless Great Lakes create coastal wetlands of tremendous variability, ever changing, ever renewing. This renewal is essential to the diverse and abundant life of the Great Lakes coastal wetlands.

Wetlands Research Needs

Many remaining Great Lakes wetlands are degraded by human activities. Polluted water, sediment from farms and construction sites, dredge spoils from harbors and channels, diking and pumping to control water levels, and fragmentation of wetlands into small parcels, all disrupt the normal course of ecological interactions.

The dynamic nature of Great Lakes wetlands makes these disturbances difficult to trace and predict, but they must be understood if remaining wetlands are to be protected and rehabilitated. Some wetland features requiring further study are described below.

Sediments. Many of the pollutants that enter wetlands adhere to sediment particles through chemical reactions. So scientists are eager to study sediment chemistry to better understand how wetlands purify water. Scientists also want to learn at what point pollutants in the sediments might return to the water or enter the food web, thus injuring the wetland ecosystem.

Nutrient Dynamics. "Nutrient dynamics" refers to how nutrients such as nitrogen and phosphorus enter and flow through wetlands, are converted by plants, animals, and chemical reactions, and cycled through the food web. It is important to understand this process so that when increased nutrients reach wetlands from such sources as fertilizer runoff, the results in the food web can be predicted. Then land use guidelines can be established to protect wetland plants and animals from harm.

Invertebrates. These small creatures—insects, worms, crustaceans, and the like—form essential links in the wetland food web. They burrow in the sediments, float in the water, or cling to plants, forming interdependent communities. Little is known about how these communities interact, how they vary seasonally, or their specific roles in the food web. Once wetland invertebrates are better understood, they may serve as valuable bioindicators—animals that warn us through population shifts of environmental changes.

Fish. Many Great Lakes fish spawn, hatch, grow, or feed in coastal wetlands. Wetlands are essential to nearly 50 species of Great Lakes fish, including sport fish like walleye and smaller fish essential to the food web. Fish are very sensitive to changes in wetland habitat. The nuances of their response must be better understood to help fishery managers protect Great Lakes fish stocks.

Vegetation. Green plants jump start the food web by converting inorganic nutrients, such as nitrogen, into organic matter—leaves, seeds, stems, and roots—that animals can eat. Botanists know little about how the abundance and health of wetland plants are affected by pollution and sedimentation.

Waterfowl. Vast clouds of ducks and geese once blackened the skies over Great Lakes shores, but the destruction of Great Lakes and prairie wetlands and other environmental changes have cut waterfowl numbers. Ecologists are concerned about waterfowl response to continued disturbance from habitat loss, pollution, and exotic species invasions.

Exotic Species. Exotic species may harm Great Lakes wetlands. Two important species are purple loosestrife and the zebra mussel. The loosestrife plant rapidly invades disturbed wetlands, crowding out native plants. This eliminates natural food and cover for wildlife. Zebra mussels may dramatically change wetland food webs by filtering most floating microorganisms from the water. Scientists are seeking ways to control these and other exotic species.

For More Information

Journal of Great Lakes Research: Special Issue on Coastal Wetlands of the Laurentian Great Lakes. International Association for Great Lakes Research. Vol. 18, No. 4, 1992. Contact: IAGLR, 313/747-1673.

Great Lakes Wetlands. Quarterly newsletter about wetlands research, regulation, management, and protection. Contact: Tip of the Mitt Watershed Council, 616/347-1181.

Legislative Research Offices. **Michigan Sea Grant has provided the following materials to the House and Senate Majority and Minority staff offices and the Legislative Services Bureau.**

Preserving Great Lakes Wetlands: An Environmental Agenda. Summary of the Final Report of the Great Lakes Wetlands Policy Consortium. 1990.

EPA Wetlands Fact Sheets and EPA Wetlands Hotline. U.S. EPA. 1993.

State and Federal Activities in Michigan

Several state laws authorize the Michigan Department of Natural Resources (DNR) to regulate activities in areas that include coastal wetlands. Generally, filling, draining, dredging, and construction are regulated. Farming and timber harvesting are usually exempt if guidelines are followed. Regulation is by a permitting process that seeks to minimize damage to the environment and the public trust. Permits are denied if standards of environmental protection and public health, safety, and welfare are not met.

Michigan Wetlands Protection Act. Regulates activities in both coastal and inland wetlands. In some cases the law allows for mitigation—building a new wetland to replace the one being destroyed. Many scientists feel that manmade wetlands cannot duplicate the diversity of naturally occurring habitats.

Shorelands Protection and Management Act. Seeks to protect critical shoreland habitats. Authorizes the DNR to designate "environmental areas"—areas necessary to fish and wildlife. A variety of activities in these areas require permits.

Great Lakes Submerged Lands Act. Regulates activities on Great Lakes bottomlands—any land lakeward of the ordinary high water mark. This includes some coastal wetlands.

Rivers and Harbors Act. Regulates river and harbor dredging and disposal, including these activities in coastal wetlands.

Federal Clean Water Act of 1972, Section 404. This is the principal federal law regulating wetlands. It requires landowners to obtain permits from the U.S. Army Corps of Engineers before dredging or filling.

The Clean Water Act is due for reauthorization, and many different proposals for both strengthening and weakening wetlands legislation are being debated in Congress. In addition, the previous Administration proposed changes to the 1989 manual that federal agencies use to define wetlands when implementing Section 404. This manual had received broad agency support, but farmers and developers felt it restricted their activities too much. Ultimately, Congress mandated a study by the National Academy of Sciences on what criteria to use to identify wetlands. The study will be completed in 1994.

North American Waterfowl Management Plan. This is a cooperative effort of the U.S. and Canadian governments, led by the U.S. Fish and Wildlife Service and Environment Canada. With the goal of increasing waterfowl populations, the plan seeks to protect 6 million acres of wetlands through the activities of joint venture partnerships of public and private organizations. In Michigan this program has acquired, restored, or enhanced 8,100 acres of inland and coastal wetlands since 1988.

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