Indicator: Detroit River Coastal Wetlands

Background

Wetlands are characterized by water saturation, which is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. However, wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. Often called "nurseries of life," wetlands provide habitat for thousands of species of plants and animals (Figure 1).

Figure 1. Coastal wetland restoration project at Grosse Ile, MI Nature Area (Photo credit: Emily Wilke).

Coastal wetlands are commonly formed where there is relatively flat land, shallow water, and a barrier to wave and wind action. They are valuable resources ecologically, recreationally, and aesthetically. Wetlands, which are often dependent upon wetland type and location, do the following:

- provide essential breeding, staging, and nursery grounds for many fish and wildlife, including endangered and threatened species;
- stabilize and maintain the water table by retaining water during dry periods and storing excess water during storm and flood conditions;
- minimize bank and shoreline erosion along rivers and lakes;
- serve as living filters by removing nutrients and sediments from upland runoff waters that could otherwise pollute lakes and rivers;
- function as sites for groundwater recharge, replenishing and purifying the water in aquifers that supply local drinking wells; and
- provide recreational opportunities such as hunting, fishing, bird-watching, and hiking.

Despite all of the benefits provided by wetlands, over half of them in Michigan have been drained, filled, and developed, particularly coastal wetlands along the Detroit River.

Status and Trends

Coastal wetlands were extensive along the Detroit River 200 years ago (Manny et al. 1988; Manny 2003). First explorers like Father Hennepin and Antoine Cadillac described the Detroit River as a pristine "paradise" with abundant edible fruits, lush meadows, forests, fish, and wildlife (Manny 2003). In 1815, the river shoreline consisted of contiguous coastal wetlands that were up to 1.6 kilometers (1 mile) wide along both sides of the river (Figure 2). Vegetation types included submersed marsh, emergent marsh, wet

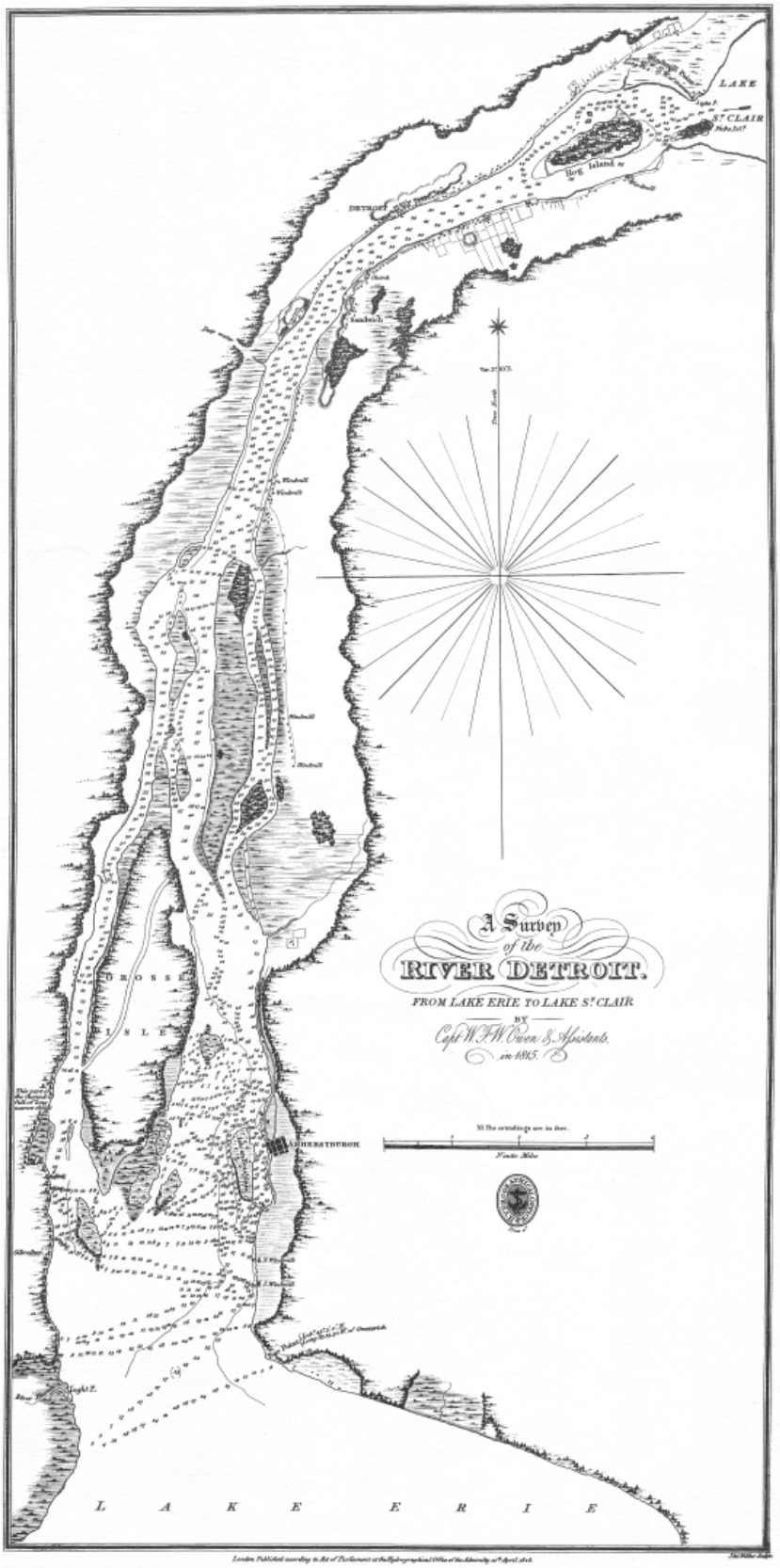

Figure 2. An 1815 map of the Detroit River with coastal wetlands up to a mile wide along both sides of the river for most of its length, prior to shoreline development (Map credit: Association of Canadian Map Libraries and Archives facsimile of an original held in Library and Archives Canada).

meadow and shrub swamp, swamp forest, and lakeplain prairie. Since 1815, the Detroit River ecosystem has undergone dramatic changes. Habitats for fish and wildlife in the river are now degraded by contaminants, largely destroyed by shoreline and channel modifications, and greatly reduced in abundance and quality from what was there historically.

The largest habitat change has been encroachment into the river and hardening of the shoreline by the addition of steel sheet-piling, concrete breakwalls, and fill material. Analysis of Figure 2 reveals that 2,768 hectares (10.7 square miles) of coastal wetlands were present along the Michigan shore of the Detroit River in 1815 (Manny 2003).

Analysis of 1982 Landsat photographs (Figure 3) reveals only 25.5 hectares (a tenth of a square mile) of coastal wetlands remained on the Michigan mainland, mostly in the vicinity of Humbug Marsh (Manny 2003). By 1982, more than 99% of the coastal wetlands present in 1815 along the Michigan shore were converted to other land uses. In total, 97% of the coastal wetlands on both sides of the Detroit River have been lost to development. Other losses of habitat included removal of limestone spawning grounds for lake whitefish in order to create navigational channels, clearing of wooded areas for agriculture, and contamination of the water by waste effluents. In the process, people lost benefits provided by wetlands along the river, such as flood control, protection from shoreline erosion, and removal of nutrients and sediment.

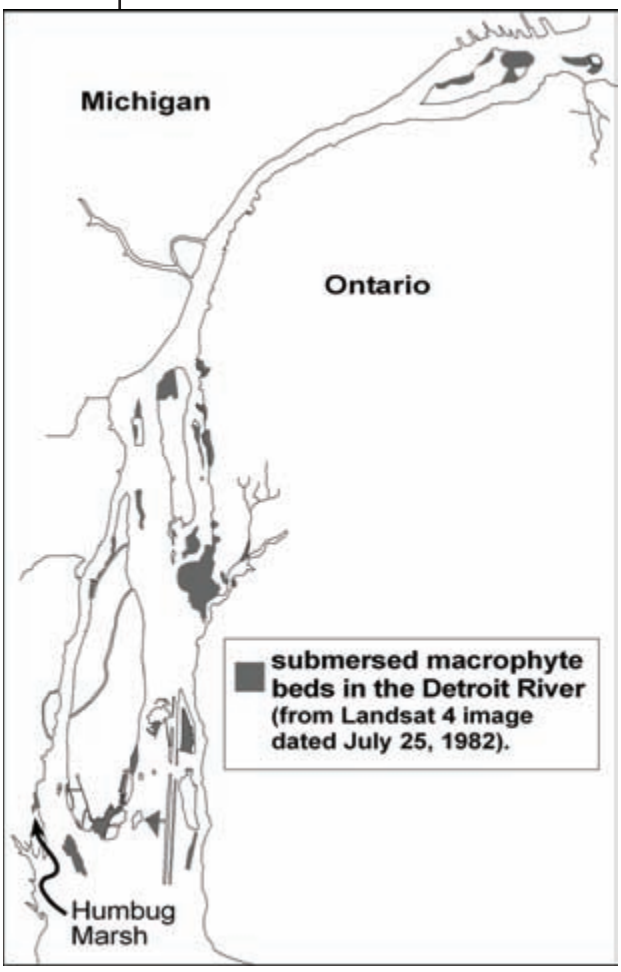

Figure 3. Distribution of wetlands and large submersed macrophyte beds in the Detroit River, July 1982 (from Manny et al. 1988).

Management Next Steps

Biologists from Canada and the U.S. should establish realistic, achievable, and quantitative targets for the protection and restoration of fish and wildlife habitat, including coastal wetlands, as called for in the U.S.-Canada Great Lakes Water Quality Agreement. These quantitative targets could then be used as benchmarks to measure progress in terms of acres of productive and uncontaminated habitat, kilometers/miles of natural shoreline, etc., that have been protected in perpetuity (Manny 2003).

Consistent with "A Conservation Vision for the Lower Detroit River Ecosystem," coordinated efforts are needed to protect in perpetuity remaining marshes, coastal wetlands, islands, and natural shorelines from development, and to rehabilitate degraded marsh, wetland, island, and shoreline habitats (Metropolitan Affairs Coalition 2001). Additional management actions include:

- developers and communities could be encouraged to protect remaining wetlands in the Detroit River watershed through adoption of the best management practices;
- nonprofit organizations like the International Wildlife Refuge Alliance and Friends of the Detroit River could foster volunteer programs that utilize local expertise and interest, along with governmental technical assistance, to protect and enhance coastal wetlands on a watershed scale;
- governments could maintain a publicly-accessible, comprehensive, coastal wetland inventory that tracks changes in total wetland area;
- communities and private landowners could use soft engineering techniques on river shoreline redevelopment projects to a greater degree; and
- regulatory agencies could more adequately enforce wetland protection laws and stop the encroachment of development into floodplains.

Research/Monitoring Needs

There is a need to increase research and monitoring programs to quantify wetland losses, establish cause-and-effect relationships, evaluate and select appropriate wetland rehabilitation techniques, and quantify beneficial wetland functions (Tulen et al. 1998). In essence, wetland restoration and conservation projects should be treated like adaptive management experiments that explicitly link research/monitoring with restoration and management of wetlands. Further, available data on ways to protect and enhance wetland ecological functions need to be pooled and synthesized to sort out the most successful tools. For example, we could:

- assess the quality of wetland habitats for production of fish and wildlife to better rank candidate sites for wetland protection and enhancement;
- describe and characterize biodiversity in Detroit River coastal wetlands and habitats they provide for young fish and wildlife; and
- quantify economic, social, and ecological benefits resulting from wetland restoration and conservation projects.

References

Association of Canadian Map Libraries and Archives Facsimile Map Series No. 20. Reproduced from an original in the National Map Collection, Public Archives of Canada. W.F.W. Owen, "A Survey of the River Detroit from Lake Erie to Lake St. Clair," London, 1828.

Manny, B.A. 2003. Setting priorities for conserving and rehabilitating Detroit River habitats. In *Honoring Our Detroit River: Caring for Our Home*, ed. John H. Hartig, pp. 79-90. Bloomfield Hills, MI: Cranbrook Institute of Science.

Manny, B.A., T.A. Edsall, and E. Jaworski. 1988. The Detroit River, Michigan: An ecological profile. U.S. Fish and Wildlife Service Biological Report 85 (7.17).

Metropolitan Affairs Coalition. 2001. *A Conservation Vision for the Lower Detroit River Ecosystem*. Detroit, MI.

Tulen, L.A., J.H. Hartig, D.M. Dolan, and J.J.H. Ciborowski. 1998. Rehabilitating and conserving Detroit River habitats. Great Lakes Institute for Environmental Research, University of Windsor, Ontario, Canada.

Links for More Information

Detroit River candidate sites for habitat rehabilitation: http://www.glsc.usgs.gov/main.php?content=research_detroitriver&title=Detroit%20River%20Candidate%20Sites%20for%20Habitat%20Remediation1&menu=research_RE_detroitriver

Rehabilitating and conserving Detroit River habitats: http://www.mnsi.net/%7Ericcawu/title.html

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