Indicator: Recovery of Wild Celery

Background

Wild celery (*Vallisneria americana*) (Figure 1) is a submersed aquatic plant that is a very important food for diving ducks in the Detroit River. Extensive wild celery beds in the lower Detroit River attract canvasbacks and other diving ducks that feed on the tubers of wild celery for energy during migration (Miller 1943; Jones 1982).

Figure 1. Wild celery (Vallisneria americana) *(Photo credit: Ben Legler).*

Wild celery is also an important ecological indicator in the Detroit River because it is very sensitive to pollution and will not grow where pollutants, such as oil, contaminate bottom sediment (Schloesser and Manny 1990).

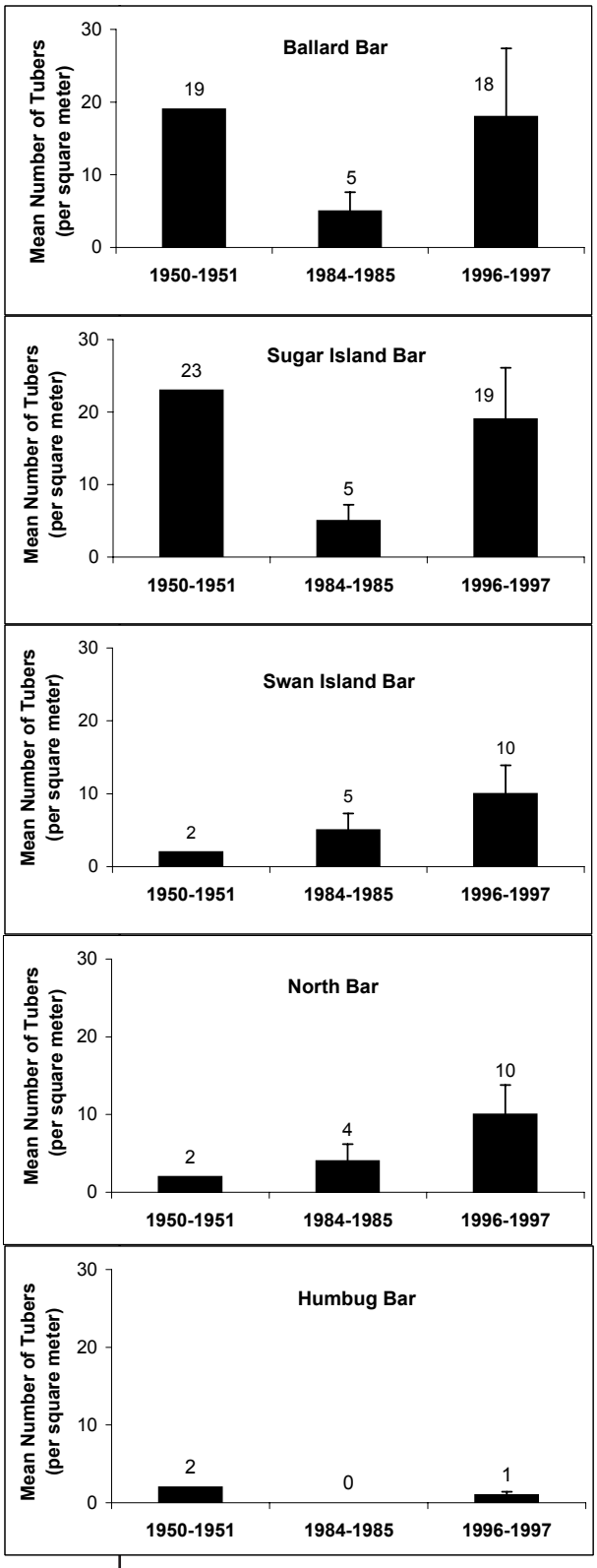
Status and Trends

Before the beginning of the twentieth century, contiguous coastal wetlands up to a mile wide existed along both shores of the Detroit River (Manny 2003). By 1950, wild celery beds in the river had decreased because of oil pollution (Hunt 1963). Despite pollution abatement programs implemented in the 1960s and 1970s, wild celery in the lower Detroit River decreased even further between 1950 and 1984-1985 (Schloesser and Manny 1990). In 1986, the nonnative zebra mussel (*Dreissena polymorpha*) began to colonize Lake St. Clair located immediately upstream of the Detroit River. These filter-feeders are responsible for increasing water clarity by filtering large quantities of suspended particulate matter from the water. It is believed that increased water clarity allowed more light penetration, which then increased wild celery abundance (Schloesser and Manny 2007).

Including 1950-1951, wild celery abundance has been measured three times at five historically important duck-feeding locations in the lower Detroit River. Wild celery tubers or winter buds in river bottom sediments were collected and enumerated at Ballard Bar, Sugar Island Bar, Swan Island Bar, North Bar, and Humbug Bar in May of 1950-1951, 1984-1985, and 1996-1997. Sampling locations were located in areas of shallow water where waterfowl were seen feeding (Schloesser and Manny 1990).

Wild celery tuber abundance declined 72% between 1950-1951 and 1984-1985, and then increased 200% between 1984-1985 and 1996-1997 (Figure 2). In 1985, wild celery beds had decreased, resulting in a net loss of 36,720,000 tubers at the five locations (Schloesser and Manny 1990).

From 1950-1951 to 1984-1985 there were small increases in wild celery abundances at Swan Island Bar and North Bar, however, the increases were not significant enough



to compensate for the large losses of wild celery at other locations sampled. From 1984-1985 to 1996-1997 the mean density of wild celery tubers increased significantly at all five sites. The Humbug Bar site increased the least amount, from zero to one, most likely because bottom sediments were contaminated with oil. The Swan Island Bar and North Bar had a higher mean number of tubers in 1994-1995 than in 1950-1951. However, the total estimated number of tubers was not significantly different at all locations between 1950-1951 and 1994-1995 counts (Schloesser and Manny 2007).

In general, less wild celery means less food for ducks. For example, an average daily meal (feeding twice a day) of a canvasback feeding on wild celery buds in the Detroit River is 78.47 ml. The decrease in the mean number of tubers from the 1950s to the 1980s was equivalent to a net loss of 11,540,000 ml of food. This net loss corresponds to a potential loss of 147,000 waterfowl feeding-days in the spring for canvasbacks, assuming that they did not consume other food (Schloesser and Manny 1990). It should be noted that these feeding-day figures are likely an underestimate because more wild celery tubers were consumed by the higher numbers of diving ducks that migrated through Michigan in 1950 than in 1984-1985 (Hunt 1957; Martz et al. 1976). Further, there was an increase in duck feeding-days between 1984-1985 and 1996-1997 because of the slight increase in the migrating waterfowl population.

Management Next Steps

It is recommended that management agencies continue to place priority on pollution abatement programs that aid in improving water quality and clarity to encourage recovery of wild celery beds. Priority should also be placed on preserving remaining coastal wetland habitats and rehabilitating degraded ones to support wildlife populations.

Figure 2. Mean number of wild celery tubers per site at five historic sampling locations in the Detroit River including: Ballard Bar, Sugar Island Bar, Swan Island Bar, North Bar, and Humbug Bar in May 1950-1951, 1984-1985, and 1996-1997. Standard errors available only for 1984-1985 and 1996-1997 data (data collected by U.S. Geological Survey).

Research/Monitoring Needs

Scientists should continue to monitor wild celery abundance at the five historical sampling locations. The next logical period of sampling is 2006-2007, which would span a period of 10 years since the last survey was done. Future wild celery monitoring should be performed in conjunction with waterfowl surveys and parallel feeding habit studies. Research should also be undertaken to fully understand the factors affecting wild celery abundance, such as the proliferation of zebra mussels, water clarity, and oil pollution.

References

Hunt, G.S. 1957. Causes of mortality among ducks wintering on the lower Detroit River. Ph.D. dissertation, University of Michigan, Ann Arbor, MI.

Hunt, G.S. 1963. Wildcelery in the lower Detroit River. *Ecology* 44:360-370.

Jones, J.J. 1982. Potential effects of winter shipping on diving ducks wintering in the Detroit River. M.S. Thesis, University of Michigan, Ann Arbor.

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. 121-139. Bloomfield Hills, MI: Cranbrook Institute of Science.

Martz, G.F., J.W. Aldrich, and D. Ostyn. 1976. History and future of canvasback populations in Michigan's Great Lakes habitat during fall migration and early winter. Michigan Department of Natural Resources, Wildlife Development Report 2759. Lansing, MI.

Miller, H.J. 1943. Waterfowl survey of Saginaw Bay, Lake St. Clair, Detroit River, Lake Erie and marshes adjacent to these waters. Project No. 13-R Wildlife Division, Michigan Department of Natural Resources. Lansing, MI.

Schloesser, D.W., and B.A. Manny. 1990. Decline of wildcelery buds in the lower Detroit River, 1950-1985. *Journal of Wildlife Management* 54(1):72-76.

Schloesser, D.W., and B.A. Manny. 2007. Recovery of wildcelery, *Vallisneria americana*, in the lower Detroit River of the Lake Huron-Lake Erie corridor. *Journal of Great Lakes Research* 33(supl):8-19.

Links for More Information

USGS - American wildcelery (*Vallisneria americana*): Ecological considerations for restoration: http://www.npwrc.usgs.gov/resource/plants/wildcel/value.htm

Contact Information

Don Schloesser
U.S. Geological Survey, Great Lakes Science Center
E-mail Address: dschloesser@usgs.gov

Bruce A. Manny
U.S. Geological Survey, Great Lakes Science Center
E-mail Address: bmanny@usgs.gov