

# Chapter 3: The Refuge Environment

## Geographic/Ecosystem Setting

### The Great Lakes Basin Ecosystem

The U.S. Fish and Wildlife Service has implemented an ecosystem approach to fish and wildlife conservation. Under this approach the Service's goal is to contribute to the effective conservation of natural biological diversity through perpetuation of dynamic, healthy ecosystems by using an interdisciplinary, coordinated strategy to integrate the expertise and resources of all stakeholders.

The Detroit River IWR lies within the Great Lakes Basin Ecosystem, a system shared with Canada and eight states. The ecosystem is made up of the world's largest freshwater body, which holds 18 percent of the world's supply of freshwater, covers 95,000 square miles, has 9,000 miles of shoreline, over 5,000 tributaries, and a drainage basin of 288,000 square miles.



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Biological concerns within the ecosystem include the impact of exotic species, the precarious nature of the aquatic community structure, and contaminant levels. Various fish and wildlife activities, drinking water, recreation, hydropower production, industrial waste supply, waste disposal, and commercial navigation affect the natural resources in the ecosystem. The basin contains critical breeding, feeding, and resting areas as well as migration corridors for waterfowl, colonial nesting birds, non-game birds, and many species of migratory birds.

Within the Great Lakes basin certain species have drawn special concern. Fish species of special interest include lake trout, lake sturgeon, lake whitefish, walleye, Pacific salmon, and landlocked Atlantic salmon and their forage. There is a concern for native mussels because they are being seriously impacted by zebra mussels and are in danger of extirpation from the Great Lakes Basin. Thirty-one species of migratory non-game birds of management concern to the Service are found in the Great Lakes ecosystem. (Figure 4.)

A recent survey of biological diversity in the basin identified 130 globally rare or endangered plant and animal species. The Bald Eagle, Peregrine Falcon, Kirtland's Warbler, Piping Plover, Mitchell's satyr blue butterfly, Indiana bat, gray wolf, lake sturgeon and deepwater sculpin are some of the threatened, endangered, and candidate species that inhabit the Great Lakes ecosystem. The Bald Eagle, Peregrine Falcon and lake sturgeon have been observed on the Detroit River. The Great Lakes Basin Ecosystem is divided into seven focus areas. The Lower Detroit River focus area contains the Detroit River IWR. The

**Figure 4: U.S. Fish & Wildlife Service Great Lakes Basin Ecoregion**



Refuge is also within the St. Clair/Detroit River focus area identified by the Midwest Natural Resources Group, which consists of 14 federal agency partners.

## **The Detroit River**

The U.S. Environmental Protection Agency and Environment Canada have identified the Detroit River as a portion of the Great Lakes shoreline with significant concentrations of coastal wetlands and distinctive characteristics (U.S. Environmental Protection Agency and Environment Canada, 1999). In 1990, Region 3 designated the marshes associated with Lake Erie and the Detroit River as a wetland focus area within the Regional Wetlands Concept Plan.

The Detroit River consists of a 32-mile-long channel bordered by a poorly drained clay lake plain. The rapidly flowing river is underlain by limestone bedrock. Heavy industrial development dominates the shoreline. The river has 66 miles of Canadian shoreline, 79 miles of U.S. shoreline, five Canadian wetlands with 2,808 acres, and 16 U.S. wetlands with 3,415 acres. The wetlands are principally of two types: (1) channel-side (fringing) wetlands with mineral and organic soils and (2) submergent beds of vegetation with mineral soil, cobble, and limestone bedrock. The submergent beds, which once characterized large portions of the river, have been degraded, and the fringing emergent marsh has been almost completely destroyed. At one time extensive wild celery beds were important for diving ducks. After a decline in the beds from the 1950s to the 1970s, it appears that the beds are recovering and may be at the levels that existed in the 1950s.

The Detroit River wetlands provide spawning areas for 26 percent of the fish species in the Great Lakes and nursery areas for 20 percent of the species. Compared with other shoreline reaches in the Great Lakes, the Detroit River is above the 50th percentile for providing spawning and above the 75th percentile for nursery areas. One hundred species of breeding birds, approximately 50 percent of the breeding birds of Ontario, use the Detroit River wetlands along the Canadian shoreline. We would expect an equivalent bird use in the remnant wetlands on the U.S. side.

In their evaluation of the importance of the Detroit River wetlands, the EPA and Environment Canada noted that although the wetlands are important for a large number of plant and animal species, the number of rare species in coastal wetlands is very low. In valuing the various shoreline reaches, the agencies weighed the distribution, size, uniqueness, and quality of wetlands. They acknowledged the general perception that the Detroit River's large submergent vegetation beds provide important habitat for migrating waterfowl and nursery areas for fish. However, they identified the wetlands along the Detroit River as deserving high priority not only because they serve as important habitat for a large number of fish and bird species, but especially because there are so few wetlands remaining in the area. Challenges to wetlands along the Detroit River include:

- # Wetland loss from dredging, filling, and urban and industrial development.
- # Contamination by phosphates, heavy metals, oils, and PCBs, especially along the U.S. shoreline.
- # Vulnerability to invasive exotic species of plants, fish, and invertebrates.
- # Many marshes are diked with accompanying problems of being isolated from the river.

Based on the Great Lakes Water Quality Agreement, the Government of Canada and the U.S. Environmental Protection Agency (1995) have listed concerns for the Detroit River. They report the following concerns: degradation of benthic populations; fish tumors and other deformities; restrictions on fish and wildlife consumption; beach closings due to bacteria in the water; restrictions on dredging; taste and odor in drinking water; degradation of aesthetics; and loss of fish and wildlife habitat.

The Detroit River has been designated a bi-national Area of Concern under the Great Lakes Water Quality Agreement. The U.S. Environmental Protection Agency has the lead on the Remedial Action Plan to restore and protect beneficial uses in the Area of Concern. U.S. Fish and Wildlife Service coordination and collaboration in the Remedial Action Plan process is important to address the restoration and protection of fish and wildlife habitat in the Detroit River.

## **American Heritage River**

The Detroit River was designated as an American Heritage River in 1998, one of only 14 rivers nationwide with this distinction. The American Heritage Rivers Initiative is a federal effort to support the local community's goals for the river by providing focused federal support. It is a locally driven program formally chartered as the Greater Detroit American Heritage River Initiative. In Detroit, the private and municipal sectors are the primary forces within the steering committee. Late in 1999, a Federal contact was named for the river and stakeholders held their first major event. In July 2001, the Canadian government designated the river as a Canadian Heritage River, and made the Detroit River the only bi-nationally designated heritage river in the world.

## Lake Erie (Western Basin)

The authorized boundary of the Detroit River International Wildlife Refuge extends along the western shore of Lake Erie to the Ohio state boundary and extends along portions of four separate watersheds (see Figure 5). The western shore is characterized by several small communities, marinas, agricultural fields, state wildlife areas, and coastal lagoons and wetlands. The City of Monroe (population 22,000) is the largest community along this coast. The shoreline in many locations has been subject to erosion from storms and wave actions during periods of high water on Lake Erie. The coastline near most lakeshore communities and developments has been armored to prevent erosion.

In 1990, the Great Lakes Coastal Barrier Act identified privately-owned coastal barrier lands for inclusion in the Coastal Barrier Resource System. Due to their susceptibility to flooding and erosion, lands included in this program are ineligible for federal economic development funds or federal flood insurance. However, development is not precluded on these lands. Two sites within Monroe County are included in the program; undeveloped lands around Toledo Beach and the Fermi Nuclear Facility.

Two large barrier reef-like structures have been constructed along the shoreline to recreate the protection afforded by eroded barrier islands. The Pointe Mouillee Confined Disposal Facility is a 3-mile-long structure constructed to contain dredgings from the Detroit River and the Lake Erie Shipping Channel. The banana-shaped structure assists in the restoration of the former wetlands and managed water impoundments of the Pointe Mouillee State Game Area. Another confined disposal facility has been constructed in the northeast corner of Sterling State Park. This 90-acre site is intended to hold dredged sediments from the River Raisin. After closure, the facility will be developed for public recreational purposes.

## The Upper Detroit River: A Report to Congress

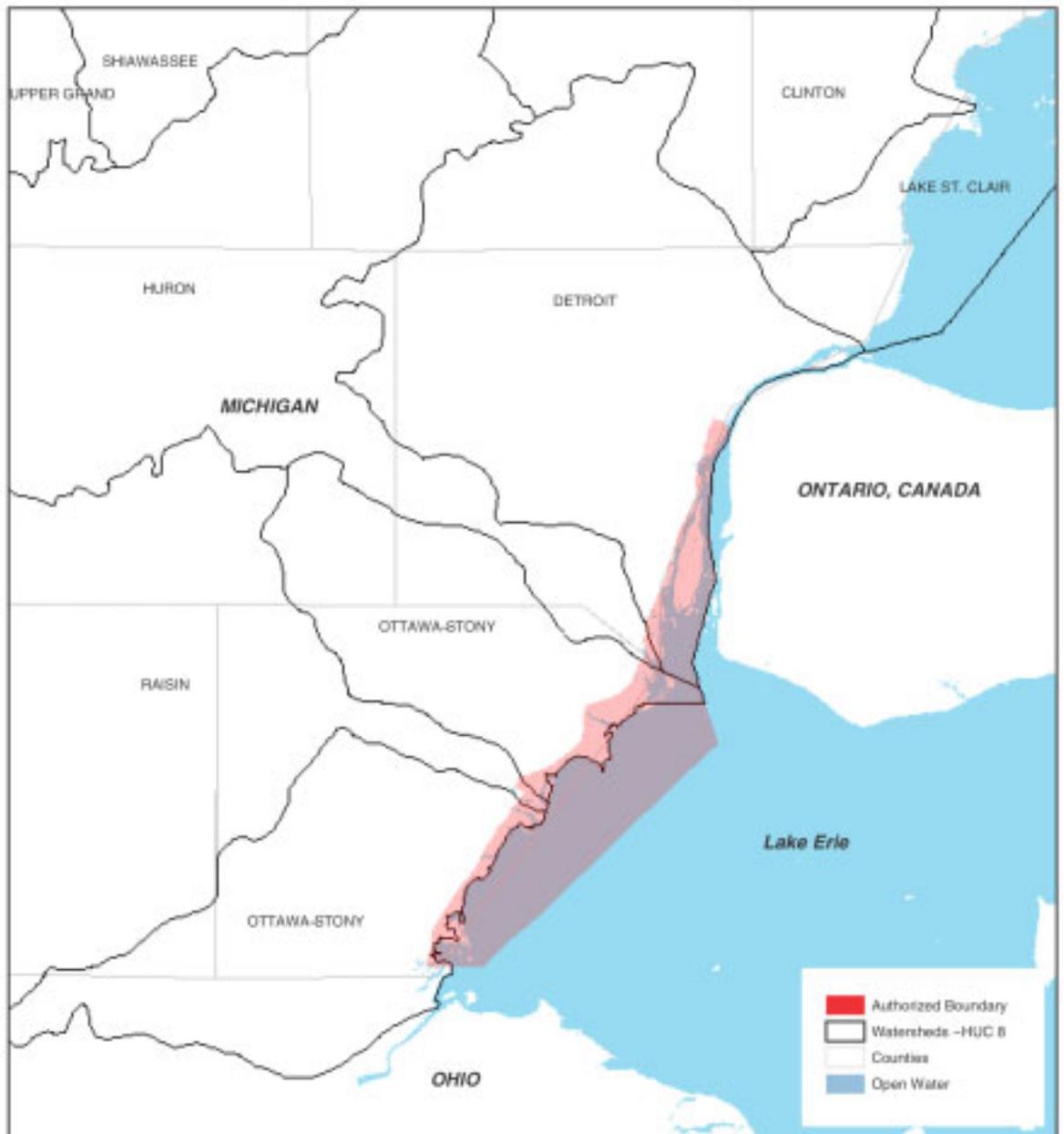
The Detroit River International Wildlife Refuge Establishment Act included a provision to study the resource merits of the Upper Detroit River. The Service was given 18 months to conduct a study of fish and wildlife habitat and aquatic and terrestrial communities of the north reach of the Detroit River for potential inclusion in the Refuge, and to report its findings to Congress. To meet this directive, the Service developed this CCP for the Refuge.

The subsection of Public Law 107-91:

Section 5(f) STUDY OF ASSOCIATED AREA.—The Secretary (acting through the Director of the United States Fish and Wildlife Service) shall conduct a study of fish and wildlife habitat and aquatic and terrestrial communities of the north reach of the Detroit River, from the northernmost point of Ojibway Shores north to the mouth of Lake St. Clair, for potential inclusion in the Refuge. Not later than 18 months after the date of the enactment of the Act, the Secretary shall complete such study and submit a report containing the results thereof to the Congress.

As a general rule, lands included in the National Wildlife Refuge System were selected because they contain habitats of high value to fish and wildlife species considered Trust resources of the agency. Trust species are those in which the Service has been legislated jurisdiction and include migratory birds and wildlife, invertebrate, or plant species on the federal threatened and endangered species list.

Figure 5: Watersheds of the Detroit River and Western Lake Erie Basin



The Service has determined that the shoreline of the 14-mile-long Upper Detroit River does not contain sufficient undeveloped lands or Trust resources to warrant inclusion in the authorized boundary for a national wildlife refuge. However, we recognize that the waters of the Detroit River, and some small sections of mainland shoreline and areas on Belle Isle, do provide habitats for resident and migratory birds and fish. The Service will remain involved in habitat restoration efforts on these sites through the Great Lakes Coastal Program, Partners for Fish and Wildlife program, endangered species consultations, and through environmental education programs to be developed by future staff of the adjacent Detroit River International Wildlife Refuge. Please see Appendix J for more details and the text of our report to Congress.

## Migratory Bird Conservation Initiatives

### Nongame Bird Conservation Initiatives

Nationally and internationally, several nongame bird initiatives have been developed in recent years. The Refuge will strive to implement the conservation strategies they outline to the extent possible and practical.



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Partners In Flight (PIF) deals primarily with landbirds and has developed Bird Conservation Plans for numerous physiographic areas across the United States. These plans include priority species lists, associated habitats, and management strategies. The Refuge lies within Partners in Flight Physiographic Area No. 16, Upper Great Lakes Plain (see <http://www.partnersinflight.org>).

The U. S. Shorebird Conservation Plan and the North American Waterbird Conservation Plan have regional components that identify priority species and conservation strategies, mostly focused around habitat, which will address the needs of these groups of birds (see <http://www.manomet.org/USSCP.htm> and <http://www.nqacwcp.org>).

All migratory bird conservation programs will be integrated under the umbrella of the North American Bird Conservation Initiative (NABCI). This is a continental effort to have all bird initiatives operate under common Bird Conservation Regions and to consider the conservation objectives of all birds together to optimize the effectiveness of management strategies. The goal of NABCI is to facilitate the delivery of the full spectrum of bird conservation through regionally-based, biologically-driven, landscape-oriented partnerships.

### North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP), signed in 1986, outlines a broad framework for waterfowl management strategies and conservation efforts in the United States, Canada, and Mexico. The goal of the NAWMP is to restore waterfowl populations to historic levels of the mid-1970s. The NAWMP is designed to reach its objectives through key habitat joint venture areas, species joint ventures, and state implementation plans within these joint ventures.

The entire State of Michigan is within the Upper Mississippi River and Great Lakes Region Joint Venture. Areas within Michigan have substantial use by waterfowl during migration, particularly the coastal waters and marshes of Saginaw Bay, the Lake St. Clair and Erie complex, and the eastern Upper Peninsula along the St. Mary's River and northern Lake Huron. Emphasis for Michigan in the Joint Venture is waterfowl reproduction, as well as maintenance of important migration areas.

The greatest potential to increase Michigan wetland wildlife populations exists on relatively productive lake plain landscapes where agricultural practices have eliminated or significantly altered wetlands and associated uplands. The 1998 Michigan implementation strategy emphasizes waterfowl reproduction and does not include new migration habitat objectives. However, maintenance of these traditional migration areas is viewed as extremely important, especially for black ducks and many species of diving ducks. Please see <http://northamerican.fws.gov/NAWMP/nawmphp.htm> for more information.

## **Region 3 Fish & Wildlife Resource Conservation Priorities**

The Government Performance and Results Act (GPRA) required the Service to identify its most important functions and to direct its limited fiscal resources toward those functions. From 1997 to 1999, a group of staff looked at how best to identify the most important functions of the Service within the region. The group recognized that the Service has a complex array of responsibilities specified by treaties, laws, executive orders, and judicial opinions that dwarf the agency's budget.

The group recognized that at least two approaches are possible in identifying conservation priorities – habitats and species. The group chose to focus on species because (1) species represent biological and genetic resources that cannot be replaced; (2) a focus on species conservation requires a concurrent focus on habitat; and (3) by focusing on species assemblages and identifying areas where ecological needs come together the Service can select the few key places where limited efforts will have the greatest impact. Representatives of the migratory bird, endangered species, and fisheries programs in Region 3 identified the species that require the utmost attention given our current level of knowledge. Representatives prioritized the species based on biological status (endangered or threatened, for example), rare or declining levels, recreational or economic value, or “nuisance” level. The group recognized that species not on the prioritized list are also important. But, when faced with the needs of several species, the Service should emphasize the species on the priority list.

The Detroit River IWR provides habitat for 11 species, including eight bird species and three fish species, that are currently listed as a Resource Conservation Priority.

We have considered the American Heritage River Initiative, the ecosystem context, state-listed species, and the regional resource conservation priorities as we wrote this comprehensive conservation plan.

# Establishment History, Refuge Resources, Cultural Values and Uses

## History of the Refuge



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Grassy Island and surrounding shoals, including the submerged Mamajuda Island, constitute the first properties added to what is now the Detroit River IWR. Grassy Island appears as a 6-acre marshy area on 1796 maps of the Detroit River. At that time, the river bottom around the island sloped gradually off on all sides into deeper channels. The area was called “Ile Marecageuse” on the 1796 map and “Grassy Island” on later maps. An 1873 fisheries report contains a line drawing of the “Grassy Island Pond

Fishery” for spawning whitefish. The drawing depicts a large seine being drawn in by horse-drawn windlasses and several sheds on the island. The fishery employed 30 men, working night and day, September to November and produced 45,000 adult whitefish per spawning season.

An executive order in 1843 reserved the islands for lighthouse purposes, and navigation lights have been on the islands for years. In 1955, Grassy Island was under the jurisdiction of the U.S. Treasury Department, which had reserved it for installation of navigation aids by the U.S. Coast Guard. In September 1959, the U.S. Army Corps of Engineers (Corps) began diking a 300-acre area around Grassy Island for disposal of polluted dredge spoils from the Rouge River. In October 1959, at a meeting between the Corps, the U.S. Bureau of Sport Fisheries and Wildlife, and the Michigan Department of Conservation, Congressman John D. Dingell negotiated an agreement that the Corps could continue construction of the Grassy Island Confined Disposal Facility (CDF).

In January 1960, Congressman Dingell introduced legislation to designate Grassy Island and surrounding shoals as a national wildlife refuge because wild celery (*Vallisneria americana*) was abundant and widely distributed near Grassy Island, and wild celery is the preferred food of diving ducks, such as Canvasbacks, Redheads, and Scaup. The area was known to attract thousands of diving ducks during their fall and spring migration. In July 1960, the Department of the Interior agreed that if it received jurisdiction over the Grassy Island area, it would not object to the Corp’s continued use of a 72-acre CDF for dredge spoils from the Rouge River. The act to create Wyandotte NWR became law on August 3, 1961. The Refuge included Grassy Island and surrounding shoals out to a water depth of 6 feet and an area of about 300 acres extending downstream to the Mamajuda Light near Point Hennepin. The Refuge was administered by the Shiawassee National Wildlife Refuge near Saginaw, Michigan.

The Detroit River IWR was established by an Act of Congress, which became Public Law 107-91 on December 21, 2001. The authorized Refuge boundary in this Act included islands, coastal wetlands, marshes, shoals and riverfront lands along 18 miles of the Lower Detroit River. The establishing Act included Mud Island and Grassy Island, lands already managed by the Service as Wyandotte NWR. In May 2003, Public Law 108-23 extended the

authorized boundary of the Refuge south to the Ohio border. Please see Chapter 1 for more details on establishment of the Refuge.

## General Habitat Description

Much of the lower Detroit River shorelines, island shoals, and the western Lake Erie shoreline were originally a marshy, low-lying area of emergent and submersed vegetation that might be classified today as a Great Lakes coastal marsh. On an 1815 map, such marshes were contiguous along both sides of the entire 32-mile length of the Detroit River. By 1982, shoreline development had reduced the marshes to less than 3 percent of their original area along the Michigan side of the river. Today, only remnants of these marshes, such as Humbug Marsh, portions of Stony Island, Gibraltar Bay at the southern end of Grosse Ile, and several coastal lagoons along Lake Erie remain in Michigan waters. These remnants contain stands of bottomland hardwoods, glacial lakeplain prairie, coastal plain pond communities, and a variety of wetland types. Such coastal marshes are used as spawning, nursery, feeding, migration and overwintering habitat by many of the 47 species of fish that spawn in the lower Detroit River, including northern pike, muskellunge, largemouth and smallmouth bass, walleye, and possibly lake sturgeon. More than 17 species of birds of prey, or raptors, use coastal marshes as feeding and resting habitat, including eagles, hawks, owls, and falcons. In addition, coastal marshes are used by 48 species of non-raptors that migrate through the Detroit River area each year, including waterfowl, loons, herons, egrets, terns, and neotropical migrant songbirds.

Comparison of Detroit River maps drawn in 1815 and 1982 reveals that:

- # More than 97 percent of wetlands in Michigan waters have disappeared under shoreline modifications.
- # Ninety percent of the remnant wetlands in the Detroit River are found downstream of Grassy Island.
- # About 40 percent of these remnant wetlands are in Humbug Marsh and on small, undeveloped islands forming the “Conservation Crescent” around the southern tip of Grosse Ile.
- # Because wetland habitats are essential to a high diversity of fish and wildlife species at various stages of their life cycle, such Great Lakes coastal marshes have been classified as globally unique and significant in biological diversity by The Nature Conservancy.

## Wetlands

At least 20 species of submersed aquatic macrophytes occur in the Detroit River and Lake Erie marshes: wild celery (*Vallisneria americana*), water stargrass (*Heteranthera dubia*), waterweed (*Elodea canadensis*), Eurasian watermilfoil (*Myriophyllum spicatum*), bushy pondweed (*Najas flexilis*) and redhead grass (*Potamogeton richardsonii*) predominate in the vicinity of the river islands.

Shallow water habitat, gradually sloping off into deeper waters, exists on the west side of Grassy Island in a small 20-acre bay. Historically, wild celery was abundant and widely distributed near Grassy Island and in the Detroit River system. The extent of wild celery was measured in the 1950s, 1980s, and again in 1996-97. There was a 72 percent decline in wild celery from the 1950s to the 1980s. Now, wild celery has rebounded and is at or exceeds the levels of the 1950s. The increase in wild celery is attributed to increased water clarity in Lake St. Clair and the Detroit River. The increased water clarity is attributed primarily to filtration of the water by zebra mussels (Manny, 2000).

## Wet Prairie

Natural habitats along the Detroit River and Western Basin of Lake Erie have been altered drastically (Figure 6 and Figure 7). Restoring native prairie plant communities, once abundant in the region, provide benefits on both a local and regional scale. Lakeplain wet prairie is listed with the Michigan Natural Features Inventory as S2 state ranking (imperiled in state because of rarity) and G2 on a global scale (imperiled globally because of rarity). A few local, small prairie restoration efforts have occurred in recent years. Native prairie remnants and restored sites are important as they can provide a native seed source for restoration efforts in other parts of the local region. Native seed sources currently are rare in this area due to limited sources of remnant prairies. Sometimes it is necessary to seek alternatives to using local seed sources.

Prairie communities provide quality breeding and migration habitat for grassland birds, waterfowl, and other migratory birds. Land conversion to native prairies will provide habitat for a diverse array of birds, mammals, reptiles, rare insects, and migratory birds. This habitat type consists of various grasses, sedges, and forbs that provide quality wildlife habitat and are aesthetically pleasing at the same time. Wet prairie grasslands in southeast Michigan range from mowed lawns to idle fields to grainfields. Before settlement, wet prairie grassland types were scattered throughout the coastline of the Refuge. The major management concern related to prairie grass restoration is the invasion of shrubs, trees, noxious weeds and phragmites into the grassland. Prescribed fire should be used to manage grasslands with a burning rotation of every 3 to 5 years. If burning is not an option, mowing should be the second alternative to grassland management. All mowing should be conducted after July 15 to avoid nesting birds and broods. According to a recent report by The Michigan Natural Features Inventory, less than 1 percent of Michigan's 158,000 acres of former lakeplain prairies remain today.

Grasslands support a variety of resident wildlife species. Grasslands within the authorized Refuge boundaries are important to Northern Bobwhite, Ring-necked Pheasants and waterfowl. Pheasants in particular also find native grasses such as switchgrass, Indiangrass, and the bluestems suitable for winter shelter because the grasses stand up to snow and provide good nesting cover. White-tailed deer use grasslands for food and cover, particularly during spring and summer. Cottontail rabbits raise their young and find food and security in grassland edges. Grasslands provide essential habitat for waterfowl, especially puddle ducks, during the nesting season. They are also home to mice, shrews, voles, some kinds of snakes, and a host of avian and ground predators including hawks, owls, raccoons, skunks, opossums, foxes, and coyotes.

## Uplands and River Islands

Terrestrial plants on Grassy and Mud islands include giant reed grass (*Phragmites communis*), cattails (*Typha* spp.), as well as aspen, cottonwood, willow, wild cherry and box elder trees that provide habitat for some animals. Wildlife use of small ponds on Grassy Island has not been fully characterized.

The quality of existing habitats for production of fish and wildlife is low on Grassy Island due to the monotypic dominance of giant reed grass and exposure to dredged sediments. The quality of habitat on the shoals surrounding Grassy Island is medium due to contamination of river bottom sediments. The condition of historic fish spawning grounds on the shoals is unknown.

Figure 6: Historic Vegetation of the Lower Detroit River and Lake Erie Shoreline

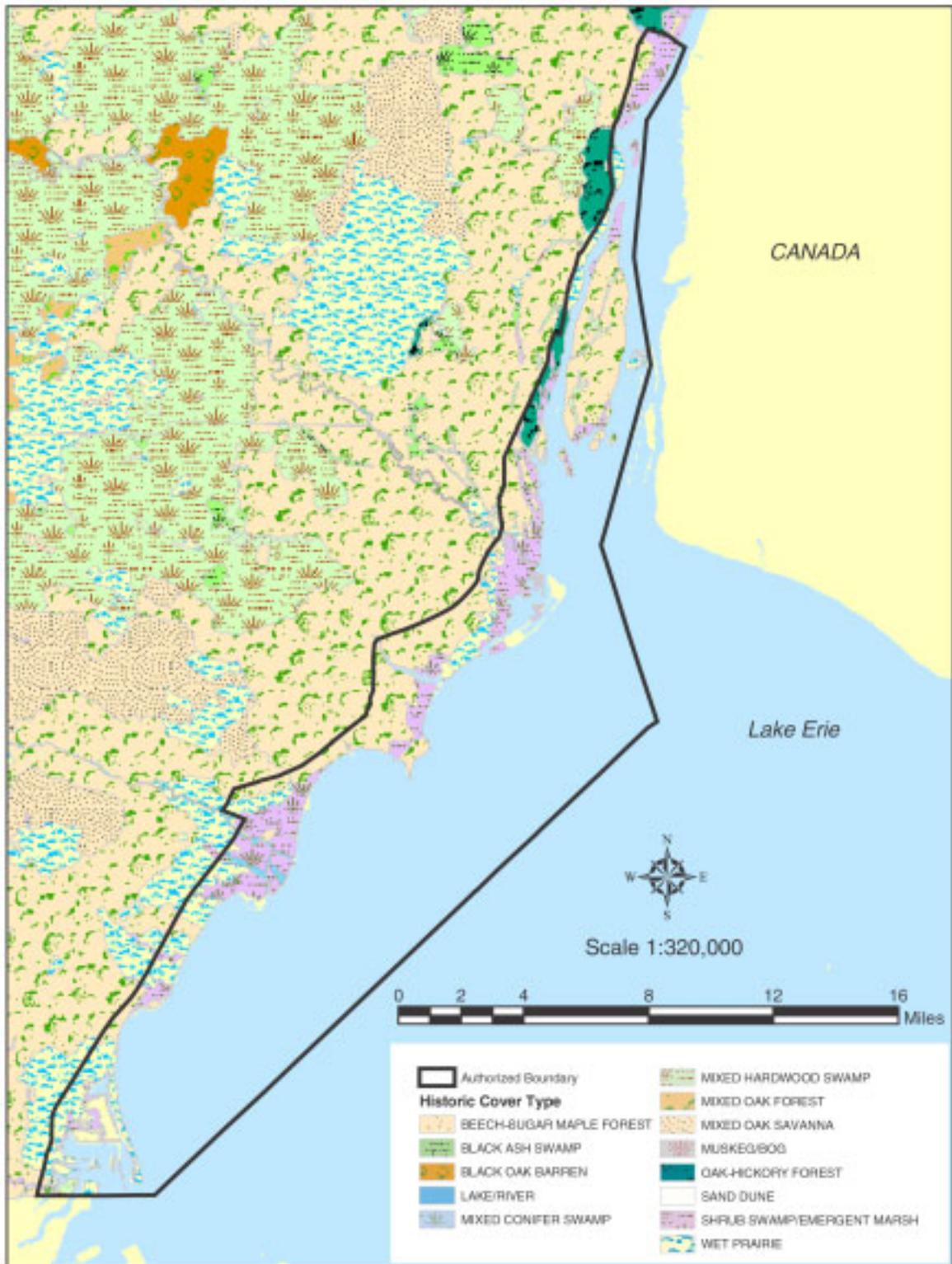
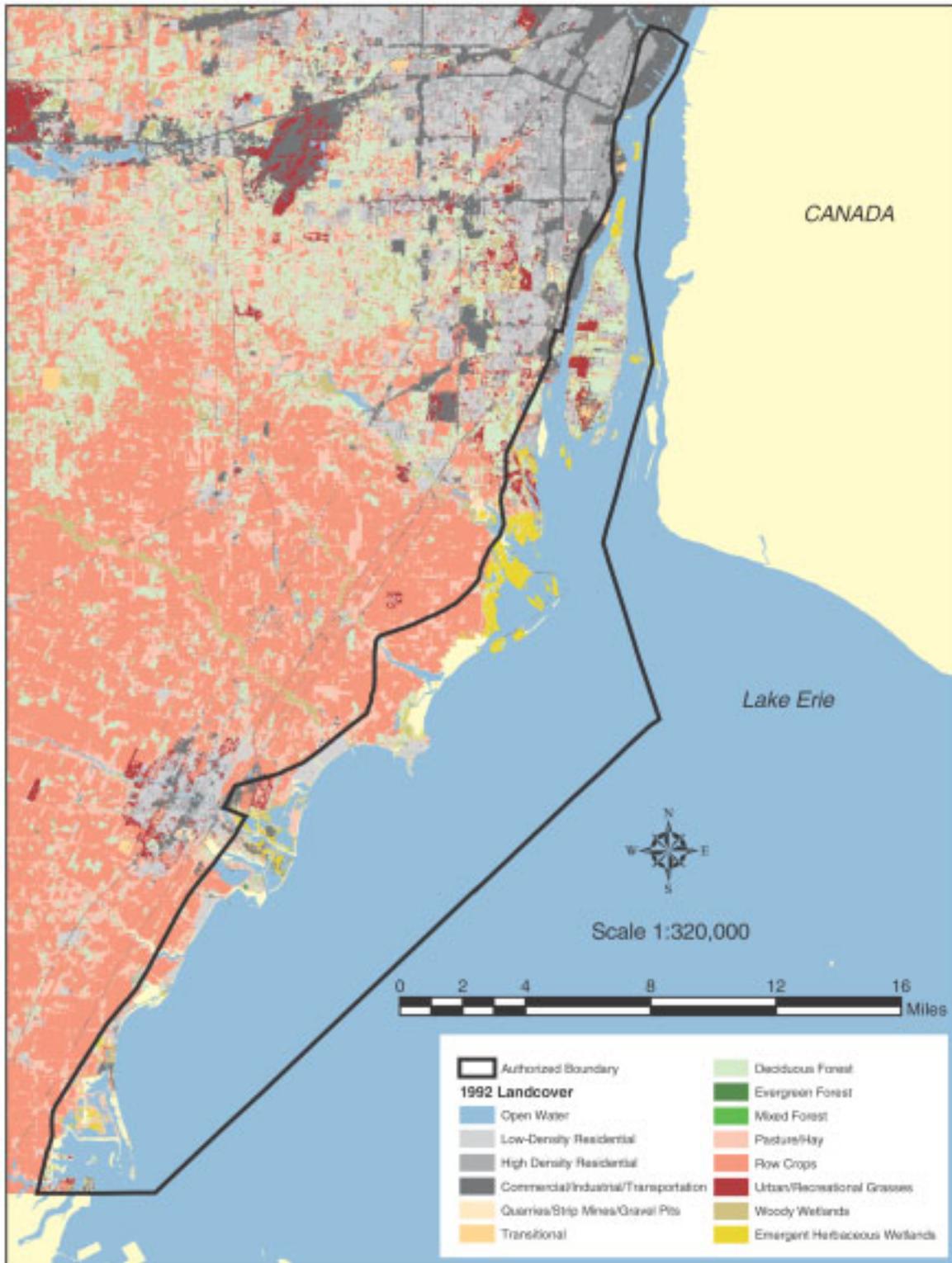


Figure 7: Landcover (1992) of the Lower Detroit River and Lake Erie Shoreline



Approximately 75 percent of Mud Island is forested with more than 20 years growth of deciduous hardwood trees, dominated by red maple, silver maple, white ash, cottonwood and willow. Its surrounding shoals are, on average, 2 feet in depth and support aquatic species such as wild celery.

Calf Island is an 11-acre, uninhabited island in the Trenton Channel of the Lower Detroit River that was added to the Refuge in 2002. Its upland habitat consists of bottomland hardwoods. It has a sheltered, shallow, emergent marsh on the northeast portion of the island. A long, narrow, shallow bar extends off the southeast end of the island and provides ideal habitat for water celery, an important food for waterfowl.

## Fish and Wildlife

### Waterfowl

The coastal marshes of western Lake Erie and lower Detroit River have provided habitat for the highest concentration of staging American Black Ducks in North America, with an annual average peak of 51,500 birds before American Black Duck numbers declined in the 1950s. The area contains extensive feeding and nesting habitats for waterfowl. The Pointe Mouillee State Game Area attracts and holds 20,000 ducks during peak migration in the fall (Robison, Pers. Comm.). More than 300,000 diving ducks stop each year to rest and feed on beds of wild celery in the Lower Detroit River during fall migration. The lower Detroit River is designated as an Important Bird Area that is globally significant as a site for congregating waterfowl. On average, more than 8,261 Canvasback and 7,000 Common Mergansers are recorded each year during the annual Christmas Bird Count centered on Rockwood, Michigan. More than 3 million waterfowl are estimated to migrate through the Great Lakes area annually. In addition, Canada Geese have increased statewide at an average rate of 14 percent per year since the 1970s and are now very common throughout the Refuge.

Extensive beds of aquatic vegetation, particularly wild celery, historically attracted large concentrations of divers, primarily canvasback and scaup. However, in the past 100 years discharges from industrial plants and municipal sewage effluent along with the effects of large, deep draft vessels have degraded the lower Detroit River ecosystem, thus resulting in the substantial decline of these preferred foods. Remnants of the once vast rafts of migratory waterfowl can still be found in the aquatic vegetative beds surrounding some of the islands in the Detroit River.

**Table 1: November Waterfowl Survey Results for the Lower Detroit River and Northern Portion of Lake Erie (Kafcas and Robison, 2002)**

Year	Canvasback	Scaup	Bufflehead	Merganser	Goldeneye	Redhead	Total
1995	11,150	800	-	275	-	1,500	13,725
1996	400	675	50	400	75	-	1,600
1997	11,250	14,450	20	50	50	400	26,220
1998	750	10,000	150	515	50	800	12,265
1999	600	16,200	20	560	20	100	17,500
2000	40	15,000	-	-	-	-	15,040
2001	-	17,020	20	-	100	-	17,140
2002	-	4,780	20	200	-	-	5,000

**Table 2: Historic Aerial Count-estimates of Waterfowl on the Lower Detroit River from the Ambassador Bridge to lake Erie (Miller, 1961)<sup>1</sup>**

Year	Winter	Spring	Pre-season Fall	Mid-season Fall	Post-season Winter
1950	23,400	14,000	12,200	7,700	73,500
1951	28,000	21,900	5,300	56,000	63,500
1952	15,100	21,400	5,000	90,200	91,000
1953	45,000	41,000	4,400	30,000	95,000
1954	44,300	55,000	7,000	293,000	54,000
1955	48,400	70,100	4,500	217,000	24,500
1956	19,900	25,300	6,500	43,700	38,500
1957	51,300	41,600	4,850	17,500	41,050
1958	37,300	-	-	29,700	-
1959	86,400	-	-	7,550	-
1960	38,260	-	-	5,470	-
1961	10,300	-	-	-	-

*1. Dashes indicate years when the census was discontinued.*

During the November counts conducted by the Michigan DNR Wildlife Division, a large amount of waterfowl are seen in the area. In the fall, there appears to be more waterfowl activity in the south end of the River, south of Grosse Ile than in other parts of the Refuge. In the fall the birds may be moved from the area because of hunting pressure and other activity. However, there is a good deal of hunting activity and success at the Canard River Refuge, which is in Canada across the river from Grassy Island. In the winter, the waterfowl seem to spread out more widely along the Detroit River and Western Lake Erie. In the winter of 2003, large rafts of Canvasbacks were seen in the Detroit River on the American side and Canadian side. One raft of canvasbacks was estimated at 2,800 birds along Mud Island (Robison, January waterfowl count, 2003).

The shallow, open waters of the Detroit River are an important waterfowl wintering area. Thousands of Mallards, Black Ducks, Canada Geese and swans were observed resting and feeding in the nearshore waters of Grassy and Mud islands during a site visit in early February 2003 (Spencer, Pers. Comm.).

#### Other Bird Species

A wide variety of wading and shorebirds can be found within the Refuge area. The Lake Erie shoreline has been recognized as a Site of International Shorebird Importance. In 2000, 26,000 shorebird observations were made during the months of July, August and September at the Pointe Mouillee State Game Area by professional bird observers (Robison, Pers. Comm.). Shorebirds represent an especially important group of vertebrates that depend upon wetlands. Pointe Mouillee has been designated a Western Hemispheric Shorebird Reserve Network site.

There are several active Bald Eagle nests within the authorized Refuge boundary, including two active nests in Wayne County and five active nests in Monroe County. The Bald Eagle is listed on both the federal and state list of endangered species. In January 1999, 52 Bald Eagles were observed along the river and Lake Erie shoreline during Michigan DNR's annual waterfowl survey.

Peregrine Falcons can be found in and around the Refuge. The diet of the Peregrine Falcon includes a wide variety of small birds, including pigeons, seabirds, shorebirds and songbirds. The 2001 surveys found nine nesting pairs in Michigan, including five in the southeast region, one in Lansing and three in the Upper Peninsula.



*Sharon Cummings*

Ring-necked Pheasant, Northern Bobwhite Quail, Red-winged Blackbird, Canada Goose, Tundra and Trumpeter Swans, American Woodcock, Common Tern, Black-crowned Night Heron, Great Egret, Wood Duck, Mallard, Blue-winged Teal, Common Loon, and many species of songbirds can also be found in the region. A complete list of bird species observed in the area can be found in Appendix E.

#### Mammals

Several species of mammals are found within the Refuge ecosystem. Common species include muskrat, mink, raccoon, eastern cottontail, woodchuck, opossum, skunk, white-tailed deer, coyote, gray fox, fox squirrel, and several mole and mice species. A few years ago, a family of river otter was seen near the lower Detroit River. Beaver have recently returned to nearby Livingston, Oakland, and Washtenaw counties. Mammals are most abundant in and around wetland habitat due to the abundant food and cover that wetland habitats provide.

#### Threatened and Endangered Species

Several pairs of Bald Eagles, a federally-listed threatened species, nest and feed along the Detroit River and western Lake Erie basin. The Northern riffleshell, a federally-listed endangered mussel, has not been documented in the Detroit River but may occur on island shoals.

Several state-listed threatened species have been associated with the Detroit River ecosystem, including pugnose minnow, small-mouthed salamander, Osprey and Common Tern. The spotted turtle was recorded in the Michigan Natural Features Inventory in 1997. Additional state-listed species such as the lake sturgeon and Eastern fox snake are discussed in the following paragraphs.

#### Fish

The lower Detroit River and western end of Lake Erie support a diverse assemblage of fishes including over 60 species of resident and migratory fish (Appendix L). In addition to approximately 34 resident species in the Detroit River, the high diversity is enhanced by an additional 28 species that use the river as a migratory pathway between Lake Erie, Lake St. Clair, and Lake Huron, and stop in the river for spawning, feeding, and nursery grounds (Manny et al. 1988). The high diversity of fishes is partially attributable to the variety of

habitats: deep channels, shallow-water nearshore, and the land-water edge, including river shorelines, island shorelines, and coastal wetlands.

Although the current fish community is diverse, it has changed dramatically compared to the historic fish community. A number of native species have either disappeared or their numbers have been severely reduced. Examples include lake trout, sauger, blue pike, lake whitefish, lake herring, and lake sturgeon. Contributing factors to these losses include overfishing, habitat loss, and the introduction of exotic species.

Lake sturgeon once spawned on the rocky bottom in swift currents just northeast of Grassy Island, one of seven historic spawning areas in the Detroit River (Figure 8). This fish is listed as “threatened” by 19 of the 20 states in its original range, and by seven of the eight Great Lakes states, including Michigan. Recent, incidental catches of genetically unique, juvenile lake sturgeon in Lake Erie near the Detroit River suggest that lake sturgeons are reproducing again in the Detroit River. More than 10 million walleye, white bass, steelhead, and salmon migrate through the Detroit River each year and attract many anglers to the Refuge area.

### Reptiles and Amphibians

Reptiles within the Refuge include turtles and snakes. Amphibians include frogs, toads, and salamanders. Reptiles and amphibians are important to study because they are sensitive to subtle environmental changes such as water quality or ozone depletion in the atmosphere that permits more ultraviolet light to reach the earth from the sun. As “environmental indicators,” reptiles and amphibians help us to monitor these and other changes that may eventually be harmful to us. The Eastern fox snake (*Elaphe vulpina gloydi* Conant) is listed on the state’s list of endangered species.



Frank Durbian

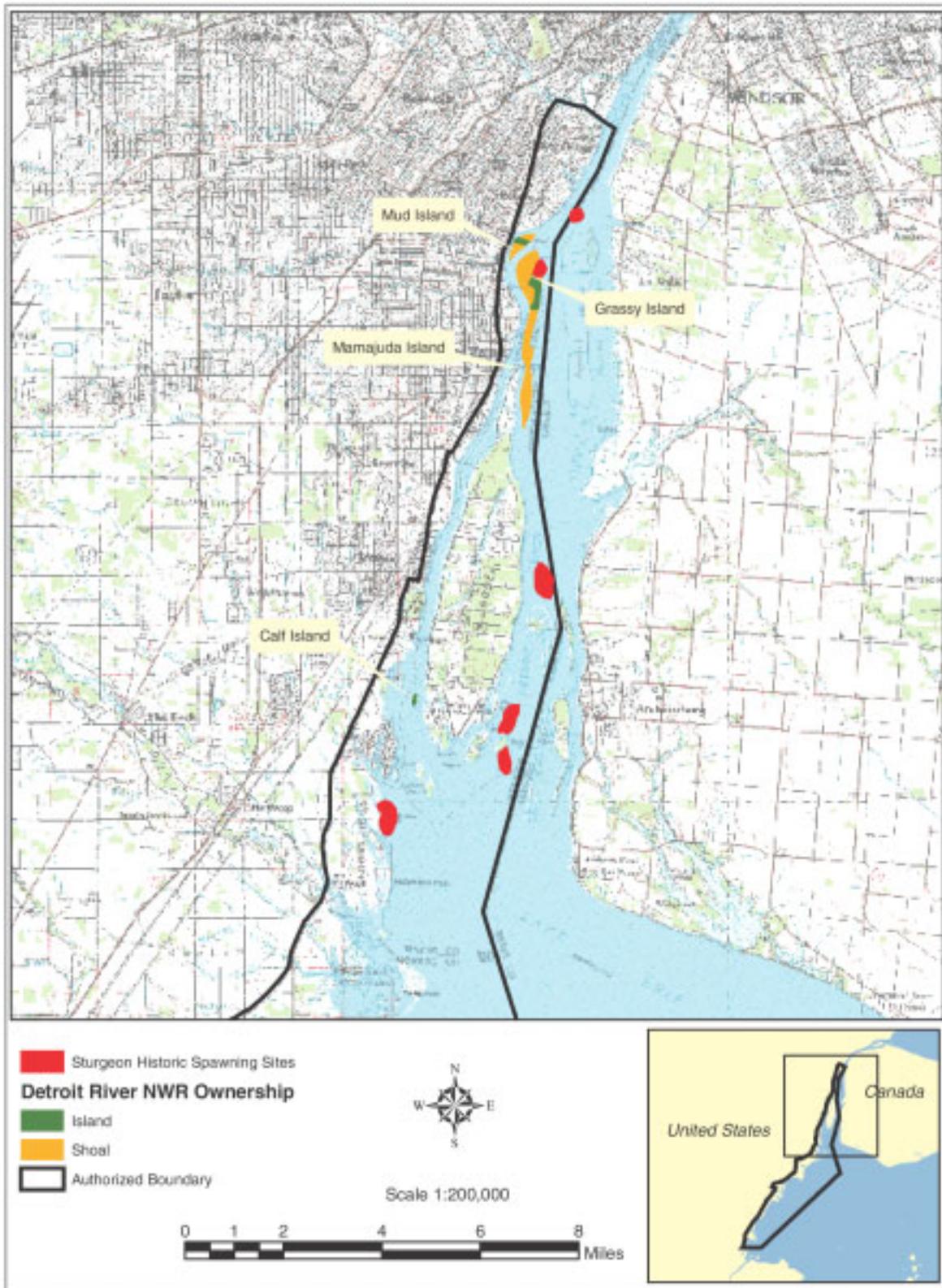
The eastern fox snake can be found throughout the region. Special management considerations should be considered for this species. Another state-listed threatened species found within the Detroit River environment is the spotted turtle (*Clemmys guttata*). Volunteer frog and toad surveys are conducted within the region. The data that is collected is submitted to the Michigan DNR Natural Heritage Division, which uses the data to monitor the frog and toad populations in the State of Michigan.

### Environmental Contaminants

The Detroit River has experienced over a century of heavy contaminant discharges from industry and municipalities. The sources of contaminants vary and include: nonpoint sources such as stormwater runoff and air deposition, combined sewer overflows, municipal and industrial point sources, tributaries, sediments and upstream inputs (MDEQ 1996). The quality of the Detroit River ecosystem is closely connected to the high water volume flowing from Lake Huron, St. Clair River, and Lake St. Clair. The primary contaminants have been cadmium, copper, lead, mercury, zinc, and polychlorinated biphenyls (PCBs) (UGLCCS 1988), but other contaminants also have been identified.

Many contaminants, such as PCBs and mercury, can bioaccumulate and biomagnify. Therefore wildlife, especially those that eat fish or fish-eating animals, such as Bald Eagles

Figure 8: Historic Spawning Sites for Lake Sturgeon in the Lower Detroit River



and mink, can contain high levels of these contaminants. Wildlife can be adversely affected by these contaminants if they are exposed to a high enough dose. Polynuclear aromatic hydrocarbons (PAHs) have been shown to be carcinogenic, mutagenic, or teratogenic to a wide variety of organisms, including fish and other aquatic life, amphibians, birds, and mammals (Eisler 1987a). In general, PAHs show little tendency to biomagnify in food chains, despite their high lipid solubility, probably because most PAHs are rapidly metabolized. Contaminants such as cadmium and mercury have been shown to adversely affect growth, reproduction, development, behavior, and learning of various wildlife species (Eisler 1985; Eisler 1987b). Additionally, these compounds are known to be teratogenic and carcinogenic. PCBs elicit a variety of biologic and toxic effects including death, birth defects, reproductive failure, liver damage, tumors, and a wasting syndrome (Eisler 1986).

Concern about contaminants in water and sediments has resulted in restrictions in the uses of the Detroit River. These restrictions include degraded fish populations, fish tumors or other deformities, bird or animal deformities or reproductive problems, and fish and wildlife consumption restrictions.

Improvements in water and sediment quality have occurred during the past three decades. The long-term trends of lead, copper and zinc concentrations in the water show distinct decreases from 1981 through the present (MDEQ 1996). Although the sharpest declines were observed through the mid-1980s, fairly uniform concentrations have been observed since that time. Water quality trend data for concentrations of mercury and PCBs are not continuous or readily available, but appear to show decreases over time.



*U.S. Fish & Wildlife Service*

The importance of and distinct linkage among discharges, water quality and sediment quality is recognized as sediments act as a repository for discharged contaminants. Sediment surveys that can be compared on a river-wide basis were conducted in 1970, 1980, and 1991 (Hamdy and Post 1985). These surveys showed that concentrations of mercury and other heavy metals distinctly declined between 1970 and 1980. Between 1980 and 1991, however, little change in concentrations was exhibited. In some cases, increases were observed or the findings were mixed, depending on the contaminant and location. Concentrations of PCBs in sediments exhibited a slight decrease throughout the system between 1980 and 1991. In general, sediments in the U.S. sector of the river were considerably more contaminated than on the Canadian side.

The Detroit River has recovered from the extremely high levels of pollutants in sediment and water. There is little doubt that the environmental quality of the river improved considerably from the early 1950s when pollutants were released into the river with few or no abatement programs, to the middle 1980s when pollution control programs had been implemented.

In 1999 an extensive survey of the sediments of the Detroit River was conducted by the Great Lakes Institute for Environmental Research at the University of Windsor, with the financial support of the Sustainability Fund managed by Environment Canada. Unlike earlier surveys, which assessed environmental quality only in areas suspected of being polluted, the 1999 survey addressed the overall environmental quality of the river. This

river-wide study provided many insights about how the Detroit River functions as an ecological system.

The 1999 study revealed important facts about current mercury distribution in the Detroit River. The historic pockets of high concentration no longer exist; instead mercury is now distributed quite evenly throughout the river. For PCBs, the situation is similar. Unlike mercury, however, where the major sources were upstream in the St. Clair River, inputs along the shoreline of the Detroit River have dominated PCB loadings. Both PCBs and mercury are persistent chemicals; they bioaccumulate to increasingly higher concentrations in the food web and are recognized to be very toxic.

The final example of chemicals in sediment is PAHs. This is a complex group of chemicals, many of which can be metabolized to produce very potent carcinogens. The PAHs in Detroit River sediment are associated with the development of tumors in fish such as the brown bullhead. Definite efforts have been made to control loadings of PCBs and mercury. Some concerns remain about PAH loadings, which may come from oils placed in sewer systems, released into the atmosphere by diesel trucks and other incomplete carbon combustion processes, or leaching from uncontrolled industrial or municipal coal yards along the shoreline not associated with controlled and permitted energy industry facilities.

#### Contaminants in Fish

A review of fish consumption guidelines shows that there has been little change in the level of contaminants found in tested fish (Ministry of the Environment, 1987-1999). This supports other data that indicates the Detroit River recovery has plateaued in recent years.

Many fish species move long distances in search of prey and spawning habitat. The majority of walleye in the Detroit River are known to move upstream from Lake Erie, through the river, and on to Lake St. Clair to feed and spawn. Mercury levels have decreased in Lake St. Clair walleye since the 1970s, although levels have been variable in recent years and the trend is less clear. The same is true for the western basin of Lake Erie, but the total mercury levels are higher in Lake St. Clair walleye. The trend for mercury levels in walleye and other fish is similar to the trends of mercury levels in Detroit River sediments; high in the 1970s, declining in the 1980s, and fluctuating in the 1990s. This supports the conclusion that sediments are a major source of contaminants, including mercury, and levels of contaminants in sediments appear to be dictating contaminant levels throughout the Detroit River system.

The State of Michigan has issued Fish Consumption Advisories for the Detroit River and Lake Erie for walleye, drum, carp, catfish, northern pike, redhorse suckers and yellow perch. Mercury is the primary contaminant of concern although PCBs and Dioxin can also accumulate in these fish. The Michigan Department of Community Health advises extra caution about eating Michigan fish for women of childbearing age and children under 15. Between 1977 and 1982, PCB levels declined in Lake Erie walleye but have shown no changes beyond 1982. Although low enough not to restrict consumption, PCB levels for many species remain above the guidelines to protect fish and wildlife.

Studies suggest that organic chemicals, including PCBs, pesticides, and PAHs, could be having toxic effects on bottom-dwelling fish, such as carp and channel catfish. Although PAHs metabolize quickly and are not found in fish flesh, they may still have an adverse effect on fish, e.g. tumors in bullheads.

#### Contaminants in Benthos

Bottom-dwelling organisms, also called Benthos, are a vital food source for many fish species. Benthos also serve as useful indicators of water and sediment quality. Over 300 species of benthic organisms have been recorded in the Detroit River. Predominant species

include worms, midge larvae, snails and clams, mayfly nymphs and caddisfly larvae (Manny et al. 1988). Net-spinning caddisflies, virtually absent from the river during 1930-1977, have been steadily increasing in numbers throughout the last 20 years. The recent presence and increase of mayflies also indicates an improvement in water quality. However, in some areas of the Detroit River, such as the Trenton Channel, benthic communities still indicate degraded water and sediment quality conditions. (Cibrowski 2001)

#### Contaminants in Wildlife

The long-term monitoring of Herring Gull eggs provides one of the most complete and consistent databases for assessing PCB levels and ecosystem trends within the Detroit River-western Lake Erie basin. Concentrations of PCBs in Herring Gull eggs collected from sites in the Detroit River and Western Lake Erie have exhibited a significant decline since the mid-1970s, but no significant change since 1996 (DRCCC 1999).

Herring Gulls feed on fish. Their primary food source is freshwater drum, a bottom dwelling species that in turn feeds on zebra mussels, which are known to accumulate high levels of contaminants. A decline in contaminant levels in Herring Gulls suggests that contaminant levels in freshwater drum and zebra mussels are also declining.

One study conducted on ducks in the Detroit River concluded that the Detroit River/western basin of Lake Erie corridor is a major source of contamination to migrating ducks, due to the abundance of highly contaminated zebra mussels which ducks eat (Mazak et al. 1997). The study made no conclusions regarding the effects of the contaminants on duck populations.

## The Detroit River Remedial Action Plan

The International Joint Commission has identified 43 Areas of Concern throughout the Great Lakes Basin. These Areas exceed environmental standards and contain significant pollution from heavy metals and toxic chemicals, as well as bottom sediments that are heavily contaminated. The Detroit River has been named as a bi-national Area of Concern. In 1985, the Great Lakes Water Quality Board of the International Joint Commission called for Remedial Action Plans to initiate clean up of Areas of Concern. The U.S. Environmental Protection Agency and the Michigan Department of Environmental Quality were chosen as the lead agencies in a Remedial Action Plan (RAP) for the river.

The Remedial Action Plan, completed in 1996, states that the Detroit River will be restored for 14 beneficial water uses identified as being impaired. Some of these beneficial water uses include: drinking water consumption; taste and odor quality; fish and wildlife habitat; wetlands; and, degraded fish and wildlife populations. The Detroit River Remedial Action Plan Report identified the specific requirements necessary to control existing sources of pollution, eliminate environmental contamination, and restore the Detroit River to ecosystem health. The Remedial Action Plan was developed through a large stakeholder effort in three stages:



*U.S. Fish & Wildlife Service*

1. Stage 1 defined and outlined the nature of the pollution problems. It included a detailed definition of each beneficial use impairment and the geographic extent of these impairments. For example, the Detroit River Area of Concern was defined to extend from the mouth of the River at Peche Island to the end of Grosse Ile at the entrance to Lake Erie.
2. Stage 2 was an evaluation of both the improvements to be put into place as well as the alternative, additional measures to restore the beneficial uses of the Detroit River and define a schedule for their implementation. The industries, municipalities and agencies responsible for improvement measures were also identified.
3. Stage 3 is the ongoing process for evaluating the improvement measures that have been identified in Stage 2 as well as progress on implementing the Remedial Action Plan. This includes a description of surveillance and continuing monitoring techniques that will be used to track the effectiveness of the action plan; and, confirmation of the restoration of the beneficial uses.

The Detroit River IWR Comprehensive Conservation Plan will help to fulfill or augment a number of recommendations called for in the 1996 Report, including: No. 2, develop a habitat management plan for the Area of Concern; No. 7, provide more effective protection to the migratory birds and their habitat; and No. 16, improve communication among the public, local governments . . . to preserve and protect existing habitat in the Area of Concern.

## Grassy Island Remediation

Grassy Island is a 72-acre island in the Detroit River, situated between the City of Wyandotte and Fighting Island, and north of Grosse Ile. In 1961, Congress declared Grassy Island and the surrounding shoals as Wyandotte National Wildlife Refuge. The U.S. Army Corps of Engineers (ACOE) used this island as a confined disposal facility (CDF) to deposit contaminated sediments dredged primarily from the Rouge River. The CDF consisted of two cells surrounded by dikes. Dredged material was hydraulically pumped as a slurry into the receiving cells and allowed to settle. The resulting water was discharged back into the river via an overflow weir. From the years 1961 to 1983, over three million cubic yards of dredged sediments were deposited into Grassy Island.

Because the Grassy Island CDF preceded Public Law 91-611 (1970), which initiated the Great Lakes-wide CDF program, it lacks the confinement technology employed in later CDF designs. This CDF was constructed without liners and caps and the sand and clay dikes were unprotected by riprap. The original dikes were raised in the 1960s and capacity was further expanded in 1971. The Detroit District of the ACOE operated and maintained the CDF until it was filled in 1982. In 1985 and 1986, the ACOE repaired and reinforced the dikes adjacent to the navigation channel with filter cloth and riprap to prevent their failure from riverine and navigational forces. Both cells remain uncapped and polluted sediments are exposed over much of the CDF.

In 1987 Beyer and Stafford surveyed nine CDFs throughout the Great Lakes, including the Grassy Island CDF. They found that soils within the vegetated portions of the Grassy Island CDF contained some of the highest levels of PCBs, mercury, and other heavy metals. They also found levels of chlordane, and eight PAH compounds that exceeded criteria for exposure by direct contact. Earthworms associated with this soil showed positive bioaccumulation of several of the heavy metals.

In 1987, the U.S. Fish and Wildlife Service's East Lansing Field Office began to identify and quantify contaminants in the sediments of two small ponds that were present. They also quantified contaminant residues in birds using all habitats on Grassy Island. They found PCB and DDT levels in the flesh of waterfowl and Woodcock on the island exceeded U.S. Food and Drug Administration Tolerance Levels.



*Sharon Cummings*

In 1997, the U.S. Geological Survey's (USGS) Biological Resources Division investigated contamination of surface soils on Grassy Island and of wild celery tubers growing on shoals surrounding the island. In the same year the USGS's Water Resources Division and the U.S. Fish and Wildlife Service investigated groundwater movements around the island and contaminants in subterranean soils and water. These studies showed that contamination exists in the surface soils on the island, there is little contamination of the wild celery tubers, and there is a low level of contaminants in the sediments outside the CDF.

As the Grassy Island CDF was constructed without an impermeable liner or cap, the Service is concerned that wildlife in direct contact with island are being exposed to contaminants, and that contaminants may be "leaking" into the Detroit River. The Service is currently moving forward on plans to more fully characterize the risks from the identified contaminants and evaluate the feasibility of several approaches to both remediate contaminant risks and enhance long-term benefits of the area for fish and wildlife.

With the designation of the Detroit River as an American Heritage River, the remediation of the contaminants found on Grassy Island could be used as a model to encourage others to remediate contaminated sites found throughout the Detroit River area, including Canada.

## Cultural Resources

As part of its larger conservation mandate and ethic, the Service, through the Refuge Manager, applies the several historic preservation laws and regulations to ensure historic properties are identified and protected to the extent possible within established Refuge purposes and the Refuge System mission.

Cultural resources management is the responsibility of the Regional Director and is not delegated for the Section 106 process when historic properties could be affected by Service undertakings, for issuing archeological permits, and for Indian tribal involvement. The Regional Historic Preservation Officer (RHPO) advises the Regional Director about procedures, compliance, and implementation of the several cultural resources laws. The Refuge Manager assists the RHPO by providing early notification about Service undertakings that could affect historic properties. Also, assistance is provided by protecting archeological sites and historic properties on Service managed and administered lands, by monitoring archeological investigations by contractors and permittees, and by reporting violations.

The Refuge Manager will, with the assistance of the RHPO, develop a step-down plan for surveying lands to identify archeological resources and for developing a preservation program to meet the requirements of Section 14 of the Archaeological Resources Protection Act and Section 110(a)(2) of the National Historic Preservation Act.

Archeological investigations and collecting are performed only in the public interest by qualified archeologists or by persons recommended by the Governor working under an Archeological Resources Protection Act permit issued by the Regional Director. The Refuge Manager must find this third-party use of Refuge land to be compatible. The requirements of the Archeological Resources Protection Act apply to Service cultural resources contracts; the contract is the equivalent of a permit. In addition, the Refuge Manager also issues a special permit. Refuge personnel take steps to prevent unauthorized collecting by the public, contractors, and Refuge personnel; violators are cited or other appropriate action taken. Violations are reported to the RHPO.

## Special Topics

### Jurisdiction on Navigable Waterways

The designation of an authorized boundary for the Refuge did not supercede any water rights or obligations of the State of Michigan or riparian landowners.

The following section was provided by the Michigan DNR for general information purposes:

The Detroit River falls under the Inland Lakes and Streams Act, 1972 PA346. That means the bottomlands of the Detroit River are owned by Riparian owners. "Riparian rights," as defined in the act, means all the rights accruing to the owners of riparian property, including the following rights, subject to the public trust:

- # Access to the navigable waters.
- # Dockage to boatable waters, known as wharfage.
- # Use of water for general purposes, such as bathing and domestic use.
- # Title to natural accretions.

Lake Erie's jurisdiction falls under the Great Lakes Bottom Lands Act, 1955, PA 247. The bottomlands are owned by the State of Michigan. The Michigan Supreme Court has determined that title to the submerged lake bottomlands of the Great Lakes within the boundary of Michigan is held in trust by the State for the use and benefit of all the people. The State cannot dispose of the public rights in these lands such as the public rights of hunting, fishing, and navigation, but it may, under authority delegated by the State Legislature, dispose of proprietary interests such as leasehold interests. Michigan's Submerged Lands Program began in 1955 with the passage of the Great Lakes Submerged Lands Act. The Public Trust Doctrine gives the state authority to manage but also to protect the public's fundamental rights to use the property.

Michigan courts have determined that private uses of the bottomlands and waters, including the riparian rights of waterfront property owners, are subject to the public trust. In other words, if a proposed private use would adversely impact the public trust, the State of Michigan's regulatory authority requires that the proposal be modified or denied altogether in order to minimize those impacts.

### Coast Guard Memorandum of Understanding

In 1964, the U.S. Coast Guard raised some questions about its rights and privileges on Grassy Island and Mamajuda Island to erect and maintain navigational aids. In a memorandum of understanding, the Service and the U.S. Coast Guard agreed that the Coast Guard has the right and privilege to operate, maintain, and relocate aids to navigation

on Grassy and Mamajuda islands, including the right of ingress and egress for servicing the aids (See Appendix F). The Coast Guard has been maintaining and replacing navigational aids on the Refuge throughout the years.

## **Wilderness Review**

The Detroit River and Lake Erie shorelines have supported agricultural, industrial and residential uses for more than three centuries. However, as part of the CCP process, we reviewed lands within the legislative boundaries of the Refuge for wilderness suitability. No lands were found suitable for designation as Wilderness as defined in the Wilderness Act of 1964. The Refuge does not contain 5,000 contiguous roadless acres nor does it have any units of sufficient size to make their preservation practicable as Wilderness. In addition, lands to be acquired for the Refuge have been substantially affected by humans.