HABITAT PROTECTION AND REMEDIATION, DETROIT RIVER

Final Completion Report for :

U.S. Environmental Protection Agency
Water Division, Region 5, WS-15J
77 West Jackson Blvd.
Chicago, Il 60604

EPA IAG Identification Number: DW-94793801 - 1

Parent Project No. DW-14-94793801-1

Project Period: 08/15/99 to 12/31/2002
Effective Date: 10/1/1999
Original Termination Date: 7/31/2001
(Extended at no cost to 12/31/2002)

EPA Project Officer: Paulette Foreste/Dorthy Wormbly
Ph: 312-886-9736

Total Amount Authorized in this Agreement: $145,000
EPA Amount Authorized for FY 2000: $80,000

USGS Project Manager:
Dr. Bruce A. Manny
U.S. Geological Survey
Great Lakes Science Center
1451 Green Road, Ann Arbor, MI 48105
Ph: 734 214 7255
Fx. 734 994 8780
Email: bruce_manny@usgs.gov

USGS/BRD Agreement No. 2000-3208-ARH60
Customer Number: 8000007811-0

Detroit River Candidate Sites for Habitat Protection and Remediation

I. Executive Summary

An inventory of physical characteristics of remaining habitat for fish and wildlife in Michigan waters of the Detroit River was conducted. Green areas (Candidate Sites) in and near Detroit River along the Michigan shore that were visible in natural-color, low-altitude aerial photography taken in 1996, were identified for further examination, using a Geographic Information System (GIS; "MrSID") provided by the Army Corps of Engineers (ACOE). Each candidate site was further investigated and characterized through the use of other photographic images, information provided by local area residents, and field surveys. Field surveys included establishing the geographic location of each site and observations from a boat on public waters and from public rights of way, were recorded on a field form. Private property rights were carefully respected in all aspects of the study. One hundred and four candidate sites possessing potential for protection and remediation were investigated further by examination of existing public records, including tax statements, zoning maps, plat books, soil types, and field surveys of land forms, habitat characteristics, fish and wildlife resources observed, and photographs taken at each site. After analysis of all available data, all candidate sites were placed into one of two categories: (1) functional habitats to be protected from impairment, and (2) impaired, nonfunctional, habitats to be remediated or enhanced. All candidate sites in each of the two categories were ranked in priority for protection or restoration using existing criteria in a Canadian report titled Survey of Candidate Sites on the St. Clair and Detroit Rivers for Potential Habitat Rehabilitation/Enhancement. Application of those criteria ensured consistent, compatible evaluation of all candidate sites in the Detroit River on the same basis. Products of the project included: a spread sheet of 36 attributes of each the 104 candidate sites; a photo record showing at least one digital image of each site, two scientific posters showing the location, size, and attributes of the 104 candidate sites; a metadata showing all sources of information included in this project; a GIS integrating all elements of the study, and this completion report. This report ranked all 104 sites using an existing scoring system in priority of each functional and impaired site for protection and remediation, respectively, based on cost/benefit, design simplicity, partnerships, land ownership, educational potential, habitat type or purpose, existing measures available to protect the 53 functional sites and existing techniques that could remediate the 51 impaired sites. All aspects of the study were closely tied to objectives and goals of the 1996 Detroit River Remedial Action Plan, particularly Recommendation 1 under Objective #1, to Develop a Habitat Inventory for the Detroit River Area of Concern.

II. Introduction

The Detroit River links the colder, deeper, and sparsely populated upper Great Lakes region (Lakes Superior, Michigan and Huron) and the warmer, less deep, and more densely populated lower Great Lakes region (Lakes Erie and Ontario). It also links St. Clair Flats, the largest freshwater delta in the Great Lakes, to Lake Erie, the most productive of the Great Lakes. Last, the river connects residents of the area with thousands of miles of high-quality Great Lakes water, is a vast fish spawning ground (Goodyear et al. 1982), and provides one of the Nation's most productive sport fisheries for walleye, bass, and muskellunge.

Scientists have demonstrated that the Detroit River is an important migration route for fish, birds, and insects. This includes the 117 species of fish that inhabit the Great Lakes (Manny et al. 1988); 27 species of waterfowl that frequent Michigan's coastal wetlands (Prince et al. 1992); at least 17 species of raptors, including eagles, hawks, and falcons, and 48 species of non-raptors, including loons, warblers, neo-tropical songbirds, cranes, and shore birds; and numerous species of dragonflies and butterflies that migrate south from Canada each year (Holiday Beach Observatory 1997a, 1997b, 1998). Because it is at the intersection of two major flyways, the river is a migration route for a wide variety of bird life (see Hartig 2003, Chapter 9). In the North American Waterfowl Management Plan, the Detroit River was identified as "significant, international, waterfowl habitat of major concern". The river was nominated as a focus area for habitat restoration by the U.S. Fish and Wildlife Service and as a Biodiversity Investment Area by the U.S. Environmental Protection Agency (Rodrigues and Reid 2001). It was also recognized as an important staging area for ducks by the North American Migratory Bird Commission. Partly for these reasons, President Clinton designated the Detroit River as the Nation's sixth American Heritage River (see Hartig 2003, Chapter 13).

The loss of coastal wetlands and other habitat in the Detroit River has been rapid. First explorers like Father Hennepin and Antoine Cadillac described the river as a pristine “paradise” with abundant edible fruits, lush meadows, forests, fish and wildlife (see Hartig 2003, Chapter 3). In 1815, the river shoreline consisted of a coastal wetland up to a mile wide along both sides of the river (Figure1). Vegetation types included submersed marsh, emergent marsh, wet meadow and shrub swamp, swamp forest and lakeplain prairie. Since 1815, the Detroit River ecosystem has undergone dramatic changes. Habitats for fish and wildlife are now degraded by contaminants, largely destroyed by shoreline and channel modifications, and greatly reduced in abundance and quality from historic levels. The largest habitat change has been encroachment into the river and hardening of the shoreline by the addition of sheet steel, cement walls and fill material. Analysis of Figure 1 revealed 10.687 square miles (2,768.02 hectares) of coastal wetlands were present on the Michigan mainland in 1815. Analysis of 1982 landsat photographs (Figure 2) revealed only 0.1165 square miles (25.46 hectares) of coastal wetlands remained on the Michigan mainland, mostly in the vicinity of Humbug Marsh. Between those dates (167 years), more than 99% of the coastal wetlands present in 1815 along the Michigan mainland were converted to other land uses. Other losses of habitat included removal of bedrock limestone spawning grounds for whitefish (by blasting of navigation channels), losses of wooded areas (to agriculture, then urban development); and contamination from waste effluents. In the process,

people lost the direct benefits provided by wetlands along the river, such as flood control, protection from shoreline erosion, and removal of nutrients and sediment.

In 1985, the Detroit River was designated by the International Joint Commission as an Area of Concern (AOC). In 1987, the protocol for the binational Great Lakes Water Quality Agreement was amended to define ecosystem integrity in terms of water-use impairments (Hartig et al. 1997). Then, a Stage 1 RAP team for the Detroit River began meeting to identify why remaining fish and wildlife habitat did not meet fish and wildlife management goals. They found that loss of habitat was due to perturbation in the physical, chemical or biological integrity of the Boundary Waters, including wetlands (IJC 1991; Table 1). In 1991, the Stage 1 Remedial Action Plan (RAP) was written to detail the impaired beneficial uses, degree of impairment, geographical extent of impairment, and causes of impairments (MDNR 1991). In 1996, the Stage 2 RAP report recommended objectives and goals for restoring lost fish and wildlife habitat (MDNR 1996), restore water uses, and get maximum benefit out of remaining natural resources (IJC 1985 in Hartig and Thomas 1988; Hartig and Zarull 1992). The report identified several candidate sites for habitat restoration in Ontario and Michigan waters and assigned high priority to conducting an inventory of remaining habitat for fish and wildlife in Michigan waters of the Detroit River.

In 1999, the U.S. Environmental Protection Agency funded the U.S. Geological Survey to conduct an inventory of fish and wildlife habitat in Michigan waters. The 2-year project, titled "Detroit River Candidate Sites for Habitat Protection and Remediation", determined the location and size of 104 candidate sites along the river. Scientists examined 1996, color, aerial photography of the river and adjacent lands provided by the U.S. Army Corps of Engineers and noted the location of each green, undeveloped site on the mainland and all islands. They visited each site to determine its geographic location, photograph its river shoreline, observe its biological resources, describe its landforms, vegetation and wildlife, assess its level of threat from development, note uses of adjacent lands, rated the quality of existing habitat on a scale from pristine to highly degraded, and classify the current uses and condition of the land. They also examined public records about each site to determine its name, ownership (public or private), area, assessed value, present zoning, planned zoning in the master plan, feet of river frontage, shoreline treatment, fish and wildlife resources, wetland classification, habitat quality rating, remediation potential, remediation planned, and remediation completed.

Results of this project have been used by planning commissions along the Detroit River to establish the location and ecological value of sites within their jurisdictions. In time, the results will be used as a starting point to balance sustainable uses of the river for recreation, natural resource use, and economic development (see Hartig 2003, Chapter 10). Every jurisdiction along the Michigan shore of the river contributed data to this project and received copies of a poster titled Candidate Sites for Habitat Protection and Restoration in Michigan waters of the Detroit River that shows the name, site number, location, and jurisdiction of each of the 104 candidate sites.

III. Methods

Candidate sites for habitat protection and restoration were chosen by closely examining 1996 Army Corps of Engineer's digital ortho photos of the Detroit River. Fifteen photos were converted to Mr. Sid format and loaded into ArcView 3.2 for viewing and analysis. The ortho-

rectified photography overlapped seamlessly within the GIS environment to form a complete mosaic of the river. The photography was examined and interpreted for areas of possible fish and wildlife habitat. Criteria for site selection were: (1) Any upland area adjacent to the Detroit River that was green and relatively undisturbed, (2) Any upland area that may have potential for restoration and remediation but had some level of development or disturbance, and (3) Any near shore and inland aquatic environment that currently provides fish and wildlife habitat or may have potential for restoration and remediation. All sites meeting the previous criteria were indicated by a yellow dot on GIS maps of the river. Close-ups of the locations were printed out to aid in subsequent field verification. Each site was visited by car, boat, or both to verify site quality and record field data. Field data collected at each site consisted of exact geographic location, color photography of the site's shoreline, adjacent land uses, and general appearance that was recorded on a field data sheet. Also recorded on the field data sheet were: street address, landform, wetland characteristics, vegetation, soils, wildlife present, approximate size and ownership, land use classification, relative habitat quality rating, adjacent land uses, number of photographs taken, and general site comments. Sites were numbered in descending order based on latitude and given a name. Geographic location was recorded with a Trimble Geoexplorer GPS unit at each location. Photographs were taken at each site with an Olympus Stylus Zoom 115 35-mm camera. Sites that were inaccessible by car, or for which scientists did not have permission of the private landowner to access, were visited by boat and assessed from just offshore in public waters. After all sites were visited and all pertinent field data were collected, all data were entered into a spreadsheet for comparison and analysis. GPS positions were differentially corrected using base station data from the Michigan State University base station website with GPS Pathfinder Office 2.70 software. The differentially corrected positions were then converted to a shapefile and overlaid on the Digital Ortho Photography in ArcView to indicate the exact location of the candidate sites. After the site locations were established, a polygon shapefile was created to delineate the approximate site boundaries and length of river frontage. Boundaries were established to represent the approximate size, area, and geographic extent of the site, as it appeared to the photo interpreter. Legal and political boundaries were given secondary consideration at best. Attribute information on the legal descriptions and tax statements for the land parcels comprising the sites was collected primarily from the Wayne County Register of Deeds, the Wayne County Treasure's Office, and the City of Detroit Information Technology Services Department. This information was entered into a spreadsheet along with the field data to create a master index of candidate site attribute data. This spreadsheet was linked to the candidate sites GPS points as an attribute table in the GIS environment. From this geospatial database, two map products (posters) were produced.

Each candidate site was classified as either functional or impaired, based on whether it was productive or unproductive of fish and wildlife, respectively. Determination of site productivity of fish and wildlife was based on field observations and evidence of fish and wildlife populations recorded on field sheets, all attributes recorded for the site on the spreadsheet, and photographs taken at each site. Each site was further classified as either protected or unprotected, based on whether the site was in public or private ownership, respectively, on tax statements.

Priority for habitat protection or remediation at each site was evaluated and scored using a system described in Section 9 of OMNR (1994). Before rating a site, the investigator first

envisioned and recorded on the site scoring form a potential site concept plan that included all potential habitat design improvements that could be accomplished at the site, as a result of partnerships and programs that could potentially enhance or restore habitat for fish and wildlife at that site (see Table 1). Using the scoring form on page 55 of that document, each of the 104 candidate sites were rated with respect to fifteen variables and subvariables including, Cost/Benefit, Habitat Enhancement vs. Creation, Habitat Type-Purpose; Habitat Type-Life Cycle; Required Habitat; Habitat Amount; Design Simplicity-Access, Material, Conditions; Partnerships; Other Programs; Sustainability; Educational Value; Ownership and Use; and Legislation/Approval difficulty. This scoring system took into account the importance of each of these variables and determined which habitat concept plans was most likely to achieve the goals of the Remedial Action Plan for the Detroit River. In scoring a site, each variable was assigned a score that depended on the importance of that variable at that site. A score was assessed for each variable in the project concept plan. The scores were summed and divided the highest possible score of all variables combined (1400) and multiplied by 100 to calculate the rank for the concept plan at that site as a percentage. The percentage basis was used to rank the habitat projects at each candidate site in priority. Those sites with projects that scored the highest percentage had the greatest potential to contribute the maximum overall positive effect to fisheries and wildlife habitat in the Detroit River AOC.

IV. Results

This project yielded seven products, linked by a geographic information system (GIS): (1) a poster containing a color map of the river (Figure 3) and table showing the site number, site name, location, and jurisdiction of each site; (2) another poster summarizing scientific results and significance of the project titled: Detroit River Habitat Inventory (3) a computer database (GIS spread sheet) summarizing all information gathered about each site (Appendix 1); (4) low-altitude aerial photographs of each site (Appendix 2); (5) About 400 photographs of candidate sites (Appendix 3); (6) a metadata summarizing all sources of information used in this study (Appendix 4; USGS 1998, 2000) and (7) this written completion report.

The inventory identified 104 candidate sites to be considered for habitat protection and remediation totaling 3,432 ac in Michigan waters of the Detroit River. . Forty sites covering 1578 ac are in private ownership; 64 sites covering 1854 ac are in public ownership. Public candidate sites are mostly parks (24 sites), and plots of wooded land conserved through the Grosse Ile Open Space milage (9 sites). Thirteen islands in the river possess one or more candidate sites. Of those, 6 sites are owned by either federal, state, or city government. Ten of the publically owned sites contained aquatic habitat, including 7 sites on Belle Isle. Privately owned candidate sites were owned mostly by business, industry, and utility companies (27 sites), the remaining 13 private sites were owned by private citizens or conservation organizations like the Grosse Ile Nature Conservancy and Land Trust. Seven private sites were islands or land on islands. Four sites were classified on field forms as aquatic habitat and 13 sites were privately owned brownfields. In total, we identified 2,704 ac of terrestrial habitat, and 732 ac of aquatic habitat that has potential for habitat protection or remediation.

Of the 104 sites, 40 sites, totaling 1578 ac (46% of total candidate site acreage), are in private

ownership and 64 sites, totaling 1854 ac (54% of total acreage), are in public ownership. Fifty-five sites were classified as functional (productive of fish and wildlife; Table 2). Of these functional sites, 17 sites, totaling 757 acres, are in private ownership and 38 sites, totaling 1582 ac, are in public ownership. Forty-nine sites were classified as impaired (unproductive of fish and wildlife; Table 3). Of these impaired sites, 23 sites, totaling 821 ac, are in private ownership and 26 sites, totaling 273 ac, are in public ownership.

Fifteen brownfields, generally consisting of highly contaminated former industrial manufacturing sites, but also including a confined disposal facility for contaminated sediments, were also characterized in this study (Table 4). In total, these brownfields amounted to 933 acres of largely vacant land and 27% of the total candidate site acreage. Three are in public ownership (Mariner s Park, Grassy Island, and Chrysler Paint Plant); the others are privately owned. Three brownfield sites (Grassy Island, Point Hennepin, and Chrysler Paint Plant) are functional (cf. Table 2), the other 12 sites are impaired (cf. Table 3).

We identified 30 functional sites in public ownership totaling 1,324 ac (Figure 4.). Among these, 14 sites (777 ac) were on Grosse Ile, 9 sites (131 ac) were on Belle Isle, 3 were islands owned by the federal government, 2 were islands owned by the State of Michigan, and 1 was an island owned by the Huron-Clinton Metropolitan Park Authority. We also identified 13 functional candidate sites in private ownership (Figure 5). Among these sites were 4 islands totaling 93 ac and 2 coastal marshes totaling 366 ac. Numerous, diverse fish and wildlife resources were observed and recorded on field forms at these sites.

Among the candidate sites in private ownership, functional sites ranking 1st, 2nd, and 3rd highest in priority for habitat protection of a functional site were Humbug Marsh at 93%; North Hennepin Marsh at 91%; and the Solutia site at 89%, respectively (Table 5). Impaired sites ranking 1st, 2nd, and 3rd highest in priority for habitat remediation were the BASF Riverview at 71%, the Detroit Steel Corporation (DSC) site at 65%, and the DTE Trenton site at 62%, respectively. The lowest priority sites in private ownership in the functional and impaired categories, respectively, for protection and remediation, respectively were Thorofare Canal at 35% and NE Grosse Ile at 0%.

Among the candidate sites in public ownership, functional sites ranking 1st, 2nd, and 3rd highest in priority for habitat protection were the Grosse Ile Nature Center site at 100%, the Chrysler Paint Plant site at 99%, and Calf Island at 98%, respectively (Table 6). Impaired sites ranking 1st, 2nd, and 3rd highest in priority for habitat remediation were Elizabeth Park at 98%, Gabriel Richard Park at 94%, and Fort Wayne at 90%, respectively. The lowest priority sites in public ownership in the functional and impaired categories, respectively, for protection and remediation, respectively, were Grosse Ile N at 45% and Mariner s Park at 9%.

In terms of shoreline extent and treatment, riparian candidate sites with river frontage consisted of 85 total sites, including 52 sites totaling 11.24 mi on the mainland and 33 sites totaling 36.40 mi on islands (Table 7; Figure 7). Shoreline treatment was predominantly concrete (on the 4.31 mi or 38%) of the mainland sites and earthen (24.02 mi or 66%) on the island sites. At candidate

sites on offshore islands, none of the shoreline was concrete or steel bulkhead. Among all 85 riparian candidate sites in this study, 9%, 4%, 30%, and 57% of the 47.64 mi of shoreline was composed of concrete, steel wall, riprap, or earth, respectively. Among the mainland riparian candidate sites, 38%, 16%, 19%, and 27% of the 11.24 mi of shoreline treatments were concrete, steel, riprap, and earth, respectively (Figure 7). About 10% (3.05 mi) of Michigan's 32-mile riverfront is an undeveloped, natural, earthen shoreline.

V. Discussion

Delisting Loss of Fish and Wildlife Habitat as an Impaired Use of the Detroit River

Beneficial Use Impairment #14, the loss of fish and wildlife habitat, was identified more than 20 years ago for AOCs by international agreement. Specifically, loss of fish and wildlife habitat was listed as a Beneficial Use Impairment (BUI) in the Detroit River because fish and wildlife management goals had not been met, owing to loss of fish and wildlife habitat, as a result of perturbations in the physical, chemical, or biological integrity of the Detroit River AOC (IJC, 1991). Subsequently, loss of fish and wildlife habitat in the Detroit River AOC was identified as a water use impairment in the Stage 1 RAP report (MDNR, 1991) and 1996 RAP report (MDNR, 1996). Later reports prepared as part of the RAP process have identified loss of fish and wildlife habitat as a water use impairment as well, e.g., DRCCC (1999), GLIER (2000), CEA (2001), US EPA et al. (2001). The delisting criteria for BUI #14 is: When the amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals has been achieved and protected (Hartig and Mikol 1992).

There is overwhelming evidence that the loss of fish and wildlife habitat in the Detroit River is a result of industrial and urban development. A comparison of Detroit River maps prepared in 1815 and 1982 shows that over 95 percent of upland forest, 96 percent of Canadian wetlands, and 97 percent of US wetlands along the Detroit River have disappeared primarily due to industrial development (Tulen et al. (1998), DRCCC (1999), Read et al. (2001)). Recent interpretations of the watershed areas that drain to the Detroit River show urban and agricultural development have continued to result in habitat loss (ERCA 1999). In addition to a significant loss of habitat quantity, the quality of habitats that remain is significantly degraded. For example, remaining coastal wetlands are affected by poor water quality, excessive sedimentation, and invasions by exotic species (Read et al., 2001).

Efforts to identify and characterize the remaining fish and wildlife habitat in the Detroit River watersheds include OMNR (1993), ERCA (1999) and this report. The emphasis of these studies was the identification of natural, undeveloped areas that are considered high priority for protection or remediation, based on guidelines to ensure optimum conditions for diverse, healthy, functioning ecosystems. To link natural habitat areas to production of desired fish and wildlife species, the U.S.Geological Survey is coordinating a Natural Resource Vision for the Detroit River that will identify how much of each kind of habitat that must be protected in an uncontaminated state to

produce enough of each fish, wildlife, and plant species that we desire to sustain in perpetuity in the Detroit River AOC.

Despite efforts to protect productive habitat for fish and wildlife in this river, habitat losses continue throughout the Detroit River AOC at an alarming rate. Although various government and non-government organizations are actively enhancing and restoring habitats throughout the AOC, there is neither coordination of these efforts nor a clear understanding of how much of what kinds of habitat are required to sustain the priority species of fish, wildlife, and plants.

Recommended Delisting Criteria

In 2000 and 2001, preliminary delisting criteria were developed for the Loss of Fish and Wildlife Habitat in Detroit River AOC (GLIER, 2000; CEA, 2001). This beneficial use impairment will be considered eligible for delisting when:

1. Loss of productive fish and wildlife habitat in the Detroit River AOC has ceased, in accordance with local bylaws, ordinances, and or statutes.

2. A net gain of restored and protected habitats has occurred, in accordance with fish and wildlife management plans for the conservation and restoration of Detroit River habitat, and is protected in perpetuity through local bylaws, ordinances and statutes.

3. The amount and quality of physical, chemical and biological habitat required to sustain all desired fish, wildlife and plant species in the Detroit River AOC, established through a process such as the Natural Resource Vision, have been achieved and protected.

Suggested Monitoring, Sampling Activities, and Data Needs

1. Determine the quantity of each species of fish, wildlife and plants that is desired for public use and enjoyment in perpetuity in the Detroit River AOC.

2. Determine the quantity and quality (level of contamination) of each kind of habitat that is needed to sustain all desired species of fish, wildlife and plants in the Detroit River AOC.

3. Determine the quantity and quality of habitat that currently exists in the Detroit River AOC for the production of desired fish, wildlife and plants using the same reference criteria (OMNR 1993) for all sites in Ontario waters and Michigan waters.

4. Every three years, assess and report on the quantity (hectares/acres and linear feet of soft-engineered shoreline) and quality of protected habitat to ensure that no net loss of restored, protected, and uncontaminated habitat for fish and wildlife has occurred.

Suggested Follow Up Actions to Delisting BUI #14

1. A Work Plan should be prepared by the relevant habitat committees of the 4-party RAP Implementation Team and the Detroit River Canadian Cleanup Committee that includes a series of short- and long-term milestones for achievement of steps 1-4 above.

2. The relationship between loss of fish and wildlife habitat and other beneficial use impairments in the Detroit River AOC should be further explored, including the biological productivity of such habitat in relation to increasing levels of contamination above background levels.

3. Progress on the achievement of permanently protected, uncontaminated habitat that is productive of fish and wildlife and meaningful, municipal habitat protection policies should be assessed every 3 years.

Setting Priorities to Protect and Restore Habitat in the Detroit River (Natural Resource Vision)

The first priority could be to agree on how many of each species of fish, wildlife, and plants that we desire to sustain in the Detroit River in perpetuity. State and provincial management biologists could meet and agree on their Natural Resource Vision for the river. The vision would list the number and kind of each natural resource (e.g., fish, wildlife, and threatened or endangered plant) they expect to provide for public use and enjoyment. Then other natural resource organizations (e.g., Audubon Society, Michigan United Conservation Clubs, and The Nature Conservancy) could add other species of native plants and animals to the list. When the list of desired species has been reviewed by the public and is judged by all to be complete, we could move to the second priority.

The second priority could be for natural resource professionals to agree on how much of each kind of native habitat once present in the Detroit River is needed to sustain in perpetuity enough of each of the desired fish, wildlife and plant species listed in the Natural Resources Vision. Some species are year-round residents of the river and need several habitats to sustain each stage of their life cycle. Other species are migratory (e.g., diving ducks) and have only one or two habitat requirements (e.g., wild celery tubers as food and resting areas away from human disturbance) during their brief stay on the river each year. Estimates of how much of each kind of habitat are needed would be based on available published scientific information and field experience of the trained professional biologists.

Our third priority could be to determine how much of each kind of needed habitat remains in the river. Candidate sites for habitat protection and restoration are known for Ontario waters (OMNR 1993; Taylor 1998) and are known for Michigan waters as a result of this project. We recognize that restoration of Detroit River habitats will proceed concurrently on several fronts: (1) protection of unimpaired, natural areas still productive of fish and wildlife; (2) restoration of natural areas impaired by physical modification and chemical contamination; and (3) creation of new, uncontaminated habitat. If we address habitat conservation opportunities as they arise, we could increase available habitat. It could be futile to design and restore habitat for production of fish and wildlife, if that habitat is not permanently protected from future development and contamination by

toxic substances. Worse yet, we could restore habitat that attracts exotic nuisance species at the expense of desired, native, species of plants and animals.

Implementation of habitat protection and restoration could begin with the small percentage of undeveloped shoreline that remains. It may be possible to create habitat on brownfield sites as they are redeveloped, if soft engineering is used to protect the shoreline from erosion and create habitat for fish and wildlife (Caulk et al. 2000). The highest priority lands for protection could be large, undeveloped, uncontaminated areas that still produce fish and wildlife, such as Stony, Celeron, Peche, and Sugar Islands, the Canard River Marsh Complex, and Humbug Island and Marsh. The next highest priority could be smaller islands in the Conservation Crescent around the southern tip of Grosse Isle, such as Round and Calf Islands, remnant coastal wetlands, and bottomland hardwoods that are most threatened by development. Protection of high quality, riparian habitat in private ownership could be encouraged by local land trusts working in concert with state and federal programs, such as the Partners in Flight and Urban Migratory Bird Treaty programs of the U.S. Fish and Wildlife Service. Essential components of any mechanism for identifying and protecting habitat in the river could include identification and evaluation of natural areas based on scientific criteria; a realistic land use plan for each municipal jurisdiction, willing land owners and community stake holders; adequate funds and tax incentives to establish conservation easements on private lands; and regulations to control filling or other harmful disruption and degradation of protected habitats (Taylor 1998).

Public, not private, lands could receive the highest priority for habitat restoration in the river. Restoration will be more easily accomplished on public lands because approvals prior to construction are more readily obtained, authority for projects is often embodied in existing legislation, and funding is often part of existing government programs. Most importantly, restored habitat on public land will not be developed later because control of development rights is inherent in public ownership, in the form of conservation easements, deed restrictions, or fee simple purchase. It is important to recognize that nearly half of the remaining shoreline open space in Michigan waters of the Detroit River is privately owned. Private owners of undeveloped land along the river are encouraged to protect their property from development, if it has significant habitat restoration potential, by contacting a local land conservancy, their local elected officials, or natural resource agency personnel. A monetary incentive equal to the development value of private open space would encourage landowners to protect and restore habitat on their property. In Ontario, such a grant incentive program for private landowners has been proposed to the Environment Canada s Great Lakes Sustainability Fund but not yet implemented (Child 2001). Although Michigan has provided funds to purchase development rights and establish conservation easements on prime farmland, no funds have been authorized by the legislature to purchase development rights on private, undeveloped land along the Detroit River. A transfer of development rights program could reward owners of private land in the sending areas for protecting and restoring habitat on their land and reward developers of brownfields with greater profits in receiving areas along the river.

Industry and corporations that own land along the Detroit River are restoring habitat on their property and could do more, if they were organized like member corporations of the Wildlife Habitat Council along the St. Clair River. There, the Council s Waterways for Wildlife Project

recognizes corporations that manage their lands for wildlife habitat in coordination with adjacent landowners (WHC 1995; 2000). The shoreline of public lands, such as Grassy Island in the Wyandotte National Wildlife Refuge, Crystal Bay Island, and the Sugar Island Cut Dike could be modified to create gently sloping, earthen shores, coastal wetlands, e.g., bulrushes, shrub swamp, wet prairie, mixed hardwood swamps, and beech-maple forests (MNFI 2000), and fish spawning grounds. Such gently sloping, earthen shoreline provides a gradient in water depth that allows coastal vegetation to survive changes in water level (Mitsch and Gosselink 1993; Maynard and Wilcox 1996; MNFI 1997) that varies up to 5 feet in the river (Quinn 1981).

Progress in reaching benchmarks, objectives, and goals for protected, clean, and productive habitats could be assessed after each project of habitat protection or restoration is completed. As we complete such projects, we will learn what works best, if we study the stability, biological diversity, and biological productivity of habitats that we protect and restore.

Choices about what, when, where, why, and how to restore habitat could be based on credible scientific information. Ideally, we would know in advance exactly what kind of habitat we want to restore to produce the desired number of each desired species listed by management agencies in the Detroit River Natural Resources Vision. Why restore habitat, if desired fish and wildlife species do not use it, if habitat essential for part of the life cycle of a desired species is not restored, or if undesirable (non-native) fish or wildlife occupy the restored habitat? Each habitat restoration project could be defined on a species specific basis to provide enough habitat and habitat conditions required by the target species, (known native plant and/or animal community). Ideally we would restore the kind(s) of habitat in shortest supply to produce the greatest diversity and number of desired species. For example, lake sturgeon live in the river and diving ducks migrate to the river to consume wild celery tubers. We could chose to restore spawning habitat for sturgeon before wild celery beds for diving ducks because lake sturgeon do not spawn on existing reputed, historic grounds and wild celery is the most abundant aquatic plant in the river. Plants like wild celery stay put but fish, birds, and insects move around as they develop from one life stage to the next. Each habitat used by a life-stage of a desirable plant or animal species needs to be available in adequate supply for that species to sustain itself. To restore habitat for a desired species of animal, each habitat used by every life-stage of that species must be present to sustain it.

Some habitats in path of economic development, such as in tributaries to the river, have been so altered by dams, loss of habitat, and water pollution that life stages of fish and wildlife species dependent upon them are nearly gone because they can no longer access the tributaries. To the extent that dams on the tributaries are removed and water pollution abated, those species could recover in the Detroit River. In all habitat restoration projects, design concepts must be in harmony with natural forces inherent to the Detroit River. In the Mississippi River, such forces were harnessed to create and manage productive fish and wildlife habitat successfully (Schnick et al. 1982).

Plenty of guidance exists for the restoring native plant and animal communities, setting restoration targets and location priorities (Environment Canada et al. 1998), designing successful habitat (OMNR 1993; Kelso and Hartig 1995; Caulk et al. 2000), controlling shoreline erosion (Fuller

1997), restoring native prairie (Morgan et al. 1995), restoring other native vegetation (Henderson et al. 1999), and protecting wetlands in private ownership (Cwikiel 1998) along the Detroit River.

Examples of successful habitat protection in the Detroit River include the recent purchase of 101-acre Stony Island (Ginnebaugh 1998) and 50-acre Peche Islands by the State of Michigan and the City of Windsor, respectively; protection of Ruwe Marsh near the Canard River (Tulen 1998); donation of the 115-acre Hennepin Marsh in the Trenton Channel by BASF Corporation to the Grosse Ile Nature and Land Conservancy; donation of 14-acre Mud Island by National Steel Corp. to the U.S. Fish and Wildlife Service; transfer of 40 riparian acres on Gibraltar Bay from the federal government to the Township of Grosse Ile for a Nature Education Center; and purchase of numerous open spaces on Grosse Ile by the citizens of Grosse Ile Township through a dedicated tax millage. Because of their large area, high habitat diversity, and high level of development threat, Ojibway Shores just south of Windsor and the Humbug Marsh area could be among the highest priority sites for habitat protection.

Canadian biologists have established target amounts of contiguous, forest cover required by deep-nesting birds and riparian vegetation along 1st to 3rd order streams needed to restore the Detroit River watershed to a healthy, functional level (Table 8). These data show that a lot of work needs to be done to restore the environmental health of the Detroit River AOC and its watersheds. Through protection and remediation of existing habitats for fish and wildlife and creation of new habitats that are productive of fish and wildlife we can sustain the Detroit River AOC and its fish and wildlife populations. Since 1993, numerous successful habitat restorations have been completed along the Ontario shore, including Goose Park on the Windsor waterfront, Turkey Creek channel improvements, stabilization of the river shoreline, cleanup and reforestation of the Little River Watershed, and enhancement of the Canard River marshes (DRCCC 1999). To date, in Michigan waters, only one habitat restoration project has been completed: removal of contaminated sediments from the last 0.5 mile of Monguagon Creek by the Michigan Department of Environmental Quality with funding from the U.S. Environmental Protection Agency. A Spirit of Trenton project to landscape and restore native, aquatic and terrestrial habitat at five road ends along the Trenton Channel was designed and funded (City of Trenton 1998). Several feasibility studies by the Army Corps of Engineers for habitat restoration at Belle Isle, Hennepin Marsh, and the Black Lagoon were begun, and creation of a keyhole wetland was built as part of the upgrade of the Conners Creek Combined Sewer Overflow (NWF 1999). However, no habitats have yet been restored to full productivity, decontaminated, and protected in perpetuity in Michigan waters of the Detroit River. At no cost, throughout the river, wild celery recovered during the 1990s to high abundance in the Detroit River, owing to greater water clarity and better light penetration (Manny and Schloesser 1999). Native bushes that provide cover and food for resident nesting, and migratory birds could be included in restorations of upland, riparian habitat (see Hartig 2003, Chapter 9). Lastly, we could restore habitats for spawning fish and refuges for resting waterfowl in offshore waters.

To delist loss of fish and wildlife habitat as a use impairment in the Detroit River, we need to achieve a guideline that was recommended by the International Joint Commission (IJC 1991):
When the amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected . That guideline depends on the

understanding and expertise of professional fish and wildlife biologists to determine the amount and quality of habitat needed by desired species. Such biologists work in state and provincial management agencies and are willing to envision a comprehensive, binational Detroit River habitat management plan. Ideally, those biologists, will begin the visioning process and agree on the amount and kinds of habitat required to sustain in perpetuity all desired fish and wildlife species at all stages of their life cycle in the river.

Professional biologists from management agencies in Canada and the United States could first identify and list how many of what species of fish and wildlife they are mandated to provide for the public in the river. Then, they could estimate how much of each kind of habitat is needed to produce and sustain that many of each desired fish and wildlife species for our use and enjoyment. The list could then be enlarged to include other plants and animals that are desired in the river by other natural resource organizations. Then, professional biologists, in concert with the four parties to the RAP process could set realistic, achievable benchmarks for the protection and restoration of those habitats that everyone agrees will permit loss of habitat to be delisted as a water use impairment. Ideally, the benchmarks could be monitored in quantitative terms, such as acres of protected, productive, and uncontaminated habitat and miles of natural earthen and soft-engineered shoreline we have protected in perpetuity. Then anyone could judge if adequate progress is being made toward protecting and restoring the desired kinds and amount of fish and wildlife habitat needed to delist this loss of habitat use impairment. For 5 years after achieving the kinds and amounts of habitat needed, the protected, restored, and created habitats could be monitored each year to verify that all those habitats remain protected, productive of fish and wildlife, and uncontaminated. Then, loss of habitat could be delisted as a use impairment in the Detroit River. Each of us could be a part of that achievement!

VI. Conclusions

Candidate sites identified by this project are a starting point for sustained use of the river for conservation of natural resources and economic development. Results of this inventory of habitat for fish and wildlife in Michigan waters of the Detroit River in 2000 provide a baseline of such habitat available that was present then for protection, remediation, or other uses. Every jurisdiction along the Michigan riverfront has provided data to the project and received copies of the site map. The success of the project will be measured by how many of the candidate habitat sites are protected or restored during implementation of the Detroit River Remedial Action Plan and other river front projects.

References:

Caulk, A.D., J.E. Gannon, J.R. Shaw, and J.H. Hartig. 2000. Best Management Practices for Soft Engineering of Shorelines. Greater Detroit American Heritage River Initiative, Detroit, MI.

Child, Matthew. 2001. Biodiversity Conservation Strategy Implementation for the Detroit River AOC. Project Proposal to Environment Canada s Great Lakes Sustainability Fund. Submitted

February 15, 2001.

Citizens Environment Alliance, 2001. Changes to the draft document entitled Criteria for Determining Delisting Eligibility for Impaired Beneficial Uses in the Detroit River Area of Concern based on Public Meetings hosted by the CEA in February and March, 2001.

City of Trenton. 1998. City of Trenton Linked Riverfront Parks Master Plan. City of Trenton, Engineering Department, 2800 Third Street, Trenton, MI 48183-2992. 22 pp.

Cwikiel, W. 1998. Living with Michigan s Wetlands: A Landowner s Guide. Tip of the Mitt Watershed Council, P.O. Box 300, Conway, MI 49722. 149 pp.

Detroit River Canadian Cleanup Committee, 1999. Detroit River Update Report. Great Lakes Institute for Environmental Research, University of Windsor.

DRCCC (Detroit River Canadian Cleanup Committee). 1999. Detroit River Update Report. Great Lakes Institute for Environmental Research, University of Windsor, Windsor, Ontario, N9B3P4. 105 pp.

Environment Canada, Ontario Ministry of Natural Resources, and Ontario Ministry of Environment. 1998. A framework for guiding habitat rehabilitation in Great Lakes Areas of Concern. Canada-Ontario Remedial Action Plan Steering Committee. Environmental Conservation Branch, 4905 Dufferin St., Downsview, Ontario. Canada. M3H 5T4

Essex Region Conservation Authority, 1999. Essex Region Biodiversity Conservation Strategy - Habitat Restoration and Enhancement Guidelines and Priorities.

Fuller, D.R. 1997. Understanding, Living With, and Controlling Shoreline Erosion. A Guidebook for Shoreline Property Owners. Tip of the Mitt Watershed Council, P.O. Box 300, Conway, MI 49722. 97 pp.

GDAHRI (Greater Detroit American Heritage Rivers Initiative). 1997. American Heritage Rivers Nomination. C/o Rivertown Foundation, 300 River Place, Suite 5350, Detroit, MI 48207. 15 pp + appendices.

Ginnebaugh, M. 1998. Conserving critical habitats in the Conservation Crescent: The Stony Island story. pp. 13-14, in Tulen et al. (1998) below.

Goodrich, C. and H. van der Schalie. 1932. The naiad species of the Great Lakes. Occasional Papers of the Museum of Zoology, University of Michigan 238: 8-14.

Goodyear, C.S., T.A. Edsall, D.M. Ormsby Dempsey, G.E. Moss, and P.E. Polanski. 1982. Atlas of the spawning and nursery areas of Great Lakes fishes. Volume 8, Detroit River. U.S. Fish and Wildlife Service, Washington, D.C. FWS/OB 82/52.

Great Lakes Institute for Environment Research, 2000. Criteria for Determining Delisting Eligibility for Impaired Beneficial Uses in the Detroit River Area of Concern.

Hartig, J.H., and R.L. Thomas. 1988. Development of plans to restore degraded areas in the Great Lakes. Environmental Management 12(3): 327-347.

Hartig, J.H., and G. Mikol. 1992. How Clean is Clean? An operational definition for degraded areas in the Great Lakes. Journal of Environmental Engineering and Management 2:15-23.

Hartig , J.H., and M.A. Zarull. 1992. Under Raps, Toward Grassroots Ecological Democracy in the Great Lakes Basin. University of Michigan Press, Ann Arbor, MI 48104. 289 pp.

Hartig, J.H., M.A. Zarull, T.B. Reynoldson, G. Mikol, V.A. Harris, R.G. Randall, and V.C. Cairns. 1997. Quantifying targets for rehabilitating degraded areas of the Great Lakes. Environmental Management 21(5):713-723.

Hartig, J.H. (ed.) 2003. Honoring our Detroit River, Caring for our Home. Wayne University Press.

Henderson, C.L, C.J. Dindorf, and F.J. Rozumalski 1999. Landscaping for Wildlife and Water Quality. Minnesota s Bookstore, 117 University Avenue, Saint Paul, MN 55155. 176 pp.

Hinsdale, W.B. 1927. The Indians of Washtenaw County, Michigan. George Wahr Publisher, Ann Arbor, MI, 68 pp.

Holiday Beach Migration Observatory. 1997a. 26th Hawkwatch Season, Almanac for November 1997. Essex Region Conservation Authority, Essex Ontario, Canada N8M 1Y6.

Holiday Beach Migration Observatory. 1997b. 26th Hawkwatch Season, Almanac for October 1997. Essex Region Conservation Authority, Essex Ontario, Canada N8M 1Y6.

Holiday Beach Migration Observatory. 1998. ERCA Internet Success. Hawkwatchers access web page. The Northwind, Winter, 1998. Volume 13(1). 32 pp. Essex Region Conservation Authority, Essex Ontario, Canada N8M 1Y6.

IJC (International Joint Commission). 1985. Report on Great Lakes water quality. Great Lakes Water Quality Board, Windsor, Ontario, Canada.

IJC (International Joint Commission) 1991. Commission Approves List/Delist Criteria for Great Lakes Areas of Concern. Focus, Volume 16, Issue 1 (March/April) Table 1.

Kelso, J.R.M. and J.H. Hartig. 1995. Methods of modifying habitat to benefit the Great Lakes ecosystem. CISTI Occas. Pap. 1, 294 pp.

Larson, J.W. 1981. Essayons. A History of the Detroit District U.S. Army Corps of Engineers. U.S.

Army Corps of Engineers, Detroit District, Detroit, MI. 215 pp.

Manny, B.A. 1998. Ecological Restoration of Grassy Island and the Wyandotte National Wildlife Refuge in the Detroit River. pp. 18-21 in Tulen et al. (1998) below.

Manny, B.A., and D. Kenaga. 1991. The Detroit River: effects of contaminants and human activities on aquatic plants and animals and their habitats. Hydrobiologia 219: 269-279.

Manny, B.A. and D.W. Schloesser. 1999. Recovery of wild celery (Vallisnerai Americana) in the Detroit River from 1985 to 1996. Presentation to the International Association of Great Lakes Research, Case Western Reserve University, Cleveland, Ohio. May 26, 1999.

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(7.3). 130 pp.

Maynard, L., and D. Wilcox. 1996. Coastal wetlands of the Great Lakes. Background paper, State of the Lakes Ecosystem Conference 1996. Environment Canada and U.S. Environmental Protection Agency. EPA 095-D-96-001c.

MDNR (Michigan Department of Natural Resources). 1991. Detroit River Remedial Action Plan Stage 1. Surface Water Quality Division, Lansing, MI. 504 pp.

MDNR (Michigan Department of Natural Resources). 1996. Detroit River Remedial Action Plan Report. Surface Water Quality Division, Lansing, MI. 414 pp.

MDNR (Michigan Dept of Natural Resources). 1991. Detroit River Remedial Action Plan Stage 1 Report.

MDNR (Michigan Department of Natural Resources). 1996. 1996 Detroit River Remedial Action Plan Report.

Milner, J.W. 1873. Report on the fisheries of the Great Lakes; The results of inquiries prosecuted in 1871 and 1872. U.S. Commission of Fisheries. Annual Report. pp. 12-13.

Mitsch, W. J. and J. G. Gosselink. 1993. Wetlands. Second Edition. Van Nostrand Reinhold, New York. 722 pp.

MNFI (Michigan Natural Features Inventory). 1995. A survey of lakeplain prairie in Michigan. Report to Michigan Department of Natural Resources, Land and Water Management Division, Coastal Zone Management Program. P.O. 30444, Lansing, MI, 48909-7944. 234 pp.

MNFI (Michigan Natural Features Inventory). 1997. Great Lakes Coastal Wetlands. An Overview of Controlling Abiotic Factors, Regional Distribution, and Species Composition. P.O. 30444, Lansing, MI, 48909-7944. 307 pp.

MNFI (Michigan Natural Features Inventory). 2000. Landuse circa 1800 county base by county [Wayne Co.]. Digital database map, edition 1.1. P.O. 30444, Lansing, MI, 48909-7944.

Morgan, J.P., D.R. Collicutt, and J.D. Thompson. 1995. Restoring Canada s Native Prairies. A Practical Manual. Rural Lambton Stewardship Network, c/o OMNR, P.O. Box 1168, Chatham, Ontario, Canada. N7M 5L8. 84 pp.

NWF (National Wildlife Federation). 1999. Report to the Great Lakes Fishery Trust for creation of fish and wildlife habitat at Conners Creek in the Detroit River. National Wildlife Federation, 506 E. Liberty, Ann Arbor, MI 48104-2210.

OMNR (Ontario Ministry of Natural Resources). 1994 Draft version. Survey of Candidate Sites on the St. Clair and Detroit Rivers for Potential Habitat Rehabilitation/Enhancement. Chatham Area Office, Chatham, Ontario. 228 pp. + site plans.

Prince, H.H., P.I. Padding, and R.W. Khapton. 1992. Waterfowl use of the Laurentian Great Lakes. Journal of Great Lakes Research 18(4):673-699.

Quinn, F.H. 1981. Secular changes in annual and seasonal Great Lakes precipitation 1854-1979, and their implications for Great Lakes water resource studies. Water Resource Research 17:1619-1624.

Read, J., Murray, P. and J.H. Hartig (eds.), 2001. State of the Strait: Status and Trends of the Detroit River Ecosystem. Great Lakes Institute for Environmental Research, Occasional Publication No. 3, University of Windsor, Windsor, ON.

Rodriguez, K.M., and R.A. Reid. 2001. Biodiversity Investment Areas: Rating the potential for protecting and restoring the Great Lakes ecosystem. Ecological Restoration 19(3):135-144.

Schnick, R.A., J.M Morton, J.C. Mochalski, and J.T. Beall. 1982. Mitigation and enhancement techniques for the Upper Mississippi River System and other large river systems. U.S. Fish and Wildlife Service, Washington, D.C., Resource Publication 149, 714 pp.

Taylor, S. 1998. Identification and protection mechanisms for Detroit River Habitats, pp. 10-12 in Tulen et al. 1998 (below).

The Nature Conservancy. 1994. The conservation of biological diversity in the Great Lakes ecosystem: Issues and opportunities. U.S. Environmental Protection Agency, 79 W. Monroe St., Suite 1309, Chicago, IL 60603. 118 pp.

Tulen, L. 1998. Ruwe Marsh restoration project. pp. 15-17, in Tulen et al. (1998) below.

Tulen, L.A., J.H. Hartig, D.M. Dolan, J.J.H. Ciborowski (eds.) 1998. Rehabilitating and Conserving Detroit River Habitats. Proceedings of a Binational Converence in Windsor, Ontario. March 4, 1988. Great Lakes Institute for Environmental Research. Occasional Publication No. 1. Windsor, Ontario,

Canada. 65 pp. Available from University of Windsor, Great Lakes Institute for Environmental Research, 2990 Riverside Drive West, Windsor, Ontario, Canada N9B 3P4

US Environmental Protection Agency, Michigan Department of Environmental Quality, Environment Canada, Ontario Ministry of Environment, 2001. Detroit River Remedial Action Plan Update Report - 2001 (DRAFT).

USGS (U.S. Geological Survey) 1998. Content Standard for National Biological Information Infrastructure (NBII) Metadata, Workbook. Biological Resources Division, Washington, D.C.

USGS (U.S. Geological Survey) 2000. NBII/NPS (National Biological Information Infrastructure/National Part Service) Metadata Training Workshop Workbook, San Antonio TX, March 21-22, 2000.

Vigmostad, K.E. (ed.). 1999. State of the Great Lakes Islands. Proceedings for the 1996 U.S.-Canada Great Lakes Islands Workshop.

Weniger, D. 2000. Wildlife program gives awards for activities. Times Herald, Port Huron, MI, May 6, 2000.

WHC (Wildlife Habitat Council). 1995. St. Clair River Waterways for Wildlife Project Plan, A Public-Private. Partnership to Rehabilitate and Enhance Habitat. Wildlife Habitat Council, Great Lakes Regional Office, c/o Detroit Edison, 2000 Second Ave., Room 742 WCB, Detroit, MI. 48226

WHC (Wildlife Habitat Council). 2000. Waterways for Wildlife, The St. Clair River Basin Project. Summer 2000 Newsletter, c/o Detroit Edison, 2000 Second Ave., Room 742 WCB, Detroit, MI. 48226

Tables

Figures

Appendices

1. Spreadsheet of 29 attributes for each of 104 candidates sites for habitat protection and remediation in Michigan waters of the Detroit River.

2. Low-altitude, color, aerial photographs of each of 104 candidates sites for habitat protection and remediation in Michigan waters of the Detroit River.

3. Photographic record of each of 104 candidates sites for habitat protection and remediation in Michigan waters of the Detroit River.

4. Metadata for EPA-funded project (IAG Number: DW-94793801 - 1) describing 104 candidates sites for habitat protection and remediation in Michigan waters of the Detroit River.

Table 1. Potential habitat design improvements, partners, and programs used to rank the priority of habitat protection and remediation at 104 candidate sites in Michigan waters of the Detroit River.

Habitat Design Improvements:

- Bank stabilization and erosion control
- Brownfield remediation and redevelopment
- Build key-hole wetland like McDonald Park in Ontario (Chapter 4 in Caulkl et al. 2000)
- Contaminated sediment remediation
- Enhanced nesting habitat for turtles
- Enhanced spawning habitat for fish
- Restore historic lake plain prairie (following Morgan et al. 1995)
- Modify light intensity and placement so migratory birds are not confused and disoriented
- Excavate to create deeper water near shore to enhance public fishing success
- Create offshore islands to diversify fish and wildlife habitat
- Remove dikes to flood former wetlands, create off-channel fish habitat
- Create fish access between island lagoon and river
- Create for feeding and nesting habitat for migratory shorebirds
- Create gradually sloping bank and emergent wetland along shoreline
- Create upland habitat for large and small mammals
- Enhance existing fragmented habitat by creating wildlife migration corridors
- Enhance habitat for threatened and endangered plant species (American lotus)
- Create or restore nursery and or spawning habitat for State-threatened fish (Lake sturgeon)
- Create feeding habitat for migratory waterfowl
- Install duck nesting boxes in forested wetlands
- Plant native tall grass prairie as year-round habitat for pheasants and other ground birds.
- Greater public access and greenway construction
- Remove derelict buildings and structures
- Remove trees to prevent translocation of buried contaminants onto overlying clay cap soils
- Urban migratory bird habitat, plant trees and food plants for migratory neotropical birds
- Inner forest nesting habitat for birds
- Construct raptor perches and platforms for eagles and ausprey
- Enhance water level flucturation in wetlands by diversion of street runoff.
- Install impoundments upstream to trap contaminants and suspended sediments
- Install walking and nature appreciation trails and wildlife migration corridors
- Vegetated shore revetments
- Riprap revetments
- Install logs, stumps, and brush bundles
- Rock aprons
- Breakwater shelves
- Small scale breakwaters
- Buffer strips
- Sediment ponds

Table 1 cont'd. Potential habitat design improvements, partners, and programs used to rank the priority of habitat protection and remediation at 104 candidate sites in Michigan waters of the Detroit River.

Partners and Programs:

- Commissions
  - Migratory Bird Commission
    - North American Wetlands Conservation Act
- Foundations and Trusts
  - National Fish and Wildlife Foundation
  - Great Lakes Fishery Trust
  - National Arbor Foundation
- Industry
  - Banks and other financial institutions
  - BASF, National Steel, and other corporate land owners
- Non-Profit Organizations
  - Confederated Garden Clubs of Michigan
  - Downriver Walleye Federation
  - Ducks Unlimited
  - Ford Yacht Club
  - Friends of the Detroit River
  - Greenway Coalition
  - Grosse Ile Conservation Club
  - Grosse Ile Nature and Land Conservancy
  - Huron Clinton Metro-Park Authority
  - Michigan Audubon Society
  - Pheasants Forever
  - Sturgeon for Tomorrow
- Township
  - Grosse Ile
- Cities of Detroit, Wyandotte, Trentor, and Gibraltar
  - Parks and Recreation Department
  - Water and Sewer Department
- County
  - Wayne County Parks and Recreation Department
- State
  - Departments of Environmental Quality and Natural Resources
- American Heritage River Initiative
  - Soft engineered shorelines (cf. Caulk et al. 2000)
- U.S. Army Seawall Reconnaisance Project
  - Wetlands Creation program
  - Shoreline Erosion Control
- U.S. Fish and Wildlife Service
  - Urban Migratory Bird Treaty
  - North American Waterfowl Management Plan
  - International Wildlife Refuge management authorities
  - U.S. Shorebird Conservation Plan and Council
  - Endangered Species Act
- U.S. Geological Survey
  - Partners in Flight
- Ontario Ministry of Natural Resources
- Canadian Army Corps of Engineers

Table 2. Site name and size (acres) of functional (ie., productive) candidate sites with the most potential for habitat protection in Michigan waters of the Detroit River.

Unprotected (in private ownership)		Protected (in public ownership)	
Name	Acres	Name	Acres
Fisher Mansion Woodlot	14.2	Belle Isle Water Intake	20.3
Shipwreck Marine	2.4	Lake Muskoday	22.6
UAW Lot	19.5	Blue Heron Lagoon	42.1
Point Hennipen	222	Lake Okonoka	23.8
Conservancy lots	1.9	North Fishing Pier	2
South Hennipen Marsh	47.3	South Fishing Pier	2.6
Grosse Ile A	83.7	Belle Isle North Shore	2.7
Solutia	14.6	North Canoe Livery	2.2
Chrysler Paint Plant	43.1	Lake Tacoma	12.9
Humbug Marsh/Island	222	Mud Island	22.4
Gibraltar Bay	143	Grassy Island	74
Channel Woods	10.4	North Hennipen Marsh	105.4
Round Island	43,3	Grosse Ile B `	34
Sugar Island	28.1	Grosse Ile C	46.5
Calf Island	3.7	Grosse Ile D	27.6
Dynamite Island	0.5	Grosse Ile F	62.5
Fox Island	0.7	Grosse Ile G	14.4
		Grosse Ile H	44.3
		Grosse Ile J	45.6
		Grosse Ile K	190
		Grosse Ile L	22.7
		Grosse Ile N	17
		Grosse Ile M	30.7
		Elizabeth Park	165
		Crystal Bay Navigation Dike	112.6
		Stony Island	52
		Gibraltar Bay	143
		Livingstone Channel Nav. Dike	19.5
		Oldani Marsh	13.2
		Elba Woods	9.8
		Meso Island	11.8
		Hickory Island	11.8
		Airport Marsh	45.9
		Sugar Island Cut Dike	3.2
		Celeron Island	68.1
		Elba Marsh	18
		Grosse Ile Nature Center	38
		Sturgeon Bar	1.9
Total Area:	757.4 ac		1582.1ac

Table 3. Site name and size (acres) of impaired (ie., unproductive) candidate sites with potential for habitat remediation in Michigan waters of the Detroit River.

Unprotected (in private ownership)		Protected (in public ownership)	
Name	Acres	Name	Acres
DTE Conners Creek	13.7	Mariner's Park	6.4
Inland Lime and Stone	5.8	Lakewood East Park	25.2
Uniroyal	42.1	Alfred Brush Ford Park	20.9
Free Press Easement	9.3	Maharas/Gentry Park	62.2
Detroit Union Depot	1.3	Vaughn-Reid Memorial Park	3.9
Revere Copper and Brass	30	Porter Field	6.2
Del Ray Boat Launch	13.8	Stockton Memorial Park	2.2
DTE River Rouge	2	Henderson Park	24.9
National Steel Settling Ponds	4.6	Owen Park	8.2
National Steel Skull Drop site	1.9	Gabriel Richard Park	16.6
Great Lakes Steel Boat Club	7.1	Mt. Elliott Park	6
National Steel Lot	20.8	Chene Park	8.9
BASF Wyandotte	142.7	St. Aubin Park	9.3
Wyandotte Shores golf course	85	Hart Plaza	12
NE Grosse Ile	0.3	Riverside Park	10.3
BASF Grosse Ile	8.5	Ft. Wayne	23.9
Elf Atochem America	86.3	Balanger Park	10.2
BASF Riverview	25.3	John Dingell Park	4.5
Crown Enterprises	38.2	Bishop Park	10.7
DSC (Detroit Steel Corp)	227.5	Meyer-Elias Park	4.5
Levy Trucking	26.2	George St. Road end	0.1
Howard Elias Trust Property	12.3	Traux St. Road end	0.2
DTE Trenton	16.3	Rotary Park	5.3
		Cherry Street Road end	0.1
		Elm Street Park	0.3
		West Road Park	0.6
Total Area:	821 ac		273 ac

Table 4. Brownfields on the Michigan shoreline of the Detroit River in 2000.

Site Number	Site Name	Acres
1	Mariner's Park	6
25	UniRoyal	42
33	Revere Copper and Brass	30
38	National Steel Settling Ponds	5
39	National Steel Skull Drop	2
41	National Steel Lot	21
44	Grassy Island	74
47	Point Hennepin	222
48	Wyandotte Shores Golf Coarse	85
51	Elf Atochem America	86
54	BASF Riverview	25
55	Crown Enterprises	38
61	DSC (Detroit Steel Corp.)	228
62	Levy Trucking	26
81	Chrysler Paint Plant	43
	Total area:	933 ac

Table 5. Privately owned candidate sites for habitat protection and remediation, in order of priority.

Functional	Priority (%)	Impaired	Priority (%)
Humbug Marsh	93	BASF Riverview	71
North Hennepin Marsh	91	Detroit Steel Corp. (DSC)	65
Solutia	89	DTE Trenton	62
Conservancy Lots	85	Elf Atochem America	58
South Hennepin Marsh	83	Great Lakes Steel Boat Club	54
UAW Lot	82	BASF Wyandotte	49
Hickory Island	78	Inland Lime and Stone	48
Fisher Mansion Woodlot	67	Shipwreck Marine	48
National Steel Lot	66	Revere Copper and Brass	47
Round Island	64	Levy Trucking	38
National Steel Settling Ponds	64	Crown Enterprises	38
Point Hennepin	64	Wyandotte Shores Golf Club	35
Sugar Island	62	DTE River Rouge	29
BASF Grosse Ile	61	UniRoyal	26
National Steel Skull Drop	52	DTE Conners Creek	22
Channel Woods	52	Free Press Easement	22
Howard Elias Trust	45	Detroit Union Depot	12
Dynamite Island	38	NE Grosse Ile	0
Fox Island	38		
Thorofare Canal	35		

Table 6. Publically owned candidate sites for habitat protection and remediation, in order of priority.

Functional	Priority (%)	Impaired	Priority (%)
Grosse Ile Nature Center	100	Elizabeth Park	98
Chrysler Paint Plant	99	Gabriel Richard Park	94
Calf Island	98	Fort Wayne	90
Lake Okonoka	98	Meyer Elias Park	90
North Canoe Livery	96	George Street road end	88
Gibraltar Bay	95	Traux Street road end	88
Blue Heron Lagoon	95	Rotary Park	88
Livingstone Channel Dike	92	Cherry St. road end	88
Sturgeon Bar	89	Elm St. road end	88
Lake Muskoday	85	West Road road end	88
Grassy Island	81	Belle Isle North shore	75
Mud Island	80	Maharas Gentry Park	74
Lake Tacoma	79	Dingell Park	71
Meso Island	78	Balanger Park	69
Stony Island	78	Porter Field	68
Airport Marsh	78	Sugar Island Cut Dike	64
Crystal Bay Island	77	Henderson Park	64
Elba Woods	76	Mt. Elliott Park	60
Oldani (Upper Elba) Marsh	75	Lakewood East Park	57
Elba Marsh	75	Bishop Park	57
Celeron Island	72	Owen Park	57
Grosse Ile A	45	St. Aubin Park	54
Grosse Ile B	45	Chene Park	52
Grosse Ile C	45	Stockton Memorial Park	51
Grosse Ile D	45	Riverside Park	49
Grosse Ile F	45	Belle Isle North Fishing Pier	49
Grosse Ile G	45	Belle Isle South Fishing Pier	48
Grosse Ile H	45	Del Ray Boat Launch	47
Grosse Ile J	45	DTE Conners Creek	22
Grosse Ile K	45	Hart Plaza	22
Grosse Ile L	45	Alfred Brujsh Ford Park	22
Grosse Ile M	45	Vaughn Reid Park	16
Grosse Ile N	45	Mariner's Park	9

Table 6: Great Detroit River Habitat Guidelines vs. Proposed Restoration Conditions

Parameter	Guideline	Local Target	Proposed (Based on GIS Analyses)				
			Detroit River	Little River	River Canard	Turkey Creek	Total Study Area
% Natural Cover (all habitats)		12	12.81	10.83	13.66	19.64	13.77
Size (ha) of Largest Forest Patch	100	100	123.21	59.62	179.01	156.2	179.01
% Forest Cover (>0.5 ha) (upland + wetland)	30		3.96	2.66	4.82	10.73	4.8
% Forest Cover 100 m or Farther from Edge	> 10		0.53	0.24	0.74	1.88	0.76
% Forest Cover 200 m or Farther from Edge	> 5		0.15	0.05	0.2	0.49	0.2
% Riparian Habitat Naturally Vegetated along First-to-Third Order Streams (guideline: 30 m optimum; local target, not less than 3-10 m wide)	> 75	> 75	91.9	97.38	92.44	83.23	91.99
% Wetland in a Sub-watershed	> 6		5.59	0	0.55	0.37	1.51

Table 7. Shoreline extent (miles) and treatment (%) at riparian candidate sites in Michigan waters of the Detroit River.

Number of	Mainland	Offshore	Total
Candidate Sites	52	33	85
River Frontage	11.24 mi	36.40 mi	47.64 mi
Shoreline Treatment:			
Concrete	4.31 mi	0	4.31 mi
Steel	1.78 mi	0	1.78 mi
Riprap	2.l0 mi	12.38 mi	14.48 mi
Earthen	3.05 mi	24.02 mi	27.07 mi
Percentage of Sampled Shoreline:			
Concrete	38%	0	9%
Steel	16%	0	4%
Riprap	19%	34%	30%
Earthen	27%	66%	57%

gu

Site Number	SITE NAME	Jurisdiction	Latitude	Longitude	OWNER	OWNERSHIP
1	Mariner's Park	City of Detroit	42 21 27.96 N	82 55 45.72 W	City of Detroit, Planning and Development	Public
2	Riverfront-Lakewood East Park	City of Detroit	42 21 24.53 N	82 56 04.48 W	City of Detroit, Planning and Development	Public
3	Alfred Brush Ford Park	City of Detroit	42 21 23.55 N	82 56 12.35 W	City of Detroit, Planning and Development	Public
4	Fisher Mansion Woodlot	City of Detroit	42 21 21.43 N	82 56 36.34 W	C&EDD Greyhaven	Private
5	Maheras/Gentry Park	City of Detroit	42 21 18.81 N	82 56 56.85 W	City of Detroit, Planning and Development	Public
6	DTE/Conner's Creek	City of Detroit	42 21 24.91 N	82 57 12.00 W	The Detroit Edison Company	Private
7	Inland Lime and Stone	City of Detroit	42 21 26.04 N	82 57 44.59 W	Crown Enterprises	Private
8	Vaughn-Reid Memorial Park	City of Detroit	42 21 18.09 N	82 57 48.94 W	City of Detoit, Parks and Recreation Dept.	Public
9	Shipwreck Marine	City of Detroit	42 21 20.25 N	82 58 04.24 W	City of Detoit	Public
10	Porter Field	City of Detroit	42 21 16.00 N	82 58 40.64 W	City of Detoit	Public
11	David F. Stockton Memorial Park	City of Detroit	42 21 12.29 N	82 58 49.51 W	City of Detoit, Parks and Recreation Dept.	Public
12	Erma Henderson Park & Marina	City of Detroit	42 21 06.65 N	82 59 09.03 W	City of Detroit, Parks and Recreation Dept.	Public
13	Owen Park	City of Detroit	42 21 03.67 N	82 59 21.61 W	City of Detroit, Parks and Recreation Dept.	Public
14	UAW Lot	City of Detroit	42 21 03.59 N	82 59 21.59 W	United Auto Workers	Private
15	Gabriel Richard Park	City of Detroit	42 20 47.27 N	82 59 54.62 W	City of Detroit, Parks and Recreation Dept.	Public
16	North Fishing Pier	City of Detroit	42 20 34.15 N	82 59 11.59 W	City of Detroit, Parks and Recreation Dept.	Public
17	Belle Isle North Shore	City of Detroit	42 20 32.00 N	82 20 32.00 W	City of Detroit, Parks and Recreation Dept.	Public
18	Lake Muskoday	City of Detroit	42 20 56.23 N	82 58 01.93 W	City of Detroit, Parks and Recreation Dept.	Public
19	Belle Isle Water Intake	City of Detroit	42 20 59.17 N	82 57 54.97 W	City of Detroit, Parks and Recreation Dept.	Public
20	Blue Heron Lagoon	City of Detroit	42 20 40.43 N	82 57 34.53 W	City of Detroit, Parks and Recreation Dept.	Public
21	Lake Okonoka	City of Detroit	42 20 30.04 N	82 57 35.90 W	City of Detroit, Parks and Recreation Dept.	Public
22	South Fishing Pier	City of Detroit	42 20 19.66 N	82 57 51.62 W	City of Detroit, Parks and Recreation Dept.	Public
23	Lake Tacoma	City of Detroit	42 20 04.98 N	82 59 26.88 W	City of Detroit, Parks and Recreation Dept.	Public
24	North Canoe Livery	City of Detroit	42 20 14.74 N	82 59 52.47 W	City of Detroit, Parks and Recreation Dept.	Public
25	UniRoyal site	City of Detroit	42 20 45.39 N	83 00 14.85 W	City of Detroit, (C&EDD)	Public
26	Mt. Elliott Park	City of Detroit	42 20 25.87 N	83 00 24.33 W	City of Detroit, Parks and Recreation Dept.	Public
27	Chene Park	City of Detroit	42 20 02.42 N	83 01 12.46 W	City of Detroit, Parks and Recreation Dept.	Public
28	St. Aubin Park & Marina	City of Detroit	42 19 55.94 N	83 01 29.87 W	City of Detroit, Parks and Recreation Dept.	Public
29	Hart Plaza	City of Detroit	42 19 34.01 N	83 02 40.84 W	City of Detoit	Public
30	Free Press Easement	City of Detroit	42 19 20.18 N	83 03 36.07 W	Detroit Free Press	Private
31	Detroit Union Depot	City of Detroit	42 18 57.43 N	83 04 32.93 W	Detroit Union Depot Co.	Private
32	Riverside Park & Boat Ramp	City of Detroit	42 18 44.33 N	83 04 44.36 W	City of Detroit, Parks and Recreation Dept.	Public
33	Revere Copper and Brass	City of Detroit	42 18 12.54 N	83 05 31.00 W	City of Detroit (C&EDD)	Public
34	Fort Wayne Parade Grounds	City of Detroit	42 17 41.93 N	83 05 48.91 W	City of Detroit, Historical Dept	Public
35	Delray Boat Launch	City of Detroit	42 17 34.02 N	83 05 55.66 W	Detroit Edison	Private
36	DTE River Rouge	City of River Rouge	42 16 26.15 N	83 06 38.08 W	The Detroit Edison Company	Private
37	Belanger Park	City of River Rouge	42 16 14.11 N	83 06 40.62 W	City of River Rouge	Public
38	National Steel Settling Ponds	City of River Rouge	42 15 50.91 N	83 06 54.68 W	National Steel Corporation	Private
39	National Steel Skull Drop Site	City of River Rouge	42 15 41.99 N	83 06 59.76 W	National Steel Corporation	Private
40	Great Lakes Steel Boat Club	City of River Rouge	42 15 39.69 N	83 07 00.52 W	National Steel Corporation	Private
41	National Steel Lot	City of Ecorse	42 14 32.37 N	83 08 26.37 W	National Steel Corporation	Private
42	Mud Island	City of Ecorse	42 14 21.24 N	83 08 37.66 W	U.S. Fish and Wildlife Service	Public
43	John D. Dingell Park	City of Ecorse	42 14 20.18 N	83 08 43.69 W	City of Ecorse	Public
44	Grassy Island	City of Ecorse	42 13 11.54 N	83 08 14.13 W	U.S. Fish and Wildlife Service	Public
45	BASF Wyandotte Site	City of Wyandotte	42 12 56.98 N	83 08 28.73 W	BASF Wyandotte Corporation	Private
46	Bishop Park	City of Wyandotte	42 12 18.74 N	83 08 44.83 W	City of Wyandotte	Public
47	Point Hennepin	Grosse Ile Township	42 11 55.73 N	83 08 44.00 W	Michigan Alkali Co (BASF Wyandotte Corp)	Private
48	Wyandotte Shores Golf Course	City of Wyandotte	42 11 40.28 N	83 09 00.09 W	BASF Wyandotte Corporation	Private
49	NE Grosse Ile	Grosse Ile Township	42 10 59.08 N	83 08 35.12 W	Standard Federal Bank	Private
50	BASF Grosse Ile	Grosse Ile Township	42 10 54.09 N	83 08 50.55 W	BASF Wyandotte Corporation	Private
51	Elf Atochem America Site	City of Riverview	42 10 57.45 N	83 09 24.49 W	Penwalt Corp. (ELF Atochem North America)	Private
52	North Hennepin Marsh	Grosse Ile Township	42 10 47.75 N	83 09 15.13 W	Grosse Ile Nature and Land Conservancy	Private
53	Conservancy Lots	Grosse Ile Township	42 10 43.19 N	83 08 58.80 W	Mark Chernuta & Keith West	Private
54	BASF Riverview Site	Grosse Ile Township	42 10 29.44 N	83 09 48.43 W	BASF Wyandotte Corporation	Private
55	Crown Enterprises	City of Riverview	42 10 25.40 N	83 09 50.87 W	Crown Enterprises	Private
56	South Hennepin Marsh	Grosse Ile Township	42 10 16.72 N	83 09 41.88 W	Rock Financial Corp. & National City Mortgage Co.	Private
57	Thoroughfare Canal	Grosse Ile Township	42 10 05.06 N	83 08 39.40 W	Curtis Korneffel	Private
58	Grosse Ile B	Grosse Ile Township	42 09 58.91 N	83 08 39.40 W	Grosse Ile Township	Public
59	Grosse Ile A	Grosse Ile Township	42 09 59.20 N	83 08 53.62 W	Grosse Ile Garden Club	Private
60	Grosse Ile C	Grosse Ile Township	42 09 47.95 N	83 09 11.60 W	Grosse Ile Township	Public
61	DSC Site	City of Trenton	42 09 58.62 N	83 10 20.92 W	Detroit Steel Corporation	Private
62	Levy Trucking	City of Trenton	42 09 16.46 N	83 10 20.92 W	Edward C. Levy Co. & City of Trenton	Private
63	Howard Ellias Trust Property	City of Trenton	42 09 11.42 N	83 10 24.69 W	Howard Ellias Trust	Private
64	Meyer-Ellias Park	City of Trenton	42 09 07.59 N	83 10 20.96 W	City of Trenton	Public
65	George St. Road End	City of Trenton	42 08 58.55 N	83 10 22.99 W	City of Trenton	Public
66	Traux St. Road End	City of Trenton	42 08 54.23 N	83 10 23.62 W	City of Trenton	Public
67	Rotary Park	City of Trenton	42 08 47.21 N	83 10 24.41 W	City of Trenton & Hattie Duich	Public
68	Cherry Street Park	City of Trenton	42 08 40.15 N	83 10 26.72 W	City of Trenton	Public
69	Elm Street Park	City of Trenton	42 08 35.22 N	83 10 28.17 W	City of Trenton	Public
70	West Road Park	City of Trenton	42 08 26.04 N	83 10 31.23 W	City of Trenton	Public
71	Grosse Ile D	Grosse Ile Township	42 08 20.57 N	83 09 15.23 W	Grosse Ile Township and R. McCloud	Public
72	Grosse Ile F	Grosse Ile Township	42 08 04.85 N	83 10 04 66 W	Grosse Ile Township	Public
73	Elizabeth Park	City of Trenton	42 07 52.32 N	83 10 45.48 W	Wayne County	Public
74	Grosse Ile G	Grosse Ile Township	42 07 55.23 N	83 09 43.43 W	Grosse Ile Township	Public
75	Grosse Ile H	Grosse Ile Township	42 07 45.54 N	83 09 15.53 W	Grosse Ile Township	Public
76	Stony Island	Grosse Ile Township	42 07 24.83 N	83 07 48.23 W	State of Michigan	Public
77	Grosse Ile J	Grosse Ile Township	42 07 15.73 N	83 08 55 80 W	Grosse Ile Township	Public
78	DTE Trenton	City of Trenton	42 07 15.47 N	83 10 56.95 W	The Detroit Edison Company & Wayne County	Private
79	Solutia Site	City of Trenton	42 07 11.87 N	83 10 47.47 W	Monsanto Chemical Company	Private
80	Crystal Bay Navigation Dike	Federal Government	42 07 06.43 N	83 10 57.96 W	U.S. Army Corps of Engineers	Public
81	Chrysler Paint Plant	City of Trenton	42 06 57.22 N	83 10 57.96 W	Chrysler Corporation	Private
82	Grosse Ile M	Grosse Ile Township	42 06 52.03 N	83 09 44.91 W	Grosse Ile Township	Public
83	Grosse Ile L	Grosse Ile Township	42 06 48.16 N	83 10 01.89 W	Grosse Ile Township	Public
84	Grosse Ile K	Grosse Ile Township	42 06 46.88 N	83 09 36.01 W	Grosse Ile Nature and Land Conservancy, Grosse Ile Township, Feather Properties	Public
85	Livingston Channel Navigation Dike	Federal Government	42 06 41.72 N	83 07 42.29 W	U.S. Army Corps of Engineers	Public
86	Grosse Ile N	Grosse Ile Township	42 06 28.95 N	83 10 14.52 W	MDNR Trust Fund	Public
87	Dynamite Island	Grosse Ile Township	42 06 27.45 N	83 08 07.60 W	Edward A. Koonmen	Private
88	Fox Island	Grosse Ile Township	42 06 22.98 N	83 08 28.25 W	Dominic J. Gorno	Private
89	Oldani Marsh	Grosse Ile Township	42 06 19.28 N	83 08 52.89 W	Grosse Ile Township	Public
90	Humbug Marsh/Island	City of Gibralter	42 06 20.95 N	83 11 11.48 W	Made in Detroit	Private
91	Calf Island	Grosse Ile Township	42 06 17.17 N	83 10 44.74 W	The Nature Conservancy	Private
92	Elba Marsh	Grosse Ile Township	42 06 10.37 N	83 09 02.57 W	Grosse Ile Township	Public
93	Elba Woods	Grosse Ile Township	42 05 56.80 N	83 09 09.26 W	Grosse Ile Township	Public
94	Grosse Ile Nature Center	Grosse Ile Township	42 05 54.25 N	83 09 14.36 W	Grosse Ile Township	Public
95	Gibraltar Bay	Grosse Ile Township	42 05 46.31 N	83 09 02.90 W	Grosse Ile Township	Public
96	Round Island	Grosse Ile Township	42 05 42.67 N	83 10 02.84 W	Ford Yacht Club	Private
97	Channel Woods	Grosse Ile Township	42 05 34.95 N	83 10 23.93 W	Ford Yacht Club	Private
98	Meso Island	Grosse Ile Township	42 05 36.50 N	83 09 17.98 W	Cranblum Assoc, Warren-Susan Horbal, , Darryl Filarski	Private
99	Airport Marsh	Grosse Ile Township	42 05 32.68 N	83 09 37.24 W	Grosse Ile Township	Public
100	Sugar Island	Grosse Ile Township	42 05 26.15 N	83 08 21.27 W	William Herschler	Private
101	Sugar Island Cut Dike	Federal Government	42 05 26.30 N	83 08 21.20 W	U.S. Army Corps of Engineers	Public
102	Hickory Island	Grosse Ile Township	42 05 16.91 N	83 09 17.96 W	Hickory Island Company	Private
103	Celeron Island	Grosse Ile Township	42 05 11.26 N	83 10 34.13 W	State of Michigan	Public
104	Sturgeon Bar	Brownstown Township	42 04 05.82 N	83 11 10.34 W	Lake Erie Metro Park	Public

PROTECTED	ZONED	ASSESSED VALUE (SEV)	TAXES PAID	PARCEL NUMBER
Yes	R - Residential	$21,300	taxes exempt	Ward 21, Item 000119-23
Yes	M - Industrial	$943,200	taxes exempt	Ward 21, Item 000110-6
Yes	M - Industrial	$817,200	taxes exempt	Ward 21, Item 000110-6
No	R - Residential	$153,650	taxes exempt	Ward 21, Items 000084-7, 000108, 000109, 050307-11, 050278-306
Yes	C - Commercial	$1,064,550	taxes exempt	Ward 21, Item 000073-4
No	M - Industrial	$166,500	33.49	Ward 21, Item 045687.002L
No	M - Industrial	$146,400	1854.57	Ward 21, Item 000070.002L
Yes	M - Industrial	$186,550	taxes exempt	Ward 21, Item 000001
Yes	M - Industrial	$161,000	taxes exempt	Ward 21, Item 000005
Yes	M - Industrial	$346,850	taxes exempt	Ward 19, Item 000012.001
Yes	R - Residential	$21,150	taxes exempt	Ward 19, Item 000001-4
Yes	C - Commercial	$1,905,700	taxes exempt	Ward 19, Item 000017
Yes	C - Commercial	$391,900	taxes exempt	Ward 17, Item 000007.003L
No	C - Commercial	$208,850	taxes exempt	Ward 17, Item 000017
Yes	C - Commercial	$2,627,750	taxes exempt	Ward 17, Item 000020
Yes	M - Industrial	$129,733,650	taxes exempt	Ward 15, Item 000001
Yes	M - Industrial	$129,733,650	taxes exempt	Ward 15, Item 000001
Yes	M - Industrial	$129,733,650	taxes exempt	Ward 15, Item 000001
Yes	M - Industrial	$129,733,650	taxes exempt	Ward 15, Item 000001
Yes	M - Industrial	$129,733,650	taxes exempt	Ward 15, Item 000001
Yes	M - Industrial	$129,733,650	taxes exempt	Ward 15, Item 000001
Yes	M - Industrial	$129,733,650	taxes exempt	Ward 15, Item 000001
Yes	M - Industrial	$129,733,650	taxes exempt	Ward 15, Item 000001
Yes	M - Industrial	$129,733,650	taxes exempt	Ward 15, Item 000001
No	M - Industrial	$4,629,400	no data provided	Ward 15, Item 000008-9
Yes	M - Industrial	$952,000	taxes exempt	Ward 15, Item 000003
Yes	M - Industrial	$6,807,700	taxes exempt	Ward 9, Item 000001-4
Yes	M - Industrial	$3,490,850	no data provided	Ward 9, Item 000008-10
Yes	D - Dowtown Development Authority	$56,734,900	taxes exempt	Ward 2, Item 000001-21, 001916-25, 000038-41, 000050-1
No	M - Industrial	$4,836,300	49145.42	Ward 8, Item 000001-17
No	M - Industrial	$93,750	no data provided	Ward 12, Item 000002
Yes	M - Industrial	$768,150	taxes exempt	Ward 12, Item 000013, 000008-9
No	M - Industrial	$1,252,400	taxes exempt	Ward 16, Item 000006.001, 000006.002L, 000008-9
Yes	M - Industrial	$4,832,850	taxes exempt	Ward 18, Item 000041.001
No	M - Industrial	$837,650	taxes exempt	Ward 18, Item 000042.002L
No	M-2 Heavy Industrial	$18,297,900	1356033.86	50-002-99-0001-000
Yes	M-2 Heavy Industrial	None	taxes exempt	50-002-99-0006-000
No	M-2 Heavy Industrial	$1,322,100	97975.30	50-003-99-0003-000
No	M-2 Heavy Industrial	$1,322,050	no data provided	50-003-99-0003
No	M-2 Heavy Industrial	$1,112,700	82463.61	50-003-99-0010-001
No	I-2 Heavy Industrial	$500,600	37856.49	34-007-14-0051-000
Yes	Industrial	$4,300	309.52	34-013-99-0024
Yes	FCD - Frenchman's Cove District	None	taxes exempt	34-013-01-0001-000, 02-0050, 03-0001, 99-0014-000
Yes	RA - One Family Residential	None	no data provided	Granted to the U.S. Aug 27, 1893 liber 399 page 523
No	I-2 Industrial District	$12,611,600	738146.79	57-008-99-0005 & 0006-000
Yes	RA - One Family Residential	None	taxes not assessed	57-010-99-0004-000
No	SE -Special Environmental District	$241,600	2282.30	73-001-99-0002-000
No	RU -Recreational Unit District	$6,100	358.84	57-021-01-0001-000, 57-023-99-0001-000
No	R-1-B Single Family Residential	$98,500	3829.24	73-010-01-0027-003
No	R-1-D Single Family Residential	$573,950	24088.70	73-010-01-33 to 45
No	I-1 Industrial	$1,209,500	68211.37	51-007-99-0001, 0002, 0005
Yes	SE -Special Environmental District	None	taxes not assessed	73-009-01-0244-000
Yes	R-1-B Single Family Residential	$92,200	4058.88	73-010-01-0057 & 0058-000
No	M-2 General Industrial District	$540,200	30467.16	51-009-99-0001
No	M-2 General Industrial District	$595,300	34663.80	51-009-03-0001
No	R-1-A Single Family Residential	$837,100	25237.59	73-004-01-0024-000, 0025, 0026, 73-006-01-0001-001, 0002, 0003-001, 002, 003
No	R-1-A Single Family Residential	$33,200	1733.95	73-002-03-0010-300
Yes	O-1 Open Space District	unknown	taxes not assessed	73-002-02-0040-004
Yes	O-1 Open Space District	None	no data provided	73-003-01 & 02 "Grosse Ile Woods Subdivision"
Yes	O-1 Open Space District	None	1355.85	73-014-01-0185-003, 73-014-06-0000-000
No	I-3 Industrial	$9.092,200	599360.28	54-001-99-0006-700, 0007, 0009, 0020, 54-001-01-0082-000, 0097, 54-001-03-0051-001, 54-011-99-0002-000
No	I-2 Industrial	$471,400	25676.53	54-011-99-001-000, 54-011-99-0003-005
No	WM Waterfront Marina	$90,600	4855.76	54-011-99-0003-004
Yes	R-2 One Family Residential	None	taxes not assessed	54-011-99-0004-000
Yes	RM-2 Multiple Family Residential	None	taxes not assessed	Public right of way (no parcel #)
Yes	RM-2 Multiple Family Residential	None	taxes not assessed	Public right of way (no parcel #)
Yes	RM-2 Multiple Family Residential	None	no data provided	54-014-02-0109, 0112-002
Yes	RM-2 Multiple Family Residential	None	taxes not assessed	Public right of way (no parcel #)
Yes	RM-2 Multiple Family Residential	None	taxes not assessed	Public right of way (no parcel #)
Yes	RM-2 Multiple Family Residential	None	taxes not assessed	Public right of way (no parcel #)
Yes	O-1 Open Space District	$15,200	405.30	73-016-01-0018-003, 73-017-01-0145-000, 0152-002
Yes	R-1-B Single Family Residential	unknown	no data provided	73-032-01 "Grosse Ile Manor Subdivision"
Yes	R-1 One Family Residential	None	taxes not assessed	54-016-99-0005-000
Yes	R-1-B Single Family Residential	unknown	no data provided	73-032-01 "Grosse Ile Manor Subdivision"
Yes	O-1 Open Space District	$73,950	taxes not assessed	73-027-02-0108-001, 0109-001, 002, 0110-303, 0112-308, 0113-006, 0113-310
Yes	O-1 Open Space District	$170,700	taxes not assessed	73-068-99-0001-000
Yes	O-1 Open Space District	None	taxes not assessed	73-050-01-339-005
No	I-3 Industrial	$23,631,800	14359.28	54-029-99-0004, 0006
No	I-3 Industrial	$3,861,300	210314.62	54-029-99-0003
Yes	O-1 Open Space District	None	None	None
No	I-3 Industrial	$599,000	59234.73	54-026-99-0002
Yes	A-1 Airport District	unknown	taxes not assessed	73-037-01-231a
Yes	A-1 Airport District	unknown	no data provided	73-037-01-231a & 73-037-02-b11, b12 to b17, b18
Yes	O-1 Open Space District	$331,300	19374.46	73-047-01-201-000, 202, 203-000, 205-007, 207-303, 73-048-01-0195-008, 0198-004, 0200-000
Yes	O-1 Open Space District	None	None	None
Yes	R-1-B Single Family Residential	unknown	no data provided	73-037-01-232-a1, 233-b1, b2a, b2b, b2c & 73-037-02-b5a, b6a, b7a, b5b, b6b, b7b, b8b, b9, b10, b11
No	R-1-B Single Family Residential	$600	2850.32	73-069-99-0001-000
No	R-1-B Single Family Residential	$2,100	15.64	73-069-99-0002-000
Yes	O-1 Open Space District	None	taxes not assessed	73-043-01-0069-309
No	R-1 One Family Residential	$2,719,790	160042.51	54-026-99-0003-000, 36-003-99-0001-000, 36-004-99-0001-001
Yes	R-1-A Single Family Residential	$59,700	162931.64	73-067-01-0399
Yes	R-1-B Single Family Residential	None	taxes not assessed	73-043-0069-309
Yes	R-1-B Single Family Residential	None	taxes not assessed	73-054-01-0440-000
Yes	A-1 Airport District	None	taxes not assessed	73-061-01-0255-002
Yes	Public Waterway	None	no data provided	73-066-01-0248-XXX
No	R-1-A Single Family Residential	$40,200	2046.92	73-063-01-0393-000
No	R-1-B Single Family Residential	$552,200	28079.72	73-063-01-0392-005
No	R-1-B Single Family Residential	$261,470	13316.58	73-066-01-0253a, 0253b, 0253c, 0253e
Yes	A-1 Airport District	None	taxes not assessed	73-062-01-0257
No	R-1-A Single Family Residential	$48,600	2076.82	73-070-99-0001-000
Yes	Unknown	None	no data provided	None
No	R-1-B Single Family Residential	$28,500	759.92	73-065-01-0001-000
Yes	O-1 Open Space District	$547,700	4677.95	73-071-99-0001-000
Yes	Unknown	unknown		70-157-99-0005-0004

AREA (acres)	RIVER FRONTAGE (feet)	SOIL TYPE	CURRENT LAND USE
6.4	370	loam, 2, PBM	brownfield, (demolished hospital/fishing)
25.2	1142	loam, 2, PBM	park/greenspace (not maintained)
20.9	942	loam, 2, PBM	park/handicap learning center
14.2	370	clay/loam, 2, PBM	wild (undeveloped mature woodlot)
62.2	1264	fill, 2, PBM	park/marina
13.7	112	fill/loam, 2, PBM	green space (sewage treatment plant/woods)
5.8	257	fill/loam, 2, PBM	wild/abandoned lot/greenspace
3.9	513	loam, 2, PBM	park (public boat launch)
2.4	700	fill/loam, 2, PBM	dock/marina (yacht club)
6.2	420	fill/loam, 2, PBM	empty lot/greenspace (mowed lawn)
2.2	233	loam, 2, PBM	park (undeveloped, mowed lawn)
24.9	740	loam, 2, PBM	park/dock/marina
8.2	613	loam, 2, PBM	park (undeveloped woodlot, fields, no roads)
3.8	332	loam, 2, PBM	wild/abandoned lot (partly wooded)
16.6	1330	loam, 2, PBM	park (mowed lawn/bridge to Belle Isle)
2.0	445	loam, 2, PBM	park /other(fishing pier, wildlife habitat)
1.1	867	loam, 2, PBM	park (mowed lawn, natural earthen shoreline
22.7	6518	loam, 2, PBM	park/other (lake) (fishing, wildlife habitat)
15.5	5545	loam, 2, PBM	park/other (lake) fishing, wildlife habitat)
42.0	5950	loam, 2, PBM	park/other (lake) (fishing, wildlife habitat)
23.7	6807	loam, 2, PBM	park/other (lake) (fishing, wildlife habitat)
2.6	576	loam, 2, PBM	park/other(fishing pier, wildlife habitat)
12.7	5047	loam, 2, PBM	park/other (lake) (fishing, wildlife habitat)
2.1	827	loam, 2, PBM	park (canel, natural earthen shore,wildlife habitat
42.1	1942	loam, 2, PBM	brownfield, abandoned industrial site
6.0	500	loam, 2, PBM	park (new, well-maintained, landscaped)
8.9	905	fill/loam, 2, PBM	park
9.3	1248	fill/loam, 2, PBM	park/marina
12.0	855	fill/loam, 2, PBM	park (concrete and mowed grass)
9.3	2141	fill/loam, 2, PBM	empty lot (mowed grass, baseball fields)
1.3	700	loam, 2, PBM	other (railroad yard) base of Ambassador Bridge
10.3	1828	loam, 2, PBM	park (boat ramp) base of Ambassador Bridge
30.0	1108	loam, 4, BST	brownfield (abandoned industrial site)
23.9	1270	loam, 4, BST	park/parade grounds (historic structures)
13.8	780	fill/loam, 4, BST	other (public boat launch)
2.0	500	loam, 4, BST	park
10.2	670	fill/loam, 4, BST	park (public boat launch)
4.6	1490	loam, 4, BST	brownfield, wild (former industrial site)
1.9	330	loam, 4, BST	brownfield, abandoned lot (steel scrapping site)
7.1	675	loam, 4, BST	dock/marina (yacht club)
20.8	1280	clay/loam, 6, HN	brownfield, wild (former industrial site)
22.4	4143	loam, 6, HN	wild (Detroit River National Wildlife Refuge)
4.5	1460	clay/loam, 6, HN	park (mowed grass, boardwalk)
73.8	9420	dredge spoils, CDF, Ma	brownfield (Detroit River National Wildlife Refuge)
142.7	5520	clay/loam, 6, HN	greenspace (mowed grass)
10.7	1770	loam, 7, PB	park (fishing pier)
221.6	17061	caustic soda, 7, PB, Mb	brownfield (former industrial disposal facility)
85.0	381	loam, 7, PB	brownfield, greenspace (golf course)
0.3	100	7, PB, Pe, BbB	empty lot (mowed grass)
8.5	1305	7, PB, Pe, BbB	wild/empty lots beside canal to Hennipen Pt.
86.3	2775	7, PB, Mb	brownfield, wild (former industrial site)
105.4	6366	loam, 7, PB, Cu	wild (emerg./submersed marsh, earthen shoreline)
1.9	290	7, PB, Pe, BbB	wild/ greenspace/ empty lots
25.3	1268	loam, 7, PB, Cu	brownfield (contaminated former industrial site)
38.2	1180	loam, 7, PB, Cu	brownfield (remediation/new development)
47.3	3500	sand, 7, PB, Mb, Pe, Mob	wild (natural area, shorebird & waterfowl habitat
1.6	308	7, PB, BbB, MoB, Pe	wild/empty lot (earthen shoreline, wooded)
34.0	969	7, PB, BbB, MoB, Pe	greenspace (diverse woodlot, public open space)
83.7	994	7, PB, BbB, Pe	greenspace (intact forest, public open space)
46.5	0	7, PB, BbB, Pe, MoB	greenspace, (intact forest, public open space)
227.5	6000	loam, 7, PB, Cu	brownfield (contaminated former industrial site)
26.2	445	cut/fill	brownfield, (industrial site)
12.3	935	cut/fill, Cu	greenspace (small marsh, borders Black Lagoon)
4.5	250	loam, 7, PB, Cu	park (earthen shoreline borders Black Lagoon)
0.1	90	loam, 7, PB, Cu	empty lot (road end, water dept. substation)
0.2	247	loam, 7, PB, Cu	empty lot (road end, shallow embayment)
5.3	550	loam, 7, PB, Cu	park (boat ramp, boardwalk)
0.1	73	loam, 7, PB, Cu	park (road end, stormwater discharge pipe)
0.3	60	loam, 7, PB, Cu	park (road end, stormwater discharge pipe)
0.6	67	loam, 7, PB, Cu	park (road end, stormwater discharge pipe)
27.6	1290	7, PB, BbB, Pe	greenspace (intact forest, public open space)
62.2	3162	7, PB, BbB, Pe	greenspace (intact forest, public open space)
165.0	3821	loam, 7, PB, BbB, Cu, Pe	park (boat launch, large woodlot, marsh, canal)
14.4	1670	7, PB, BbB, MoD, Pe	greenspace, wild, beside Throrofare Canal
44.3	0	7, PB, BbB, Pe	greenspace (intact forest, public open space)
52.0	18081	7, PB, Mb, Pe, Cu	other (wild undeveloped/natural island)
45.6	0	7, PB, BbB, Pe	greenspace (intact forest, public open space)
16.3	290	cut/fill	other (industry, power generating station)
14.6	1420	loam, 7, PB, Cu	other (industry, stormwater management ponds)
112.6	32180	limestone/boulder, Ma, Cu	other (island, binational, navigation structure
43.1	910	cut/fill	brownfield (contaminated former industrial site)
16.9	0	7, PB, BbB, Pe	greenspace (intact forest, public open space)
22.7	0	7, PB, BbB, Pe	greenspace (wooded, wetland, public open space)
189.8	0	7, PB, BbB, Pe	greenspace (wooded, wetland, public open space)
19.5	16921	limestone/boulder, Ma, Cu	other (stone dike, emergent sedge marsh)
30.7	0	7, PB, BbB, MoD	greenspace (forest/marsh public open space)
0.5	666	7, PB, Cu	other (natural island; rocky shoals
0.7	786	clay/sand, 7, PB, Pe, MoD	other (natural island; rocky shoals
13.2	3041	7, PB, Mb, Pe	other (lagoon/marsh, excellent aquatic habitat)
222.2	6238	7, PB, Mb, BbB, MoB, MeA, Ho	other (island/lagoon/marsh, diverse aquat. habitat
3.7	2803	sand, 7, PB, Mb, Pe, Mob	other (natural island; rocky & sandy shoals
17.9	3765	7, PB, Mb	other (natural marsh/lagoon adjacent to developmt)
9.8	2013	7, PB, Mb	greenspace (wooded marsh, public open space)
37.9	1353	7, PB, Mb, Cu	park (nature preserve, on Gibraltar Bay)
143.0	13104	laucustrine/bottomland	other (coastal wetland embayment/natural marsh)
43.3	6630	loam, 7, PB, BbB, Mb, Pe	other (island, wooded, undeveloped/natural)
10.4	295	loam, 7, PB, BbB, Mb, Pe	wild (intact coastal woods, joins interior woodlands
11.8	1478	7, BbB, Pe, Mb	other (island, Gibraltar Bay coastal marsh
45.9	3632	7, Pb, Mb, Cu	other (coastal wetland embayment/natural marsh)
28.1	4652	clay, 7, PB	other (island, wooded/undeveloped/natural)
3.2	5524	limestone/boulder, Ma	other (flow compensation dike of heavy stone)
11.8	1900	7, BbB	other (island, residential, coastal wetlands)
68.1	14997	7, PB, Mb, BbB, Pe	island (undeveloped/natural, coastal wetlands
1.9	2827	sand/boulders/gravel	other (island, wildlife/shorebird/sturgeon spawning)
3422.0			

ADJACENT LAND USES	SHORELINE STATUS	RIVER LINK	LANDFORM
E- DTR, N- Windmill Pt Country/Yacht Club, S- Old trailer court, W- residential	Steel/concrete bulkhead	No	Upland
E- DTR, W- Fox Creek, N- Lakeside trailer court, S- Alfred B. Ford Park	Steel/concrete wall with steel guard rail	Yes (Fox Creek)	Upland, Wooded grassland
E- DTR/Peche Island, W- upscale residential, N- Lakewood East Park, S- Center for the Handicapped	Steel/concrete wall with steel guard rail	No	Upland
E- DTR, W- Fisher Mansion, N- Center for the Handicapped, S- Shorepoint village at Grayhaven	Concrete wall	Yes, canal	Upland
E- DTR, W- residential, N- Shorepoint village, Yacht club, S-DTR	Large concrete rip-rap	Yes, canal	Upland
E- Gregory Marina, W- DTE raw materials, N- Conner's Creek, S- DTR	Natural	Yes, canal	Upland
E- DTE plant, W- Vaughn-Reid park, N- Detroit East Side, S- DTR	Concrete rip-rap; wooden docks, earthen	Yes, canal	Upland
E- DTR, W- Industry/Marina, N- DTE generating station, S- Abandonded steel structure	Steel wall with concrete rip-rap	No	Upland
E- DTR/Belle Ille, W- old residential, N- Vaughn-Reid Boat launch, S- Yacht club	Concrete rip-rap	No	Riverine/ Coastal Wetland
E- DTR, W- Dept of Water and Sewage, N- Hydroplane Grand Stands, Marina	Concrete rip-rap	No	Upland
E- DTR, W- residential, N- Marina, S- Mayor's residence	Concrete rip-rap	No	Upland
E- DTR, W- Church/commercial, N- Upscale residential, S- The Wittier	Concrete wall with steel guard rail	No	Upland
E- DTR, W- Commercial Development, N- The River Plaza Apts, S- Belle Maison East Apts	Concrete wall	No	Upland
E- DTR, W- Commercial Development, N- UAW main headquarters, S- Rivertowers Apts	Concrete wall, some natural shoreline	No	Upland
E- DTR, W- commercial development, N- Marine Corps Reserve Center, S- old UniRoyal site	Concrete rip-rap	No	Upland
E- Police Station, W- DTR, N- Belle Isle Public Beach, S- Detroit Boat Club	Natural, some rock	Yes	Riverine/Coastal Wetland
E- Belle Isle Zoo, W- DTR, N- Belle Isle Public Beach, S- North Fishing Pier	Natural	Yes	Littoral Wetland/Beach
E- Police Station, W- DTR, N- Belle Isle Public Beach, S- Detroit Boat Club	Natural	Yes	Lacustrine Wetland
E- Lake Muskoday, W- DTR, N- DTE Power Plant, S- Detroit Yacht Club	Natural, some rock	Yes	Other (Lagoon)
E- Park/DTR, W- Driving Range, N- Detroit Edison, S- Woodlot	Natural	Yes	Lacustrine Wetland
E- DTR/USCG, W- Woodlot, N- Livingston Lighthouse Park, S- Athletic Fields	Natural	Yes	Lacustrine Wetland
E- DTR, W- Lake Okonoka, N- USCG, S- Belle Isle	Concrete rip-rap	Yes	Riverine Wetland
E- DTR, W- Shady Nook Park, N- Ann Scripps Whitcomb Conservatory, S- Casino	Natural	Yes	Palustrine Wetland
E- Casino, W- DTR, N- Police Dept (harbor master), S- Fountain Drive	Natural	Yes	Upland
E- DTR, W- commercial development, N- McArthur Bridge, S- commercial/industrial	Concrete/Steel wall	No	Upland
E- DTR, W- USCG station, N- commercial/industrial, S-USCG dock/pier	Concrete rip-rap	No	Upland
E- DTR, W- large parking lot, N- Cement factory, S- Cement factory	Large concrete rip-rap	No	Upland
E- DTR, W- abandoned lot/Globe Tradinig Co., N- Medusa Cement factory, S- Lafarge Cement Factory	Concrete rip-rap	No	Upland
E- DTR, W- Downtown Detroit, N- Renaissance Center, Cobo Arena	Concrete wall	No	Upland
E- DTR, W- Main Detroit Post Office, N- empy lot, S- Detroit Free Press	Concrete wall	No	Upland
E- DTR, W- railyards, N- railyards?, S- Riverside Boat Launch	wood/steel bulkhead	No	Upland
E- DTR, W- Animal Control Center, N- J.W. Westcott Co, The Detroit News	Concrete wall	No	Upland
E- DTR, W- Flor-Dri Supply Co., N- Mistersky Power Station, S- Fort Wayne	Concrete wall/rip-rap	No	Upland
E- DTR, W- Fort Wayne, N- U.S. Army Corps of Engineers, S- Delray Boat Launch	Large concrete rip-rap	No	Upland
E- DTR, W- General Electric Delray Project, N- Fort Wayne, S- DTE transfer station	Cement wall	No	Upland
E- DTR, DTE/railyard, N- National Steel, Belanger Park	some concrete rip-rap, most natural	Yes (canal)	Upland
E- DTR, W-Industrial, N- DTE River Rouge Plant, S- Great Lakes Steel 80" mill	Steel wall	No	Upland
E- DTR, W- Steel Mill complex, N- 80" mill, S- Great Lakes Steel Marina	100% natural	No	Littoral Wetland/Beach
E- DTR, W- National Steel complex, N- Settling ponds, S-Great Lakes Steel Marina	Rock and boulder rip-rap	No	Upland
E- DTR, W- Lindy Oxygen Plant, N- National Steel 80" mill, S- Coal piles	Steel wall	No	Upland
E- DTR, W- Jefferson Ave (commercial), N- Serbian American Hall, S- National Steel Training Center	Natural, some rock	Yes, canal	Upland
E- Dingell Park, W- Fighting Island, N- Ecorse, S- Grassy Island	Natural	Yes	Island
E- DTR, W- residential, N- Grand Port Café, S- Ecorse Rowing Club	Steel wall	No	Upland
E- Fighting Island, W- Wyandotte, N- Mud Island, S- DTR	Broken limestone	Yes	Island
E- DTR, W- BASF complex, N- Marina, S- Henry Ford Wyandotte Hospital	Concrete wall	No	Upland
E- DTR (Point Hennepin), W- residential/commercial, N- Wyandotte Electric, S- private residential	Steel wall	No	Upland
E- DTR, W- Wyandotte, N- DTR, S- Grosse Ile	Broken limestone	Yes	Island
E- DTR, W- commercial development, N- Wyandotte Boat Club, S- Penwalt Chemical lot	Concrete rip-rap	No	Upland
E- DTR, W- residential/Point Hennepin, N- residential/Point Hennepin, S- residential	Concrete rip-rap	No	Island
E- Parke Lane, W- Hennepin Marsh, N- Point Hennepin, S- Harbor Point	Natural	Yes	Other (Riparian Buffer)
E- DTR, W- commercial/light industrial, N- Wyandotte Shores Golf Course, S- Materials Processing Inc	Natural, some steel wall	No	Upland
E- Residential, W- River, N & S - River	Natural	Yes	Littoral Wetland
E- Wild (undeveloped), W- DTR (Trenton Channel), N- residential, S- residential	Natural	Yes	Upland, riparian buffer
E- DTR, W- commercial/light industrial, N- MPI industries, S- riverview boat launch	Semi-natural, some rip-rap	No	Upland
E- DTR (Trenton Channel), W- residential, N- Toll bridge, S- Detroit Steel Corporation	Steel wall	Yes	Upland
E- Forested residential, W- Trenton Channel/DSC property, N- Toll bridge road grade, S- Marina	Natural	Yes	Littoral Wetland
E- Residential, W- Residential, N- Thoroughfare Canal, S- Residential	Natural	Yes	Upland/Woodlot
E- Residential/DTR, W- Canal, N- residential, S- Horsemill St.	Natural	No	Upland/Woodlot
E- woodlot, W- woodlot, N- woodlot/residential, S- woodlot/residential	Natural	No	Upland/Woodlot
E- Thorofare Rd/residential, W- Meridian Rd/residential, N- Horsemill Greenway, S- residential	N/A (None)	No	Upland/Woodlot
E- Trenton Channel, W- Quarry, N- Grosse Ile Toll Bridge, S- Black Lagoon	Cement wall	No	Upland
E- DTR, W- Jefferson Ave (residential), N- DSC, S- Howard Ellias Trust Property	Natural	Yes	Upland
E- DTR, W- Jefferson Ave (residential), N- Levy Trucking, S- Meyer Ellias Park	Natural	Yes	Upland
E- DTR, W- Residential, N- Mclough Steel Plant (DSC), S- Residential	Natural	Yes	Upland/Lagoon
E- DTR, W- Residential, N- Residential, S- Riverside Osteopathic Hospital	Concrete rip-rap	No	Upland
E- DTR, W- Downriver cardiology, N- Riverview Osteopathic Hospital, S- Condo complex	Concrete rip-rap, some natural	No	Upland
E- DTR, W- Residential, N- Condo complex, S- Marina/condo complex	Concrete	No	Upland
E- DTR, W- Residential, N- Island View condos, S- Porte Marina	Concrete rip-rap	Yes	Lakeplain
E- DTR, W- Residential, N- Porte Marina, S- Trenton Towers Co-op	Concrete rip-rap	Yes	Lakeplain
E- DTR, W- Commercial development, N- Trenton Riverside Marina, S- private residential	Concrete rip-rap	Yes	Upland/RiparianWoodlot
E- Residential, W- canal, N- residential, S- residential	Natural	No	Upland/Woodlot
E- Canal/Meridian Rd, W- Trenton Channel (DTR), N- residential, S- Canal	Natural	No	Upland/RiparianWoodlot
E- DTR, W- Residential, N- Residential, DTE Trenton Channel Plant	Natural and Concrete wall	Yes	Upland/Woodlot
E- Meridian Rd, W- Canal, N- Canal/residential, S- Residential	Natural	Yes	Upland/Riparian Greenspace
E- Parke Lane, W- Meridian Road, N- Commercial/Business district, S- Residential	N/A (None)	No	Lakeplain/Woodlot
E- Livingston Channel, W- Grosse Ile, N- Bullards Reef, S- Powderhouse Island	Natural/emergent marsh	Yes	Island
E- Horse Farm, W- Meridian Rd, N- Residential/Bellevue Rd, S- Residential/Manchester Rd	N/A (None)	No	Upland/Woodlot
E- DTR, W- Jefferson Ave (comercial/industrial), N- Grosse Ile Free Bridge, S- Solutia	Concrete rip-rap	Yes	Island
E- DTR, W- Solutia Phosphates Plant, N- DTE Power Plant, S- Old Chrysler Paint Plant	Small rip-rap, semi natural	Yes	Upland
E- Amherstburg Channel training dike, W- Livingston Channel training dike, N- Crystal Bay dike, S- Bois Blanc Island	rocky shore/man made	Yes	Man-made (ACOE)
E- DTR, W- Jefferson Ave (commercial/industrial), N- Solutia, S- Humbug Marsh/Island	Natural	Yes	Upland
E- Meridian Rd, W- Playing Fields, N- Meridian Elementary School, S- Iverson Industries	N/A (None)	No	Upland/Woodlot
E- Site M, W- Residential, N- Hawthorn residential development, Iverson Industries (playing fields)	N/A (None)	No	Upland/Woodlot
E- Residential/DTR, W- Residential/Site M, N- Residential, S- Residential	N/A (None)	No	Upland/Woodlot
E- Crystal Bay Island, W- Grosse Ile, N- Stoney Island, S- Livingston Channel trainer	Broken limestone	Yes	Other (heavy-stone dike)
E- Grosse Ile Memorial Cemetary, W- Residential/DTR, N- Residential, S-Residential	N/A (none)	Yes	Upland/RiparianWoodlot
E- Livingston Channel Navigation Dike, W- Fox Island, N- DTR, S- Sugar Island cut dike	rip-rap and large limestone boulders	Yes	Island
E- Powderhouse Island, W- Grosse Ile, N- Stoney Island, S- Sugar Island	Natural	Yes	Island
E- Residential, W- Elba Island Marsh, N- Residential, S- Residential	Natural	Yes	Riverine Wetland
E- DTR (Trenton Channel), W- Undeveloped upland forest, N- Empty Chrysler lot, S- Humbug Marina	Natural	Yes	Riverine Wetland
E- Grosse Ile, W- Humbug Marsh, N- DTR (Trenton Channel), S- Celeron Island	Natural/sandy beach	Yes	Island
E- Residential, W- Grosse Ile Airport, N- Residential, S- Meso Island	Natural with many boat docks/slips	Yes	Riverine Wetland
E- Elba Mar Boat Club, W- Grosse Ile Nature Center, N- Residential, S- Gibralter Bay	Natural/swamp	Yes	Upland/Woodlot
E- Gibralter Bay, W- Airport Marsh/Grosse Ile Airport, N- Grosse Ile Airport, S- DTR/Celeron Island	Natural	Yes	Upland
E- Meso Island, W- Airport Marsh, N- Grosse Ile Nature Center, S- DTR	Natural with many boat docks/slips	Yes	Riverine Wetland
E- Grosse Ile Municipal Airport, W- Ford Yacht Club, N- Residential, S- Lake Erie	Natural	Yes	Island
E- Grosse Ile, W- DTR (Trenton Channel), N- New Residential, S- Ford Yacht Club	Natural/sandy beach	Yes	Upland/Woodlot
E- Residential, W- Gibralter Bay, N- Residential, S- Hickory Island	Natural, some concrete rip-rap	Yes	Island
E- Gibralter Bay, W- DTR, N- Grosse Ile Airport, S- DTR/Celeron Island	Natural	Yes	Littoral Wetland
E- Sugar Island cut dike, W- Meso Island, N- DTR, S- DTR	Natural	Yes	Island
E- Livingston Channel dike, W- Sugar Island, N- DTR, S- Lake Erie	Broken limestone boulders	Yes	Other (heavy-stone dike)
E- Residential, W- Gibralter Bay, N- Residential, S- Celeron Island	Natural, some concrete rip-rap	Yes	Island
E- DTR, W- Horse Island, N- Grosse Ile, S- Lake Erie	Natural/sandy beach	Yes	Island
E- DTR, W- Lake Erie Metro Park, N- Horse Island, S- Pt. Moullie	Natural	Yes	Island/sand bar

FISHERY RESOURCES	WILDLIFE PRESENT	VEGETATION PRESENT	HABITAT QUALITY RATING	Habitat Category
smallmouth bass	none noted	clover, wild carrot, oak, mulberry, cottonwood, maple trees	Fair	Impaired
bluegill, minnows	duck, blue heron, muskrat, egrets	grass, honey locust, tulip, basswood, black walnut, willow trees	Good	Impaired
no data	seagulls	grass, willow, cottonwood, sycamore, elm, locust, box elder	Good	Impaired
no data	rabbit, Hooded Merganser w/ ducklings	oak, maple, cottonwood, dense stand of hardwood trees	Pristine	Functional
no data	none noted	grass, willow, mulberry, thistles--few trees	Fair	Impaired
carp,	mallard's, cormorant	willow, cottonwood, silver maple, tree-of-heaven	Fair	Impaired
no data	egret, mallards, resting turtles	willow, cottonwood,	Fair	Impaired
no data	turtle	grass,	Fair	Impaired
no data	mallards, redwing blackbird	grass, cottonwood, mulberry trees, giant reed grass	Fair	Impaired
no data	seagulls	grass, catalpa, American elm, maple, and willow trees	Fair	Impaired
no data	canadian geese	grass, white ash, cottonwood, Norway maple trees	Fair	Impaired
no data	seagulls	grass, Amer.ash, honey locust, Norway maple, red pine	Fair	Impaired
no data	none noted	grass, silver & Norway maple, box elder, wild grape	Fair	Impaired
no data	ducks, ducklings	grass, cottonwood, horse chestnut, Norway maple	Good	Functional
no data	seagulls, Canadian geese	grass, Amer.ash, honey locust, Norway maple, oaks	Good	Impaired
central mudminnow, green sunfish, silver lamprey	geese	grass, pond weeds, catalpa, silver maple, willow	Good	Impaired
central mudminnow, green sunfish, silver lamprey	geese	grass, emergent wetland, thistle, cottonwood,	Good	Impaired
no data	geese, ducks	grass,cattails, giant reed grass, sedges, willow, locust	Good	Functional
johnny darter, bluntnose minnow, brook silverside	none noted	none noted	Fair	Functional
bluntnose minnow	geese, seagulls, swans	ash, cottonwood, linden, European white poplar, cranberry	Good	Functional
no data	geese	grass, rush, riverbank grape, weeping willow	Good	Functional
logperch	seagulls, ducks, Canadian geese	grass, ash, horse chestnut, weeping willow	Fair	Impaired
no data	geese, ducks	grass, sedge, sycamore, willow, Eur.white poplar, wild grape	Good	Functional
no data	muskrat	grass, horse chestnut, linden, silver maple, white mulberry	Good	Functional
no data	none noted	none noted	Highly degraded	Impaired
no data	seagulls	grass, crab apple, honey locust, pin oak, red pine, sugar maple	Fair	Impaired
no data	seagulls	grass, cottonwood, honey locust, red oak, scots pine	Fair	Impaired
spottail shiner, emerald shiner, mottled sculpin	seagulls, ducks, pheasant	grass, cottonwood, linden, honey locust, black pine,	Fair	Impaired
spottail shiner, emerald shiner, mottled sculpin	seagulls	white ash, honey locust, ginko, small-leaved linden	Fair	Impaired
no data	seagulls	grass, black ash, black pine, sycamore, weeping willow	Fair	Impaired
rainbow smelt, emerald shiner, walleye	none noted	none noted	Highly degraded	Impaired
rainbow smelt, emerald shiner, walleye	seagulls, ducks	grass, European white poplar, honey locust, weeping willow	Fair	Impaired
no data	none noted	none noted	Highly degraded	Impaired
no data	various birds	grass, cottonwood, red/black ash, sugar maple	Good	Impaired
gizzard shad, channel catfish, longnose gar	seagulls	grass, aster, cottonwood, honey locust	Fair	Impaired
emerald shiner, white bass, walleye	ducks, geese	grass, Amer. elm, staghorn sumac, wild grape, red pine, willow	Fair	Impaired
american eel	seagulls	grass, blue spruce, scots pine, linden, silver maple, willow	Fair	Impaired
no data	seagulls	cottonwood, riverbank grape, sweet clover, silver maple,	Good	Functional
no data	none noted	cottonwood, sweet clover, staghorn sumac, tree of heaven	Good	Impaired
no data	none noted	giant reed grass, cottonwood, juniper, silver maple, tree of hevn	Good	Impaired
no data	ducks, ducklings, heron	cottonwood, Siberian elm, staghorn sumac, white sweet clover	Good	Functional
mooneye	kingfishers, cormorant, mallards, raccoon	box elder, honeysuckle, elm, cottonwood, mulberry, burdock	Pristine	Functional
mooneye	seagulls, ducks	white ash, honey locust, red maple, red oak, basswood	Fair	Impaired
alewife, yellow perch, emerald shiner, bass	kingfisher, wren, swallows, ducks, deer, fox,	giant reed grass, cottonwood, willow, silver maple, tree of hevn	Good	Functional
walleye, smallmouth bass, sauger	geese	grass, honey locust, sugar maple, eastern red cedar, willow	Fair	Impaired
no data	seagulls	grass, horse chestnut, silver & Norway maple, sycamore, pine	Fair	Impaired
northern madtom	mallards along the shore	grass, giant reed grass, purple aster, willow, red cedar,	Poor	Functional
no data	seagulls	grass, Queen Ann's lace, willow, sugar maple, red oak, tulip tree	Fair	Impaired
no data	none noted	grass, riverbank grape, Queen Ann's Lace, aquat. Plants	Fair	Impaired
no data	none noted	Black ash, honeysuckle, glossy buckthorne, Hawthorne,	Pristine	Functional
no data	woodchuck	giant reed grass, Queen Ann's lace, white sweet clover,	Good	Impaired
emerald shiner, yellow perch, rock bass	swan, egret, mallard, gulls	willow, cottonwood, cattails, giant reed grass, sedges, aq.plants	Good	Functional
no data	none noted	cottonwood, reed grass, Amer. Elm, red oak, glossy buckthorne	Good	Functional
no data	seagulls	grass, cottonwood plantation,	Fair	Impaired
no data	none noted	cottonwood, elm, arrowhead,	Poor	Impaired
no data	cormorant, buzzard, mallard	cottonwood, willow, reed grass, water lily, emerg/subm. Plants	Pristine	Functional
no data	none noted	cottonwood, specled alder, Glossy Buckthorne	Good	Functional
no data	none noted	cottonwood, swamp white oak, black walnut, silver maple	Good	Functional
no data	none noted	basswood, bur oak, Am.elm, Glossy Buckthorne, black walnut	Pristine	Functional
no data	none noted	white ash, Queen Ann's lace, Glossy Buckthorne	Pristine	Functional
no data	seagulls,blue heron, king fisher	riverbank grape, sumac, cottonwood, willow, aspen	Highly degraded	Impaired
walleye, emerald shiner, gizzard shad	swallow nests, seagulls, crows	giant reed grass,	Highly degraded	Impaired
no data	squirrel	giant reed grass, elm, wild cherry, box elder, cottonwood	Good	Functional
no data	seagulls, plovers	grass, cattails, cottonwood, willow, horse chestnut, box elder	Good	Impaired
no data	none noted	grass, box elder, reed grass, silver maple, hawthorne	Good	Impaired
no data	ducks, swallow	silver maple, siberian elm,	Good	Functional
no data	none noted	willow, small leafed linden, winged wahoo	Fair	Impaired
no data	none noted	grass, willow, ash	Fair	Impaired
no data	none noted	riverbank grape, willow, white mulberry, tree of heaven	Fair	Impaired
no data	ducks	grass, juniper	Fair	Impaired
bluntnose minnow, mimic shiner, brook stickleback	none noted	red oak, hickory, black walnut, honeysuckle, hawthorne	Pristine	Functional
no data	none noted	Glossy buckthorne, Am. Elm, white ash, bur oak	Good	Functional
spotfin shiner, bluegill, largemouth bass	seagulls, ponies	grass, shagbark hickory, norway maple, gray dogwood, ash	Good	Functional
bluntnose minnow, mimic shiner, brook stickleback	none noted	gray dogwood, silver maple, cottonwood, goldenrod, bull thistle	Good	Functional
no data	none noted	cottonwood, aspen, sugar maple, Am. Elm, red oak	Pristine	Functional
least darter, banded killfish, silver lamprey	white egret, cormorant, ducks, seagulls	cattails, wild celery, canadian waterweed, sedge, hardwoods	Pristine	Functional
no data	none noted	Am. Elm, shagbark hickory, hawthorne, red oak, silver maple,	Pristine	Functional
no data	seagulls	riverbank grape, aspen/cottonwood, golden rod, morning glory	Fair	Impaired
no data	heron	riverbank grape, duckweed, dogwood, willow, box elder	Good	Functional
carp, bowfin, bluegill	mallard, kingfisher, blue heron, hawk	cottonwood, willow, purple loosestrife, wild celery, pond weeds	Good	Functional
largemouth bass, golden shiner, bluegill	seagulls, many cormorants	grass, cottonwood, wild grape, aspen, sumac	Poor	Impaired
no data	none noted	basswood, Am.elm, flowering dogwood, white ash, buckthorne	Pristine	Functional
no data	ring neck pheasant	flowering dogwood, Am.elm, black walnut, cottonwood, hawthorn	Good	Functional
no data	rabbit, squirrels	swamp white oak, basswood, cottonwood, sugar maple, hickory	Pristine	Functional
no data	damselfly, blue heron, mallard duck, seagulls	cottonwood, riverbank grape, maple, willow, yellow snapdragon	Fair	Functional
no data	none noted	cattail, cottonwood, green ash, dogwood	Good	Functional
no data	none noted	riverbank grape, willow, elm, staghorn sumac, white mulberry	Good	Functional
no data	kingfisher, cormorant	European white poplar, cottonwood, red oak, basswood, grape	Good	Functional
no data	none noted	cattail, purple loosestrife, silver maple, emerg/subm. Plants	Good	Functional
round goby, pumpkin seed, bluegill	blue heron, mallards, gulls, swallow	cattail, wild celery, oak, willow, sedge meadow, pond weeds	Pristine	Functional
no data	blue herons, mallards, gulls	cottonwood, willow, cattail, maple, emerg/subm. Plants	Pristine	Functional
no data	blue heron	cattail, purple loosestrife, cottonwood, emerg/subm. Plants	Good	Functional
no data	none noted	cottonwood, sumac, gray dogwood	Good	Functional
no data	none noted	honeysuckle, burdock, cottonwood, black walnut, QuenAnn lace	Pristine	Functional
yellow perch, rock bass, spottail shiner	none noted	American lotus, willow, sedges, rushes, emerg/subm. Plants	Pristine	Functional
yellow perch, brook silverside, pumpkin seed	blue heron, fox squirrel, muskrat, ducks, dragonfly	cottonwood, box elder, black walnut, wild cherry, cattail, lily	Pristine	Functional
round goby, bluegill, tadpole madtom	red-wing black bird, kingfisher	cottonwood, willow, giant reed grass, maple, sedge, wild celery	Good	Functional
yellow perch, rock bass, spottail shiner	osprey w/ fish, cormorants, fox, deer, black squirrel	willow, white pine, scots pine, emerg/subm.aquatic plants	Good	Functional
yellow perch, rock bass, spottail shiner	blue heron, ducks	cottonwood, box elder, gray dogwood, willow, silver maple	Good	Functional
gizzard shad, common carp, log perch	blue heron, kingfisher, deer, cyote, racoon, eagle	raspberry, swamp white oak, cottonwood, flowering dogwood	Good	Functional
rock bass, striped shiner, golden shiner	none noted	cottonwood, ash, chinese elm, yellow snap dragon, subm.plants	Poor	Impaired
no data	squirrel,	grass, willow, silver maple, Norway maple, blue spruce,	Fair	Functional
round goby, pumpkin seed, bluntnose minnow	blue heron, ducks, gulls	cottonwood, willow, honey locust, giant reed grass, wild celery	Pristine	Functional
yellow perch, white bass, various minnows	white egret, ducks, cormorant, geese, vultures, gulls	wild celery, milfoil, cottonwood, maple, willow	Pristine	Functional

LEVEL OF THREAT	Priority Rating (%)	PROPOSED REHABILITATION/ENHANCEMENT	REMEDIATION COMPLETED	Site Number
high	9	none--site was being developed in 2002	Being redeveloped for urban use in 2002.	1
low	57	dredge canal to provide assess to fish in river	None	2
low	22	dredge canal to provide assess to fish in river	None	3
high	67	soft-engineer shoreline/create shorebird habitat	None	4
low	74	create keyhole wetland as part of Conners Creek chlorination	keyhole wetland completed 2002	5
low	22	dredge Conners Creek	creek dredged & chlorination of CSO in 2002	6
medium	48	enhance migratory bird and turtle habitat	None	7
low	16	create migratory bird habitat	None	8
low	48	create migratory bird habitat	None	9
low	68	restore lakeplain prairie, create migratory bird habitat	None	10
low	51	create migratory bird habitat	None	11
low	64	create migratory bird habitat, ACOE Seawall Reconnaisance	None	12
low	57	create migratory bird habitat	None	13
medium	82	create migratory bird habitat, soft-engineer shoreline	None	14
low	94	create migratory bird habitat, ACOE Seawall Reconnaisance	None	15
low	49	excavate trench, build offshore islands, diversity fish habitat	None	16
low	75	soft-engineer shoreline/create shorebird habitat	None	17
low	85	restore lakeplain prairie, create migratory bird habitat	None	18
low	41	create shorebird habitat	None	19
low	95	create keyhole wetland & migratory bird habitat, fish access	some shoreline biodiversification & stabilization	20
low	98	create emergent wetland fringe, fish spawning & nursery area	None	21
low	48	create emergent wetland fringe, fish feeding & nursery area	None	22
low	79	create emergent wetland fringe, migratory bird habitat	Shore stabilization	23
low	96	create emergent wetland, migratory bird habitat, deer managt.	None	24
low	26	ACOE Seawall Reconnaisance, soft engineer shoreline	controversial brownfield -competing city uses	25
low	60	create migratory bird habitat	None	26
low	52	ACOE Seawall Reconnaisance, soft engineer shoreline	None	27
low	22	migratory bird habitat	None	28
low	22	new riverwalk & migratory bird habitat	new walk pending, repair edge	29
medium	22	create migratory bird habitat	None	30
low	12	soft-engineer shoreline; create migratory bird habitat	None	31
low	49	create migratory bird habitat	edge to be repaired w/ grant	32
low	47	ACOE Seawall Reconnaisance, soft engineer shoreline	None	33
low	90	ACOE Seawall Reconnaisance, soft engineer shoreline	None	34
low	47	create nursery area for lake sturgeon fry	None	35
low	29	Canada goose feeding area; migratory bird habitat	None	36
low	69	create migratory bird habitat	None	37
medium	64	build keyhole wetland; plant lake plain prairie	None	38
medium	52	tallgrass prairie; pheasant habitat, migratory bird habitat	None	39
medium	54	migratory bird habitat	None	40
medium	66	tallgrass prairie; pheasant habitat, keyhole wetland	None	41
low	80	emergent wetland on shoals; soft engineer shoreline	None	42
low	71	migratory bird habitat	None	43
low	81	tallgrass prairie, pheasant habitat; emergent marsh on shoals	None	44
low	49	lake plain prairie; migratory bird habitat	None	45
low	57	migratory bird habitat	None	46
low	64	tallgrass prairie, pheasant habitat; emergent marsh on shoals	some biodiversification & soil stabilization	47
low	35	migratory bird habitat	None	48
high	0	None	None	49
high	61	enhance migratory bird and turtle habitat in canal	None	50
low	58	tallgrass/lakeplain prairie; duck/pheasant nesting habitat	None	51
low	91	ACOE marsh restoration, eagle/ausprey feeding perches	None	52
low	85	Raptor platforms, emergent vegetation fringe, offshore islands	None	53
low	71	tallgrass/lakeplain prairie; duck/pheasant nesting habitat	None	54
low	38	soft-engineer shoreline	None	55
high	83	enhance emergent marsh vegetation, shorebird habitat	None	56
high	35	stabilize canal bank with soft engineering	None	57
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	58
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	59
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	60
medium	65	soft engineer shoreline, greenway, migratory bird habitat	None	61
high	38	soft engineer shoreline, greenway, migratory bird habitat	None	62
high	45	soft engineer shoreline, greenway, migratory bird habitat	None	63
low	90	lake plain prairie; migratory bird habitat; soft engineer shoreline	None	64
low	88	soft engineer shoreline, greenway, migratory bird habitat	None	65
medium	88	create emergent wetland in embayment; soft engineer shore	None	66
low	88	soft engineer shoreline, greenway, migratory bird habitat	None	67
low	88	soft engineer shoreline, greenway, migratory bird habitat	None	68
low	88	soft engineer shoreline, greenway, migratory bird habitat	None	69
low	88	soft engineer shoreline, greenway, migratory bird habitat	None	70
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	71
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	72
low	98	soft engineer shoreline, greenway, migratory bird habitat	None	73
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	74
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	75
low	78	protect heron rookery, create sturgeon spawning habitat	None	76
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	77
low	62	soft engineer shoreline of canal, greenway, migr. bird habitat	None	78
medium	89	keyhole wetland, soft engineered shoreline, waterfowl resting	Enhanced stormwater retention ponds near river	79
low	77	soft engineered shoreline, create sturgeon spawning habitat	None	80
low	99	keyhole wetland, soft engineered shoreline, greenway	Protected as headquarters for DTR IWR	81
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	82
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	83
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	84
low	92	create sportfish gravel spawning habitat, Eagle perch	None	85
low	45	nesting habitat for deep-forest birds, migratory bird habitat	None	86
low	38	enhance duck food plants on shoals around island	None	87
low	38	enhance duck food plants on shoals around island	None	88
low	75	enhance water level fluctuations; shunt street runoff into marsh	None	89
high	93	remove contaminated soil; build marsh on airport drain	None	90
low	98	enlarge wetland on isl., enhance emgent marsh around isl.	None	91
low	75	open access to marsh from Detroit River for fish passage	None	92
low	76	add walking trails for nature appreciation; create fish access	None	93
low	100	slope earthen shore on Gib. Bay; lake plain prairie, shorebirds	None	94
medime	95	enhance American lotus bed; shorebird habitat; sturg nursery	None	95
high	65	build shorebird habitat; deep woods/woodduck nesting habitat	None	96
high	52	restore shorebird habitat	None	97
low	78	nesting habitat for deep-forest birds, migratory bird habitat	None	98
low	76	open access to marsh from Detroit River for fish passage	None	99
High	62	arrest shoreline erosion on E and S sides; sturg.nursery habitat	None	100
low	64	build fish spawning gravel beds; tern nesting habitat	None	101
high	65	build shorebird habitat; deep woods/woodduck nesting habitat	None	102
low	72	create shorebird habitat; Raptor perch/platforms	None	103
low	89	create shorebird habitat; Raptor perch/platforms	None	104

Site Number	Site Name	Number of Photos
1	Mariner's Park	11
2	Riverfront-Lakewood East Park	19
3	Alfred B. Ford Park	8
4	Fisher Mansion Woodlot	29
5	Maheras/Gentry Park	8
6	DTE/Conner's Creek	7
7	Inland Lime and Stone	3
8	Vaughn/Reid Memorial Park	7
9	Shipwreck Marine	9
10	Porter Field	6
11	David F. Stockton Memorial Park	5
12	Erma Henderson Park & Marina	5
13	Owen Park	7
14	UAW Lot	11
15	Gabriel Richard Park	6
16	North Fishing Pier	5
17	Belle Isle North Shore	3
18	Lake Muskoday	3
19	Belle Isle Water Intake	1
20	Blue Heron Lagoon	5
21	Lake Okonoka	6
22	South Fishing Pier	3
23	Lake Tacoma	4
24	Belle Isle North Canoe Livery	5
25	UniRoyal site	6
26	Mt. Elliott Park	5
27	Chene Park	7
28	St. Aubin Park & Marina	7
29	Hart Plaza	6
30	Free Press Easement	6
31	Detroit Union Depot	3
32	Riverside Park & Boat Ramp	5
33	Revere Copper and Brass	2
34	Fort Wayne Parade Grounds	5
35	Delray Boat Launch	12
36	DTE River Rouge	7
37	Belanger Park	6
38	National Steel Settling Ponds	5
39	National Steel Skull Drop Site	5
40	Great Lakes Steel Boat Club	6
41	National Steel Lot	9
42	Mud Island	7
43	John D. Dingell Park	4
44	Grassy Island	
45	BASF Wyandotte Site	3
46	Bishop Park	8
47	Point Hennepin	5
48	Wyandotte Shores Golf Course	7
49	NE Grosse Ile	4
50	BASF Grosse Ile	3
51	Elf Atochem America Site	1

52	North Hennepin Marsh	3
53	Conservancy Lots	5
54	BASF Riverview Site	7
55	Crown Industries	3
56	South Hennepin Marsh	7
57	Thoroughfare Canal	6
58	Grosse Ile B	5
59	Grosse Ile A	3
60	Grosse Ile C	3
61	DSC Site	7
62	Levy Trucking	19
63	Howard Ellias Trust Property	8
64	Meyer/Ellias Park	26
65	George St. Road End	8
66	Traux St. Road End	5
67	Rotary Park	5
68	Cherry Street Park	3
69	Elm Street Park	4
70	West Road Park	2
71	Grosse Ile D	4
72	Grosse Ile F	4
73	Elizabeth Park	13
74	Grosse Ile G	3
75	Grosse Ile H	3
76	Stony Island	3
77	Grosse Ile J	5
78	DTE Trenton	3
79	Solutia Site	6
80	Crystal Bay Navigation Dike	4
81	Chrysler Paint Plant	3
82	Grosse Ile M	4
83	Grosse Ile L	6
84	Grosse Ile K	7
85	Livingston Channel Navigation Dike	2
86	Grosse Ile N	3
87	Dynamite Island	4
88	Fox Island	4
89	Oldani Marsh	5
90	Humbug Marsh/Island	10
91	Calf Island	6
92	Elba Marsh	4
93	Elba Woods	3
94	Grosse Ile Nature Center	4
95	Gibraltar Bay	12
96	Round Island	9
97	Channel Woods	1
98	Meso Island	3
99	Airport Marsh	7
100	Sugar Island	12
101	Sugar Island Cut Dike	3
102	Hickory Island	6
103	Celeron Island	4

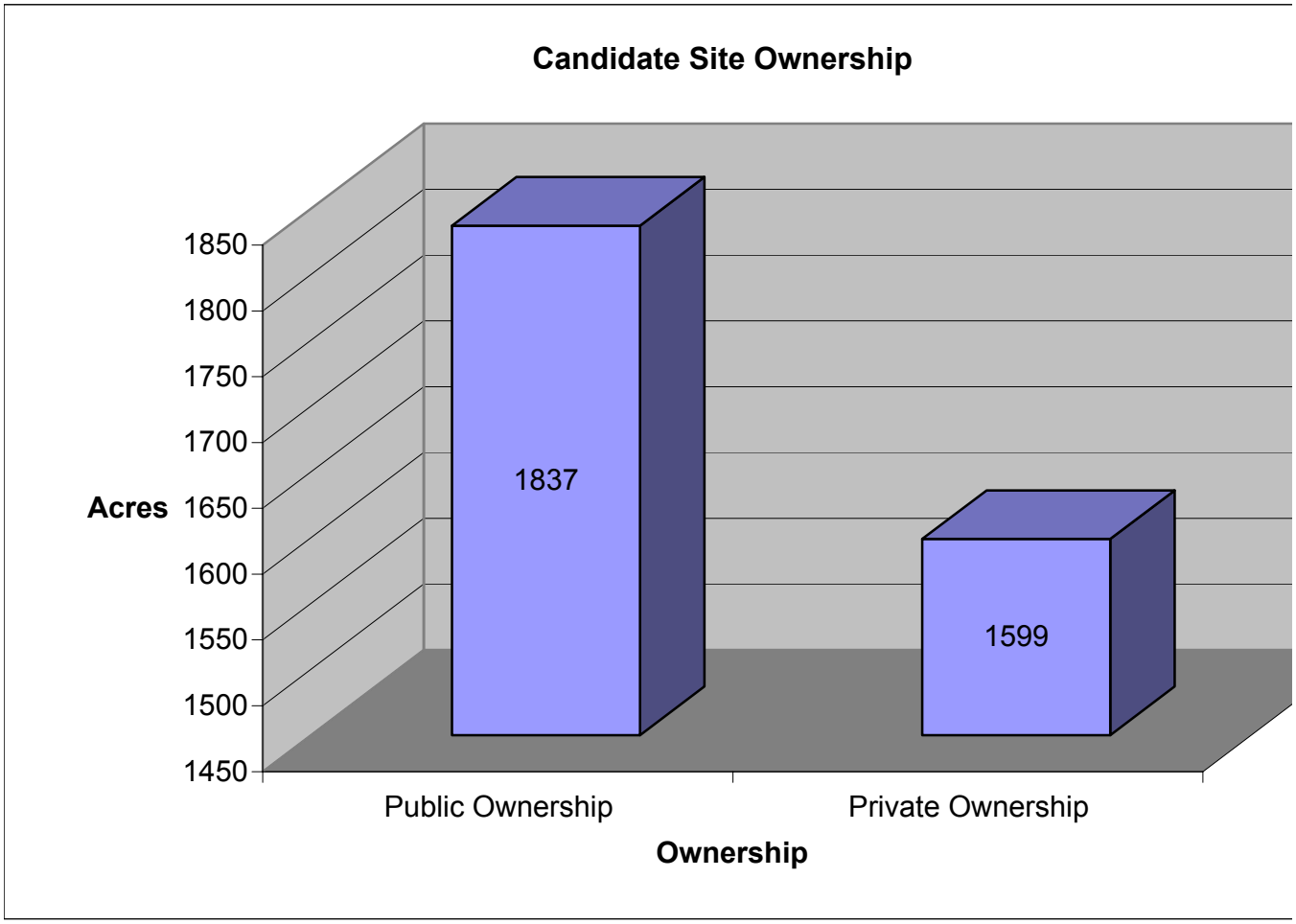
104	Sturgeon Bar	2

Site Number	Site Name	Jurisdiction
1	Mariner's Park	Detroit
2	Riverfront-Lakewood East Park	Detroit
3	Alfred B. Ford Park	Detroit
4	Fisher Mansion Woodlot	Detroit
5	Maheras/Gentry Park	Detroit
6	DTE/Conner's Creek	Detroit
7	Inland Lime and Stone	Detroit
8	Vaughn/Reid Memorial Park	Detroit
9	Shipwreck Marine	Detroit
10	Porter Field	Detroit
11	David F. Stockton Memorial Park	Detroit
12	Erma Henderson Park & Marina	Detroit
13	Owen Park	Detroit
14	UAW Lot	Detroit
15	Gabriel Richard Park	Detroit
16	North Fishing Pier	Detroit
17	Belle Isle North Shore	Detroit
18	Lake Muskoday	Detroit
19	Belle Isle Water Intake	Detroit
20	Blue Heron Lagoon	Detroit
21	Lake Okonoka	Detroit
22	South Fishing Pier	Detroit
23	Lake Tacoma	Detroit
24	Belle Isle North Canoe Livery	Detroit
25	UniRoyal site	Detroit
26	Mt. Elliott Park	Detroit
27	Chene Park	Detroit
28	St. Aubin Park & Marina	Detroit
29	Hart Plaza	Detroit
30	Free Press Easement	Detroit
31	Detroit Union Depot	Detroit
32	Riverside Park & Boat Ramp	Detroit
33	Revere Copper and Brass	Detroit
34	Fort Wayne Parade Grounds	Detroit
35	Delray Boat Launch	Detroit
36	DTE River Rouge	River Rouge
37	Belanger Park	River Rouge
38	National Steel Settling Ponds	River Rouge
39	National Steel Skull Drop Site	River Rouge
40	Great Lakes Steel Boat Club	River Rouge
41	National Steel Lot	Ecorse
42	Mud Island	Ecorse
43	John D. Dingell Park	Ecorse
44	Grassy Island	Ecorse
45	BASF Wyandotte Site	Wyandotte
46	Bishop Park	Wyandotte
47	Point Hennepin	Grosse Ile
48	Wyandotte Shores Golf Course	Wyandotte
49	NE Grosse Ile	Grosse Ile
50	BASF Grosse Ile	Grosse Ile
51	Elf Atochem America Site	Riverview

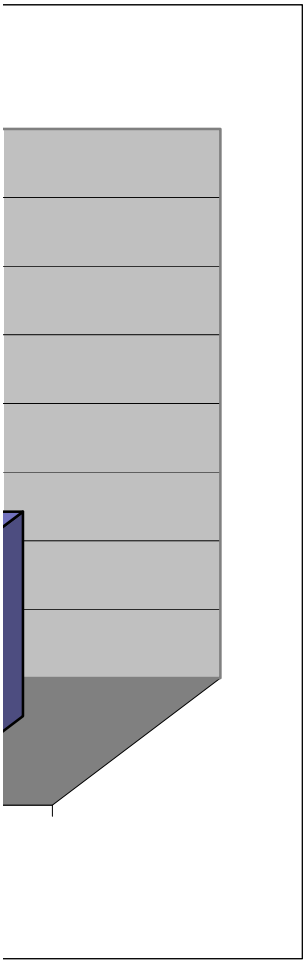
52	North Hennepin Marsh	Grosse Ile
53	Conservancy Lots	Grosse Ile
54	BASF Riverview Site	Grosse Ile
55	Crown Industries	Riverview
56	South Hennepin Marsh	Grosse Ile
57	Thoroughfare Canal	Grosse Ile
58	Grosse Ile B	Grosse Ile
59	Grosse Ile A	Grosse Ile
60	Grosse Ile C	Grosse Ile
61	DSC Site	Trenton
62	Levy Trucking	Trenton
63	Howard Ellias Trust Property	Trenton
64	Meyer/Ellias Park	Trenton
65	George St. Road End	Trenton
66	Traux St. Road End	Trenton
67	Rotary Park	Trenton
68	Cherry Street Park	Trenton
69	Elm Street Park	Trenton
70	West Road Park	Trenton
71	Grosse Ile D	Grosse Ile
72	Grosse Ile F	Grosse Ile
73	Elizabeth Park	Trenton
74	Grosse Ile G	Grosse Ile
75	Grosse Ile H	Grosse Ile
76	Stony Island	Grosse Ile Township
77	Grosse Ile J	Grosse Ile
78	DTE Trenton	Trenton
79	Solutia Site	Trenton
80	Crystal Bay Navigation Dike	Army Corps of Engineers
81	Chrysler Paint Plant	Trenton
82	Grosse Ile M	Grosse Ile
83	Grosse Ile L	Grosse Ile
84	Grosse Ile K	Grosse Ile
85	Livingston Channel Navigation Dike	Army Corps of Engineers
86	Grosse Ile N	Grosse Ile
87	Dynamite Island	Grosse Ile Township
88	Fox Island	Grosse Ile Township
89	Oldani Marsh	Grosse Ile
90	Humbug Marsh/Island	Gibraltar
91	Calf Island	Grosse Ile Township
92	Elba Marsh	Grosse Ile
93	Elba Woods	Grosse Ile
94	Grosse Ile Nature Center	Grosse Ile
95	Gibraltar Bay	Grosse Ile
96	Round Island	Grosse Ile
97	Channel Woods	Grosse Ile
98	Meso Island	Grosse Ile
99	Airport Marsh	Grosse Ile
100	Sugar Island	Grosse Ile Township
101	Sugar Island Cut Dike	Detroit River
102	Hickory Island	Grosse Ile Township
103	Celeron Island	Grosse Ile Township

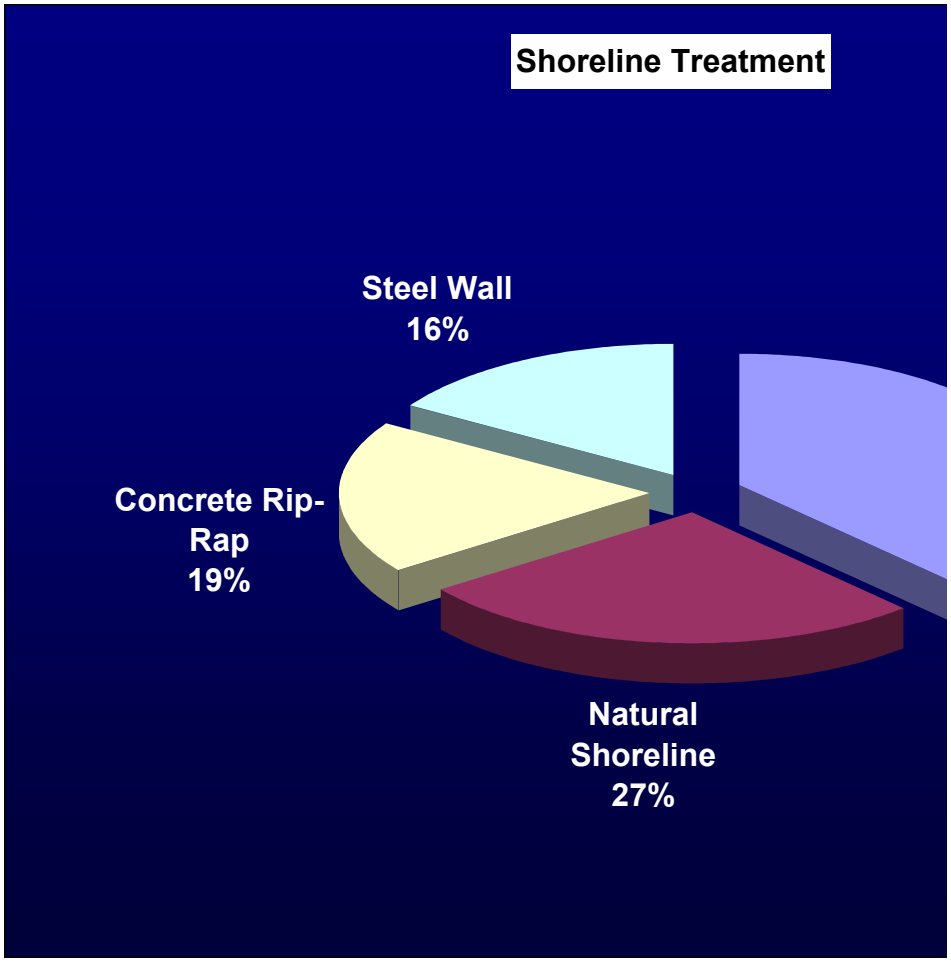
104	Sturgeon Bar	Brownstown Township

Public Owr	Private Ownership
1837	1599



Concrete Wall	Natural Shoreline	Concrete Rip-Rap	Steel Wall
38%	27%	19%	16%






Concrete Wall
38%

Proposed Table of Shoreline Extent and Treatments at Riparian Sites within this study

	Mainland	Offshore	Total
Number of candidate sites	52	33	85
Riparian frontage	11.24 mi	36.40 mi	47.64 mi
Shoreline Treatment			
Concrete	4.31 mi	0	4.31 mi
Steel	1.78 mi	0	1.78 mi
Riprap	2.1 mi	12.38 mi	14.48 mi
Earthen	3.05 mi	24.02 mi	27.07 mi
Percentage of Sampled Shoreline			
Concrete	38%	0	9%
Steel	16%	0	4%
Riprap	19%	34%	30%
Earthen	27%	66%	57%

The water frontage at all but 18(?) of our study sites consisted of one of the four shoreline treatments sh
For preparation of this table, at each site where the frontage was comprised of more than one shoreline

nown in this table.
treatment, all feet of water frontage was attributed to the predominant shoreline treatment at that site.

Site Number	Site Name	Number of Photos
1	Mariner's Park	11
2	Riverfront-Lakewood East Park	19
3	Alfred B. Ford Park	8
4	Fisher Mansion Woodlot	29
5	Maheras/Gentry Park	8
6	DTE/Conner's Creek	7
7	Inland Lime and Stone	3
8	Vaughn/Reid Memorial Park	7
9	Shipwreck Marine	9
10	Porter Field	6
11	David F. Stockton Memorial Park	5
12	Erma Henderson Park & Marina	5
13	Owen Park	7
14	UAW Lot	11
15	Gabriel Richard Park	6
16	North Fishing Pier	5
17	Belle Isle North Shore	3
18	Lake Muskoday	3
19	Belle Isle Water Intake	1
20	Blue Heron Lagoon	5
21	Lake Okonoka	6
22	South Fishing Pier	3
23	Lake Tacoma	4
24	Belle Isle North Canoe Livery	5
25	UniRoyal site	6
26	Mt. Elliott Park	5
27	Chene Park	7
28	St. Aubin Park & Marina	7
29	Hart Plaza	6
30	Free Press Easement	6
31	Detroit Union Depot	3
32	Riverside Park & Boat Ramp	5
33	Revere Copper and Brass	2
34	Fort Wayne Parade Grounds	5
35	Delray Boat Launch	12
36	DTE River Rouge	7
37	Belanger Park	6
38	National Steel Settling Ponds	5
39	National Steel Skull Drop Site	5
40	Great Lakes Steel Boat Club	6
41	National Steel Lot	9
42	Mud Island	7
43	John D. Dingell Park	4
44	Grassy Island	
45	BASF Wyandotte Site	3
46	Bishop Park	8
47	Point Hennepin	5
48	Wyandotte Shores Golf Course	7
49	NE Grosse Ile	4
50	BASF Grosse Ile	3
51	Elf Atochem America Site	1

52	North Hennepin Marsh	3
53	Conservancy Lots	5
54	BASF Riverview Site	7
55	Crown Industries	3
56	South Hennepin Marsh	7
57	Thoroughfare Canal	6
58	Grosse Ile B	5
59	Grosse Ile A	3
60	Grosse Ile C	3
61	DSC Site	7
62	Levy Trucking	19
63	Howard Ellias Trust Property	8
64	Meyer/Ellias Park	26
65	George St. Road End	8
66	Traux St. Road End	5
67	Rotary Park	5
68	Cherry Street Park	3
69	Elm Street Park	4
70	West Road Park	2
71	Grosse Ile D	4
72	Grosse Ile F	4
73	Elizabeth Park	13
74	Grosse Ile G	3
75	Grosse Ile H	3
76	Stony Island	3
77	Grosse Ile J	5
78	DTE Trenton	3
79	Solutia Site	6
80	Crystal Bay Navigation Dike	4
81	Chrysler Paint Plant	3
82	Grosse Ile M	4
83	Grosse Ile L	6
84	Grosse Ile K	7
85	Livingston Channel Navigation Dike	2
86	Grosse Ile N	3
87	Dynamite Island	4
88	Fox Island	4
89	Oldani Marsh	5
90	Humbug Marsh/Island	10
91	Calf Island	6
92	Elba Marsh	4
93	Elba Woods	3
94	Grosse Ile Nature Center	4
95	Gibraltar Bay	12
96	Round Island	9
97	Channel Woods	1
98	Meso Island	3
99	Airport Marsh	7
100	Sugar Island	12
101	Sugar Island Cut Dike	3
102	Hickory Island	6
103	Celeron Island	4

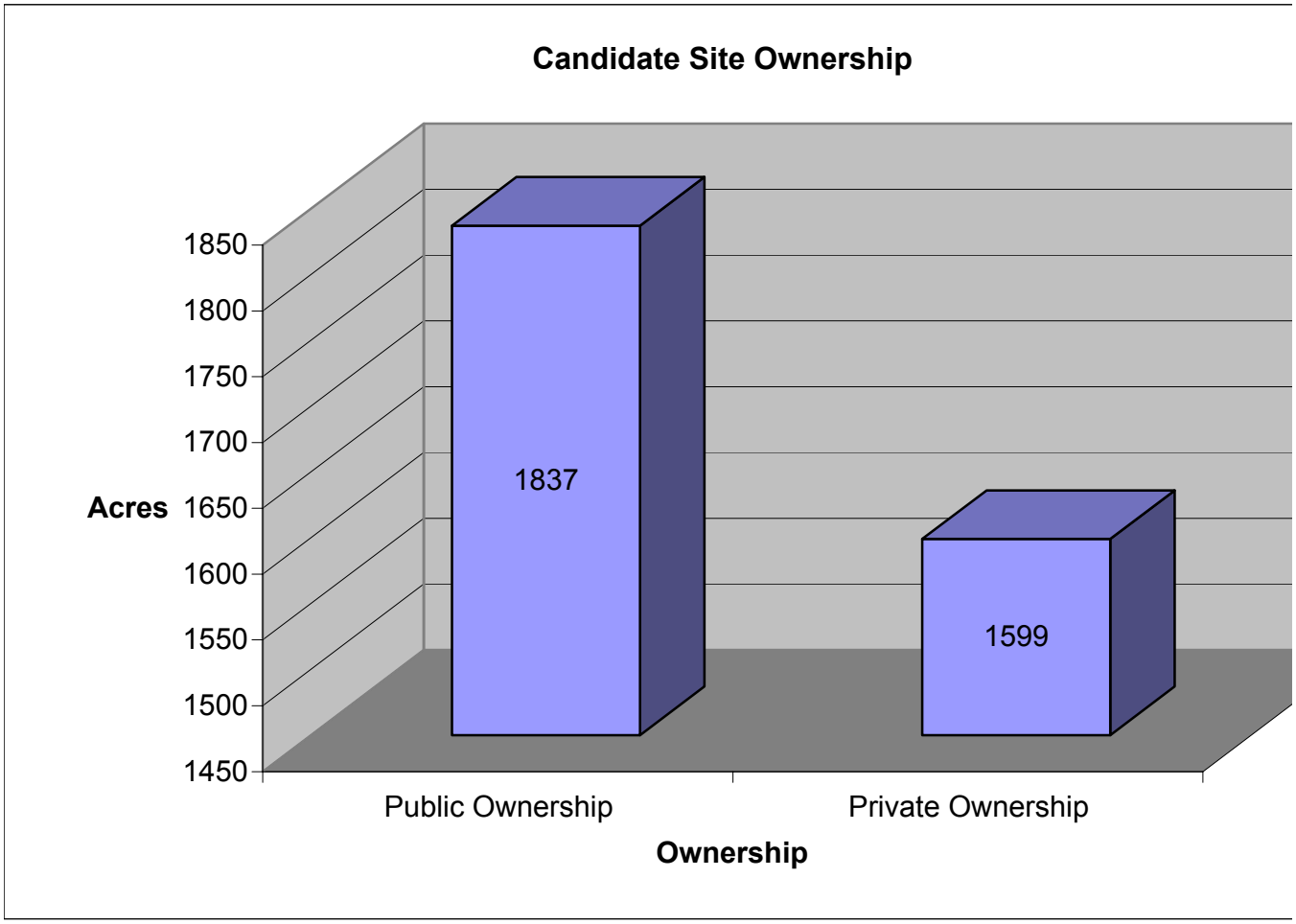
104	Sturgeon Bar	2

Site Number	Site Name	Jurisdiction
1	Mariner's Park	Detroit
2	Riverfront-Lakewood East Park	Detroit
3	Alfred B. Ford Park	Detroit
4	Fisher Mansion Woodlot	Detroit
5	Maheras/Gentry Park	Detroit
6	DTE/Conner's Creek	Detroit
7	Inland Lime and Stone	Detroit
8	Vaughn/Reid Memorial Park	Detroit
9	Shipwreck Marine	Detroit
10	Porter Field	Detroit
11	David F. Stockton Memorial Park	Detroit
12	Erma Henderson Park & Marina	Detroit
13	Owen Park	Detroit
14	UAW Lot	Detroit
15	Gabriel Richard Park	Detroit
16	North Fishing Pier	Detroit
17	Belle Isle North Shore	Detroit
18	Lake Muskoday	Detroit
19	Belle Isle Water Intake	Detroit
20	Blue Heron Lagoon	Detroit
21	Lake Okonoka	Detroit
22	South Fishing Pier	Detroit
23	Lake Tacoma	Detroit
24	Belle Isle North Canoe Livery	Detroit
25	UniRoyal site	Detroit
26	Mt. Elliott Park	Detroit
27	Chene Park	Detroit
28	St. Aubin Park & Marina	Detroit
29	Hart Plaza	Detroit
30	Free Press Easement	Detroit
31	Detroit Union Depot	Detroit
32	Riverside Park & Boat Ramp	Detroit
33	Revere Copper and Brass	Detroit
34	Fort Wayne Parade Grounds	Detroit
35	Delray Boat Launch	Detroit
36	DTE River Rouge	River Rouge
37	Belanger Park	River Rouge
38	National Steel Settling Ponds	River Rouge
39	National Steel Skull Drop Site	River Rouge
40	Great Lakes Steel Boat Club	River Rouge
41	National Steel Lot	Ecorse
42	Mud Island	Ecorse
43	John D. Dingell Park	Ecorse
44	Grassy Island	Ecorse
45	BASF Wyandotte Site	Wyandotte
46	Bishop Park	Wyandotte
47	Point Hennepin	Grosse Ile
48	Wyandotte Shores Golf Course	Wyandotte
49	NE Grosse Ile	Grosse Ile
50	BASF Grosse Ile	Grosse Ile
51	Elf Atochem America Site	Riverview

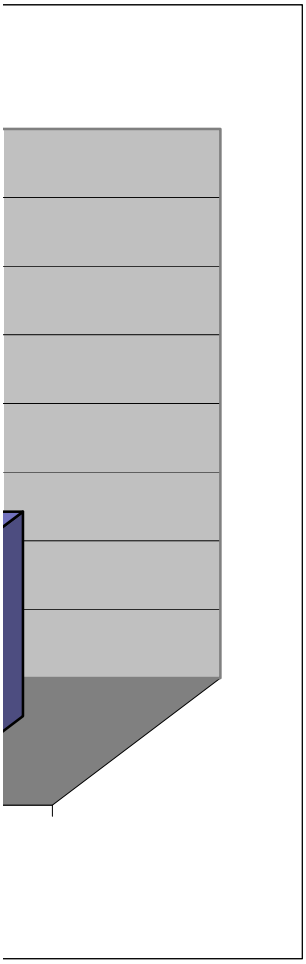
52	North Hennepin Marsh	Grosse Ile
53	Conservancy Lots	Grosse Ile
54	BASF Riverview Site	Grosse Ile
55	Crown Industries	Riverview
56	South Hennepin Marsh	Grosse Ile
57	Thoroughfare Canal	Grosse Ile
58	Grosse Ile B	Grosse Ile
59	Grosse Ile A	Grosse Ile
60	Grosse Ile C	Grosse Ile
61	DSC Site	Trenton
62	Levy Trucking	Trenton
63	Howard Ellias Trust Property	Trenton
64	Meyer/Ellias Park	Trenton
65	George St. Road End	Trenton
66	Traux St. Road End	Trenton
67	Rotary Park	Trenton
68	Cherry Street Park	Trenton
69	Elm Street Park	Trenton
70	West Road Park	Trenton
71	Grosse Ile D	Grosse Ile
72	Grosse Ile F	Grosse Ile
73	Elizabeth Park	Trenton
74	Grosse Ile G	Grosse Ile
75	Grosse Ile H	Grosse Ile
76	Stony Island	Grosse Ile Township
77	Grosse Ile J	Grosse Ile
78	DTE Trenton	Trenton
79	Solutia Site	Trenton
80	Crystal Bay Navigation Dike	Army Corps of Engineers
81	Chrysler Paint Plant	Trenton
82	Grosse Ile M	Grosse Ile
83	Grosse Ile L	Grosse Ile
84	Grosse Ile K	Grosse Ile
85	Livingston Channel Navigation Dike	Army Corps of Engineers
86	Grosse Ile N	Grosse Ile
87	Dynamite Island	Grosse Ile Township
88	Fox Island	Grosse Ile Township
89	Oldani Marsh	Grosse Ile
90	Humbug Marsh/Island	Gibraltar
91	Calf Island	Grosse Ile Township
92	Elba Marsh	Grosse Ile
93	Elba Woods	Grosse Ile
94	Grosse Ile Nature Center	Grosse Ile
95	Gibraltar Bay	Grosse Ile
96	Round Island	Grosse Ile
97	Channel Woods	Grosse Ile
98	Meso Island	Grosse Ile
99	Airport Marsh	Grosse Ile
100	Sugar Island	Grosse Ile Township
101	Sugar Island Cut Dike	Detroit River
102	Hickory Island	Grosse Ile Township
103	Celeron Island	Grosse Ile Township

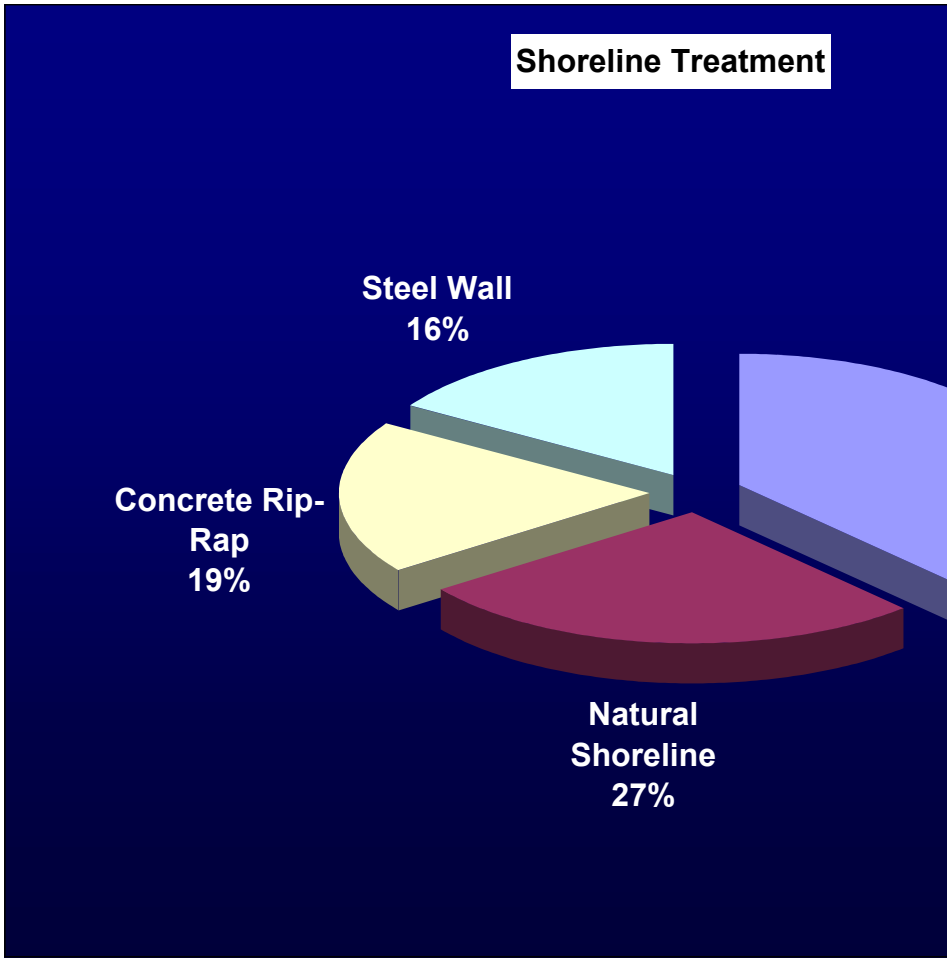
104	Sturgeon Bar	Brownstown Township

Public Owr	Private Ownership
1837	1599



Concrete Wall	Natural Shoreline	Concrete Rip-Rap	Steel Wall
38%	27%	19%	16%






Concrete Wall
38%

Proposed Table of Shoreline Extent and Treatments at Riparian Sites within this study

	Mainland	Offshore	Total
Number of candidate sites	52	33	85
Riparian frontage	11.24 mi	36.40 mi	47.64 mi
Shoreline Treatment			
Concrete	4.31 mi	0	4.31 mi
Steel	1.78 mi	0	1.78 mi
Riprap	2.1 mi	12.38 mi	14.48 mi
Earthen	3.05 mi	24.02 mi	27.07 mi
Percentage of Sampled Shoreline			
Concrete	38%	0	9%
Steel	16%	0	4%
Riprap	19%	34%	30%
Earthen	27%	66%	57%

The water frontage at all but 18(?) of our study sites consisted of one of the four shoreline treatments sh
For preparation of this table, at each site where the frontage was comprised of more than one shoreline

nown in this table.
treatment, all feet of water frontage was attributed to the predominant shoreline treatment at that site.

Site Number	SITE NAME	AREA (acres)
1	Mariner's Park	6.4
2	Riverfront-Lakewood East Park	25.2
3	Alfred Brush Ford Park	20.9
4	Fisher Mansion Woodlot	14.2
5	Maheras/Gentry Park	62.2
6	DTE/Conner's Creek	13.7
7	Inland Lime and Stone	5.8
8	Vaughn-Reid Memorial Park	3.9
9	Shipwreck Marine	2.4
10	Porter Field	6.2
11	David F. Stockton Memorial Park	2.2
12	Erma Henderson Park & Marina	24.9
13	Owen Park	3.7
14	UAW Lot	19.5
15	Gabriel Richard Park	19.6
16	North Fishing Pier	2.0
17	Belle Isle North Shore	1.1
18	Lake Muskoday	22.7
19	Belle Isle Water Intake	15.5
20	Blue Heron Lagoon	42.0
21	Lake Okonoka	23.7
22	South Fishing Pier	2.6
23	Lake Tacoma	12.7
24	North Canoe Livery	2.1
25	UniRoyal site	42.1
26	Mt. Elliott Park	6.0
27	Chene Park	8.9
28	St. Aubin Park & Marina	9.3
29	Hart Plaza	12.0
30	Free Press Easement	9.3
31	Detroit Union Depot	1.3
32	Riverside Park & Boat Ramp	10.3
33	Revere Copper and Brass	30.0
34	Fort Wayne Parade Grounds	23.9
35	Delray Boat Launch	13.8
36	DTE River Rouge	2.0
37	Belanger Park	10.2
38	National Steel Settling Ponds	4.6
39	National Steel Skull Drop Site	1.9
40	Great Lakes Steel Boat Club	7.1
41	National Steel Lot	20.8
42	Mud Island	22.4
43	John D. Dingell Park	4.5
44	Grassy Island	73.8
45	BASF Wyandotte Site	142.7
46	Bishop Park	10.7
47	Point Hennepin	221.6
48	Wyandotte Shores Golf Course	85.0
49	NE Grosse Ille	0.3
50	BASF Grosse Ile	8.5

51	Elf Atochem America Site	86.3
52	North Hennepin Marsh	105.4
53	Conservancy Lots	1.9
54	BASF Riverview Site	25.3
55	Crown Enterprises	38.2
56	South Hennepin Marsh	47.3
57	Thoroughfare Canal	1.6
58	Grosse Ile B	34.0
59	Grosse Ile A	83.7
60	Grosse Ile C	46.5
61	DSC Site	227.5
62	Levy Trucking	26.2
63	Howard Ellias Trust Property	12.3
64	Meyer-Ellias Park	4.5
65	George St. Road End	0.1
66	Traux St. Road End	0.2
67	Rotary Park	5.3
68	Cherry Street Park	0.1
69	Elm Street Park	0.3
70	West Road Park	0.6
71	Grosse Ile D	27.6
72	Grosse Ile F	62.2
73	Elizabeth Park	165.0
74	Grosse Ile G	14.4
75	Grosse Ile H	44.3
76	Stony Island	52.0
77	Grosse Ile J	45.6
78	DTE Trenton	16.3
79	Solutia Site	14.6
80	Crystal Bay Navigation Dike	112.6
81	Chrysler Paint Plant	43.1
82	Grosse Ile M	16.9
83	Grosse Ile L	22.7
84	Grosse Ile K	189.8
85	Livingston Channel Navigation Dike	19.5
86	Grosse Ile N	30.7
87	Dynamite Island	0.5
88	Fox Island	0.7
89	Oldani Marsh	13.2
90	Humbug Marsh/Island	222.2
91	Calf Island	3.7
92	Elba Marsh	17.9
93	Elba Woods	9.8
94	Grosse Ille Nature Center	37.9
95	Gibraltar Bay	143.0
96	Round Island	43.3
97	Channel Woods	10.4
98	Meso Island	11.8
99	Airport Marsh	45.9
100	Sugar Island	28.1
101	Sugar Island Cut Dike	3.2

102	Hickory Island	11.8
103	Celeron Island	68.1
104	Sturgeon Bar	1.9