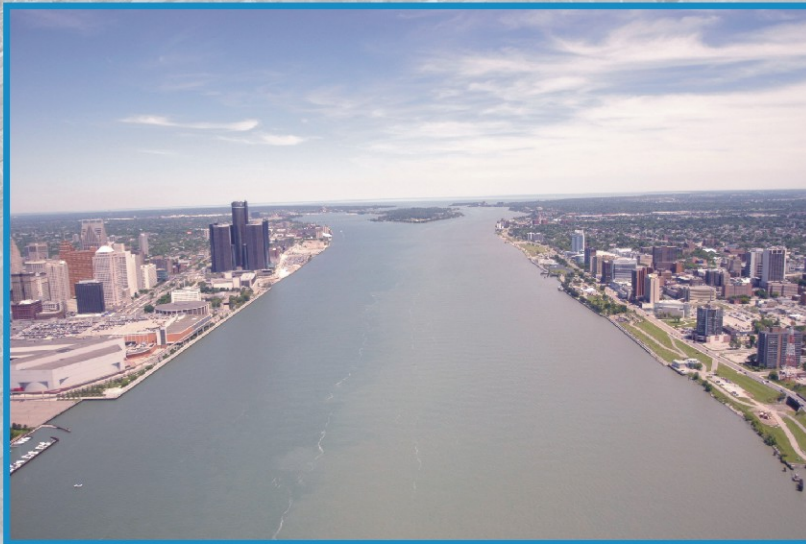


Wetland, Threatened and Endangered Species and Coastal Zone Management Technical Report

The Detroit River International Crossing Study



November 2007

Table of Contents

SUMMARY

SECTION 1 – INTRODUCTION	1-1
1.1 Purpose of the Report	1-4
SECTION 2 – METHODOLOGY	2-1
2.1 Study Area	2-1
2.2 Wetlands	2-1
2.2.1 Existing Resource Information	2-1
2.2.2 Wetland Mapping	2-1
2.2.3 Wetland Function and Value Analysis	2-3
2.3 Threatened and Endangered Species	2-4
2.3.1 Existing Resource Information	2-4
2.3.2 Field Investigations	2-4
2.4 Coastal Zone Management and CZM Projects	2-5
2.5 Fish	2-5
2.6 Wildlife and Migratory Birds	2-5
2.6.1 Wildlife	2-5
2.6.2 Migratory Birds	2-6
2.7 Water Quality/Secondary Impacts	2-6
SECTION 3 – FINDINGS	3-1
3.1 Wetlands	3-1
3.1.1 Wetland Mapping	3-1
3.1.2 Wetland Functional Assessments	3-6
3.1.3 Impacts	3-6
3.2 Threatened and Endangered Species	3-6
3.2.1 Mussels	3-10
3.2.2 Fish	3-10
3.2.3 Other Species	3-10
3.3 Coastal Zone Management and CZM Projects	3-11
3.4 Fish	3-11
3.5 Wildlife and Migratory Birds	3-11
3.5.1 Wildlife	3-11
3.5.2 Migratory Birds	3-12
3.6 Water Quality/Secondary Impacts	3-18
SECTION 4 – CONCLUSIONS	4-1
SECTION 5 – REFERENCES	5-1
Appendix A Wetland Functional Assessment: Qualifiers and Considerations from “The Highway Methodology Workbook Supplement” U.S. Army Corps of Engineers	
Appendix B Correspondence from MNFI	
Appendix C Mussel Survey Report	
Appendix D Wetlands Photography	
Appendix E Wetland Functional Assessment Data Sheets	

i:\projects\3600\wp\reports\wetlands\textwetlands.doc

LIST OF FIGURES

Figure 1-1	Existing Detroit River International Crossings	1-1
Figure 1-2	Travel Demand vs. Capacity: Combined Detroit River Crossings.....	1-2
Figure 1-3	U.S. Area of Analysis for Crossing System	1-3
Figure 1-4	Schematic Representation of X-10 Crossing Alternatives #1 through #3, #5, #14 and #16.....	1-5
Figure 1-5	Schematic Representation of X-11 Crossing Alternatives #7, #9, #11.....	1-6
Figure 2-1	Wetland Delineation.....	2-2
Figure 3-1	Wetland Delineation.....	3-2
Figure 3-2	Wetland Delineation – Crossing X-10	3-3
Figure 3-3	Wetland Delineation – Crossing X-11	3-4
Figure 3-4	Wetland Delineation – Crossing X-10	3-8
Figure 3-5	Wetland Delineation – Crossing X-11	3-9
Figure 3-6	Concept of Cable-stay Bridge	3-14
Figure 3-7	Concept of a Suspension Bridge	3-15

LIST OF TABLES

Table 1-1	Crossing System Alternatives Included in DRIC DEIS	1-4
Table 2-1	Target Species	2-4
Table 3-1	Wetland Identification.....	3-5
Table 3-2	Wetland Functions and Values Present	3-7
Table 3-3	Wildlife Observed During Field Surveys.....	3-12

SUMMARY

The Detroit River International Crossing (DRIC) Study is a bi-national effort to complete the environmental study processes for the United States, Michigan, Canada and Ontario governments. The study will identify solutions that support the region, state, provincial and national economies while addressing civil and national defense and homeland security needs of the busiest trade corridor between the United States and Canada (Figure S-1).

Figure S-1
Detroit River International Crossing Study
Existing Detroit River International Crossings



The purpose of the Detroit River International Crossing Project is to: (for the foreseeable future, i.e., at least 30 years):

- Provide safe, efficient and secure movement of people and goods across the Canadian-U.S. border in the Detroit River area to support the economies of Michigan, Ontario, Canada and the U.S.
- Support the mobility needs of national and civil defense to protect the homeland.

To address future mobility requirements (i.e., at least 30 years) across the Canada-U.S. border, there is a need to:

- Provide new border crossing capacity to meet increased long-term demand;

- Improve system connectivity to enhance the seamless flow of people and goods;
- Improve operations and processing capability; and,
- Provide reasonable and secure crossing options in the event of incidents, maintenance, congestion, or other disruptions.

The Detroit River International Crossing Study (DRIC) Draft Environmental Impact Statement (DEIS) addresses the U.S. analysis of the end-to-end alternatives for crossing the Detroit River between Detroit, Michigan, and Windsor, Ontario, Canada. The alternatives are comprised of three components: the crossing, plaza (where tolls are collected), and interchange connecting the plaza to I-75 (Figure S-2).

Figure S-2
Detroit River International Crossing Study
U.S. Area of Analysis for Crossing System



Source: The Corradino Group of Michigan, Inc.

Purpose of the Report

This technical report provides analysis to support information in the Detroit River International Crossing Draft Environmental Impact Statement in the areas of: Wetlands; Threatened and Endangered Species; Coastal Zone Management and CZM Projects; Fish; Migratory Birds; and, Water Quality impacts.

Methodology

The following procedures were followed in collecting and analyzing the topics covered by this report.

Wetlands

Wetlands information/mapping was gathered from the Michigan Department of Natural Resources (MDNR), United States Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers (USACE), the Michigan Department of Environmental Quality (MDEQ), the U. S. Department of Agriculture (USDA) and the Wayne County Department of the Environment.

Preliminary field assessments were conducted during the 2006 growing season. The study area was assessed by car, boat, and on foot to confirm: 1) the presence or absence of wetlands; 2) the types of wetlands, if present; 3) sources of wetland hydrology; and, 4) any other information that could be obtained and used as an indicator of wetland quality.

Professional Wetland Scientists from the DRIC consulting team delineated all wetland boundaries in the spring of 2007. Delineation methodology was based on statutory language and rules found in Part 303, Wetland Protection, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and guidance manuals and procedures set forth by the MDEQ for delineating wetlands in Michigan (Michigan Department of Environmental Quality, 2000). Visual signs of wetland hydrology and a predominance of wetland vegetation were the primary wetland indicators used during the delineations.

The wetlands were surveyed using a back pack GPS unit with sub meter accuracy.

Wetland functions and values were assessed using a descriptive approach developed by the USACE, New England District (USACE, 1999).

Threatened and Endangered Species

Prior to conducting field investigations, Wetlands and Coastal Resources (WCR), a member of the U.S. DRIC consulting team, identified target species and target habitats based on literature reviews and information from Michigan Natural Features Inventory (MNFI), MDNR and USFWS on threatened and endangered species, and species of special concern.

The majority of target species identified were mussels known to inhabit the Detroit River. Assessments for protected mussels focused on areas where the project could potentially involve work in the river (i.e. placement of support piers of a bridge). The mussel survey was completed in the summer of 2006. In mid-2007, the decision was made that piers would not be placed in the river mainly because of their effects on navigation. Currently, none of the alternatives propose any work within the river.

Two target fish species were identified, lake sturgeon (*Acipenser fulvescens*) and northern madtom (*Noturus stigmosus*). Habitat assessments for these species were completed using a remotely operated vehicle (ROV) with an underwater camera and by reviewing video obtained during hard hat diving for mussels.

All of the target species are aquatic and have been documented in the Detroit River. However, additional land surveys within the study area were conducted by car, boat and on foot to characterize the study area and determine if habitats for other threatened, endangered, or special concern plant and animal species are present.

Coastal Zone Management and CZM Projects

A list of all approved CZM projects was obtained from the Coastal Management Program, Environmental Science and Services Division of the MDEQ. Each individual or entity that received project approval was contacted by phone to obtain information on project location, project scope, and current status of the project.

Wildlife and Migratory Birds

Bird strikes of the proposed new bridge were identified as a potential impact. Birds identified during field surveys for wetlands and threatened and endangered species were recorded. Impacts and methods for minimizing impacts were identified based on literature reviews and consultation with the USFWS.

Water Quality/Secondary Impacts

Water quality and secondary impact assessments focused on review of proposed construction methods, plans for stormwater management, and other proposed activities that could result in discharge of sediment or other contaminants into the Detroit River. Best Management Practices were identified to minimize or eliminate negative impacts.

Findings

Based on results of the wetland delineations and functional assessments, no wetlands will be impacted by any plaza, route, or interchange alternative. Crossing X-11 is the only alternative that may impact wetland. A total of 0.01 acre of low quality wetland is located within the footprint of this crossing at the edge of the Detroit River. Loss of this wetland will result in minimal impacts to wetland function and value.

Results of field assessments landward of the Detroit River showed that no threatened, endangered, or special concern plant or animal species or their preferred habitats are present. Results of surveys for native mussels within the Detroit River showed that no live mussels are present within the areas assessed. Piers in the Detroit River were under consideration, but are no longer. Even so, investigation found placement of piers for crossings X-10a and X-10b were not expected to harm native mussels or listed fish species.

Wildlife use identified within the project area was limited to species typical of urban settings and impacts with any alternative are expected to be minimal. Migratory bird mortalities may occur as a result of bridge operation, but the degree of impact is unknown. Consultation with the USFWS will be undertaken to identify bridge design and operation features that may minimize impacts.

Impacts to water quality during and after construction will be minimized through proper stormwater management and site construction techniques. Best management practices will be included as part of project's design to remove sediments and other pollutants from stormwater.

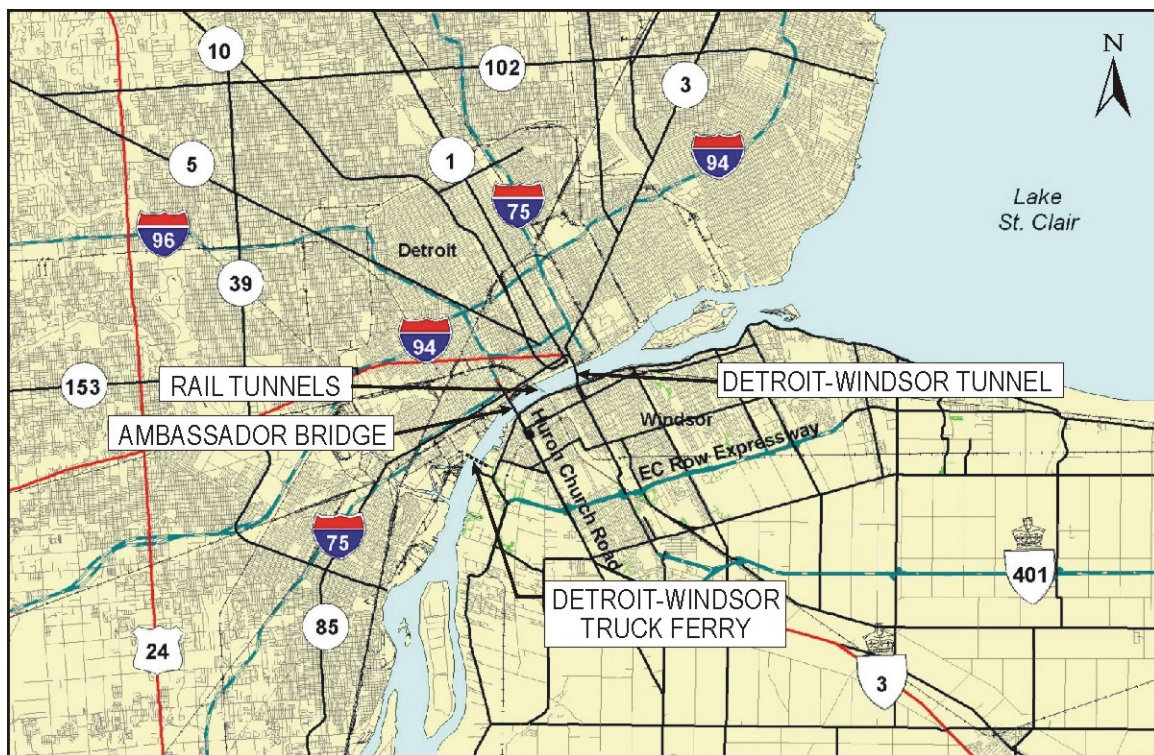
Soil erosion and sediment control plans and permits will be developed and obtained to avoid sediment discharge to surface waters.

Alternatives that include minimal impacts to natural resources and designs that address secondary impacts such as stormwater quality are consistent with requirements of the Coastal Zone Management Program. Permits from the MDEQ and USACE will be obtained prior to initiation of any regulated activity.

1. INTRODUCTION

The Detroit River International Crossing (DRIC) Study is a bi-national effort to complete the environmental study processes for the United States, Michigan, Canada and Ontario governments. The study proposes solutions that support the region, state, provincial and national economies while addressing civil and national defense and homeland security needs of the busiest trade corridor between the United States and Canada (Figure 1-1).

Figure 1-1
Detroit River International Crossing Study
Existing Detroit River International Crossings



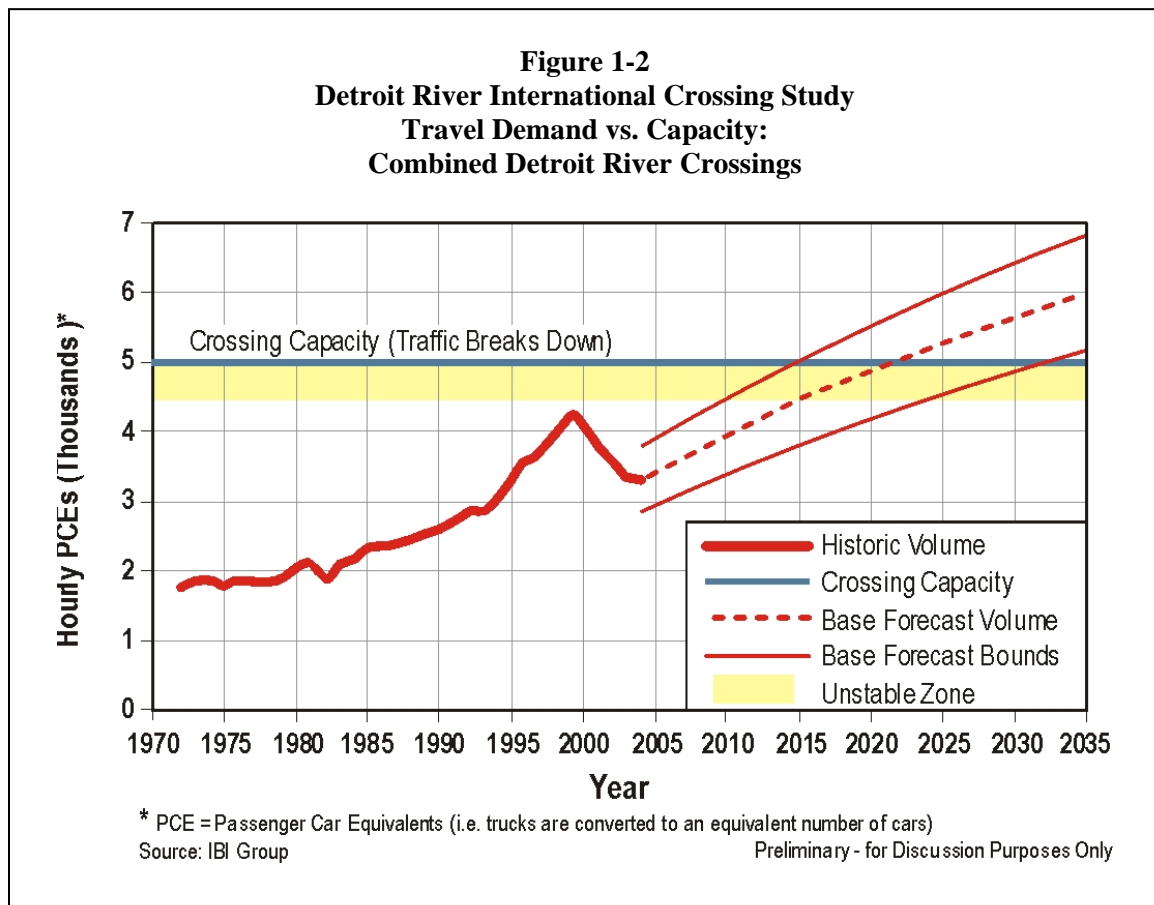
The purpose of the Detroit River International Crossing Project is to: (for the foreseeable future, i.e., at least 30 years):

- Provide safe, efficient and secure movement of people and goods across the Canadian-U.S. border in the Detroit River area to support the economies of Michigan, Ontario, Canada and the U.S.
- Support the mobility needs of national and civil defense to protect the homeland.

To address future mobility requirements (i.e., at least 30 years) across the Canada-U.S. border, there is a need to:

- Provide new border crossing capacity to meet increased long-term demand;
- Improve system connectivity to enhance the seamless flow of people and goods;
- Improve operations and processing capability; and,
- Provide reasonable and secure crossing options in the event of incidents, maintenance, congestion, or other disruptions.

Over the next 30 years, Detroit River area cross-border passenger car traffic is forecast to increase by approximately 57 percent, and movement of trucks by 128 percent. Traffic demand could exceed the “breakdown” cross-border roadway capacity as early as 2015 under high growth scenarios. Even under “low” projections of cross-border traffic, the “breakdown” roadway capacity of the existing Detroit River border crossings (bridge and tunnel combined) will be exceeded by 2033 (Figure 1-2). Additionally, the capacity of the connections and plaza operations will be exceeded in advance of capacity constraints of the roadway. Without improvements, this will result in a deterioration of operations, increased congestion and unacceptable delays to the movement of people and goods in this strategic international corridor.

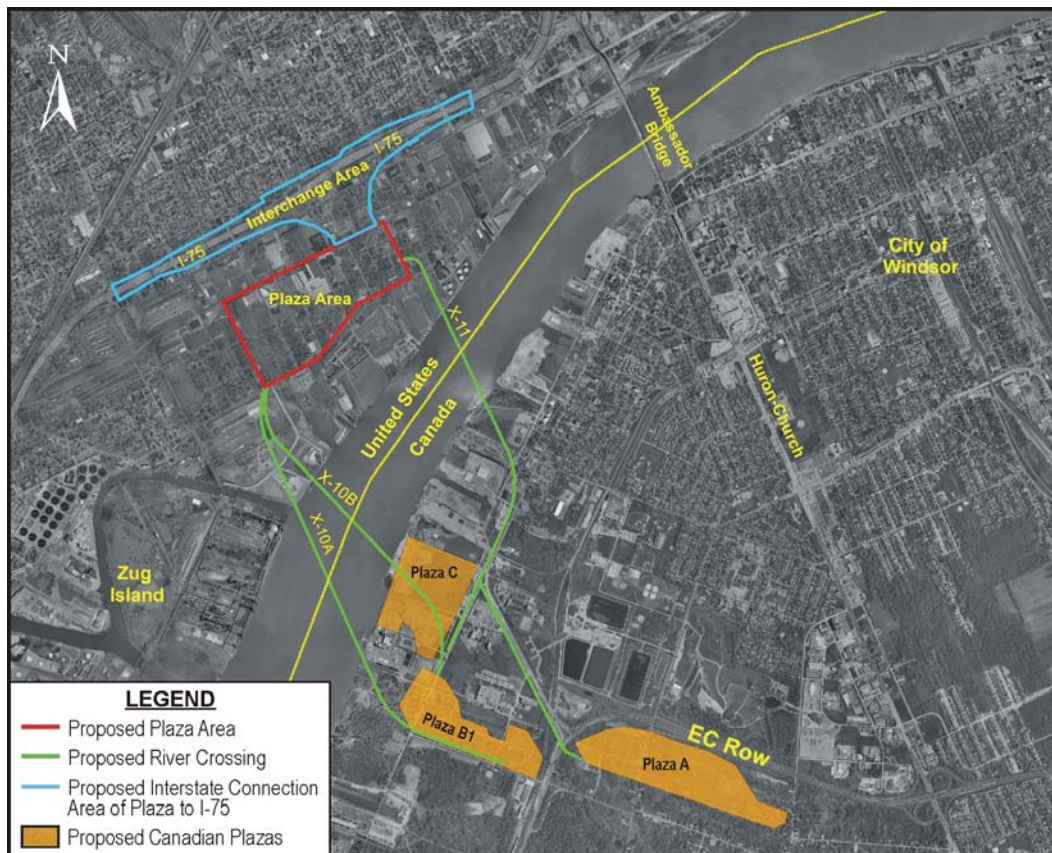


The forecast of capacity indicates that there will be inadequacies in: 1) the roads leading to the existing bridge and tunnel; 2) the ability to process vehicles through customs and immigration; and, 3) the capacities (number of lanes) of the Ambassador Bridge and Detroit-Windsor Tunnel themselves. So, even though incremental adjustments can and will be made to the plazas and, even though there is adequate border crossing capacity today (bridge and tunnel combined), the

planning, design and construction of any major international crossing takes time. Therefore, it is prudent to address, now, how and when the capacity need is to be satisfied at the crossing itself as well as the connecting roads.

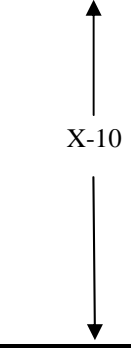
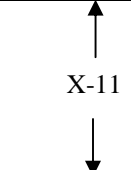
The DRIC Draft Environmental Impact Statement (DEIS) addresses the analyses of issues/impacts on the U.S. side of the border of the end-to-end crossing system over the Detroit River between Detroit, Michigan, and Windsor, Ontario, Canada. The alternatives are comprised of three components: the crossing, plaza (where tolls are collected and Customs inspections take place), and interchange connecting the plaza to I-75 (Figure 1-3). Nine alternatives exist in the U.S. These options are listed on Table 1-1 and schematically presented in Figures 1-4 and 1-5.

Figure 1-3
Detroit River International Crossing System
U.S. Area of Analysis for Crossing System



Source: The Corradino Group of Michigan, Inc.

**Table 1-1
 Detroit River International Crossing Study
 Crossing System Alternatives Included in DRIC DEIS**

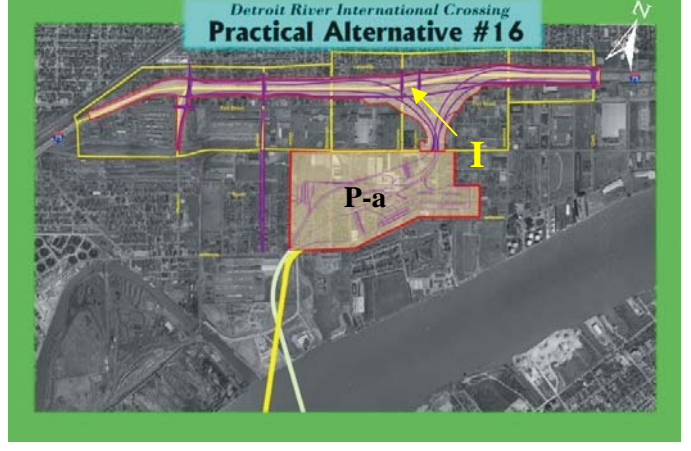
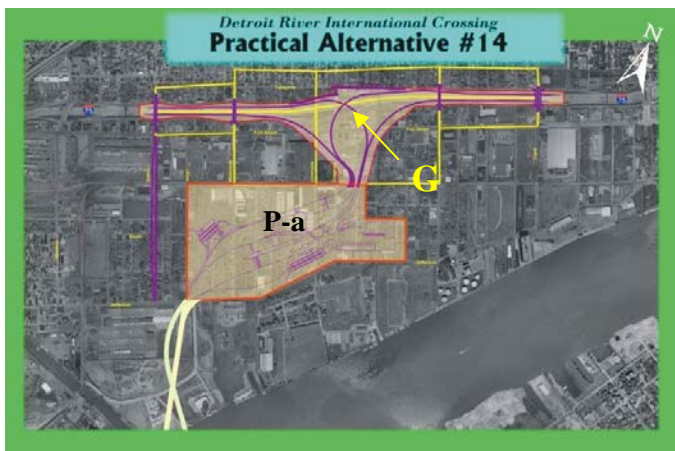
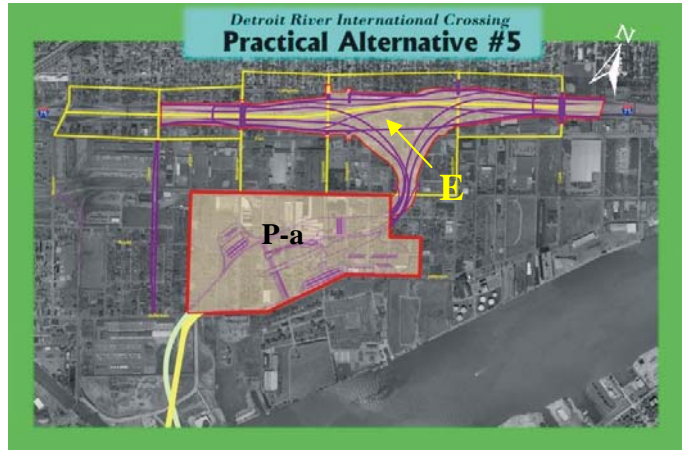
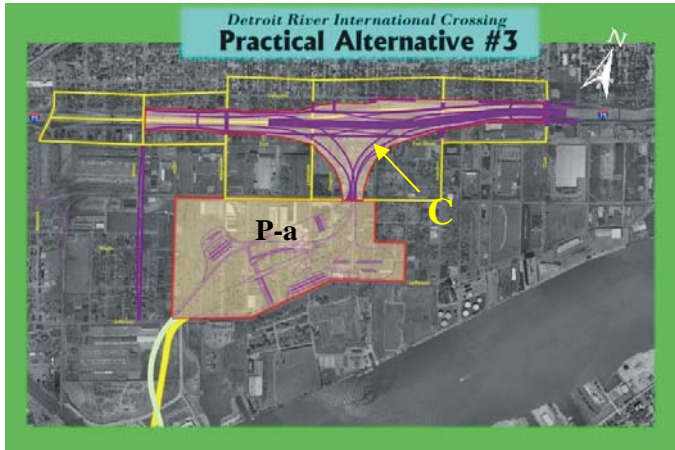
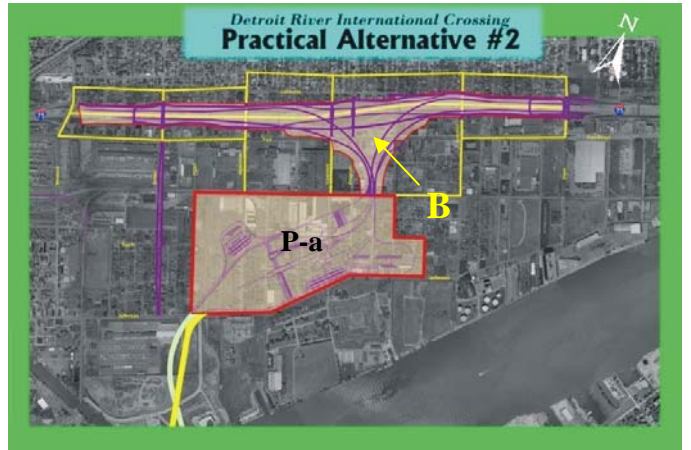
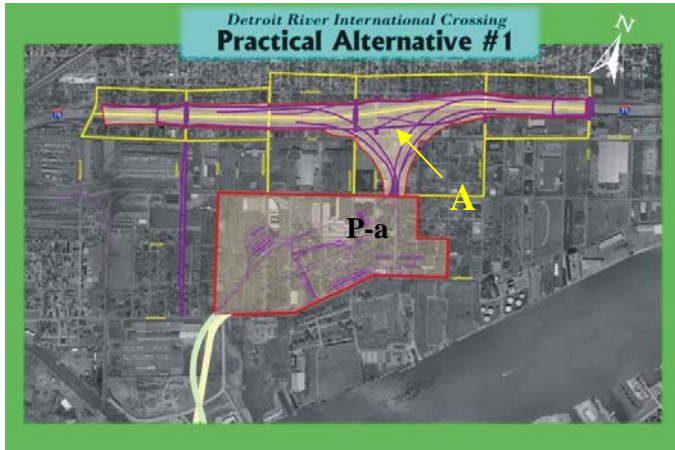
Alternative	Interchange	Plaza	Crossing	Proposed Status
#1	A	P-a		Analyzed in DEIS
#2	B	P-a		Analyzed in DEIS
#3	C	P-a		Analyzed in DEIS
#5	E	P-a		Analyzed in DEIS
#14	G	P-a		Analyzed in DEIS
#16	I	P-a		Analyzed in DEIS
#7	A	P-c		Analyzed in DEIS
#9	B	P-c		Analyzed in DEIS
#11	C	P-c		Analyzed in DEIS

Source: The Corradino Group of Michigan, Inc.

1.1 Purpose of the Report

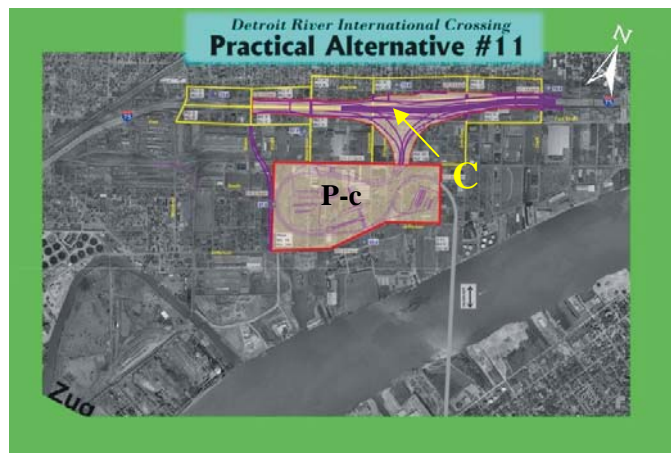
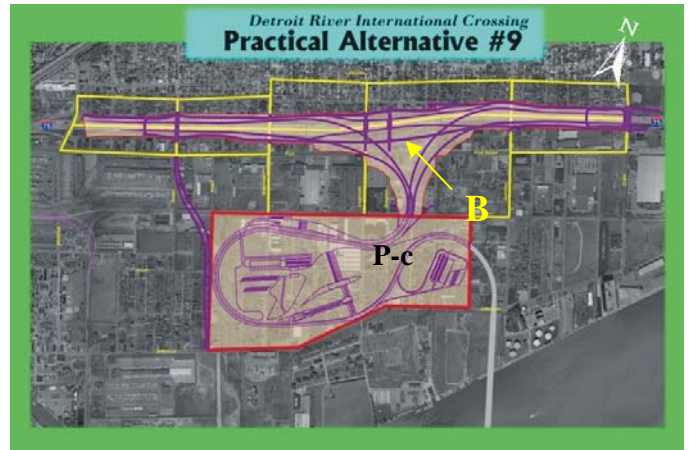
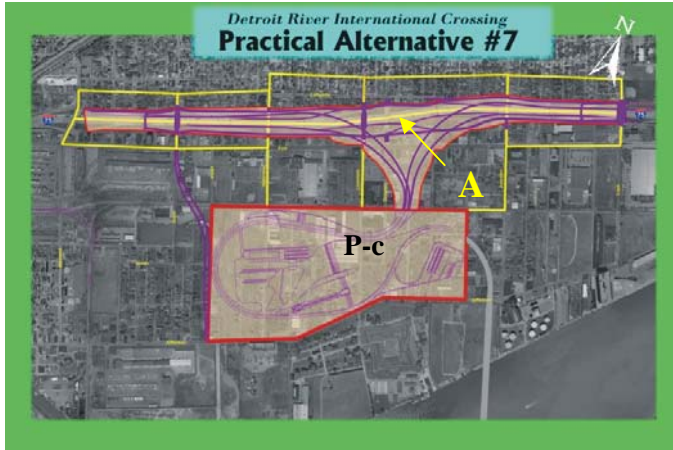
This technical report provides analysis to support information in the Detroit River International Crossing Draft Environmental Impact Statement in the areas of: Wetlands; Threatened and Endangered Species; Coastal Zone Management and CZM Projects; Fish; Migratory Birds; and, Water Quality impacts.

Figure 1-4
Detroit River International Crossing Study
Schematic Representation
of
X-10 Crossing Alternatives #1 through #3, #5, #14 and #16



Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

Figure 1-5
Detroit River International Crossing Study
Schematic Representation
of
X-11 Crossing Alternatives #7, #9, #11



Source: The Corradino Group of Michigan, Inc. and Parsons Transportation Group

2. METHODOLOGY

2.1 Study Area

The study area is located within the city of Detroit, Michigan between Zug Island and the Ambassador Bridge (Figure 2-1). It encompasses lands associated with all potential project alternatives, including two locations within the Detroit River where bridge piers were considered early in the analysis. Piers in the Detroit River have since been eliminated from consideration.

2.2 Wetlands

2.2.1 Existing Resource Information

Wetland and Coastal Resources (WCR), a member of the U.S. DRIC consulting team, contacted the Michigan Department of Natural Resources (MDNR), United States Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers (USACE), the Michigan Department of Environmental Quality (MDEQ), the U. S. Department of Agriculture (USDA) and the Wayne County Department of the Environment, to obtain pertinent wetland mapping information. The information obtained and the sources included the following:

- Natural Resource Conservation Service Soil Survey Maps
 - Center for Geographic Information (CGI), Department of Information and Technology, State of Michigan
- Wayne County Preliminary Wetland Inventory (wetlands and hydric soils)
 - Center for Geographic Information (CGI), Department of Information and Technology, State of Michigan

The Wayne County Preliminary Wetland Inventory data sets were developed by using a combination of National Wetlands Inventory (NWI) wetland maps prepared by the USFWS; land cover as mapped by the MDNR; and, soils as mapped by the USDA, Natural Resource Conservation Service (NRCS). This inventory contained the most comprehensive mapping available and, therefore, was used as an initial base map to assist in field verification.

Wetland and hydric soils shapefiles developed for the Wayne County Preliminary Wetland Inventory were overlaid on aerial photographs using Geographic Information System (GIS) software ArcView 9.0 (ESRI, Inc.). Hard copies of these maps were used in the field to confirm the presence/absence of wetlands within the study area.

2.2.2 Wetland Mapping

Preliminary field assessments were conducted during the 2006 growing season. The study area was assessed by car, boat, and on foot to confirm: 1) the presence or absence of wetlands; 2) the types of wetlands, if present; 3) sources of wetland hydrology; and, 4) any other information that could be obtained and used as an indicator of wetland quality. Areas that could not be viewed from public access points were assessed by using the Wayne County Preliminary Wetland Inventory and aerial photographic interpretation. All wetlands encountered were sketched and numbered on an aerial photograph. These data were then used to create a GIS shapefile.

Figure 2-1
Detroit River International Crossing Study
Wetland Delineation



Source: Wetland and Coastal Resources, Inc.

Professional Wetland Scientists from WCR delineated all wetland boundaries in the spring of 2007. Delineations were completed by placing high visibility glow-pink flagging tape at the upland/wetland interface. Flags were sequentially lettered and numbered and the approximate boundary of each wetland was sketched on aerial photography.

Delineation methodology was based on statutory language and rules found in Part 303, Wetland Protection, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and guidance manuals and procedures set forth by the MDEQ for delineating wetlands in Michigan (Michigan Department of Environmental Quality, 2000). Visual signs of wetland hydrology and a predominance of wetland vegetation were the primary wetland indicators used during the delineations. In the absence of visual signs of hydrology, soils were examined to assess whether hydric soils were present and/or signs of hydrology were present within the soil profile. Areas not having a predominance of wetland vegetation and/or lacking visual signs of wetland hydrology and signs of hydrology within the soil profile were classified as upland. Voss (1972, 1990, and 1996), Gleason and Cronquist (1998), and Holmgren (1998) were utilized, when necessary, to aid in plant identification.

The wetlands were surveyed using a back pack GPS unit with sub meter accuracy. GIS was used to create wetland maps by developing polygon shapefiles for each wetland area, based on field sketches. The acreage of each wetland was calculated using an ArcView script (www.esri.com/arcscrips).

2.2.3 Wetland Function and Value Analysis

Wetland functions and values were assessed using a descriptive approach developed by the USACE, New England District (USACE, 1999). This method requires assessment of the following functions and values for each wetland area identified:

- Groundwater Recharge/Discharge
- Floodflow Alteration
- Fish and Shellfish Habitat
- Sediment/Toxicant Removal
- Nutrient Removal
- Production Export
- Sediment/Shoreline Stabilization
- Wildlife Habitat
- Recreation
- Educational/Scientific Value
- Uniqueness/Heritage
- Visual Quality/Aesthetics
- Endangered Species

Field reviews of all wetland areas were completed and their function and values assessed using a series of qualifiers and considerations (Appendix A). Data sheets were used to record which function and/or value were present and why.

2.3 Threatened and Endangered Species

2.3.1 Existing Resource Information

Prior to conducting field investigations, WCR identified target species and target habitats based on literature reviews and information from Michigan Natural Features Inventory (MNFI) on threatened and endangered species, and species of special concern. Target species were those listed as threatened, endangered, or of special concern, and determined by past studies to potentially occur within the study area. Target habitats were those identified in the literature and past studies that support the target species.

WCR also used literature searches, and contacts with MDNR and USFWS to characterize potential and preferred habitats of listed species. Much of the information utilized for habitat characterizations was obtained from abstracts prepared by MNFI. These abstracts provide detailed life history information about listed species. The habitats utilized by the listed species were compared to known and potential habitats associated with the study area.

The information received from MNFI is included in Appendix B. After literature reviews, preliminary assessments of the study area, and discussions with MNFI, MDNR, and USFWS staff, a final list of target species was developed (Table 2-1).

Table 2-1
Detroit River International Crossing Study
Target Species

Scientific	Common Name	U.S. Status	State Status
<i>Acipenser fulvescens</i>	Lake sturgeon		T
<i>Cyclonaias tuberculata</i>	Purple wartyback		SC
<i>Epioblasma torulosa rangiana</i>	Northern riffleshell	LE	E
<i>Epioblasma triquetra</i>	Snuffbox		E
<i>Obovaria olivaria</i>	Hickorynut		SC
<i>Obovaria subrotunda</i>	Round hickorynut		E
<i>Noturus stigmosus</i>	Northern madtom		E
<i>Pleurobema coccineum</i>	Round pigtoe		SC

T = State Threatened; E = State Endangered; SC = State Special Concern; LE Federally Endangered
Source: Wetland and Coastal Resources, Inc.

2.3.2 Field Investigations

2.3.2.1 Mussels

The majority of target species identified were mussels known to inhabit the Detroit River. Assessments for protected mussels focused on areas where the project could potentially involve the placement of piers in the river. A separate report detailing the methodology used during mussel surveys is included in Appendix C. The mussel survey was completed in the summer of 2006. In mid-2007, the decision was made that piers would not be placed in the river mainly because of their effects on navigation.

2.3.2.2 Fish

Two target fish species were identified, lake sturgeon (*Acipenser fulvescens*) and northern madtom (*Noturus stigmosus*). Habitat assessments for these species were completed using a remotely operated vehicle (ROV) with an underwater camera and by reviewing video obtained during hard hat diving for mussels. The area of review included 11 equally spaced transects within two survey areas (as identified in the attached mussel survey report). Past studies on lake sturgeon spawning in the Detroit River were also reviewed to identify locations of critical habitat for this species.

2.3.2.3 Other Species

All of the target species are aquatic and have been documented in the Detroit River. However, additional land surveys within the study area were conducted by car, boat and on foot to characterize the study area and determine if habitats for other threatened, endangered, or special concern plant and animal species are present.

2.4 Coastal Zone Management and CZM Projects

Identification of natural resources associated with the study area, and potential impacts to those resources, is required to ensure that a project receiving federal funds is consistent with the provisions of the Coastal Zone Management (CZM) Act. In addition, the CZM program has funded numerous shoreline access and development projects, and any potential impacts to these projects are reviewed by CZM program staff.

Review of the study area for natural resources was conducted through wetland assessments, threatened and endangered species assessments, and identification of other significant resources. These assessments, as described in previous sections, provide the basis for CZM consistency determinations.

A list of all approved CZM projects was obtained from the Coastal Management Program, Environmental Science and Services Division of the MDEQ. Each individual or entity that received project approval was contacted by phone to obtain information on project location, project scope, and current status of the project.

2.5 Fish

Fish habitat within the study area was characterized during mussel surveys using underwater video, as described above and in the attached mussel survey report. Fish encountered and substrate types present were identified and recorded. Fish use within the study area and impacts to fish were also identified and assessed through literature reviews and discussions with local fisheries managers and research biologists with the MDNR and U. S. Geological Survey.

2.6 Wildlife and Migratory Birds

2.6.1 Wildlife

The presence of wildlife within the study area was documented during wetland delineations, wetland functional assessments, and threatened and endangered species assessments. Dates of

observation of birds included August 23, 24, 28 and 29, September 29 and December 17, 2006 and March 7, May 9 and June 20 and 22, 2007. Use by terrestrial animals was observed on July 27, September 6 and 29 and October 17, 2006 and March 7, May 9 and June 20 and 22, 2007. For all dates, biologists were in the field between the hours of 9 am and 5 pm. All animals and signs of animal use were recorded. Due to the urban nature of the study area, detailed assessment of wildlife use was not required.

2.6.2 Migratory Birds

Bird strikes of the proposed new bridge were identified as a potential impact. Literature reviews were conducted to determine the species of birds potentially migrating along the Detroit River corridor. Birds identified during field surveys for wetlands and threatened and endangered species were recorded. Impacts and methods for minimizing impacts were identified based on literature reviews and consultation with the USFWS.

2.7 Water Quality/Secondary Impacts

Water quality and secondary impact assessments focused on review of proposed construction methods, plans for stormwater management, and other proposed activities that could result in discharge of sediment or other contaminants into the Detroit River. Best Management Practices were identified to minimize or eliminate negative impacts.

3. FINDINGS

3.1 Wetlands

Wetland delineations and functional assessments were completed in June 2007. Two vacant parcels located adjacent to the Detroit River were found to contain small wetland areas. Both parcels are highly disturbed from past filling and grading activities. The wetlands identified appear to be present as a result of site disturbances that created depressions in the ground and collect surface runoff. All wetlands are in close proximity to the Detroit River and regulated by both the MDEQ and USACE. The remainder of the study area consists of urban land with no wetlands present.

3.1.1 Wetland Mapping

Fourteen wetland complexes were delineated within the two vacant parcels. Maps showing the location of these wetland complexes are provided in Figures 3-1 through 3-3. Table 3-1 lists flag numbers used to delineate each wetland complex, the plant species identified and wetland hydrology present within each wetland complex. Photographs showing each wetland are provided in Appendix D.

The total area of wetland present on both parcels is 0.70 acres. Figures 3-2 and 3-3 show the estimated acreages for each wetland complex. All wetlands described below are Palustrine, as classified by Cowardin et. al. 1979. The following summaries include general descriptions of the wetlands delineated:

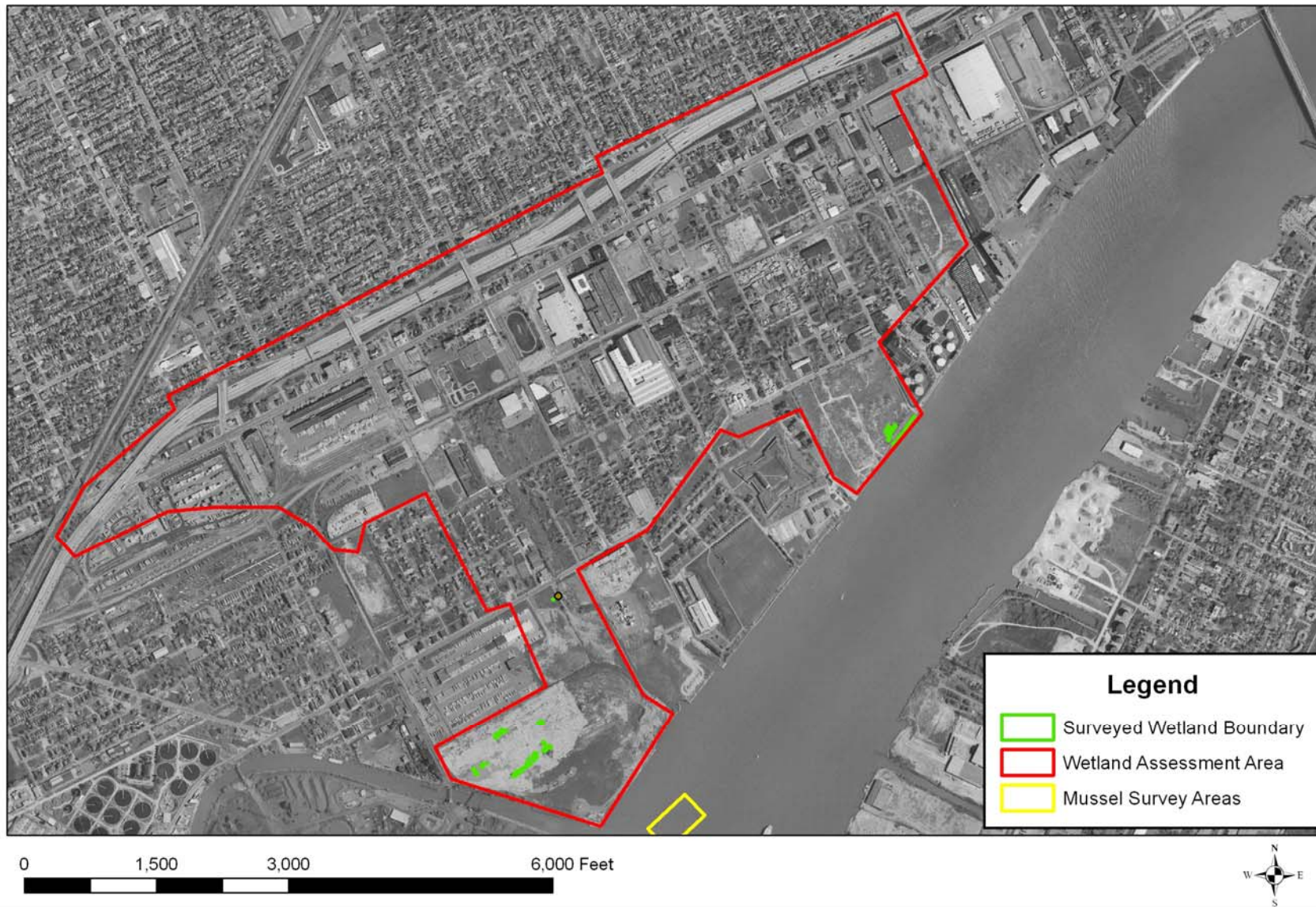
- Wetland Complex A
Cowardin Classification: Emergent/Persistent/Temporarily Flooded (PEM2A) and Scrub-Shrub/Broad-leaved Deciduous/Temporarily Flooded (PSS1A).

Wetland Complex A consists of an emergent and scrub-shrub wetland within a depression created by site disturbances. Portions of this wetland are void of vegetation with dry, cracked clay soils exposed. Dominant vegetation includes sedge (*Carex vulpinoidea*), reed (*Phragmites australis*), and sandbar willow (*Salix exigua*).

- Wetland Complexes B, C, and D
Cowardin Classification: Emergent/Persistent/Temporarily Flooded (PEM2A) and Scrub-Shrub/Broad-leaved Deciduous/Temporarily Flooded (PSS1A).

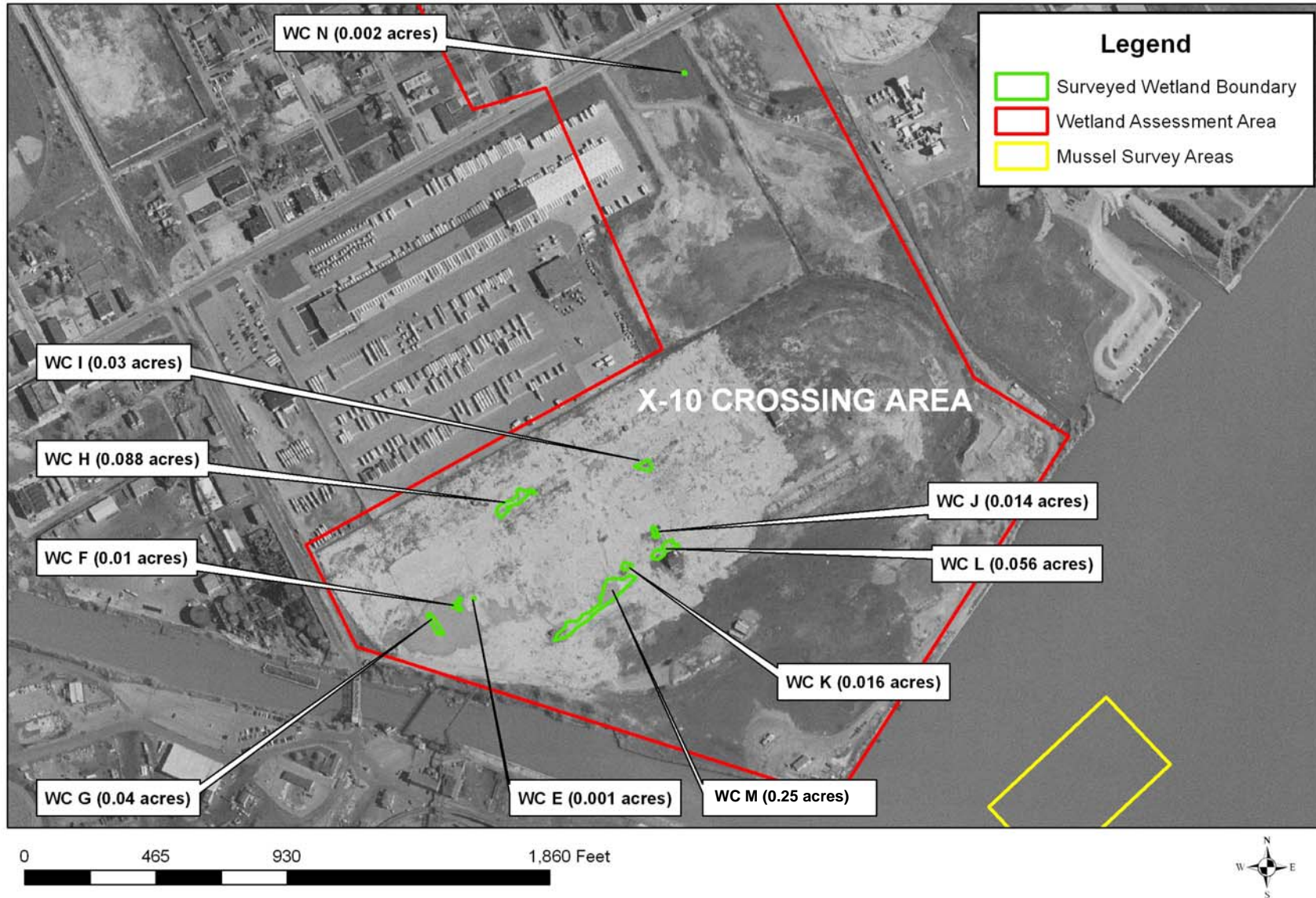
Wetland Complexes B, C, and D are linear wetlands located between asphalt fill and a concrete seawall adjacent to the Detroit River. Runoff from the adjacent fill flows into these wetlands and discharges through a break in the seawall. Dominant vegetation includes reed, sandbar willow and cottonwood (*Populus deltoids*). Soils consist of sand, gravel, and asphalt fill.

Figure 3-1
Detroit River International Crossing Study
Wetland Delineation



Source: Wetland and Coastal Resources, Inc.

Figure 3-2
Detroit River International Crossing Study
Wetland Delineation – Crossing X-10



Source: Wetland and Coastal Resources, Inc.

Figure 3-3
Detroit River International Crossing Study
Wetland Delineation – Crossing X-11



0 345 690 1,380 Feet



Source: Wetland and Coastal Resources, Inc.

**Table 3-1
Detroit River International Crossing Study
Wetland Identification**

Wetland Area	Scientific Name	Common Name	Wetness
A (Flag Numbers A1-A44)	<i>Aster novae-angliae</i>	New England Aster	FACW
	<i>Carex vulpinoidea</i>	Sedge	OBL
	<i>Phragmites australis</i>	Reed	FACW+
	<i>Populus deltoides</i>	Cottonwood	FAC+
	<i>Rumex crispus</i>	Curly Dock	FAC+
	<i>Salix exigua</i>	Sandbar Willow	OBL
	<i>Scirpus atrovirens</i>	Bulrush	OBL
	<i>Scirpus cyperinus</i>	Wool Grass	OBL
	<i>Solidago gigantea</i>	Late Goldenrod	FACW
	<i>Typha angustifolia</i>	Narrow Leaved Cattail	OBL
Hydrology: Dark stained leaves, bare soil (cracked clay), drainage patterns			
B, C, and D (Flag Numbers B1-B10; C1-C8; D1-D5)	<i>Ambrosia artemisiifolia</i>	Common ragweed	FACU
	<i>Aster novae-angliae</i>	New England aster	FACW
	<i>Impatiens capensis</i>	Spotted touch me not	FACW
	<i>Phragmites australis</i>	Reed	FACW+
	<i>Populus deltoides</i>	Cottonwood	FAC+
	<i>Salix exigua</i>	Sandbar willow	OBL
Hydrology: Dark stained leaves			
E (Flag Numbers E1-E4)	<i>Phragmites australis</i>	Reed	FACW+
	Hydrology: Dark stained leaves, depression		
F (Flag Numbers F1-F7)	<i>Phragmites australis</i>	Reed	FACW+
	<i>Hordeum jubatum</i>	Squirrel-tail grass	FAC+
	Hydrology: Dark stained leaves, depression		
G (Flag Numbers G1-G7)	<i>Rumex crispus</i>	Curly dock	FAC+
	Hydrology: Bare soil (cracked clay)		
H (Flag Numbers H1-H24)	<i>Phragmites australis</i>	Reed	FACW+
	<i>Hordeum jubatum</i>	Squirrel-tail grass	FAC+
	<i>Populus deltoides</i>	Cottonwood	FAC+
	Hydrology: Bare soil (cracked clay)		
I (Flag Numbers I1-I6)	<i>Phragmites australis</i>	Reed	FACW+
	<i>Hordeum jubatum</i>	Squirrel-tail grass	FAC+
	<i>Populus deltoides</i>	Cottonwood	FAC+
	Hydrology: Bare soil (cracked clay)		
J (Flag Numbers J1-J9)	<i>Phragmites australis</i>	Reed	FACW+
	<i>Populus deltoides</i>	Cottonwood	FAC+
	Hydrology: Stained leaves		
K (Flag Numbers K1-K6)	<i>Phragmites australis</i>	Reed	FACW+
	<i>Populus deltoides</i>	Cottonwood	FAC+
	Hydrology: Stained leaves		
L (Flag Numbers L1-L16)	<i>Phragmites australis</i>	Reed	FACW+
	<i>Populus deltoides</i>	Cottonwood	FAC+
	<i>Salix exigua</i>	Sandbar willow	OBL
	Hydrology: Bare soil (cracked clay)		
M (Flag Numbers M1-M31)	<i>Phragmites australis</i>	Reed	FACW+
	<i>Populus deltoides</i>	Cottonwood	FAC+
	<i>Salix exigua</i>	Sandbar willow	OBL
	Hydrology: Bare soil (cracked clay)		
N (Flag Numbers N1-N5)	<i>Phragmites australis</i>	Reed	FACW+
	Hydrology: Dark stained leaves, drainage patterns		

Source: Wetland and Coastal Resources, Inc.

- Wetland Complexes E, F, G, I, J, L, M, and N
Cowardin Classification: Emergent/Persistent/Temporarily Flooded (PEM2A)

These wetlands are a series of small pockets with scattered vegetation over exposed, dry, cracked clay soils. Dominant vegetation throughout most of these complexes is reed and squirrel-tail grass (*Hordeum jubatum*). Wetland Complex G was devoid of vegetation at the time of inspection and appeared to be a shallow, excavated basin that outlets to a stand pipe. The remainder of these wetlands are present as a result of standing water due to site disturbances.

- Wetland Complexes H and K
Cowardin Classification: Emergent/Persistent/Temporarily Flooded (PEM2A) and Scrub-Shrub/Broad-leaved Deciduous/Temporarily Flooded (PSS1A).

Areas H and K are similar to the preceding complexes, but have young cottonwood and sandbar willow present. Approximately one-half of these wetlands have less than 50 percent vegetative cover present over dry, cracked clay soils.

3.1.2 Wetland Functional Assessments

Results of the wetland function and value analysis indicate that all wetlands within the study area have minimal value. Table 3-2 lists the functions and values identified within each wetland complex, and the primary function each wetland provides. Appendix E includes copies of the field data sheets completed for the wetlands assessed.

3.1.3 Impacts

Alternatives for plazas and interchanges do not impact any wetlands. Likewise, alternative bridge crossings X-10a and X-10b also do not impact any wetlands (Figure 3-4). Crossing X-11 covers a total of 0.19 acres of wetland; the crossing would impact 0.01 acres, or approximately 71 percent, of Wetland Complex C. (Figure 3-5). All wetlands identified within X-11 are present as a result of past site disturbances. These areas receive little hydrology and may convert to uplands during dry years or even dry seasons. Although these wetlands do provide some functions, the significance of their functions is minimal and the loss of 0.01 acre of wetland at crossing X-11 is considered inconsequential.

3.2 Threatened and Endangered Species

Surveys using the ROV were conducted on August 23 and 24, 2006, and diving surveys were conducted on August 28 and 29, 2006. Depths within the survey zones averaged approximately nine to 11 meters (30 to 35 feet), with river current speed near eight kilometers per hour (five mph). The substrates throughout both study zones were comprised of sand and gravel with occasional cobble, stone, silt and patches of clay. Most of the rock and gravel particles were embedded with silt, and zebra mussels (*Dreissena polymorpha*) covered most of the substrate throughout the majority of both survey zones. No vegetative beds were encountered.

**Table 3-2
Detroit River International Crossing Study
Wetland Functions and Values Present**

Wetland Area	Value/Function	Qualifier/Consideration	Primary Function/Value
A	Floodflow Alteration	3. Flood storage up slope is minimal 4. Watershed contains impervious surfaces 9. Overland flow is retained 12. History of flooding in the watershed	Sediment Removal
	Sediment/Toxicant/Pathogen Retention	1. Potential sediment sources in the watershed 2. Potential pollution sources in the watershed 4. Fine grained mineral soils present	
	Nutrient Removal/Retention/Transformation	3. Potential for sediment trapping 7. Slowly drained soils present	
	Production Export	1. Wildlife food sources present 12. Nectar producing plants present	
	Wildlife Habitat	8. Wildlife food sources present nearby	
B, C, D	Floodflow Alteration	3. Flood storage up slope is minimal 4. Watershed contains impervious surfaces 7. Intermittent outlet present 9. Overland flow is retained 12. History of flooding in the watershed 13. Associated with a watercourse	Sediment Removal
	Sediment/Toxicant/Pathogen Retention	1. Potential sediment sources in the watershed 2. Potential pollution sources in the watershed 10. Wetland associated with Detroit River	
	Sediment/Shoreline Stabilization	3. Potential sediment sources present	
	Nutrient Removal/Retention/Transformation	3. Potential for sediment trapping 7. Sediment present upslope	
	Production Export	1. Wildlife food sources present 12. Nectar producing plants present	
	Wildlife Habitat	8. Wildlife food sources present nearby	
E, F, G, H, I, J, K, L, M, N	Floodflow Alteration	3. Flood storage up slope is minimal 4. Watershed contains impervious surfaces 9. Overland flow is retained 12. History of flooding in the watershed	Sediment Removal
	Sediment/Toxicant/Pathogen Retention	1. Potential sediment sources in the watershed 2. Potential pollution sources in the watershed 4. Fine grained mineral soils present	
	Nutrient Removal/Retention/Transformation	3. Potential for sediment trapping 7. Slowly drained soils present	
	Production Export	1. Wildlife food sources present 12. Nectar producing plants present	
	Wildlife Habitat	8. Wildlife food sources present	

Source: Wetland and Coastal Resources, Inc.

Figure 3-4
Detroit River International Crossing Study
Wetland Delineation – Crossing X-10

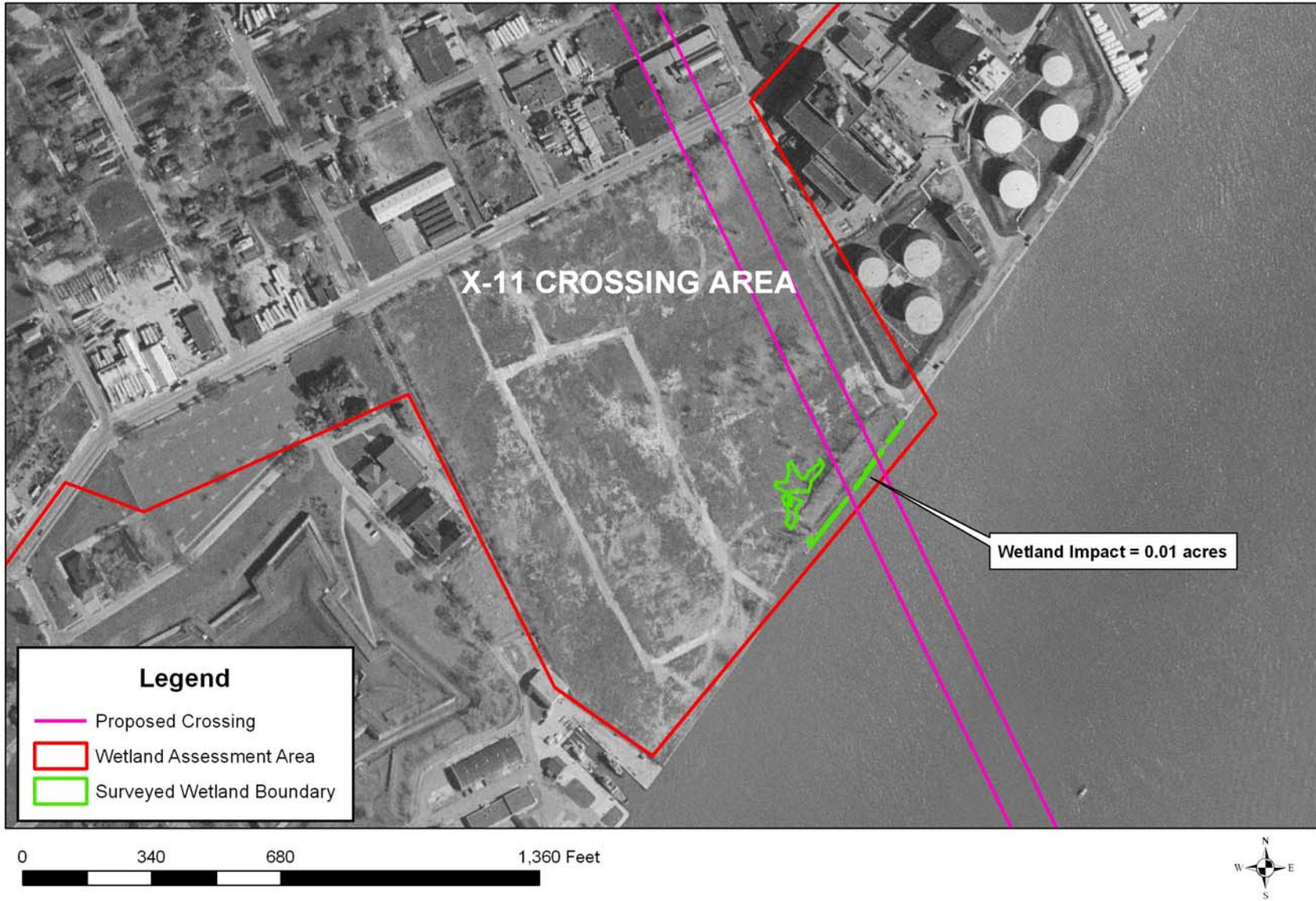


0 430 860 1,720 Feet



Source: Wetland and Coastal Resources, Inc.

Figure 3-5
Detroit River International Crossing Study
Wetland Delineation – Crossing X-11



Source: Wetland and Coastal Resources, Inc.

3.2.1 Mussels

A total of 38 shells were collected, representing four species listed by the state as special concern and three listed as state and federally endangered species. Video and data collected from the ROV and divers did not provide for mapping of habitats but did confirm the presence of habitat for native mussels. However, no live mussels of any species were found within the areas surveyed, suggesting that these species do not persist within the study area and that this area is presently uninhabitable by native mussels. It is the opinion of WCR that construction of piers in the river at the survey locations would not harm native mussel populations. A separate report detailing the findings of the mussel surveys is included as Appendix C.

3.2.2 Fish

Lake sturgeon inhabit large rivers where small benthic organisms are available for food. Spawning occurs over clean, rocky substrates in waters with swift currents (Goforth, 2000). In 1999 and 2000, surveys for active spawning sites were conducted by the USGS and USFWS. Results showed that of out of nine reputed, historic lake sturgeon spawning sites on the Detroit River, only one active spawning site was present – at Zug Island. However, that site now has lethal levels of chlorine from an upstream combined sewer overflow (Manny et al., 2004).

Direct impacts to lake sturgeon spawning habitat are not expected at crossings X-10a, X-10b, or X-11. Plans for X-11 do not include placement of support piers with the river and, therefore, no impacts are expected. Rock and gravel substrate are present within potential pier areas at crossing X-10a and X-10b; clean gravel and rock substrates are limited. However, after detailed review, piers have been ruled out at these crossings based on river navigation concerns.

In Michigan, the northern madtom has been found in large rivers with rock, gravel and sand substrates and strong currents (Carman, 2001). This species is somewhat tolerant of turbidity, but avoids heavily silted areas (Trautman, 1981). Few studies have documented the habitat and life history requirements of this fish, but its sporadic distribution and low numbers suggest it has specific habitat and ecological requirements and is sensitive to habitat degradation (Carman, 2001).

Because little is known about the habitat requirements of the northern madtom, it is possible that some of the habitat present within the X-10a, X-10b and X-11 crossings could be used by this species. However, much of the rock, gravel and sand substrates present at X-10a and X-10b are impacted by fine sediments and zebra mussels. These conditions are not consistent with known habitat requirements for this fish. Further, because construction of piers in the water has been ruled out, there are no potential impacts possible to this species.

3.2.3 Other Species

Surveys conducted at numerous times during 2006 and 2007 (referenced in Section 2.6.1 of this report) showed that the study area, with the exception of the Detroit River, consists of heavily developed urban areas and disturbed land. Habitat suitable for plant or animal species listed as threatened, endangered or special concern was not found. Construction of any alternative plaza, route or interchange is not expected to impact any listed plant or animal species.

3.3 Coastal Zone Management and CZM Projects

Water quality certification required by the CZM Act is granted through the MDEQ and USACE permit processes. Permits will be required from the MDEQ for construction of the bridge and impacts to regulated wetlands under Part 303, Wetland Protection and Part 301, Inland Lakes and Streams of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended, and from the USACE under the Clean Water Act. The proposed alternatives require minimal impacts to the aquatic resources and permits will be obtained prior to initiation of any regulated activity.

Review of records from the CZM program found that no CZM projects are present within the study area. Therefore, no impacts are expected under any proposed alternative.

3.4 Fish

Survey and stock assessment records from the MDNR, Lake St. Clair Fisheries Research Station, indicate that 31 species of fish have been captured in the Detroit River. These species have a wide variety of habitat requirements, with populations that both reside in the river and freely migrate between Lake Erie and Lake St. Clair.

The Detroit River is host to a large walleye spawning run that provides a significant spring sport fishery. Results of spring 2000 MDNR sport catch data from the Detroit River estimate that anglers in the Michigan waters of the Detroit River fished for 345,000 angler hours and harvested 97,000 walleye during a nine-week survey period.

Underwater video surveillance conducted during the mussel surveys was used to identify two fish species within the study area: smallmouth bass (*Micropterus dolomieu*) and round goby (*Neogobius melanostomus*). Round gobies are undesirable, non-native, invasive fish, while the smallmouth bass is a desirable native species. As work in the river is not an option, there will be no impact to either fish or their habitat.

3.5 Wildlife and Migratory Birds

3.5.1 Wildlife

The study area contains habitat for animals that are associated with urban settings and tolerant to human presence. Table 3-3 includes a list of animals identified during 2006 and 2007 surveys. No substantial mammal, reptile or amphibian populations were encountered, nor are they expected to be present. Impacts to terrestrial wildlife with any plaza, route or interchange alternative will be minimal.

**Table 3-3
Detroit River International Crossing Study
Wildlife Observed During Field Surveys**

Group	Scientific Name	Common Name	Location (Land/River)
Mammals	<i>Marmota monax</i>	Groundhog	Land
	<i>Odocoileus virginianus</i>	Whitetail deer	Land
	<i>Ondatra zibethicus</i>	Muskrat	River
	<i>Procyon lotor</i>	Raccoon	Land
	<i>Sciurus niger</i>	Fox squirrel	Land
	<i>Vulpes vulpes</i>	Red fox	Land
Birds	<i>Agelaius phoeniceus</i>	Red-winged blackbird	Land
	<i>Anas platyrhynchos</i>	Mallard	River
	<i>Aythya marila</i>	Greater scaup	River
	<i>Aythya valisineria</i>	Canvasback	River
	<i>Branta canadensis</i>	Canada goose	Land & River
	<i>Bucephala albeola</i>	Bufflehead	River
	<i>Bucephala clangula</i>	Common goldeneye	River
	<i>Buteo jamaicensis</i>	Red-tailed hawk	Land
	<i>Cardinalis cardinalis</i>	Northern cardinal	Land
	<i>Carduelis tristis</i>	American goldfinch	Land
	<i>Ceryle alcyon</i>	Belted kingfisher	River
	<i>Chaetura pelagica</i>	Chimney swift	Land & River
	<i>Charadrius vociferus</i>	Killdeer	Land
	<i>Colaptes auratus</i>	Northern flicker	Land
	<i>Columba livia</i>	Rock pigeon	Land
	<i>Corvus brachyrhynchos</i>	American crow	Land
	<i>Cyanocitta cristata</i>	Blue jay	Land
	<i>Larus argentatus</i>	Herring gull	River
	<i>Larus delawarensis</i>	Ring-billed gull	River
	<i>Mergus merganser</i>	Common merganser	River
	<i>Molothrus ater</i>	Brown-headed cowbird	Land
	<i>Pandion haliaetus</i>	Osprey	River
<i>Passer domesticus</i>	House sparrow	Land	
<i>Phalacrocorax auritus</i>	Double-crested cormorant	River	
<i>Phasianus colchicus</i>	Ring-necked pheasant	Land	
<i>Spizella pusilla</i>	Field sparrow	Land	
<i>Sturnus vulgaris</i>	European starling	Land	
<i>Turdus migratorius</i>	American robin	Land	
<i>Zenaida macroura</i>	Mourning dove	Land	
Insects	Odonata	Dragonflies	Land

Source: Wetland and Coastal Resources, Inc.

3.5.2 Migratory Birds

The Detroit River is an important waterfowl migration corridor, situated in the Mississippi and Atlantic Flyways where over 3 million waterfowl migrate annually. Over 200 species of birds are found within or migrate through the Detroit and Windsor area including 29 species of waterfowl (IGLR). Christmas bird counts conducted annually along the Detroit River have documented as

many as 29,365 birds and 81 species migrating through or utilizing Detroit River habitats during December and/or January of a single year (Craves and Fowler 2003). Counts conducted in December 2006 and January 2007 found 29,032 birds representing 76 species of songbirds, waterfowl, raptors, and shorebirds. A 2005 study conducted on the Detroit River at Belle Isle documented 205 species at the island from April through December including 31 species of waterfowl and 56 species of neotropical migrants during the spring (Chartier 2005). The study also documented a total of 72 species during breeding season (May-August), with evidence for 63 species breeding on the island.

Numerous studies have documented avian mortalities associated with man made structures. These studies have assessed collisions and electrocutions at transmission towers, power lines, communication towers, buildings, and wind turbines (Evans and Manville 2000; Manville 2004, 2005; Avery et al. 1976; Crawford and Engstrom 2001; Banks 1979). Most birds killed are neotropical, migratory songbirds which migrate between North America and Central/South America. For example, in a 29 year study, Crawford and Engstrom (2001) found that over 94% of the total number of individuals killed (over 44,000 individuals) at a television tower in north Florida were Neotropical migrants. However, little or no published documentation exist on avian mortalities at large bridges in the United States, particularly those over water.

Few studies or published observations exist on avian mortality associated with tall structures in Michigan. Caldwell and Cuthbert (1963) collected 812 dead birds (42 species) at a transmission tower near Cadillac, Michigan during the fall of 1961. Bird mortalities were also studied by Caldwell and Wallace (1966) at television towers throughout Michigan from 1959 to 1964. Their study found species composition differed between fall and spring, and between towers that were greater than 30 miles apart. There has been only one observation of significant bird strikes near the DRIC project. This observation found 284 birds killed in the spring of 1959 at a television tower in Detroit, Michigan (Breckenridge 1959).

While minimal avian mortalities have been documented at tall structures in the Detroit area, significant avian mortalities have been documented elsewhere in the United States. Most large mortalities occur at night during spring and fall migrations (Avery et al. 1976; Crawford and Engstrom 2001). Given that the Detroit River is host to large bird migrations and bird use, it is reasonable to assume that avian mortality would occur, to some degree, from bird strikes at Crossings X-10a, X-10b, and X-11. Avian mortalities at other tall structures have been found to be a function of structure size, visibility, migration times, weather conditions, and lighting (Manville 2000). The number of bird strikes at alternative crossings for the DRIC project could also be a function of these factors.

Two bridge types are under consideration for crossings X-10b and X-11: a cable-stay bridge and a suspension bridge (Figures 3-6 and 3-7, respectively). A suspension bridge is the only bridge type being considered for the X-10a crossing. Based on discussions with the project's design engineers, cable diameters and cable placement vary between bridge types, which could impact visibility of the bridge by birds in flight. Cable-stay bridge alternatives include single cables that could range between 20 and 60 centimeters (eight and 24 inches) in diameter, depending on final designs. Suspension bridge alternatives include placement of five-centimeter (two-inch) diameter cables clustered within a 30- to 120-centimeter (one- to four-foot) square area, with clusters spaced approximately 15 meters (50 feet) apart. No studies have been conducted that relate cable diameter and placement to avian mortality and it is impossible to make definitive conclusions that relate cable size to visibility by birds. One assumption would be that larger cables are more visible and a cable-stay bridge could result in fewer bird strikes at any given altitude.

Figure 3-6
Detroit River International Crossing Study
Concept of Cable-stay Bridge



Source: Parsons Transportation Group

Figure 3-7
Detroit River International Crossing Study
Concept of a Suspension Bridge



Source: Parsons Transportation Group

However, clustered cables on a suspension bridge could also be more visible and cable-stay bridges are higher, resulting in longer cable lengths.

The height of the bridge could also be a factor that impacts the ability of birds to avoid the bridge. Manville (2000) states that the taller the tower, the more likely birds will be killed. Findings by Crawford and Engstrom (2001) suggest that towers 94 meters (308 feet) in height or less may pose less of a threat to avian mortality than those 200 meters (656 feet) or greater. The height of any alternative bridge is a function of the span required. As the width of the Detroit River increases from crossing X-11 to X-10a, so does the span required to cross the river, and, consequently, the height of the bridge. The tower heights associated with all three crossing alternatives exceed 94 meters (308 feet). Even if tower heights were less than 94 meters, it is difficult to draw definitive conclusions regarding tower height and bird mortality at bridges. However, the potential for bird strikes could increase with downstream alternatives, which require higher towers. And, cable-stay towers are taller than suspension bridge towers.

Studies have also been conducted that examined the relationship between structure lighting, weather, and avian mortality. While lighting may provide for visibility at night, lighting has been documented as an attractor resulting in increased mortality, especially during inclement weather. For example, neotropical migratory songbirds that generally migrate at night were found to be more susceptible to collisions with lit towers during fog, mist and low cloud ceiling conditions (Manville 2000). Avery et al. (1977) found most fall mortalities at a communication tower in North Dakota occurred under overcast skies associated with cold fronts. Morrise et al. (2003) found decreases in avian mortality at four towers in New York and Ohio between 1970 and 1999 and concluded the decline may be related, in part, to a decrease in foggy nights, fog density, and nights with low cloud ceiling.

Studies conducted at communication towers suggest that lighting plays a key role in attracting birds and collision mortalities. Cochran and Graber (1958) found the frequency of bird call notes decreased when lights were turned off at a communications tower and increased again when turned on. This effect occurred only during nights with low cloud ceilings. Graber (1958) and Avery et al. (1976) hypothesized that birds that enter a lighted area are hesitant to return to the dark. Larkin and Frase. (1988) found that on cloudy nights some birds circled a tower at altitudes below the towers top but this circling was not observed on clear nights. Birds attracted to these lights appear to circle until they collide with the structure or guide wires or become exhausted.

Few if any studies exist that systematically assess avian mortality with specific lighting. However, some studies suggest that different light colors, intensities, and flashing intervals appear to result in differing mortalities. Jones and Francis (2003) found significantly fewer bird mortalities at a lighthouse on Lake Erie when the lighthouse was automated resulting in a narrower, less intense beam. Gauthreaux and Belser 1999 state that a few reports suggest that white strobe lights are less attractive to birds than steady or flashing red lights.

In Manville's 2000 review, he states that light flash appears more critical than color and suggests that birds are less likely to be attracted to lights (on foggy or cloudy nights) the longer the "off" phase of the strobe or blinking light. He also suggests that birds may be less attracted to structures by using white strobe lights at night and using the minimum number and intensity allowed by law, and the maximum "off" phase durations (currently 3 seconds).

Due to the height of the bridge towers, the Federal Aviation Administration (FAA) will require a red flashing light at the top of each support tower during daylight hours and a red flashing, white flashing or red or white steady beacon at night. Based on recommendations and impacts documented in the literature, use of a flashing white light at night, with the lowest intensity and longest off phase allowed by the FAA, could help reduce the potential for avian collisions.

Based on available studies, the USFWS has developed best management practices for tall buildings, towers, and bridges (Manville, 2005). Recommendations for bridges include the following:

- Where pilot warning/obstruction lighting are not an issue, use low-intensity lower wavelength blue, turquoise, or green lights (Wiltshko and Wiltshoko 2002). This tends not to disrupt magnetic orientation in several families of birds studied. Avoid red and yellow lights.
- Specifically, use blue jelly jar LED (light emitting diodes) lights on suspension cables and rectangular blue LED lights on bridge deck. These produce bright but directional light (25% bright as 100W bulb), and provide long-distance viewing, while minimizing light pollution, which could lead bird entrapment. Operate year-round from sunset to 1:00 am.
- Install any lights during non-nesting periods (generally August 1- January 15). Seek advice from nearest Field Office for guidance, especially when birds may be exhibiting breeding behavior.
- Where nests are active, establish 500-ft. buffer zone around nest. No work to be allowed until fledglings left nest.
- Consider turning off lights during spring and fall bird migration periods, especially during overcast, cloudy, hazy conditions.
- Once lighting is installed, perform peer-reviewed research to determine any effects on migratory birds. Coordinate with the Division of Migratory Bird Management and Field Office on research protocols.

Available literature and current views suggest that avian mortalities may be minimized by construction of the lowest bridge possible, lit with low intensity and infrequent flashing white lights at night. The recommendations above also identify suggested deck and suspension wire lighting to minimize bird entrapment and mortality. Comparing current bridge alternatives, construction of a suspension bridge at the shortest span (X-11) will result in the lowest tower elevation and potentially the lowest avian mortality. However, these lighting schemes and recommendations have yet to be systematically studied. Final bridge lighting will be reviewed in consultation with USFWS as design of the bridge advances. Further, final design engineers will be required to contact the USFWS to determine which recommendations are appropriate or if additional recommendations or methods are available to minimize avian mortality. Monitoring programs to assess avian mortality under various conditions should also be developed through consultation with the USFWS.

3.6 Water Quality/Secondary Impacts

Construction of any alternative will increase impervious surfaces that will result in increased runoff of stormwater that carries sediment and other impurities. Stormwater management plans will be developed that collect, detain, and treat all stormwater from the bridge, plaza, and interchange alignments. Stormwater management designs will meet Michigan Pollution Discharge Elimination System (MPDES) requirements. Proper designs will ensure that no significant water quality impacts will result from stormwater discharge.

Pier placement in the Detroit River has been eliminated from consideration, as well as any other work within the river. Had it occurred, methods for pier placement would have included construction of a sealed, steel sheet pile cofferdam to contain disturbed sediments. Therefore, the only potential sediment disturbance (and downstream drift of sediment) would have been associated with pushing steel into the river bottom during cofferdam construction. Professional analysis had reached the conclusion that sedimentation downstream would have been expected to be negligible.

Construction will occur largely from land, but ships and barges may deliver materials and be positioned temporarily during construction. They would be anchored or held in place by cables. Details would be part of the permit application to the U.S. Coast Guard.

4. CONCLUSIONS

Based on results of the wetland delineations and functional assessments, no wetlands will be impacted by any plaza, route, or interchange alternative. Crossing X-11 is the only alternative that may impact wetland. A total of 0.01 acre of low quality wetland is located within the footprint of this crossing at the edge of the Detroit River. Loss of this wetland will result in minimal impacts to wetland function and value. Permits to impact these wetlands will be required from both the MDEQ and USACE.

Results of field assessments landward of the Detroit River showed that no threatened, endangered, or special concern plant or animal species or their preferred habitats are present. Results of surveys for native mussels within the Detroit River showed that no live mussels are present within the areas assessed. Piers in the Detroit River were under consideration, but are no longer. Even so, investigation found placement of piers for crossings X-10a and X-10b were not expected to harm native mussels or listed fish species.

Animals observed within the project area, excluding waterfowl, were limited to species typical of urban settings and impacts with any alternative are expected to be minimal. Migratory bird mortalities may occur as a result of bridge operation, but the degree of impact is unknown. Consultation with the USFWS will be undertaken to identify bridge design and operation features that may minimize impacts.

Impacts to water quality during and after construction will be minimized through proper stormwater management and site construction techniques. Best management practices will be included as part of project's design to remove sediments and other pollutants from stormwater. Soil erosion and sediment control plans and permits will be developed and obtained to avoid sediment discharge to surface waters.

Alternatives that result in minimal impacts to natural resources and designs that address secondary impacts, such as stormwater quality, are consistent with requirements of the Coastal Zone Management Program. Permits from the MDEQ and USACE will be obtained prior to initiation of any regulated activity.

5. REFERENCES

- Avery, M., P.F. Springer, and J.F. Cassel. 1976. The effects of a tall tower on nocturnal bird migration -- a portable ceilometer study. *The Auk* 93: 281-291.
- Avery, M., Springer, PF & Cassel, JF 1977. Weather influences on nocturnal bird mortality at a North Dakota tower. *Wilson Bull.* 89: 291-299.
- Avery, Michael L, Paul F. Springer, and J. Frank Cassel. 1978. The composition and seasonal variation of bird losses at a tall tower in southeastern. North Dakota. *Am. Birds* 32: 1114-1121
- Banks, R.C. 1979. Human Related Mortality of Birds in the United States. U.S. Dept. Interior, FWS, Spec. Sci. Rept. -- Wildlife No. 215, Washington, DC. 16 pp.
- Breckenridge, W.J. 1959. Spring migration: western Great Lakes region. *Audubon Field Notes* 13(4):371-373.
- Caldwell, L.D. and N.L. Cuthbert. 1963. Bird mortality at television towers near Cadillac, Michigan. *Jack-Pine Warbler* 41(2):80-89.
- Caldwell, L.D. and G.J. Wallace. 1966. Collections of migrating birds at Michigan television towers. *Jack-Pine Warbler* 44(3):117-123.
- Carman, S.M. 2001. Special Animal Abstract for *Noturus stigmosus* (Northern Madtom). Michigan Natural Features Inventory. Lansing, MI. 2 pp.
- Chartier, A. 2005. Belle Isle Bird Surveys – 2005. A Study Funded by Detroit Edison. http://www-ersonal.umich.edu/~bbowman/birds/se_mich/BelleIsleBirdSurveys2005.pdf
- Cochran, W.W. and R.R. Graber. (1958). Attraction of Nocturnal migrants by lights on a television tower. *Wilson Bulletin.* 70(4): 378-380
- Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/1998/classwet/classwet.htm>. (Version 04DEC98).Craves, J. A. and J. A. Fowler, Jr. 2003. Twenty-five years of the Detroit River Michigan-Ontario Christmas Bird Count. *Ontario Birds* 21:109-128.
- Crawford, R.L., & Engstrom, R.T. (2001). Characteristics of avian mortality at a north Florida television tower: A 29-year study. *Journal of Field Ornithology*, 72, 380-388.
- ESRI (Environmental Systems Research Institute, Inc.). Redlands, CA.
- Evans, W. R., and A. M. Manville, II (eds.). 2000. Avian Mortality at Communication Towers. Transcripts of Proceedings of the Workshop on Avian Mortality at Communication Towers, August 11, 1999, Cornell University, Ithaca, NY. Published on the internet at <<http://migratorybirds.fws.gov/issues/towers/agenda.html>

- Gleason, H.A. and Cronquist, A. 1991. *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*. Second Ed. The New York Botanical Garden, Bronx, NY. 910 pp.
- Goforth, R.R. 2000. Special Animal Abstract for *Acipenser fulvescens* (Lake Sturgeon). Michigan Natural Features Inventory. Lansing, MI. 4 pp.
- Graber, R.R. (1968). Nocturnal migration in Illinois: different points of view. *Wilson Bulletin* 80(1): 36-71.
- Holmgren, N.H. 1998. *Illustrated Companion to Gleason and Cronquist's Manual*. The New York Botanical Garden, Bronx, NY. 937 pp
- IGLR. International Association for Great Lakes Research. Great Lakes Science and Policy. Conserving Detroit River Habitats. <http://iaglr.org/scipolicy/issues/detroit habitat.php>
- Jones, J. and C. M. Francis (2003). The effects of light characteristics on avian mortality at lighthouses *Journal of Avian Biology* 34 (4), 328–333.
- Larkin, R. P., and B. A. Frase. (1988). Circular paths of birds flying near a broadcasting tower in cloud. *J. Comp. Psychol.* 102: 90-93.
- Manny, B., G. Kennedy, J. Allen and J McClain. 2004. Classification of Lake Sturgeon Spawning Habitat in the Detroit River. Presentation at The Great Lakes Lake Sturgeon Coordination Meeting, Sault Ste. Marie, Michigan. September 9-11, 2005.
- Manville, A. M. II. 2000. The ABCs of Avoiding Bird Collisions at Communication Towers: The Next Steps. Proceedings of the Avian Interactions Workshop, December 2, 1999, Charleston, SC. Electric Power Research Institute (in press).
- Manville, A.M., II. 2004. Bird Strikes and Electrocutions at Power Lines, Communication Towers, and Wind Turbines: State of the Art and State of the Science – Next Steps Toward Mitigation. Proceedings 3rd International Partners in Flight Conference, March 20-24, 2002, Asilomar Conference Grounds, CA. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191. 14 pp. (in press).
- Manville, A. M. II. 2000. Tall Structures: Best Management Practices for Bird-friendly Tall Buildings, Towers, and Bridges – U.S. Fish & Wildlife Service Recommendations to Address the Problems Presentation at the Conference on Birds and Buildings: Creating a Safer Environment, March 11, 2005. Illinois Institute of Technology, Chicago.
- Michigan Department of Environmental Quality. 2000. MDEQ Wetland Identification Manual: A Technical Manual for Identifying Wetlands in Michigan. EQ2787. March 2001.
- Morris, S.R., A.R. Clark, L.H. Bhatti, and J.L. Glasgow. (2003). Television tower mortality of migrant birds in western New York and Youngstown, Ohio. *Northeastern Naturalist* 10(1): 67-76.

- Trautman, M.B. 1981. *The Fishes of Ohio*. Second Edition. Ohio State University Press, Columbus. 782 pages.
- US Army Corps of Engineers, New England District. September 1999. *The Highway Methodology Workbook, Supplement. Wetland Functions and Values, A Descriptive Approach* NAEPP-360-1-30a.
- Voss, E.G. 1972. *Michigan Flora. Part I. Gymnosperms and monocots*. Bull. Cranbrook Institute 55 and University of Michigan Herbarium, MI. 488 pp.
- Voss, E.G. 1985. *Michigan Flora. Part II. Dicots (Sauraceae - Cornaceae)*. Bull. Cranbrook Institute 55 and University of Michigan Herbarium, MI. 724 pp.
- Voss, E.G. 1996. *Michigan Flora. Part III. Dicots (Primulaceae – Asteraceae)*. Bull. Cranbrook Institute 55 and University of Michigan Herbarium, MI. 622 pp.

Appendix A

**Wetland Functional Assessment:
Qualifiers and Considerations
from “The Highway Methodology
Workbook Supplement”
U.S. Army Corps of Engineers**

Appendix A

Wetland evaluation supporting documentation; Reproducible forms.

Below is an example list of considerations that was used for a New Hampshire highway project. Considerations are flexible, based on best professional judgment and interdisciplinary team consensus. This example provides a comprehensive base, however, and may only need slight modifications for use in other projects.



GROUNDWATER RECHARGE/DISCHARGE— This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either.

CONSIDERATIONS/QUALIFIERS

1. Public or private wells occur downstream of the wetland.
2. Potential exists for public or private wells downstream of the wetland.
3. Wetland is underlain by stratified drift.
4. Gravel or sandy soils present in or adjacent to the wetland.
5. Fragipan does not occur in the wetland.
6. Fragipan, impervious soils, or bedrock does occur in the wetland.
7. Wetland is associated with a perennial or intermittent watercourse.
8. Signs of groundwater recharge are present or piezometer data demonstrates recharge.
9. Wetland is associated with a watercourse but lacks a defined outlet or contains a constricted outlet.
10. Wetland contains only an outlet, no inlet.
11. Groundwater quality of stratified drift aquifer within or downstream of wetland meets drinking water standards.
12. Quality of water associated with the wetland is high.
13. Signs of groundwater discharge are present (e.g., springs).
14. Water temperature suggests it is a discharge site.
15. Wetland shows signs of variable water levels.
16. Piezometer data demonstrates discharge.
17. Other



FLOODFLOW ALTERATION (Storage & Desynchronization)— This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas.

CONSIDERATIONS/QUALIFIERS

1. Area of this wetland is large relative to its watershed.
2. Wetland occurs in the upper portions of its watershed.
3. Effective flood storage is small or non-existent upslope of or above the wetland.
4. Wetland watershed contains a high percent of impervious surfaces.
5. Wetland contains hydric soils which are able to absorb and detain water.
6. Wetland exists in a relatively flat area that has flood storage potential.
7. Wetland has an intermittent outlet, ponded water, or signs are present of variable water level.
8. During flood events, this wetland can retain higher volumes of water than under normal or average rainfall conditions.
9. Wetland receives and retains overland or sheet flow runoff from surrounding uplands.
10. In the event of a large storm, this wetland may receive and detain excessive flood water from a nearby watercourse.
11. Valuable properties, structures, or resources are located in or near the floodplain downstream from the wetland.
12. The watershed has a history of economic loss due to flooding.
13. This wetland is associated with one or more watercourses.
14. This wetland watercourse is sinuous or diffuse.
15. This wetland outlet is constricted.
16. Channel flow velocity is affected by this wetland.
17. Land uses downstream are protected by this wetland.
18. This wetland contains a high density of vegetation.
19. Other

FISH AND SHELLFISH HABITAT (FRESHWATER) — This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat.

CONSIDERATIONS/QUALIFIERS

1. Forest land dominant in the watershed above this wetland.
2. Abundance of cover objects present.

STOP HERE IF THIS WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE

3. Size of this wetland is able to support large fish/shellfish populations.
4. Wetland is part of a larger, contiguous watercourse.
5. Wetland has sufficient size and depth in open water areas so as not to freeze solid and retain some open water during winter.
6. Stream width (bank to bank) is more than 50 feet.
7. Quality of the watercourse associated with this wetland is able to support healthy fish/shellfish populations.
8. Streamside vegetation provides shade for the watercourse.
9. Spawning areas are present (submerged vegetation or gravel beds).
10. Food is available to fish/shellfish populations within this wetland.
11. Barrier(s) to anadromous fish (such as dams, including beaver dams, waterfalls, road crossing) are absent from the stream reach associated with this wetland.
12. Evidence of fish is present.
13. Wetland is stocked with fish.
14. The watercourse is persistent.
15. Man-made streams are absent.
16. Water velocities are not too excessive for fish usage.
17. Defined stream channel is present.
18. Other

Although the above example refers to freshwater wetlands, it can also be adapted for marine ecosystems. The following is an example provided by the National Marine Fisheries Service (NMFS) of an adaptation for the fish and shellfish function.

FISH AND SHELLFISH HABITAT (MARINE) — This function considers the effectiveness of wetlands, embayments, tidal flats, vegetated shallows, and other environments in supporting marine resources such as fish, shellfish, marine mammals, and sea turtles.

CONSIDERATIONS/QUALIFIERS

1. Special aquatic sites (tidal marsh, mud flats, eelgrass beds) are present.
2. Suitable spawning habitat is present at the site or in the area.
3. Commercially or recreationally important species are present or suitable habitat exists.
4. The wetland/waterway supports prey for higher trophic level marine organisms.
5. The waterway provides migratory habitat for anadromous fish.
6. Essential fish habitat, as defined by the 1996 amendments to the Magnuson-Stevens Fishery & Conservation Act, is present (consultation with NMFS may be necessary).
7. Other



SEDIMENT/TOXICANT/PATHOGEN RETENTION — This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas.

CONSIDERATIONS/QUALIFIERS

1. Potential sources of excess sediment are in the watershed above the wetland.
2. Potential or known sources of toxicants are in the watershed above the wetland.
3. Opportunity for sediment trapping by slow moving water or deepwater habitat are present in this wetland.
4. Fine grained mineral or organic soils are present.
5. Long duration water retention time is present in this wetland.
6. Public or private water sources occur downstream.
7. The wetland edge is broad and intermittently aerobic.
8. The wetland is known to have existed for more than 50 years.
9. Drainage ditches have not been constructed in the wetland.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

10. Wetland is associated with an intermittent or perennial stream or a lake.
11. Channelized flows have visible velocity decreases in the wetland.
12. Effective floodwater storage in wetland is occurring. Areas of impounded open water are present.
13. No indicators of erosive forces are present. No high water velocities are present.
14. Diffuse water flows are present in the wetland.
15. Wetland has a high degree of water and vegetation interspersion.
16. Dense vegetation provides opportunity for sediment trapping and/or signs of sediment accumulation by dense vegetation is present.
17. Other



NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

CONSIDERATIONS/QUALIFIERS

1. Wetland is large relative to the size of its watershed.
2. Deep water or open water habitat exists.
3. Overall potential for sediment trapping exists in the wetland.

4. Potential sources of excess nutrients are present in the watershed above the wetland.
5. Wetland saturated for most of the season. Pondered water is present in the wetland.
6. Deep organic/sediment deposits are present.
7. Slowly drained fine grained mineral or organic soils are present.
8. Dense vegetation is present.
9. Emergent vegetation and/or dense woody stems are dominant.
10. Opportunity for nutrient attenuation exists.
11. Vegetation diversity/abundance sufficient to utilize nutrients.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

12. Waterflow through this wetland is diffuse.
13. Water retention/detention time in this wetland is increased by constricted outlet or thick vegetation.
14. Water moves slowly through this wetland.
15. Other

PRODUCTION EXPORT (Nutrient) – This function evaluates the effectiveness of the wetland to produce food or usable products for humans or other living organisms.



CONSIDERATIONS/QUALIFIERS

1. Wildlife food sources grow within this wetland.
2. Detritus development is present within this wetland.
3. Economically or commercially used products found in this wetland.
4. Evidence of wildlife use found within this wetland.
5. Higher trophic level consumers are utilizing this wetland.
6. Fish or shellfish develop or occur in this wetland.
7. High vegetation density is present.
8. Wetland exhibits high degree of plant community structure/species diversity.
9. High aquatic vegetative diversity/abundance is present.
10. Nutrients exported in wetland watercourses (permanent outlet present).
11. "Flushing" of relatively large amounts of organic plant material occurs from this wetland.
12. Wetland contains flowering plants that are used by nectar-gathering insects.
13. Indications of export are present.
14. High production levels occurring, however, no visible signs of export (assumes export is attenuated).
15. Other

SEDIMENT/ShORELINE STABILIZATION – This function considers the effectiveness of a wetland to stabilize streambanks and shorelines against erosion.



CONSIDERATIONS/QUALIFIERS

1. Indications of erosion or siltation are present.
2. Topographical gradient is present in wetland.
3. Potential sediment sources are present up-slope.
4. Potential sediment sources are present upstream.
5. No distinct shoreline or bank is evident between the waterbody and the wetland or upland.
6. A distinct step between the open waterbody or stream and the adjacent land exists (i.e., sharp bank) with dense roots throughout.
7. Wide wetland (>10') borders watercourse, lake, or pond.
8. High flow velocities in the wetland.
9. The watershed is of sufficient size to produce channelized flow.
10. Open water fetch is present.
11. Boating activity is present.
12. Dense vegetation is bordering watercourse, lake, or pond.
13. High percentage of energy-absorbing emergents and/or shrubs border a watercourse, lake, or pond.
14. Vegetation is comprised of large trees and shrubs that withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).
15. Vegetation is comprised of a dense resilient herbaceous layer that stabilizes sediments and the shoreline on a small scale (inches) during minor flood events or potentially erosive events.
16. Other



WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.¹

CONSIDERATIONS/QUALIFIERS

1. Wetland is not degraded by human activity.
2. Water quality of the watercourse, pond, or lake associated with this wetland meets or exceeds Class A or B standards.
3. Wetland is not fragmented by development.
4. Upland surrounding this wetland is undeveloped.
5. More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g., brushland, woodland, active farmland, or idle land) at least 500 feet in width.
6. Wetland is contiguous with other wetland systems connected by a watercourse or lake.
7. Wildlife overland access to other wetlands is present.
8. Wildlife food sources are within this wetland or are nearby.
9. Wetland exhibits a high degree of interspersed vegetation classes and/or open water.
10. Two or more islands or inclusions of upland within the wetland are present.
11. Dominant wetland class includes deep or shallow marsh or wooded swamp.
12. More than three acres of shallow permanent open water (less than 6.6 feet deep), including streams in or adjacent to wetland, are present.
13. Density of the wetland vegetation is high.
14. Wetland exhibits a high degree of plant species diversity.
15. Wetland exhibits a high degree of diversity in plant community structure (e.g., tree/shrub/vine/grasses/mosses)
16. Plant/animal indicator species are present. (List species for project)
17. Animal signs observed (tracks, scats, nesting areas, etc.)
18. Seasonal uses vary for wildlife and wetland appears to support varied population diversity/abundance during different seasons.
19. Wetland contains or has potential to contain a high population of insects.
20. Wetland contains or has potential to contain large amphibian populations.
21. Wetland has a high avian utilization or its potential.
22. Indications of less disturbance-tolerant species are present.
23. Signs of wildlife habitat enhancement are present (birdhouses, nesting boxes, food sources, etc.).
24. Other

¹In March 1995, a rapid wildlife habitat assessment method was completed by a University of Massachusetts research team with funding and oversight provided by the New England Transportation Consortium. The method is called WEThings (wetland habitat indicators for non-game species). It produces a list of potential wetland-dependent mammal, reptile, and amphibian species that may be present in the wetland. The output is based on observable habitat characteristics documented on the field data form. This method may be used to generate the wildlife species list recommended as backup information to the wetland evaluation form and to augment the considerations. Use of this method should first be coordinated with the Corps project manager. A computer program is also available to expedite this process.

RECREATION (Consumptive and Non-Consumptive) — This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive opportunities do not consume or diminish these resources of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Wetland is part of a recreation area, park, forest, or refuge.
2. Fishing is available within or from the wetland.
3. Hunting is permitted in the wetland.
4. Hiking occurs or has potential to occur within the wetland.
5. Wetland is a valuable wildlife habitat.
6. The watercourse, pond, or lake associated with the wetland is unpolluted.
7. High visual/aesthetic quality of this potential recreation site.
8. Access to water is available at this potential recreation site for boating, canoeing, or fishing.
9. The watercourse associated with this wetland is wide and deep enough to accommodate canoeing and/or non-powered boating.
10. Off-road public parking available at the potential recreation site.
11. Accessibility and travel ease is present at this site.
12. The wetland is within a short drive or safe walk from highly populated public and private areas.
13. Other

EDUCATIONAL/SCIENTIFIC VALUE This value considers the suitability of the wetland as a site for an “outdoor classroom” or as a location for scientific study or research.



CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened, rare, or endangered species.
2. Little or no disturbance is occurring in this wetland.
3. Potential educational site contains a diversity of wetland classes which are accessible or potentially accessible.
4. Potential educational site is undisturbed and natural.
5. Wetland is considered to be a valuable wildlife habitat.
6. Wetland is located within a nature preserve or wildlife management area.
7. Signs of wildlife habitat enhancement present (bird houses, nesting boxes, food sources, etc.).
8. Off-road parking at potential educational site suitable for school bus access in or near wetland.
9. Potential educational site is within safe walking distance or a short drive to schools.
10. Potential educational site is within safe walking distance to other plant communities.
11. Direct access to perennial stream at potential educational site is available.
12. Direct access to pond or lake at potential educational site is available.
13. No known safety hazards exist within the potential educational site.
14. Public access to the potential educational site is controlled.
15. Handicap accessibility is available.
16. Site is currently used for educational or scientific purposes.
17. Other

UNIQUENESS/HERITAGE — This value considers the effectiveness of the wetland or its associated waterbodies to provide certain special values. These may include archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location. These functions are clearly valuable wetland attributes relative to aspects of public health, recreation, and habitat diversity.

CONSIDERATIONS/QUALIFIERS

1. Upland surrounding wetland is primarily urban.
2. Upland surrounding wetland is developing rapidly.
3. More than 3 acres of shallow permanent open water (less than 6.6 feet deep), including streams, occur in wetlands.
4. Three or more wetland classes are present.
5. Deep and/or shallow marsh or wooded swamp dominate.
6. High degree of interspersion of vegetation and/or open water occur in this wetland.
7. Well-vegetated stream corridor (15 feet on each side of the stream) occurs in this wetland.
8. Potential educational site is within a short drive or a safe walk from schools.
9. Off-road parking at potential educational site is suitable for school buses.
10. No known safety hazards exist within this potential educational site.
11. Direct access to perennial stream or lake exists at potential educational site.
12. Two or more wetland classes are visible from primary viewing locations.
13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) are visible from primary viewing locations.
14. Half an acre of open water or 200 feet of stream is visible from the primary viewing locations.
15. Large area of wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
16. General appearance of the wetland visible from primary viewing locations is unpolluted and/or undisturbed.
17. Overall view of the wetland is available from the surrounding upland.
18. Quality of the water associated with the wetland is high.
19. Opportunities for wildlife observations are available.
20. Historical buildings are found within the wetland.
21. Presence of pond or pond site and remains of a dam occur within the wetland.
22. Wetland is within 50 yards of the nearest perennial watercourse.
23. Visible stone or earthen foundations, berms, dams, standing structures, or associated features occur within the wetland.
24. Wetland contains critical habitat for a state- or federally-listed threatened or endangered species.
25. Wetland is known to be a study site for scientific research.
26. Wetland is a natural landmark or recognized by the state natural heritage inventory authority as an exemplary natural community.
27. Wetland has local significance because it serves several functional values.
28. Wetland has local significance because it has biological, geological, or other features that are locally rare or unique.
29. Wetland is known to contain an important archaeological site.
30. Wetland is hydrologically connected to a state or federally designated scenic river.
31. Wetland is located in an area experiencing a high wetland loss rate.
32. Other

VISUAL QUALITY/AESTHETICS — This value considers the visual and aesthetic quality or usefulness of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Multiple wetland classes are visible from primary viewing locations.
2. Emergent marsh and/or open water are visible from primary viewing locations.
3. A diversity of vegetative species is visible from primary viewing locations.
4. Wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
5. Land use surrounding the wetland is undeveloped as seen from primary viewing locations.
6. Visible surrounding land use form contrasts with wetland.
7. Wetland views absent of trash, debris, and signs of disturbance.
8. Wetland is considered to be a valuable wildlife habitat.
9. Wetland is easily accessed.
10. Low noise level at primary viewing locations.
11. Unpleasant odors absent at primary viewing locations.
12. Relatively unobstructed sight line exists through wetland.
13. Other

ENDANGERED SPECIES HABITAT — This value considers the suitability of the wetland to support threatened or endangered species.

ES

CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened or endangered species.
2. Wetland contains critical habitat for a state or federally listed threatened or endangered species.

Appendix B

Correspondence from MNFI

MICHIGAN STATE
UNIVERSITY
EXTENSION

Enclosed is the data requested from Michigan Natural Features Inventory (MNFI). This information is a list of Element Occurrences (EO) at the section level. The sections contain the centroid of the EO. In some cases, the extent of an animal's range or a community type may extend past the section containing the centroid.

This information is the best available regarding elements tracked by MNFI. This list, however, is not a definitive statement on the presence, absence, or condition of the natural features in any given locality. Plant and animal populations and natural communities change with time. Also, not every site has been specifically surveyed. Therefore, the information provided should not be regarded as a complete statement on the occurrence of special natural features of the area in question.

The recipient(s) of the information services understand that state endangered and threatened species are protected under state law (Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection). Any questions, observations, new findings, violations or clearance of project activities should be conducted with the Michigan Department of Natural Resources, Wildlife Division. Contact Lori Sargent or Todd Hogrefe at (517) 373-1263. The recipient(s) of the information services understand that federally endangered and threatened species are protected under federal law (Endangered Species Act of 1973). Any questions, observations, new findings, violations or clearance of project activities should be conducted with the U.S. Fish and Wildlife Service in East Lansing. Their phone number is (517) 351-2555. Recipients of the information are responsible for ensuring the protection of protected species and obtaining proper clearance before project activities begin.

This information is used to guide conservation and land management activities. Some of the element records are historical. While this information may not be important for regulatory purposes, it is important for management and restoration purposes and for scientific use.

The following codes are used for the Federal and State status:

Federal Status:

- C = Candidate - species being considered for federal status
- LE = Listed endangered
- LT = Listed threatened
- LELT = Listed endangered in part of the range, threatened in a different part.
- PE = Proposed endangered
- PT = Proposed threatened
- PS = Partial status - status in only a portion of the range

State status:

- E = Endangered (Legally protected)
- T = Threatened (Legally protected)
- SC = Special Concern (Rare or status uncertain; not legally protected)
- X = Presumed extirpated (Legally threatened if rediscovered)

For questions about MNFI and the data, contact Ed Schools, MNFI, (517) 373-0798, or schoolse@michigan.gov



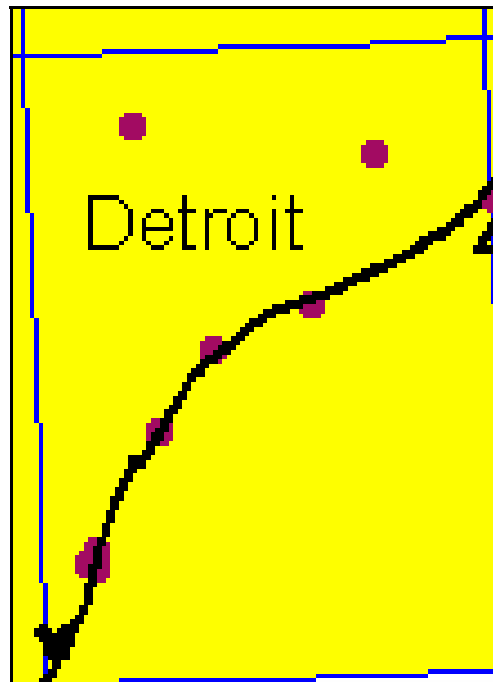
Michigan Natural
Features Inventory

P.O. Box 30444
Lansing, MI
48909-7944
(517) 373-1552
FAX: (517) 373-9566

Michigan State University
Extension programs and
materials are open to all without
regard to race, color, national
origin, gender, religion, age,
disability, political beliefs,
sexual orientation, marital
status, or family status.

MSU is an affirmative-action,
equal-opportunity institution.

4208331 - Detroit MNFI Order 02072005								
Scientific Name	Common Name	Last Observed Date	Federal Status	State Status	Element Category	Town	Range	Section
<i>Epioblasma torulosa rangiana</i>	Northern Riffleshell	1983-08	LE	E	Animal	02S	11E	25
<i>Galearis spectabilis</i>	Showy Orchis	1870-05-15		T	Plant	02S	11E	1
<i>Scleria triglomerata</i>	Tall Nut-rush	1860-06-21		SC	Plant	02S	12E	4
<i>Elaphe vulpina gloydi</i>	Eastern Fox Snake	1959-05-20		T	Animal	02S	12E	19
<i>Zizania aquatica</i> var. <i>aquatica</i>	Wild-rice	1915-09-05		T	Plant	02S	11E	35
<i>Epioblasma torulosa rangiana</i>	Northern Riffleshell	1984-07-14	LE	E	Animal	02S	12E	17
<i>Cyclonaias tuberculata</i>	Purple Wartback	1984-07-14		SC	Animal	02S	12E	17
<i>Noturus stigmosus</i>	Northern Madtom	1978-05-16		E	Animal	03S	11E	2
<i>Obovaria subrotunda</i>	Round Hickorynut	1984-07-14		E	Animal	02S	12E	17
<i>Epioblasma triquetra</i>	Snuffbox	1984-07-14		E	Animal	02S	12E	17
<i>Falco peregrinus</i>	Peregrine Falcon	2004-03-10	PS:LE	E	Animal	02S	11E	35



Location of reported occurrences of natural areas and threatened/endangered/special concern species

Appendix C

Mussel Survey Report

DETROIT RIVER MUSSEL SURVEY

for

Detroit River International Crossing at Potential Bridge Pier Locations

Prepared for:

The Corradino Group

and

Michigan Department of Transportation

Prepared by:



Wetland and Coastal Resources, Inc.
5801 West Michigan Avenue
Lansing, Michigan 48917

November 27, 2006

Introduction

The Detroit River International Crossing (DRIC) study has identified Practical Alternatives that include two areas for a potential bridge crossing of the Detroit River; X-10 and X-11. Both crossing locations include alternative alignments that require construction of support piers. At one crossing (X-10), design engineers have indicated that, although unlikely, placement of a pier in the Detroit River is possible and pier construction has the potential to impact native mussel species.

Michigan Natural Features Inventory (MNFI) database, habitat surveys, and recent underwater surveys indicate that the following threatened, endangered and special concern mussel species are known to occur or have occurred within or near the area of the potential X-10 crossing:

<u>Scientific Name</u>	<u>Common Name</u>	<u>US Status</u>	<u>State Status</u>
<i>Cyclonaias tuberculata</i>	Purple wartyback		Special Concern
<i>Epioblasma torulosa rangiana</i>	Northern riffleshell	Endangered	Endangered
<i>Epioblasma triquetra</i>	Snuffbox		Endangered
<i>Obovaria olivaria</i>	Hickorynut		Special Concern
<i>Obovaria subrotunda</i>	Round hickorynut		Endangered
<i>Pleurobema coccineum</i>	Round pigtoe		Special Concern

The Corradino Group, prime consultant to the Michigan Department of Transportation for the DRIC study, has subcontracted Wetland and Coastal Resources, Inc. (WCR) to conduct threatened and endangered species assessments for the project, including reviews for impacts to threatened, endangered, and special concern mussel species. To assess potential impacts to native mussels, WCR conducted surveys in August of 2006. This report provides the results of the mussel surveys and presents opinions regarding potential impacts.

Study Area

The study area is located in the Detroit River, at the confluence of the River Rouge, within areas where a bridge pier may potentially be placed. Piers are not proposed within the river at crossing X-11 and, therefore, sampling was not conducted at this crossing. At crossing X-10, two alignments, X-10(A) and X-10(B) may require pier construction within the river and each alignment includes a 100 meters by 175 meters zone of potential pier placement (Figure 1 of Appendix A). These two locations define the study area for the mussel surveys.

Methods

Prior to initiating surveys, permits were obtained for collection of state and/or federally threatened or endangered mussels via Agent of the State designation. Mr. Peter Badra, mussel expert with MNFI, was present during all surveys to review video, identify habitat, and identify mussel species collected.

Surveys for native mussels included habitat assessments using a remotely operated vehicle (ROV) with an underwater camera and collection of specimens by diving. Prior to conducting surveys, 11 equally spaced transects were superimposed over each survey zone. Initial plans were to survey each transect with the ROV and track the ROV locations using a global and acoustic positioning system. Surveys using the ROV were intended to identify if habitat is present that could support native mussels and to collect some mussel species utilizing a wedge shaped aluminum box with a remotely operated closing top. Under contract to WCR, SeaView Systems, Inc operated a SeaBotix LBV150s (brushless) ROV positioned by an Ultra Short BaseLine (USBL) acoustic positioning system with one video channel to view and document river bottom substrates.

Hard hat diving to collect mussel specimens was conducted over a two-day period by Great Lakes Diving Inc. (GLD), with video and verbal communication with the surface. Divers from GLD completed five transects within each study zone by sweeping hands across and into

sediments in search of live mussels and spent shells. All shells encountered were collected in a mesh bag and brought to the surface after each transect was complete. The position of the diver was tracked using a global and acoustic positioning system. The area of substrate covered for each transect was calculated by multiplying the length of transect by the width of the divers reach (six feet).

Results

Surveys using the ROV were conducted on August 23 and 24, 2006. Depths within the survey zones averaged approximately 30 to 35 feet, with river current speed near 5 mph. Although original protocols intended full coverage of each transect, interference with the acoustic positioning system did not allow for continuous tracking of the ROV and, therefore, complete coverage was not possible. Figures 2 through 4 of Appendix A identify the approximate location of ROV coverage that was recorded.

In the absence of reliable tracking, meander surveys were continued using a Global Positioning System (GPS) to track the boat and estimate the location of the ROV. The ROV was maneuvered through four quadrants within each study zone until enough substrate was viewed to characterize the habitat present. Photographs of the ROV, research boat and still photos taken from video may be found in Appendix B.

The substrates throughout both study zones were comprised of sand and gravel with occasional cobble, stone, silt and patches of clay. Zebra mussels were present in abundance throughout the majority of both survey zones. Based on video coverage, habitat that could support threatened, endangered, or special concern mussel species is present within both survey zones, with the exception of the northwestern portion of X-10(B) where fine sediments and numerous layers of zebra mussels were present. Additional surveys using divers were required to determine if native mussels, particularly threatened or endangered species, persist within the study area.

Diving surveys were conducted August 28 and 29, 2006. A total of ten transects were completed with coverage ranging from 3,540 to 4,260 square feet per transect (Figures 5 through 7 of Appendix A). Spent shells from a total of 18 mussel species were collected, including the state and federally endangered northern riffleshell (*Epioblasma torulosa rangiana*) and four species listed by the State as special concern species. No live mussels were encountered or collected. Table 1 of Appendix C lists the species collected per transect and Appendix B includes photos of the diving operation and specimens collected.

Discussion

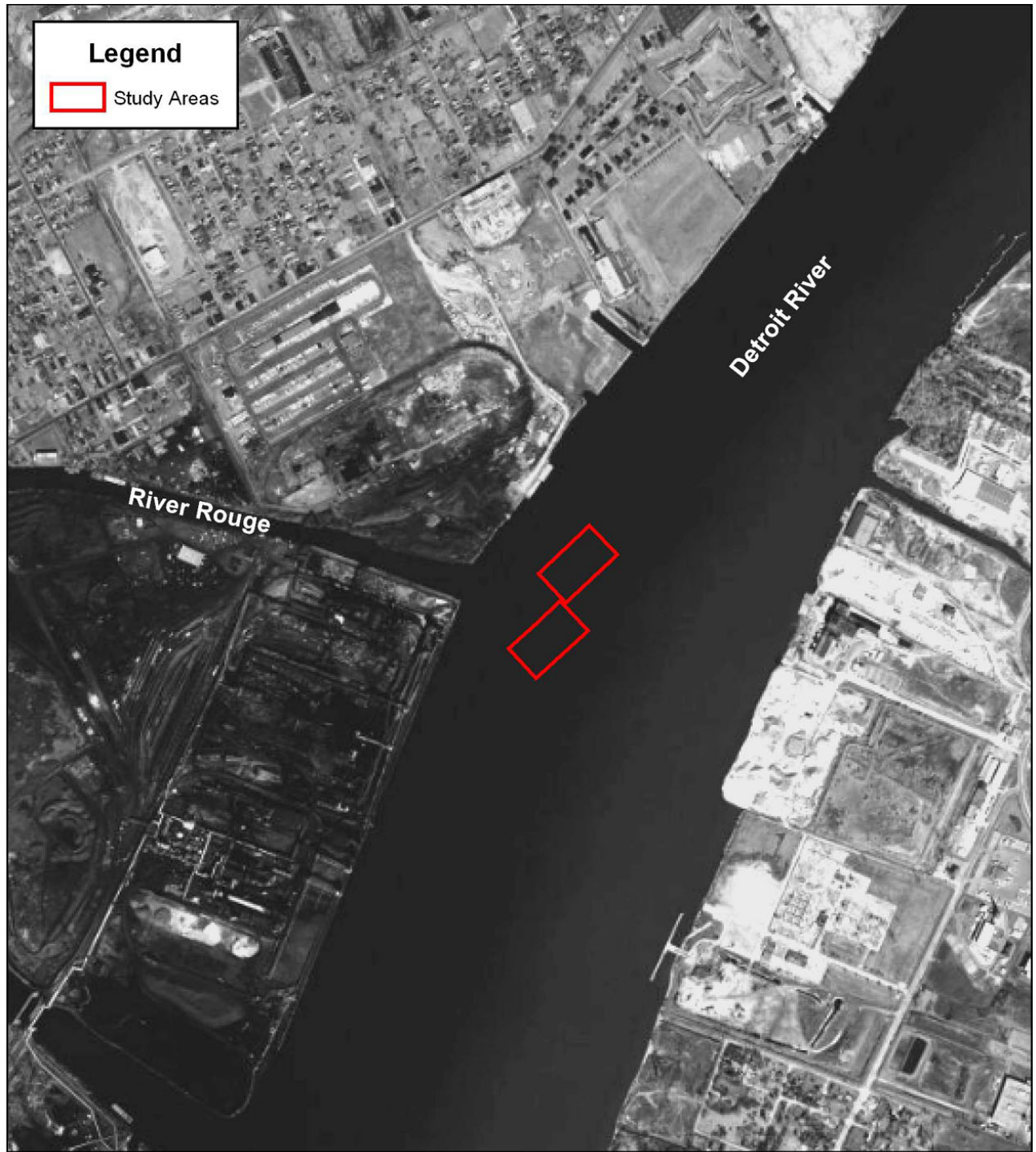
The northern riffleshell is listed as endangered by both state and federal agencies and the surveys focused on locating live specimens of this species. Three confirmed shells from the northern riffleshell were collected; two from X-10(A) and one from X-10(B). Based on the degree of weathering, it is likely that one specimen had recently died (within one to six months), suggesting that this species may still persist in the Detroit River. Two additional specimens were collected from X-10(B) that could potentially be northern riffleshells, but the degree of weathering did not allow for positive identification (50% confidence in identification). In addition, three shells were collected from X-10(B) that could potentially be from the state endangered round hickorynut (*Obovaria subrotunda*). However, weathering did not allow for positive identification (75% confidence).


A total of 38 shells were collected representing four species listed by the state as special concern and three representing a state and federally endangered species. However, the locations of these mussels when alive are unknown. No live mussels of any species were found within the areas surveyed, suggesting that these species do not persist within the study area. Based on the lack of live mussels and the significant area of coverage (19,590 square feet in X-10(A) and 19,470 square feet in X-10(B)) it is the professional opinion of Wetland and Coastal Resources, Inc. that construction of the piers at either location will not harm any threatened, endangered, or special concern mussel species.



APPENDIX A

Figures




 Wetland and Coastal Resources, Inc. 5801 W. Michigan Ave. Lansing, MI 48917	Detroit River International Crossing		AJS	FIGURE NO. 1
	Underwater Surveys		05-021	
			09/14/06	



0 235 470 940 Feet




 Wetland and Coastal Resources	Wetland and Coastal Resources, Inc. 5801 W. Michigan Ave. Lansing, MI 48917	Detroit River International Crossing		AJS	FIGURE NO.
		Underwater Surveys		05-021	2
				09/14/06	






0 100 200 400 Feet

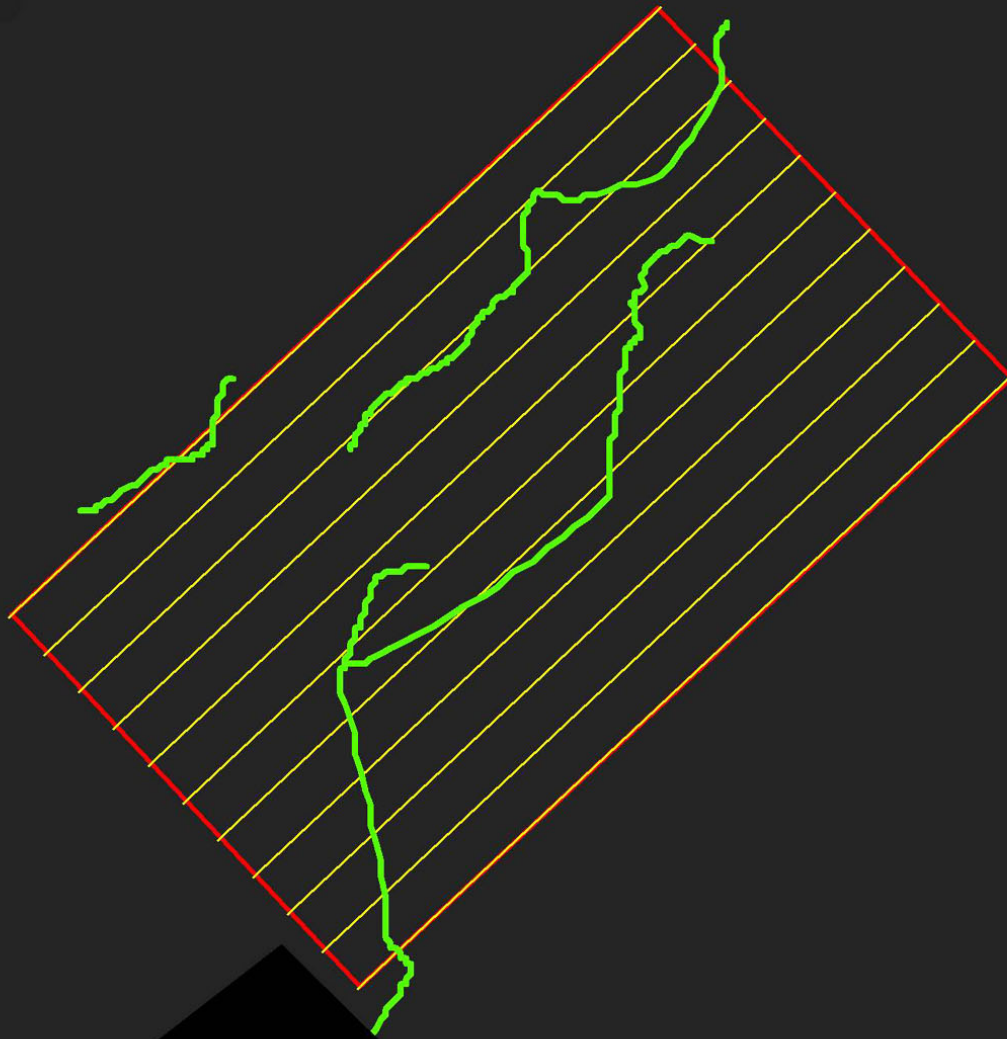


 Wetland and Coastal Resources	Wetland and Coastal Resources, Inc. 5801 W. Michigan Ave. Lansing, MI 48917	Detroit River International Crossing		AJS	FIGURE NO.
		Underwater Surveys		05-021	3
				09/14/06	




Legend

-  all-ROV-lines
-  planned-survey-lines
-  Study Areas



STUDY AREA X10 (b)




 <p>Wetland and Coastal Resources, Inc. 5801 W. Michigan Ave. Lansing, MI 48917</p>	<p>Detroit River International Crossing</p> <hr/> <p>Underwater Surveys</p>	AJS	<p>FIGURE NO.</p> <p>4</p>
		05-021	
		09/14/06	






0 160 320 640 Feet



 Wetland and Coastal Resources, Inc. 5801 W. Michigan Ave. Lansing, MI 48917	Detroit River International Crossing Underwater Surveys	AJS	FIGURE NO.
		05-021	5
		09/14/06	



Legend


-  x10a-all-diver-lines
-  planned-survey-lines
-  Study Areas



LINE	LENGTH (ft)	AREA (sq ft)
1	700	4200
2	640	3840
3	710	4260
4	590	3540
5	625	3750




STUDY AREA X10 (a)



 <p>Wetland and Coastal Resources, Inc. 5801 W. Michigan Ave. Lansing, MI 48917</p>	<p>Detroit River International Crossing</p> <hr/> <p>Underwater Surveys</p>	AJS	<p>FIGURE NO.</p> <p>6</p>
		05-021	
		09/14/06	



Legend


-  x10b-all-diver-lines
-  planned-survey-lines
-  Study Areas



LINE	LENGTH (ft)	AREA (sq ft)
6	670	4020
7	610	3660
8	630	3780
9	670	4020
10	665	3990

STUDY AREA X10 (b)



 <p>Wetland and Coastal Resources, Inc. 5801 W. Michigan Ave. Lansing, MI 48917</p>	<p>Detroit River International Crossing</p> <hr/> <p>Underwater Surveys</p>	AJS	<p>FIGURE NO.</p> <h1>7</h1>
		05-021	
		09/14/06	



APPENDIX B

Photographs



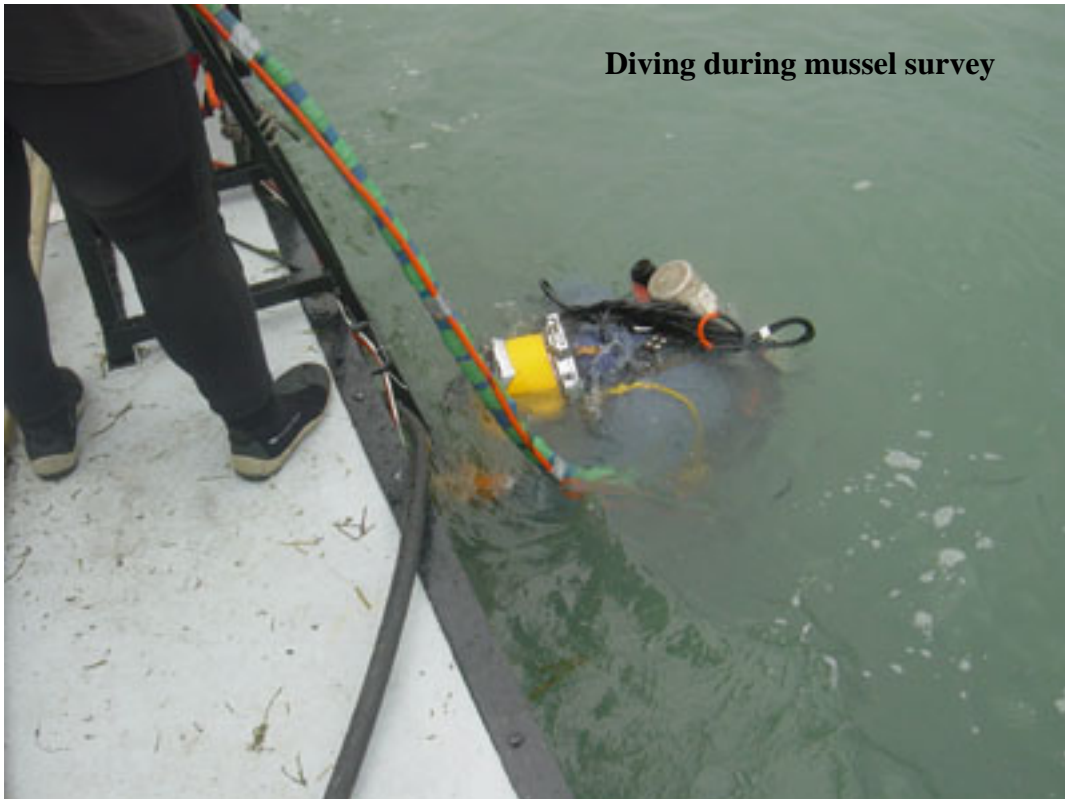
ROV and Dive Vessel



ROV being deployed



ROV operating



Diving during mussel survey







Transect sample



Black sandshell

Ligumia recta





Deertoe

Truncilla truncata



Fatmucket

Lampsilis siliquoidea





Fluted-shell

Lasmigona costata



Fragile papershell

Leptodea fragilis





Hickorynut

Obovaria olivaria



Kidney-shell

Ptychobranchus fasciolaris





Mucket

Actinonaias ligamentina



Northern riffleshell

Epioblasma torulosa rangiana





Northern riffleshell

Epioblasma torulosa rangiana



Pimpleback

Quadrula pustulosa





Pocketbook

Lampsilis ventricosa



Purple heelsplitter

Potamilus alatus







Round pigtoe

Pleurobema sintoxia



Spike

Elliptio dilatata





Threeridge

Amblema plicata



Wabash pigtoe

Fusconaia flava



APPENDIX C

Table 1

Table 1. Results of native mussel surveys in the Detroit River at a potential bridge pier sites. Numbers represent dead shells collected. No live mussels were found. (Fed E = federally listed as endangered, E = state listed as endangered, SpC = state species of special concern)

Species	Common Name	Transect #									
		X10(a)					X10(b)				
		1	2	3	4	5	6	7	8	9	10
<i>Actinonaias ligamentina</i>	Mucket				1	4			1	1	
<i>Amblema plicata</i>	Threeridge	1		1			2				1
<i>Cyclonaias tuberculata</i> (SpC)	Purple wartyback			1	5		2	1		3	1
<i>Elliptio dilatata</i>	Spike			5	12	4	3	10	4	6	11
<i>Epioblasma torulosa rangiana</i> (Fed E)	Northern riffleshell				1	1					1
<i>Fusconaia flava</i>	Wabash pigtoe				1		1		2		
<i>Lampsilis siliquoidea</i>	Fatmucket				1	1	2		1	10	3
<i>Lampsilis ventricosa</i>	Pocketbook	1	2	2	1	2	4	6	2	6	4
<i>Lasmigona costata</i>	Fluted-shell										1
<i>Leptodea fragilis</i>	Fragile papershell										3
<i>Ligumia recta</i>	Black sandshell	1					1	2	1	1	1
<i>Obovaria olivaria</i> (SpC)	Hickorynut	1		2	5	1	5	3		3	
<i>Pleurobema sintoxia</i> (SpC)	Round pigtoe										1
<i>Potamilus alatus</i>	Purple heelsplitter	1	4	1	5	1	6	7	2	11	5
<i>Ptychobranchnus fasciolaris</i>	Kidney-shell	1	2	9	2	2	2	2	3	3	
<i>Quadrula pustulosa</i>	Pimpleback				1						
<i>Truncilla truncata</i>	Deertoe										1
<i>Villosa iris</i> (SpC)	Rainbow					1					
Number of species per transect		6	5	8	9	8	10	7	8	14	8

The following additional shells were found, but were too worn to allow for positive identification.

- 1 northern riffleshell (fed E) in transect 6 (50% confidence in ID)
- 1 northern riffleshell (fed E) in transect 10 (50% confidence in ID)
- 3 round hickorynut (E) in transect 4 (75% confidence in ID)
- 3 hickorynut (SpC) in transect 3 (90% confidence in ID)

Appendix D

Wetlands Photography



Wetland Complex A



Wetland Complex B







**Wetland
Complex E**



Wetland Complex F



Wetland Complex G



Wetland Complex H



Wetland Complex I



Wetland Complex J



Wetland Complex K



Wetland Complex L



Wetland Complex M



Wetland Complex N

Appendix E

Wetland Functional Assessment Data Sheets

Wetland Function-Value Evaluation Form

Total area of wetland _____ Human made? Y Is wetland part of a wildlife corridor? N or a "barrier island"? _____

Adjacent land use Urban & Disturbed Distance to nearest roadway or other development 400'

Dominant wetland systems present PEM12A/PSS1A Contiguous undeveloped buffer zone present N

Is the wetland a separate hydraulic system? Y If not, where does the wetland lie in the drainage basin? _____

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list) _____

Wetland ID: A Longitude _____
 Latitude _____
 Prepared by: M. B. B. Date: 6-20-07
 Wetland Impact: _____ Area: _____
 Type: _____

Evaluation based on:
 Office Field
 ~~MDNR~~ wetland delineation completed? Y N

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
▼ Groundwater Recharge/Discharge	✓	3, 4, 7, 9, 12		water that collects, & infiltrates
🌊 Floodflow Alteration				Some rationale present but function is limited
🐟 Fish and Shellfish Habitat	✓			no habitat present
🌱 Sediment/Toxicant Retention	✓	1, 2, 4	✓	Primary function but has limited ability to trap/retain sediments/toxicants
🌿 Nutrient Removal	✓	3, 4, 7		limited vegetation cover.
➡ Production Export	✓	1, 12		minimal value here but some plants present/available for wildlife foods
🌊 Sediment/Shoreline Stabilization	✓			minimal value, how plant cover/overshadow
🐦 Wildlife Habitat	✓	8		some food sources present - minimal
⚖️ Recreation	✓			no rec. opportunities
🏛️ Educational/Scientific Value	✓			no value present
🏞️ Uniqueness/Heritage	✓			no special values present
🎨 Visual Quality/Aesthetics	✓			no aesthetic value
🦋 ES Endangered Species Habitat	✓			no habitat present
Other				

Notes: _____

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland _____ Human made? Y Is wetland part of a wildlife corridor? Y ^{Deer R. over} or a "habitat island"? _____

Adjacent land use Urban / Disturbed land Distance to nearest roadway or other development 10'

Dominant wetland systems present Pem 2A / PSS 1A Contiguous undeveloped buffer zone present N

Is the wetland a separate hydraulic system? N If not, where does the wetland lie in the drainage basin? lower

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland ID B, C, D
 Latitude _____ Longitude _____
 Prepared by: SWP Date 6-20-07
 Wetland Impact: Type _____ Area _____
 Evaluation based on:
 Office MDEQ Field ✓
~~Capital~~ wetland delineation completed? Y ✓ N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓			Water that collects, Drains quickly
Floodflow Alteration	✓	3, 4, 12, 9, 13, 7		minimal value/function. narrow area that collects local runoff & water from waves splashing.
Fish and Shellfish Habitat	✓			no habitat present
Sediment/Toxicant Retention	✓	1, 2, 10	✓	This is likely the Principal function but Value function is minimal
Nutrient Removal	✓	3, 4,		minimal function/value
Production Export	✓	1, 12		minimal - some down food available
Sediment/Shoreline Stabilization	✓	3,		minimal value - Provides some stability behind seawall.
Wildlife Habitat	✓	8,		food sources present here and nearby but minimal.
Recreation	✓			No recreational Value
Educational/Scientific Value	✓			No value present
Uniqueness/Heritage	✓			No specific values present
Visual Quality/Aesthetics	✓			No aesthetic value present
ES Endangered Species Habitat	✓			No habitat present
Other				

Notes: _____
 * Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland _____ Human made? Y Is wetland part of a wildlife corridor? N or a "habitat island"?

Adjacent land use Urban / Disturbed Distance to nearest roadway or other development 10'-100'

Dominant wetland systems present Pemgal Pssia Contiguous undeveloped buffer zone present N

Is the wetland a separate hydraulic system? Y If not, where does the wetland lie in the drainage basin? _____

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland ID EFGHIJKLMN
 Latitude _____ Longitude _____
 Prepared by MBP Date 6-20-07
 Wetland Impact: _____ Area _____
 Type _____
 Evaluation based on:
 Office _____ Field ✓
 (Optional) wetland delineation complete? Y X N

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓			
Floodflow Alteration	✓	3, 4, 9, 12,		water that collects, evaporates - heavy clay (fine) minimal value, some water retained
Fish and Shellfish Habitat	✓			No Habitat present
Sediment/Toxicant Retention	✓	1, 2, 4	✓	Primary function BUT minimal retains some sediment from Disturbed areas minimal value function present
Nutrient Removal	✓	3, 7		Few plants present that provide food habitat
Production Export	✓	1, 12		No Shore Stabilization functions
Sediment/Shoreline Stabilization	✓			Some food sources / Habitat present but minimal
Wildlife Habitat	✓	8		No Recreational Value present
Recreation	✓			No Value present
Educational/Scientific Value	✓			No Specific values present
Uniqueness/Heritage	✓			No Aesthetic value present
Visual Quality/Aesthetics	✓			No Habitat present
ES Endangered Species Habitat	✓			
Other				

Notes: _____ * Refer to backup list of numbered considerations.

