

Appendix K
Aquatic Ecology

NOTICE

The information contained in this Appendix was developed strictly for the purpose of evaluating the environmental impacts associated with the Ambassador Bridge Enhancement Project and responding to the regulatory requirements applicable to this proposal. Use of this information for other purposes is not intended, and any such use is at the risk of the user.



Ambassador Bridge Enhancement Project

Aquatic Ecology Information

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Aquatic Macrophytes

There are about 20 taxa of aquatic macrophytes in the Detroit River. The most abundant plants in decreasing order are *Vallisneria americana*, *Potamogeton spp.* (narrow leaf forms), *Potamogeton richardsonii*, *Elodea canadensis* (*Anacharis canadensis*), *Myriophyllum spicatum*, *Potamogeton gramineus*, and *Heteranthera dubia* (*Zosterella dubia*). *Chara spp.* is the second most abundant plant following *Vallisneria*, but it is not a true macrophyte in terms of being a higher aquatic plant (vascular plant); rather it is multi-cellular algae. Other macrophytes in the River include: Potamogetons (narrow leafed), *Najas flexilis*, *Ceratophyllum demersum*, *Potamogeton nodosus*, *Nitellopsis obtusa* (a macroalga), *Nitella hyalina*, *Potamogeton crispus*, *Potamogeton zosteriformis*, *Ranunculus longirostris*, *Butomus umbellatus*, and *Sagittaria sp.* The macrophyte stands were typically found to contain about two to three species but some stands were composed of up to eleven species. Most of the submerged aquatic plant beds were located in waters less than 7 meters deep (USFWS and USEPA, 1988). None of these plants are listed as threatened and endangered on either the Federal or State of Michigan list.

Plankton

About eighty-two species of phytoplankton are found in low densities within the Detroit River. Most of the year diatoms are dominant with blue-greens dominating in late summer. *Fragilaria crotonensis* and *Tabellaria fenestrata* are dominant diatoms and *Oscillatoria sp.* is a dominant blue-green. The number of different species of phytoplankton in the Detroit River is the third highest in the Great Lakes system (USFWS, 1988). In general, plankton entering the River from Lake St. Clair are carried downstream as a “standing crop” to Lake Erie and there is little change in densities and species composition either vertically or horizontally, across the river.

Zooplankton in the Detroit River resemble those communities found in Lake St. Clair. In Lake St. Clair there are 14 taxa of copepods in the plankton and about 18 cladoceran taxa. Dominant species include *Cyclops vernalis*, *Diatomus ashlandi*, *Diffugia* (protozoan), *Conochilus*, *Keratella*, *Polyarthra*, *Synchaeta* and *Brachionus*. (rotifers). Zooplankton numbers generally peak between June and September.

Benthic Macroinvertebrates

The Detroit River provides habitat for about 300 species of macrozoobenthos. Oligochaetes, chironomids, gastropods, ephemeropterans, tricopterans, and amphipods dominate the river on the basis of biomass. Pollution tolerant oligochaetes are the most common benthic invertebrates in the lower River. Among the most abundant species throughout the River are the chironomids with *Cricotopus*, *Parachironomus*, *Parakiefferiella*, *Rheotanytarus*, and *Strictochironomus* very common. Common gastropods include *Amnicola* and *Elimia*. *Cheumatopsyche*, *Hydropsyche* and *Oecetis* are the dominant tricopterans and *Hyaella* is the most common amphipod. *Hexagenia*

(mayflies) are found in the River but at lower population levels than are found in Lake St. Clair. Mollusks are discussed below.

Fisheries and Mollusks

The Detroit River supports about 65 fish species, with reports of up to 117 species. Fish are an important resource to both Canada and the United States for purposes of recreation and tourism. Some of the more popular sport fish found in the Detroit River include the walleye, white bass, steelhead, and salmon. The Detroit River is considered to be one of the best places to fish for walleye in North America and it is estimated that approximately 10 million walleye come to the Detroit River from Lake Erie to spawn. Walleye fishing brings in approximately \$1 million each year to the communities along the Detroit River. Therefore, loss of habitat or the fishery resource could have a direct affect on both tourism and recreation in this area, which could lead to an economic affect.



Walleye

Canada has a no net loss of fish habitat policy, which means that any damage or destruction done to fisheries resources have to be replaced elsewhere. Little to no damage should occur to the Detroit River as all construction will take place on land. The proposed bridge piers would be placed on land and not in the Detroit River. In addition, conventional erosion and turbidity control practices will be developed to insure that water quality and habitat values downstream are not compromised during and after construction.

Belle Isle, an important fish spawning and nursery habitat, is a park found in the middle of the Detroit River upstream of the Ambassador Bridge. The island serves as important breeding ground for the lake sturgeon which is a Michigan state listed threatened species. The Greater Detroit American Heritage Initiative recently received \$500,000 to construct an artificial reef off the coast of Belle Isle for sturgeon spawning. Belle Isle is upriver of the project and would not be affected. The lower Detroit River, including Humbug Marsh, is the most important fish spawning and nursery habitat in the entire river (USFWS, 2006). More than 45 species of fish spawn in this area, including some important forage fish species such as emerald shiner and spottail shiner (USFWS, 2006).

The Detroit River is also considered a major fish nursery area as well as an important migration route for fish larvae (Goodyear, et. al. 1982). Larvae move through the river in large numbers during the summer although their residence time is short because of the swift currents.

Fishes commonly found in the Detroit River (historical and current)

<i>Common Name</i>	<i>Scientific Name</i>	
By Family	Genus	Species
Lepisosteidae		
Longnose Gar	<i>Lepisosteus</i>	<i>osseus</i>
Amiidae		
Bowfin	<i>Amia</i>	<i>calva</i>
Clupeidae		
Alewife	<i>Alosa</i>	<i>pseudoharengus</i>
Gizzard Shad	<i>Dorosoma</i>	<i>cepedianum</i>
Esocidae		
Northern Pike	<i>Esox</i>	<i>lucius</i>
Muskellunge	<i>Esox</i>	<i>masquinongy</i>
Cyprinidae		
Goldfish	<i>Carassius</i>	<i>auratus</i>
Common Carp	<i>Cyprinus</i>	<i>carpio</i>
Golden Shiner	<i>Notemigonus</i>	<i>crysoleucas</i>
Emerald Shiner	<i>Notropis</i>	<i>atherinoides</i>
Blackchin Shiner	<i>Notropis</i>	<i>heterodon</i>
Spottail Shiner	<i>Notropis</i>	<i>hudsonius</i>
Blacknose Shiner	<i>Notropis</i>	<i>heterolepis</i>
River Chub	<i>Nocomis</i>	<i>micropogon</i>
Sand Shiner	<i>Notropis</i>	<i>stramineus</i>
Mimic Shiner	<i>Notropis</i>	<i>volucellus</i>
Bluntnose Minnow	<i>Pimephales</i>	<i>notatus</i>
Spotfin Shiner	<i>Cyprinella</i>	<i>spiloptera</i>
Hornyhead Chub	<i>Nocomis</i>	<i>biguttatus</i>
Golden Shiner	<i>Notemigonus</i>	<i>crysoleucas</i>
Fathead Minnow	<i>Pimephales</i>	<i>promelas</i>
Western Blacknose Dace	<i>Rhinichthys</i>	<i>obtusus</i>
Creek Chub	<i>Semotilus</i>	<i>atromaculatus</i>
Catostomidae		
Quillback	<i>Carpiodes</i>	<i>cyprinus</i>
White Sucker	<i>Catostomus</i>	<i>commersonii</i>

Common Name	Scientific Name	
Catostomidae (continued)		
Longnose Sucker	<i>Catostomus</i>	<i>catostomus</i>
Northern Hog Sucker	<i>Hypentelium</i>	<i>nigricans</i>
Bigmouth Buffalo	<i>Ictiobus</i>	<i>cyprinellus</i>
Smallmouth Buffalo	<i>Ictiobus</i>	<i>bubalus</i>
Spotted Sucker	<i>Minytrema</i>	<i>melanops</i>
Silver Redhorse	<i>Moxostoma</i>	<i>anisurum</i>
Shorthead Redhorse	<i>Moxostoma</i>	<i>macrolepidotum</i>
Ictaluridae		
Brown Bullhead	<i>Ameiurus</i>	<i>nebulosus</i>
Black Bullhead	<i>Ameiurus</i>	<i>melas</i>
Yellow Bullhead	<i>Ameiurus</i>	<i>natalis</i>
Channel Catfish	<i>Ictalurus</i>	<i>punctatus</i>
Stonecat	<i>Noturus</i>	<i>flavus</i>
Tadpole Madtom	<i>Noturus</i>	<i>gyrinus</i>
Umbridae		
Central Mudminnow	<i>Umbra</i>	<i>limi</i>
Osmeridae		
Rainbow Smelt	<i>Osmerus</i>	<i>mordax</i>
Salmonidae		
Chinook Salmon	<i>Oncorhynchus</i>	<i>tschawytscha</i>
Coho Salmon	<i>Oncorhynchus</i>	<i>kisutch</i>
Rainbow Trout	<i>Oncorhynchus</i>	<i>mykiss</i>
Brown Trout	<i>Salmo</i>	<i>trutta</i>
Lake Trout	<i>Salvelinus</i>	<i>namaycush</i>
Lake Whitefish	<i>Coregonus</i>	<i>clupeaformis</i>
Percopsidae		
Trout-perch	<i>Percopsis</i>	<i>omiscomaycus</i>
Anguillidae		
American Eel	<i>Anguilla</i>	<i>rostrata</i>
Fundulidae		
Western Banded Killifish	<i>Fundulus</i>	<i>diaphanus menona</i>
Atherinidae		
Brook Silverside	<i>Labidesthes</i>	<i>sicculus</i>

Common Name	Scientific Name	
Gasterosteidae		
Brook Stickleback	<i>Culaea</i>	<i>inconstans</i>
Ninespine Stickleback	<i>Pungitius</i>	<i>pungitius</i>
Cottidae		
Mottled Sculpin	<i>Cottus</i>	<i>bairdi</i>
Moronidae		
White Bass	<i>Morone</i>	<i>chrysops</i>
White Perch	<i>Morone</i>	<i>americana</i>
Petromyzontidae		
Silver Lamprey	<i>Ichthyomyzon</i>	<i>unicuspis</i>
Sea Lamprey	<i>Petromyzon</i>	<i>marinus</i>
Acipenseridae		
Lake Sturgeon (T)	<i>Acipenser</i>	<i>fulvescens</i>
Hiodontidae		
Mooneye	<i>Hiodon</i>	<i>tergisus</i>
Centrarchidae		
Rockbass	<i>Ambloplites</i>	<i>rupestris</i>
Green Sunfish	<i>Lepomis</i>	<i>cyanellus</i>
Pumpkinseed	<i>Lepomis</i>	<i>gibbosus</i>
Bluegill	<i>Lepomis</i>	<i>macrochirus</i>
Northern Longear sunfish	<i>Lepomis</i>	<i>peltastes</i>
Smallmouth Bass	<i>Micropterus</i>	<i>dolomieu</i>
Largemouth Bass	<i>Micropterus</i>	<i>salmoides</i>
White Crappie	<i>Pomoxis</i>	<i>annularis</i>
Black Crappie	<i>Pomoxis</i>	<i>nigromaculatus</i>
Gadidae		
Burbot	<i>Lota</i>	<i>lota</i>
Percidae		
Greenside Darter	<i>Etheostoma</i>	<i>blennioides</i>
Rainbow Darter	<i>Etheostoma</i>	<i>caeruleum</i>
Iowa Darter	<i>Etheostoma</i>	<i>exile</i>
Barred Fantail Darter	<i>Etheostoma</i>	<i>flabellare flabellare</i>
Least Darter	<i>Etheostoma</i>	<i>microperca</i>
Johnny Darter	<i>Etheostoma</i>	<i>nigrum</i>

Common Name	Scientific Name	
Yellow Perch	<i>Perca</i>	<i>flavescens</i>
Northern Logperch	<i>Percina</i>	<i>caprodes semifasciata</i>
Channel Darter (E)	<i>Percina</i>	<i>copelandi</i>
Blackside Darter	<i>Percina</i>	<i>maculata</i>
Sauger	<i>Sander</i>	<i>canadensis</i>
Walleye	<i>Sander</i>	<i>vitreus</i>
Sciaenidae		
Freshwater Drum	<i>Aplodinotus</i>	<i>grunniens</i>
Gobiidae		
Round Goby	<i>Neogobius</i>	<i>melanostomus</i>
(E)-State Endangered Species, (T)-State Threatened Species		

Due to the precautions being taken during construction and operation of the proposed project, threatened and endangered species of the Detroit River will not likely be impacted. Below is a compilation of fish species that are federally or state listed as threatened, or endangered, or a species of special concern in Wayne County of the State of Michigan and the Province of Ontario that could be affected by the proposed corridor. There are many federally listed species in Ontario though many are not confirmed to exist in the Essex County waters of the Detroit River.

Listed fish species in Wayne county of Michigan and in the Province of Ontario by the Michigan Natural Features Inventory, the United States Fish and Wildlife Services, and the Committee on the Status of Endangered Wildlife in Canada of the Ontario Ministry of Natural Resources. X =believed extirpated SC = Species of Special Concern, T = threatened, and E = endangered, (-) = not listed.

Scientific Name	Common Name	Michigan State Status	Ontario Status
<i>Ammocrypta pellucida</i>	Eastern Sand Darter	T	T
<i>Acipenser fulvescens</i>	Lake Sturgeon	T	-
<i>Clinostomus elongatus</i>	Redside Dace	E	T
<i>Coregonus clupeaformis</i>	Lake Whitefish	-	T
<i>Coregonus kiyi</i>	Kiyi	SC	SC
<i>Coregonus nigripinnis</i>	Blackfin Cisco	X	X
<i>Coregonus reighardi</i>	Shortnose Cisco	X	X
<i>Coregonus zenithicus</i>	Shortjaw Cisco	T	T
<i>Etheostoma blennioides</i>	Greenside Darter	-	SC
<i>Erimyzon sucetta</i>	Lake Chubsucker	-	T

Scientific Name	Common Name	Michigan State Status	Ontario Status
<i>Fundulus notatus</i>	Blackstripe Topminnow	-	SC
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	-	SC
<i>Ictiobus cyprinellus</i>	Bigmouth Buffalo	-	SC
<i>Ictiobus niger</i>	Black Buffalo	SC	SC
<i>Lepisosteus oculatus</i>	Spotted Gar	SC	T
<i>Lepomis gulosus</i>	Warmouth	-	SC
<i>Lepomis humilis</i>	Orangespotted Sunfish	-	SC
<i>Macrhybopsis storeriana</i>	Silver Chub	SC	SC
<i>Minytrema melanops</i>	Spotted sucker	-	SC
<i>Moxostoma carinatum</i>	River Redhorse	T	SC
<i>Moxostoma duquesnei</i>	Black Redhorse	-	T
<i>Myoxocephalus thompsoni</i>	Deepwater Sculpin	-	T
<i>Notropis anogenus</i>	Pugnose Shiner	SC	E
<i>Notropis bifrenatus</i>	Bridle Shiner	-	SC
<i>Noturus miurus</i>	Brindled Madtom	SC	-
<i>Notropis photogenis</i>	Silver Shiner	E	SC
<i>Noturus stigmosus</i>	Northern Madtom	E	E
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	E	SC
<i>Percina copelandi</i>	Channel Darter	E	T
<i>Percina shumardi</i>	River Darter	E	-
<i>Salvelinus fontinalis timagamiensis</i>	Aurora Trout	-	E

Historically, Lake Erie, Lake Huron and connecting waterways had one of the most abundant populations of freshwater mussels in North America (Metcalf-Smith et.al., 1997). Mollusks are an indicator of adverse environmental impacts caused by humans. Mollusks in the Detroit River have been declining for several decades. Erosion from the destruction of riparian areas, deforestation, and poor agricultural practices, as well as, the presence of exotic zebra mussel and other exotic mussels are common contributors the decline in mussel population. The proponent has been in discussions with Tom Freitag (formerly with the USACE) and Bill Kovalek (Detroit Edison), both regional mussel experts of the Detroit River. Both of these individuals stated that it is unlikely any mussels exist at or near the project area because of the intense invasion of zebra and Quagga mussels. (TCR-Leuchner, 2005) Zebra and Quagga mussels are non-native

invasive species from Eastern Europe that were brought to North American waterways via the ballast water of ocean going vessels. Their opinions are further substantiated by the following paper:

Schloesser, D.W., W.P. Kovalak, G.D. Longton, K.L. Ohnesorg, and R.D. Smithee, 1998. Impact of Zebra and Quagga Mussels (*Dreissena* Spp.) on Freshwater Unionids (Bivalve, Uniondale) in the Detroit River of the Great Lakes, U.S. Geological Survey.

A listing of mollusk species that are federally or state listed as threatened, or endangered, or a species of special concern in Wayne County of the state of Michigan and the Province of Ontario are found below. There are numerous federally listed species in Ontario though many are not confirmed to exist in Essex County. With no construction within the river, negative impacts to these species are not anticipated.



Purple Wartyback Mussel (*Cyclonaias tuberculata*)

Photo Credit: INHS Mollusca Home Page, Illinois Natural History Survey

Listed mollusk species in Wayne county of Michigan and in the Province of Ontario by the Michigan Natural Features Inventory, the United States Fish and Wildlife Services, and the Committee on the Status of Endangered Wildlife in Canada of the Ontario Ministry of Natural Resources. SC = Species of Special Concern, T = threatened, and E = endangered, (-) = not listed.

Scientific Name	Common Name	Michigan State Status	Ontario Status	U.S Status
<i>Cyclonaias tuberculata</i>	Purple wartyback	SC	-	-
<i>Epioblasma torulosa rangiana</i>	Northern riffleshell	E	E	E
<i>Epioblasma triquetra</i>	Snuffbox mussel	E	E	-
<i>Lampsilis fasciola</i>	Wavy-rayed lampmussel	T	E	-
<i>Obovaria subrotundra</i>	Round hickorynut	E	E	-
<i>Pomatiopsis cincinnatiensis</i>	Brown walker	SC	-	-

<i>Ptychobranchus fasciolaris</i>	Kidneyshell	-	E	-
<i>Simpsonaias ambigua</i>	Salamander mussel	E	E	-
<i>Villosa fabalis</i>	Rayed bean mussel	E	E	-

Little to no impacts on the Detroit River and its inhabitants is anticipated from the proposed project. The proposed bridge piers are on land and no construction will take place in the river itself. Mitigation measures would be implemented to minimize disturbance and habitat loss of these species, including the control of turbidity and sedimentation during and after construction and the protection of riparian zones.

References

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