

**City of Kingston
Environmental Assessment
Third Crossing of the Cataraqui River**

**Fisheries
Background Review**

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1.0 Introduction

The City of Kingston has initiated an Environmental Assessment (EA) to evaluate the need for and feasibility of implementing additional transportation capacity across the Cataraqui River within the City. Several studies, some dating back to the mid-1960's, have indicated an eventual need for an additional crossing of the Cataraqui River in order to:

- relieve traffic congestion on the LaSalle Causeway during peak hour traffic demand and/or during a Highway 401 detour event;
- improve driver safety; and
- upgrade the delivery of City emergency services to the community on the east side of the Cataraqui River.

The EA study is in the process of assessing the following alternative options:

- retain the status quo or “do nothing”;
- increase the capacity of the LaSalle Causeway;
- increase the capacity of Highway 401 from Montreal Street to Kingston Road 15; or
- construct a new crossing at a location between the LaSalle Causeway and Highway 401 by a bridge or tunnel.

Bowfin Environmental Consulting (Bowfin) has been retained to assist with the aquatic aspects of this EA study. For the purpose of this report the aquatic aspects include: submergent plants, fish and fish habitat and freshwater mussels. The terrestrial, amphibian, reptile and wetland aspects of the EA project will be dealt with in a separate report entitled *City of Kingston Environmental Assessment Third Crossing of Cataraqui Preliminary Constraints Analysis* (Ecological Services 2009).

The aquatic assessment has been broken into two phases. Phase 1 consists of a background review of existing information and Phase 2 consists of the detailed habitat assessment and sampling. The following report provides a summary of the findings from the Phase 1 field work, including:

- a summary of the existing aquatic natural heritage features;
- potential aquatic Species at Risk (SAR);
- existing information on aquatic species; and
- next steps.

Fish habitat is located throughout the Cataraqui River and its tributaries. There are 6 unnamed tributaries and one named tributary, Butternut Creek, within the EA project area. Butternut Creek is located on the eastern shoreline across from Belle Park. There

are also several channels located within the Greater Cataraqui Marsh [a provincially significant wetland (PSW) located within the EA project area], which likely provide fish habitat. The provincially significant Cataraqui River Marsh Life Science Area of Natural and Scientific Interest (ANSI) is less extensive than the Greater Cataraqui Marsh in some areas as it includes the emergent cattail portion of the wetland, but excludes much of the open water area of the wetland characterized by submergent aquatic vegetation. The ANSI is more extensive than the wetland in other areas, as it includes areas of buffering upland woodlands on both sides of the Cataraqui River south and north of the Highway 401 crossing.

The NHIC databases and information received from the Ontario Ministry of Natural Resources (OMNR) listed three submergent plant species, and three fish species as potentially present within the general area. Environment Canada's SAR website did not identify any submergent plants, fish or mussels as potentially present within the general area. The lack of recorded federal SAR was confirmed through discussions with the federal Department of Fisheries & Oceans (DFO) (Personal Communication, Mark Scott). Information on terrestrial, amphibians, reptiles and wetland natural areas and SAR is provided in the *City of Kingston Environmental Assessment Third Crossing of Cataraqui Preliminary Constraints Analysis* (Ecological Services 2009)

2.0 Methodology

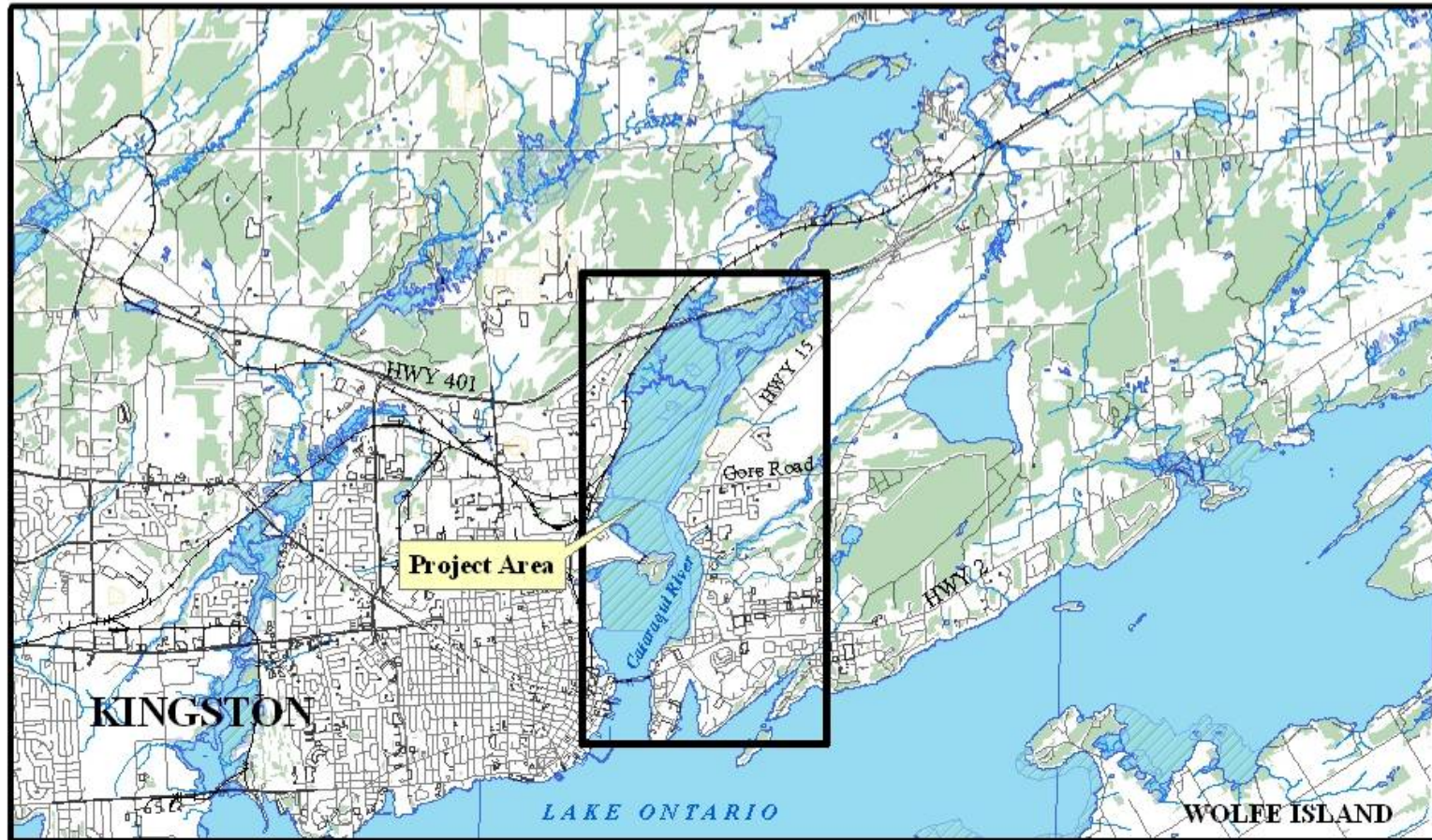
A review of historical information was conducted in order to identify potential environmental concerns. This review focused on information from various agencies, available consulting reports on the general area and a search of the NHIC and Environment Canada SAR databases. One reconnaissance field visit was conducted on May 22, 2009.

Historical information was requested from the following organizations:

- the DFO Prescott Office;
- Parks Canada (PC);
- Cataraqui Region Conservation Authority (CRCA);
- Peterborough District of the OMNR; and
- Lake Ontario Management Unit (LOMU).

The available consulting reports were those conducted by Bowfin for the *Cataraqui River Utilities Crossing* Environmental Assessment and monitoring program.

Figure 1 Location of the EA Project Area



(Basemap created from OBM)



Bowfin Environmental Consulting Inc.
June 4, 2009

3.0 Results

3.1 The EA Project Location and General Description

The project area extends along the shoreline and lands adjoining the Cataraqui River from the LaSalle Causeway – Highway 2 corridor in the south to Highway 401 in the north. The Cataraqui River forms part of the Rideau Canal system and a navigation channel is located along the entire length of the shoreline. There are also three marinas located within the EA project area, each linked to the Rideau Canal channel with a navigation channel. The Cataraqui River is used by pleasure boats as well as canoe and kayak clubs. The Cataraqui River area consists of a wide slow moving channel which flows into Lake Ontario. A brief reconnaissance visit was made on May 22, 2009. Additional habitat descriptions will be provided following the field surveys.

3.1.1 Offshore Habitat

The Cataraqui River is a slow moving glide with fines dominating the substrate within the offshore habitat. The average water depth within the river is 1.2 metres but reaches up to 3.4 metres along the new utilities crossing located south of Belle Island (Bowfin 2009). At the north end of the EA project area, the Cataraqui River consists of emergent wetland (Greater Cataraqui Marsh) with some channels cutting through the emergent vegetation allowing fish access. The Cataraqui River downstream of the Greater Cataraqui Marsh and within the channels in the marsh provides primarily slow moving, soft substrate habitat with abundant submergent and floating vegetation. The aquatic vegetation that was observed during the reconnaissance survey was limited due to the time of year. The aquatic vegetation species that were observed included: northern water-milfoil, curly-leaved pondweed (*Potamogeton crispus*), and water lily. Other vegetation species which have been observed later in the growing season have included: flat-stemmed pondweed, Canada waterweed, coontail and tapegrass (Bowfin 2009).

3.1.2 Shoreline Habitat

The substrate along the shorelines included: bedrock, boulders, cobbles, gravels and fines. Some areas were hardened with large boulders and/or rip rap. The shorelines within the EA project area include a variety of riparian vegetation types such as: wetlands, forested, manicured parkland with scattered trees, and manicured grass to the water's edge. The shorelines are exposed to wave action. During the reconnaissance visit, it was observed that portions of the shoreline were vegetated with emergent and submergent vegetation and other portions are unvegetated. However, since the visit was conducted early in the growing season, the unvegetated portions may become vegetated later in the growing season. It has also been noted during previous years, that portions of the shoreline can become choked with aquatic vegetation.

This has been observed in, but may not be limited to, the area immediately downstream of Belle Island as well as in front of Douglas Fluhrer Park.

Some examples of the vegetation found along the shoreline include: American elm, crack willow, Manitoba maple, sugar maple, oak, honeysuckle, European buckthorn, common cattail, common burdock, staghorn sumac, wild carrot, riverbank grape, sweet clover, and reed canary grass (Photo 1). A more thorough visit will be made later in the growing season.



Photo 1 An example of fully vegetated eastern shoreline of the Cataraqui River, May 22, 2009.



Photo 2 An example of developed western shoreline of the Cataraqui River, May 22, 2009.

3.1.3 Tributaries

There are 6 unnamed tributaries and one named tributary, Butternut Creek occurring within the EA project area. There are also several channels located within the Greater Cataraqui Marsh which likely provide fish habitat, including the man-made channel that parallels Highway 401. Communications with CRCA indicated that there was little available background information on the watercourses within the EA project area.

Two channels were visited during the site reconnaissance. One was Butternut Creek which consisted of a shallow rocky channel. The mouth of the channel contained cattails and may provide spawning habitat for such species as northern pike. The CRCA stated that most of the fish habitat within Butternut Creek was limited to its mouth due to its steep gradient and a large sinkhole located further upstream. Butternut Creek is frequently dry as a result of the sinkhole (Personal Communications, Tom Beaubiah).



Photo 3 Looking upstream at Butternut Creek.

The second channel was located on the west side of the Cataraqui River and runs from south to north on the north side of Belle Park. The channel consisted of a slow moving channel choked with reed canary grass on the upstream end changing to a shallow rocky channel with riffles in the middle and ending as a slow moving cattail channel at the confluence with the Cataraqui River. Communications with CRCA indicated that they had reviewed this watercourse previously and determined that it provided fish habitat for forage fish (Personal Communications, Tom Beaubiah).



Photo 4 Looking downstream from the middle section of the unnamed tributary near Belle Park.

It should be noted that there may also be other smaller channels within the EA project area, which will be confirmed as the EA study progresses.

3.2 Summary of Background Information

3.2.1 Natural Heritage Features

The Greater Cataraqui Marsh, a provincially significant wetland (PSW) within the EA project area, is a large (504 hectare) coastal marsh and is listed as having a regional significance in terms of fish spawning and rearing potential (northern pike and baitfish are listed). The Cataraqui River Marsh Life Science ANSI is a provincially significant ANSI that is less extensive than the Greater Cataraqui Marsh PSW in some areas as it includes the emergent cattail portion of the wetland, but excludes much of the open water area of the wetland characterized by submergent aquatic vegetation. The ANSI is more extensive than the wetland in other areas, as it includes areas of buffering upland woodlands on both sides of the Cataraqui River south and north of the Highway 401 crossing. Since both of these features are associated with wetland habitats they will be further addressed in a complementary report prepared by others.

3.2.2 Species at Risk

Endangered, threatened and special concern species listed either provincially or federally have been included in the following discussion. Endangered and threatened SAR are protected under both provincial (*Endangered Species Act*) and federal (*Species at Risk Act*) legislation. While Species of Special Concern are not protected, their presence/absence from the EA project area should still be noted. The terrestrial, amphibian, and reptile SAR will be dealt with in a separate report entitled *City of Kingston Environmental Assessment Third Crossing of Cataraqui Preliminary Constraints Analysis* (Ecological Services 2009).

The NHIC database provides information available to the public on those SAR that have been documented as occurring. It should be noted that not all information for all species is available to the public. Furthermore, the absence of a recording does not necessarily indicate that the species is absent from the area. The purpose of the NHIC database is to serve as a guide. To increase the likelihood that all potential species which may occur within the EA project area are considered, the NHIC search was extended to include the SAR lists for the nearby County of Frontenac and NTS map 31C8. Furthermore the OMNR was contacted for information.

There was one submergent plant species listed on the NHIC database for the EA project area, namely, grass-leaved water plantain (Table 1). The potential for grass-leaved water-plantain as occurring within the EA project area was confirmed by the OMNR (Personal Communication, Katie Novacek). There were no fish or mussel SAR listed on the NHIC database as having been observed within the EA project area however, one fish species, American eel, was listed as potentially occurring by the OMNR (Personal Communication, Katie Novacek). The review of information on the Frontenac County and the NTS map 31C8 lists identified two additional

submergent species as potentially occurring, prickly naiad and southern naiad as well as two fish species, greater redhorse and pugnose shiner (Table 1).

The Environment Canada SAR website did not identify any fish, mussels or submergent plants as potentially occurring within the EA project area. Discussions with DFO confirmed that there were no SAR species listed for the EA project area (Personal Communication, Mark Scott).

The prickly naiad is listed as “may be at risk” under the NHIC Ontario general status and has an S1. The S1 ranking signifies that NHIC considers the species to be critically imperilled due to low numbers of sightings (<5) and/or factors which cause the species to be sensitive.

The southern naiad is listed as having an S3 ranking under the NHIC Ontario general status. The S3 ranking signifies that NHIC considers the species to be vulnerable in Ontario due to its low population.

The grass-leaved water plantain is listed as a sensitive species under the NHIC Ontario general status and has an S4 ranking. The S4 ranking indicates that the species is considered uncommon but not rare and that there is some concern for declines in the long term.

The greater redhorse is listed as having an S3 ranking under the NHIC Ontario general status. Again, the S3 ranking signifies that NHIC considers the species to be vulnerable in Ontario due to its low population.

Despite the S1 ranking for the prickly naiad, S3 rankings for the southern naiad and greater redhorse, and S4 ranking for the grass-leaved water plantain under the NHIC Ontario general status, these species are not considered to be a SAR. As such, they will not be discussed in this report, but will be assessed further as the EA study progresses.

The American eel and pugnose shiner are considered to be endangered species and are discussed in the paragraphs below.

American Eel

The American eel is listed as Endangered by OMNR with an S1? ranking. The S1? ranking signifies that the ranking is uncertain but it is felt that they should be considered critically imperilled in Ontario by NHIC and Endangered signifies that it is at risk of becoming Extinct or Extirpated in Ontario. The American eel breeds in the Sargasso Sea and matures in freshwater rivers in North America (including the St. Lawrence River) (Becker 1983, DFO 2008, Scott and Crossman 1998). It migrates into the St. Lawrence River during the spring and then migrates downstream during the fall, spending 5 to 20 years in freshwater (Becker 1983, DFO 2008, Scott and Crossman 1998).

American eels are identified as migrating through the EA project area (Personal Communication, Katie Novacek) and as such are considered to occur within the EA project area. This issue will be further discussed as the EA study progresses.

Pugnose Shiner

Pugnose shiner is considered to be an endangered species both provincially and federally with an S2 ranking. The S2 ranking signifies that the species is considered to be imperilled within Ontario. The pugnose shiner has been recorded in the upper reaches of the St. Lawrence River and in eastern Lake Ontario. This omnivore is typically found in quiet areas of large lakes and rivers as well as in stagnant waters with aquatic vegetation, particularly stonewort. The preferred substrate appears to be sand and organic detritus (COSEWIC 2002). This species appears to be limited by several factors, including: turbidity, loss of habitat along the shoreline and loss of near-shore native macrophytes, increases in introduced species, and increases in abundance and diversity of predators and competitors (COSEWIC 2002). Based on the preferred habitat type, there is a potential for this species to occur within the EA project area.

Table 1 Summary of Submergent Plants, Fish and Mussels SAR and Species Listed on NHIC Identified as Potentially Occurring within the EA Project Area

Common Name	Scientific Name	Federal Status	OMNR Status (SRANK)	Preferred Habitat
Plants				
Prickly naiad	<i>Najas marina</i>		(S1)	Salt springs, brackish or highly alkaline waters.
Southern naiad	<i>Najas guadalupensis</i>		(S3)	Alkaline, brackish, and saline ponds, lakes, streams and coastal ponds.
Grass-leaved water-plantain	<i>Alisma gramineum</i>		(S4)	Calcareous waters and muddy shores.
Fish				
American eel	<i>Anguilla rostrata</i>		END (S1?)	Muddy substrate, frequently in lakes, large rivers and creeks.
Greater redhorse	<i>Moxostoma valenciennesi</i>		(S3)	Little information. Large streams with clear water.
Pugnose shiner	<i>Notropis anogenus</i>	END	END (S2)	Quiet, vegetated lakes and large rivers with sandy and detritus substrate.
Mussels				
none				

(Crow and Hellquist 2000, NHIC databases 2009, Personal Communication, Katie Novacek, Scott and Crossman 1998)

S1 – Critically Imperiled
S2 – Imperiled

S3 – Vulnerable
S4 – Apparently Secure
S5 - Secure
SC – Special Concern (formerly Vulnerable)
SZ – Not of practical conservation concern
SZB – Breeding migrants/vagrants
SZN – non-breeding migrants/vagrants
THR – Threatened
END - Endangered

3.2.3 Historical Lists of Fish Species

The following is a summary of the information obtained from the agencies consulted. DFO officials stated they had little information on the fisheries within the EA project area. They further indicated that the fish community is considered a warm-water fish community and in-water construction would be subject to the in-water timing constraint of March 15 to July 15, inclusive.

PC officials also indicated they did not have any specific reports for the fisheries within the EA project area however they did have an assessment report on the Greater Cataraqui Marsh that was prepared as part of the Highway 401 expansion project. PC officials have agreed to provide this report to the project team.

CRCA officials also indicated they had little fisheries information on the EA project area. While the *Central Cataraqui Region Natural Heritage Strategy* did not focus on fish habitat, it did indicate that bass spawning occurred towards the north end of the EA project area (CRCA 2006).

The OMNR provided the following information on fish spawning and migrations within the EA project area:

- Chinook and Coho salmon are known to migrate from Lake Ontario to Kingston Mills (located upstream of the EA project area);
- Yellow perch migrate and spawn during the spring in the Cataraqui River;
- Northern pike spawn during the spring in the Cataraqui River;
- There is a potential for muskellunge to utilize the Cataraqui River for spawning during the spring;
- Sunfish and crappie migrate and spawn in the Cataraqui River during late spring – early summer;
- American eel (an endangered species) migrate through the EA project area;
- Longnose gar have been observed spawning near the EA project area; and
- Largemouth bass spawn in the general area during late spring – early summer.

A list of 26 species known or believed to be present in the Cataraqui River was developed using the information provided by the OMNR and available background reports (Bowfin 2007 and 2009). These species consist of common sport and panfish as well as forage fish species with the exception of muskellunge and American eel. The muskellunge is typically considered

uncommon, however it is not considered to be a SAR and has an S4 ranking (apparently secure in Ontario). The American eel is listed as an endangered species provincially (see section 3.2.2 of this report). The preferred habitats and spawning requirements for these species are listed in Table 2. Please note that regarding Table 2: species listed in regular type were indicated to occur by the OMNR; and species listed in bold type were observed by Bowfin during the reconnaissance field visit on May 22, 2009.

The OMNR also indicated that since the EA project area is near Lake Ontario, a complete species list for Lake Ontario should be obtained from LOMU and utilized for the EA project area. A list of 111 species from Lake Ontario was compiled from information provided by LOMU and is provided in Appendix A. The list includes an additional 9 fish species with SAR or special concern ranking: lake sturgeon, grass pickerel, spotted gar, Atlantic salmon, lake chubsucker, bigmouth buffalo, bridle shiner, silver chub, and channel darter. Some of the species found on the list would not likely occur in the Cataraqui River (*i.e.* deepwater sculpin). Following the completion of more detailed habitat assessment as the EA study progresses, this list will be evaluated based on the available habitat and the species requirements.

Table 2 List of Known Fish Species in the Cataraqui River

Species Name	Latin Name	Trophic Class*	Thermal Regime	General Habitat (Adult)	Reproductive Guild*	Spawning Period/Habitat	Spawning Temp. (°C)
Coho salmon	<i>Oncorhynchus kisutch</i>	piscivore	cold	Found in mid-waters at depths of 16-60m. Preferred water temperature 11-17°C.	A.2.3 Non-guarder. Buries eggs in gravel.	Fall	3-12°C
Chinook salmon	<i>Oncorhynchus tshawytscha</i>	piscivore	cold	Found in mid-waters at depths of 15-60m. Preferred water temperature 12-16°C.	A.2.3 Non-guarder. Buries eggs in gravel.	Fall	5.5-14.5°C
longnose gar	<i>Lepisosteus osseus</i>	piscivore	warm	slow moving water, pools, in heavily vegetated areas of lakes and rivers. Often associated with woody debris. Preferred water temp. 33.1°C.	A.1.4 Non-guarders. Open substrate spawners. Semi-buoyant egg masses. Adhesive eggs, attach to submergents or bottom.	Spring - summer (May - June)	19-21°C
Alewife	<i>Alosa pseudoharengus</i>	planktivore	cold	prefer open water up to 60m deep in water temperatures of 16-21°C.	A.1.4 Non-guarders. Open substrate spawners. Semi-buyonat egg masses. Adhesive eggs, attach to submergents or bottom.	Summer	10-22°C

Species Name	Latin Name	Trophic Class*	Thermal Regime	General Habitat (Adult)	Reproductive Guild*	Spawning Period/Habitat	Spawning Temp. (°C)
northern pike	<i>Esox lucius</i>	piscivore	cool	Clear, slow moving water with dense aquatic vegetation. Preferred water temp 17-21°C.	A.1.5 Non-guarder. Open substrate spawner. Scatters eggs onto submerged live or dead aquatic plants or recently flooded live terrestrial plants. Occasionally on wood. Adapted to low oxygen concentrations.	Early spring	5-11°C
Muskellunge	<i>Esox masquinongy</i>	piscivore	warm	Clear, slow moving water. Preferred water temp 22-26°C.	A.1.5 Non-guarder. Open substrate spawner. Scatters eggs onto submerged live or dead aquatic plants or recently flooded live terrestrial plants. Occasionally on wood. Adapted to low oxygen concentrations.	Early spring	9.5-15°C
white sucker	<i>Catostomus commersoni</i>	insectivore/ omnivore	cool	Slow moving water, pools.	A.1.3 Non-guarder. Open substrate spawner. Rock and gravel spawners with benthic larvae.	Spring (April-May)	10-20°C

Species Name	Latin Name	Trophic Class*	Thermal Regime	General Habitat (Adult)	Reproductive Guild*	Spawning Period/Habitat	Spawning Temp. (°C)
Carp	<i>Cyprinus carpio</i>	omnivore	warm	Prefers pool habitats with depths less than 30m in water temperatures between 28-32°C.	A.1.4 Non-guarder. Open substrate spawner. Adhesive eggs on submerged matter.	Spring - summer	17-26°C
golden shiner	<i>Notemigonus crysoleucas</i>	omnivore	cool	Clear water with aquatic vegetation and slow velocities. Preferred water temperature 17-24°C.	A.1.5 Non-guarder. Open substrate spawner. Deposits adhesive eggs onto filamentous algae (may use aquatic vegetation). Adapted to low oxygen concentrations.	Late spring - summer	20-27°C
blackchin shiner	<i>Notropis heterodon</i>	insectivore	cool/warm	Clear water with aquatic vegetation and slow velocities.	Categorized as A.1.5 in MTO 2006, however little is known of its spawning behaviour. A.1.5 Non-guarder. Open substrate spawner. Scatter or deposit adhesive eggs onto submerged live or dead aquatic plants or recently flooded live terrestrial vegetation.	Spring - summer	

Species Name	Latin Name	Trophic Class*	Thermal Regime	General Habitat (Adult)	Reproductive Guild*	Spawning Period/Habitat	Spawning Temp. (°C)
blacknose shiner	<i>Notropis heterolepis</i>	insectivore	cool/warm	Clear water with aquatic vegetation, shallow depths and slow velocities.	Categorized as A.1.6 in MTO 2006, however little is known of its spawning behaviour. It is assumed to spawn over sand. May be tolerant of low oxygen which would not be typical of A.1.6 (Becker 1983, Scott and Crossman 1976)	Spring - summer	
bluntnose minnow	<i>Pimephales notatus</i>	omnivore	warm	Variety of habitats. Prefers water temp of 29°C.	B.2.7 Nest spawner. High parental care. Deposits eggs underneath flat stones (occasionally uses logs).	Late spring - summer	19-26°C
yellow bullhead	<i>Ameirus natalis</i>	insectivore	warm	Shallow, slow moving water with abundant aquatic vegetation. Preferred water temperature 28.3°C.	B.2.7 Nest spawner. High parental care. Nests in shallow depression near stream bank, stones or stumps.	Spring - summer (May - June)	16-24°C
brown bullhead	<i>Ameiurus nebulosus</i>	insectivore	warm	Shallow, slow moving water with abundant aquatic vegetation.	B.2.7 Nest spawner. High parental care. Nests in natural or constructed holes and cavities such as the underneath of flat stones.	Late spring - summer	14-25°C

Species Name	Latin Name	Trophic Class*	Thermal Regime	General Habitat (Adult)	Reproductive Guild*	Spawning Period/Habitat	Spawning Temp. (°C)
American eel	<i>Anguilla rostrata</i>	Insectivore/piscivore	cool	Soft bottom substrate in lakes and creeks.	A.1.1. Non guarder, spawn in Sargasso Sea	Do not spawn in Canada	
banded killifish	<i>Fundulus diaphanus</i>	insectivore	cool	Quiet shallows with sand or gravel substrate and aquatic vegetation.	A.1.5 Non guarder, open substratum spawner. Adhesive eggs that stick to live or dead vegetation.	Summer	21-25°C
rock bass	<i>Ambloplites rupestris</i>	insectivore/piscivore	cool	Rocky areas in lakes and streams. Prefers water temp of 25-29°C.	B.2.3 Nest guarder. Rock and gravel nester.	Late spring - early summer	16-23°C
pumpkinseed	<i>Lepomis gibbosus</i>	insectivore	warm	Prefers slow moving water with aquatic vegetation or small woody debris. Prefers water temp of 22-30°C.	B.2.2 Nest guarder. Shallow depressions created in areas with aquatic vegetation. May occur within a variety of substrates. Adhesive eggs.	Late spring - early summer	16-23°C
smallmouth bass	<i>Micropterus dolomieu</i>	insectivore/piscivore	warm	Clear water with rocky or sandy substrate. Prefers water temperatures of 20-26°C.	B.2.2 Nest builder with high parental care. Various substrates, prefers rocky. Adhesive eggs.	Spring	13-20°C

Species Name	Latin Name	Trophic Class*	Thermal Regime	General Habitat (Adult)	Reproductive Guild*	Spawning Period/Habitat	Spawning Temp. (°C)
largemouth bass	<i>Micropterus salmoides</i>	insectivore/piscivore	warm	Prefers shallow bays and lakes over rivers. Strongly associated with soft substrate and aquatic vegetation or large woody debris. Prefers water temperatures of 26-30°C.	B.2.2. Nest guarders. Spawn on available substrate. Prefer to utilize plant material for nests. Eggs adhesive.	Late spring to summer	16-23°C
black crappie	<i>Pomoxis nigromaculatus</i>	insectivore/piscivore	cool	Clear, quiet warm water of ponds, large lakes. Associated with abundant growths of aquatic vegetation and sand to mud bottoms. Prefer water temperatures 21-25°C.	B.2.2 Nest guarder. Shallow depressions created in areas with aquatic vegetation. May occur within a variety of substrates. Adhesive eggs.	Spring	14-20°C
yellow perch	<i>Perca flavescens</i>	insectivore/piscivore	cool	Variable, prefer open water with some aquatic vegetation, slow moving water. Prefers water temperatures of 20-24°C.	A.1.4 Non-guarders. Open substrate spawners. Semi-buoyant egg masses. Adhesive eggs, attach to submergents or bottom.	Spring	6-12°C
johnny darter	<i>Etheostoma nigrum</i>	insectivore	cool	Variety of habitats but prefers areas with moderate to no current over sandy or mixed substrate. Prefers water temperatures of 22.8°C.	B.2.7 Nest builder with high parental care. Deposits eggs underneath rock or ledge.	Spring	12-21°C

Species Name	Latin Name	Trophic Class*	Thermal Regime	General Habitat (Adult)	Reproductive Guild*	Spawning Period/Habitat	Spawning Temp. (°C)
Logperch	<i>Percine caprodes</i>	insectivore	cool/warm	Rocky or sandy habitats in lakes or streams.	A.1.6 Non-guarders. Spawn over sand. Eggs are adhesive.	Spring	10-18°C
brook silverside	<i>Labidesthes sicculus</i>	insectivore	warm	Found in the surface waters of lakes and quiet rivers. Prefers water temperatures of 24.5°C.	A.1.4 Non-guarders. Open substrate spawners. Semi-buoyant egg masses. Adhesive eggs, attach to submergents or bottom.	Spring - summer (May - Aug)	17-23°C
round goby	<i>Neogobius melanostomus</i>	invertivore	cool	Found in the lower waters of rivers and in the nearshore habitat of lakes. Invasive species	B.1.3 Guarder. Substrate choosers. Adhesive eggs that attach to rocky substrate in clusters.	Spring - summer (May - July)	9-26°C

(Balon 1981, Bowfin 2007 and 2009, Coker *et al.* 2001, Cooke and Bunt 1999, Edwards *et al.* 1983, Krieger *et al.* 1983, Scott and Crossman 1998, Twomey *et al.* 1984, Personal Communication, Katie Novacek)

3.2.4 Summary of Existing Conditions

Based on the information obtained from the various agencies, background reports and the site reconnaissance survey, it is evident that the EA project area provides fish habitat for a variety of sport and forage fish species. The habitat in the Cataraqui River appears to be dominated by soft substrate and abundant aquatic vegetation. There are also 6 unnamed tributaries and one named tributary, Butternut Creek. The tributaries which were observed during the reconnaissance survey contained little water and/or were heavily vegetated.

With the exception of the data collected as part of the *Cataraqui River Utilities Crossing* study, there was little specific fish community data available for the Cataraqui River or its tributaries. It would appear that at a minimum there are 26 fish species occurring in the Cataraqui River. The potential fish species list includes the provincially endangered species, American eel, and one uncommon species, muskellunge. The fish use of the area likely includes spawning, nursery and rearing sites. It would be expected that several fish species such as longnose gar, northern pike, muskellunge, carp, golden shiner, yellow bullhead, brown bullhead, pumpkinseed, largemouth bass, and yellow perch spawn in the general area. The fish species listed as occurring in Lake Ontario should also be considered as potentially occurring within the EA project area. There are 111 species listed as potentially occurring in Lake Ontario. More detailed habitat assessments that will be undertaken as the EA study progresses will assist in determining which of these species could potentially be present within the EA project area.

Based on the available background information, there is the potential for 12 fish species and 3 submergent plant species that are ranked as SAR or special concern to occur within the EA project area.

3.2.5 Crossing Options

Of the alternatives being considered, the potential for impact to the aquatic aspects referenced in this report are as follows:

1. Retain the Status Quo or Do Nothing:
 - a. There would be no impact to the identified aquatic aspects.
2. Increase the Capacity of the LaSalle Causeway; or Increase the Capacity of Highway 401; or Implement a New Crossing Between the LaSalle Causeway and Highway 401 by a bridge or tunnel:
 - a. Should this stage of the EA study recommend an alternative crossing solution that City Council approves, and in so doing, require that the EA study proceed to completion under Phase 3 and Phase 4 of the Ontario Municipal Class EA process, additional field work would be required in order to determine the types of habitat that would be impacted, potential uses of the sites for spawning/nursery/rearing and the presence of SAR. This information would be

required within areas which may be impacted by the implementation of the recommended solution.

4.0 Next Steps

The background information collected during this review identifies the Cataraqui River as providing fish habitat to a variety of fish species including uncommon species such as muskellunge and potential SAR such as American eel, and pugnose shiner. There was however little specific fish community information available for the Cataraqui River. Should this stage of the EA study recommend an alternative crossing solution that City Council approves, and in so doing, require that the EA study proceed to completion under Phase 3 and Phase 4 of the Ontario Municipal Class EA process, additional field work would be required in order to determine the types of habitat that would be impacted, potential uses of the sites for spawning/nursery/rearing and the presence of SAR. This information would be required within areas which may be impacted by the implementation of the recommended solution. Discussions would be required with DFO, PC, CRCA, and the OMNR to outline the terms of reference. It is anticipated that the field work would consist of habitat mapping, fish community assessment and evaluation of the presence/absence of SAR (provincial and federal).

Habitat Mapping

The aquatic habitat would consist of mapping within the affected areas. In conjunction with the habitat mapping component, information would be collected on the fish habitat, and potential aquatic submergent, fish and mussel) SAR habitat. Habitat mapping would be preferably completed during the summer in order to allow for the vegetation to grow.

The fish habitat description along the affected shoreline of the Cataraqui River would be collected based on the methodologies described in *Productive Capacity of Littoral Habitats in the Great Lakes: Field Sampling Procedures (1988-1995)* by Valere (1996). This would include the collection of the following information: presence/absence of nearby wetlands, aquatic vegetation community description, riparian vegetation description, shore substrate, presence/absence and description of structure, water quality (dissolved oxygen, temperature, turbidity), topography (onshore and offshore), and a description of the shoreline development and transformations. The remainder of the channel would be described by creating habitat mapping using a Humminbird side scan sonar which would provide information on the channel depths, substrate and structure. The information collected with the side scan would be ground truthed using an Atlantis underwater video and a small grab. The aquatic vegetation along the shorelines and at depth would also be identified.

A map would be produced to help illustrate the habitat types encountered within and adjacent to the affected area.

Fish Community Sampling

The majority of the information on the existing fish community is based on the data collected as part of the *Cataraqui River Utilities Crossing* study and information from the OMNR on potential spawning. It is recommended that additional sampling occur during the spring of 2010

for spawning muskellunge and northern pike and during the summer to document the use of the EA project area by young-of-the-year (YOY), including muskellunge, northern pike, and sunfish. A search for the pugnose shiner would also be recommended. It is further recommended that it be accepted that the American eel migrates through the EA project area and mitigation measures be included within the project design for this species.

The fish community sampling would consist of using the appropriate gear (*i.e.* boat electroshocking, windermere traps, seine netting). Should the preferred solution cross a tributary to the Cataraqui River, then sampling of the tributary(ies) would be recommended using the appropriate method (*i.e.* backpack electrofishing, minnow traps). The fish would be identified, measured and then released.

The following timelines are proposed:

- Spring sampling (if required) – April-May 2010;
- Summer sampling - August 2010 [note that: since the Cataraqui River is a large water body which appears to be dominated by sunfish, largemouth bass and yellow perch (Bowfin 2007), the summer sampling would provide important information on the sunfish and many forage fish; and sampling in August would allow the potential for young-of-the-year northern pike and or muskellunge to be assessed.]

Report and Assessment of Potential Impacts

Following the completion of the sampling, a report would be prepared outlining the findings and the potential impacts associated with the preferred solution. Construction methodologies, operation and maintenance would also be evaluated using the methods described in the following paragraph.

The significance of the potential impacts would be measured using three different criteria: area affected, duration of impacts and magnitude. The area affected may be local in extent signifying that only the project area would be affected or regional in extent signifying that an area outside the immediate project area would be affected. The duration of the impact would be rated as short term (construction phase), medium term (2 - 4 years) or long term (>4 years). The magnitude of the impact may be:

- negligible signifying that the impact is not noticeable;
- minor signifying that the project's impacts are perceivable and require minor mitigations;
- moderate signifying that the project's impacts are perceivable and require mitigations and compensations; or
- major signifying that the project's impacts would destroy the environmental component within the project area.

The potential impacts to the fish habitat would be further assessed using the scale of negative effect and the sensitivity of the fish and fish habitat as per the *Practitioner's Guide to the Risk Management Framework for DFO habitat Management Staff (Version 1.0)*. In determining the scale of negative effect the extent, duration and intensity of the project and the sensitivity of the

species, species dependence on habitat, rarity and the habitat resiliency must be taken into consideration.

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Personnel Communications

Katie Novacek, District Planner, OMNR Peterborough District. Email correspondence dated May 14, 2009.

Mark Scott, Area Biologist, Prescott District. Phone conversation on May 14, 2009.

Tom Beaubiah, Biologist, Cataraqui River Conservation Authority. Phone conversations on May 13 and July 8, 2009.

Appendix A – Fish Species List for Lake Ontario

Species Name	Scientific Names	Trophic Class	Thermal Regime
American brook lamprey	<i>Ichthyomyzon appendix</i>		cold
silver lamprey	<i>Ichthyomyzon fossor</i>	parasitic	cool/warm
sea lamprey	<i>Petromyzon marinus</i>	parasitic	cold
lake sturgeon	<i>Acipenser fulvescens</i>	insectivore	cold/cool
longnose gar	<i>Lepisosteus osseus</i>	piscivore	warm
spotted gar	<i>Lepisosteus oculatus</i>	piscivore	warm
bowfin	<i>Amia calva</i>	piscivore	warm
alewife	<i>Alosa pseudoharengus</i>	planktivore	cold
American shad	<i>Alosa sapidissima</i>	planktivore	cold
gizzard shad	<i>Dorosoma cepedianum</i>	planktivore/omnivore	cool
pink salmon	<i>Oncorhynchus gorbuscha</i>	piscivore	cold
Kokanee	<i>Oncorhynchus nerka</i>	planktivore	
Coho salmon	<i>Oncorhynchus kisutch</i>	piscivore	cold
Chinook salmon	<i>Oncorhynchus tshawytscha</i>	piscivore	cold
rainbow trout	<i>Oncorhynchus mykiss</i>	piscivore	cold
Atlantic salmon	<i>Salmo salar</i>	piscivore	cold
brown trout	<i>Salmo trutta</i>	piscivore	cold/cool
Artic char	<i>Salvelinus alpinus</i>	piscivore/generalist	cold
lake trout	<i>Salvelinus namaycush</i>	piscivore	cold
lake whitefish	<i>Coregonus clupeaformis</i>	insectivore	cold
lake herring	<i>Coregonus artedi</i>	planktivore	cold
round whitefish	<i>Prosopium cylindraceum</i>	insectivore	cold
rainbow smelt	<i>Osmerus mordax</i>	planktivore	cold
northern pike	<i>Esox lucius</i>	piscivore	cool
muskellunge	<i>Esox masquinongy</i>	piscivore	warm
grass pickerel	<i>Esox americanus vermiculatus</i>	piscivore	warm
chain pickerel	<i>Esox niger</i>	piscivore	cool/warm
central mudminnow	<i>Umbra limi</i>	insectivore / omnivore	cool / warm
mooneye	<i>Hiodon tergisus</i>	generalist	cool/warm
quillback	<i>Carpionodes cyprinus</i>	omnivore	cool
longnose sucker	<i>Catostomus catostomus</i>	insectivore	cold
white sucker	<i>Catostomus commersoni</i>	insectivore / omnivore	cool
lake chubsucker	<i>Erimyzon sucetta</i>	insectivore	warm
northern hog sucker	<i>Hypentilium migricans</i>	insectivore	warm

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Species Name	Scientific Names	Trophic Class	Thermal Regime
bigmouth buffalo	<i>Ictiobus cyprinellus</i>	insectivore/piscivore	warm
silver redhorse	<i>Moxostoma anisurum</i>	insectivore	cool
golden redhorse	<i>Moxostoma erythrurum</i>	insectivore	warm
shorthead redhorse	<i>Moxostoma macrolepidotum</i>	insectivore	warm
greater redhorse	<i>Moxostoma valenciennesi</i>	insectivore	cool/warm
goldfish	<i>Carassius auratus</i>	omnivore	warm
northern redbelly dace	<i>Phoxinus eos</i>	herbivore	cool / warm
finescale dace	<i>Phoxinus neogaeus</i>	insectivore	cool
lake chub	<i>Couesius plumbeus</i>	insectivore	cold
common carp	<i>Cyprinus carpio</i>	omnivore	warm
grass carp	<i>Ctenopharyngodon idella</i>	herbivore	warm
brassy minnow	<i>Hybognathus hankinsoni</i>	omnivore / herbivore	cool
hornyhead chub	<i>Nocomis biguttatus</i>	insectivore	cool
river chub	<i>Nocomis micropogon</i>	insectivore ?	cool
golden shiner	<i>Notemigonus crysoleucas</i>	omnivore	cool
pugnose shiner	<i>Notropis anogenus</i>	herbivore	cool
emerald shiner	<i>Notropis atherinoides</i>	insectivore	cool
bridle shiner	<i>Notropis bifrenatus</i>	planktivore	cool
common shiner	<i>Luxilus cornutus</i>	insectivore	cool
blackchin shiner	<i>Notropis heterodon</i>	insectivore	cool/warm
blacknose shiner	<i>Notropis heterolepis</i>	insectivore	cool/warm
spottail shiner	<i>Notropis hudsonius</i>	insectivore	cold/cool
rosyface shiner	<i>Notropis rubellus</i>	insectivore	warm
spotfin shiner	<i>Cyprinella spiloptera</i>	insectivore	warm
sand shiner	<i>Notropis ludibundus</i>	insectivore	warm
mimic shiner	<i>Notropis volucellus</i>	insectivore	warm
bluntnose minnow	<i>Pimephales notatus</i>	omnivore	warm
fathead minnow	<i>Pimephales promelas</i>	omnivore	warm
blacknose dace	<i>Rhinichthys atratulus</i>	insectivore / generalist	cool
longnose dace	<i>Rhinichthys cataractae</i>	insectivore	cool
creek chub	<i>Semotilus atromaculatus</i>	insectivore / generalist	cool
fallfish	<i>Semotilus corporalis</i>	insectivore	cool
pearl dace	<i>Margariscus margarita</i>	insectivore	cold/cool
central stoneroller	<i>Campostoma anomalum</i>	herbivore	cool/warm
striped shiner	<i>Luxilus chrysocephalus</i>	insectivore	cool
silver chub	<i>Macrhybopsis storeriana</i>	insectivore	cool
yellow bullhead	<i>Ameiurus natalis</i>	insectivore	warm
brown bullhead	<i>Ameiurus nebulosus</i>	insectivore	warm
channel catfish	<i>Ictalurus punctatus</i>	insectivore/piscivore	warm

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Species Name	Scientific Names	Trophic Class	Thermal Regime
stonecat	<i>Noturus flavus</i>	insectivore	warm
tadpole madtom	<i>Noturus gyrinus</i>	insectivore	warm
American eel	<i>Anguilla rostrata</i>	piscivore/insectivore	cool
banded killifish	<i>Fundulus diaphanus</i>	insectivore	cool
burbot	<i>Lota lota</i>	piscivore	cold/cool
brook stickleback	<i>Culaea inconstans</i>	insectivore	cool
threespine stickleback	<i>Gasterosteus aculeatus</i>	insectivore	cold
ninespine stickleback	<i>Pungitius pungitius</i>	insectivore	cold
trout-perch	<i>Percopsis omiscomaycus</i>	insectivore	cold
white perch	<i>Morone americana</i>	insectivore	warm
white bass	<i>Morone chrysops</i>	insectivore/piscivore	warm
rock bass	<i>Ambloplites rupestris</i>	insectivore / piscivore	cool
green sunfish	<i>Lepomis cyanellus</i>	insectivore/piscivore	warm
pumpkinseed	<i>Lepomis gibbosus</i>	insectivore	warm
bluegill	<i>Lepomis macrochirus</i>	insectivore	warm
longear sunfish	<i>Lepomis megalotis</i>	insectivore	warm
smallmouth bass	<i>Micropterus dolomieu</i>	insectivore / piscivore	warm
largemouth bass	<i>Micropterus salmoides</i>	insectivore / piscivore	warm
white crappie	<i>Pomoxis annularis</i>	insectivore / piscivore	cool
black crappie	<i>Pomoxis nigromaculatus</i>	insectivore / piscivore	cool
yellow perch	<i>Perca flavescens</i>	insectivore / piscivore	cool
walleye	<i>Stizostedion vitreum</i>	piscivore	cool
rainbow darter	<i>Etheostoma caeruleum</i>	insectivore	cool
Iowa darter	<i>Etheostoma exile</i>	insectivore	cool
fantail darter	<i>Etheostoma flabellare</i>	insectivore	cool
least darter	<i>Etheostoma microperca</i>	insectivore	cool/warm
johnny darter	<i>Etheostoma nigrum</i>	insectivore	cool
logperch	<i>Percina caprodes</i>	insectivore	cool / warm
channel darter	<i>Percina copelandi</i>	insectivore	cool/ warm
blackside darter	<i>Percina maculata</i>	insectivore	cool
tesselated darter	<i>Etheostoma olmstedii</i>	insectivore	cool
rudd	<i>Scardinius erythrophthalmus</i>	insectivore	cool
brook silverside	<i>Labidesthes sicculus</i>	insectivore	cool/warm
freshwater drum	<i>Aplodinotus grunniens</i>	insectivore	warm
mottled sculpin	<i>Cottus bairdi</i>	insectivore	cold
slimy sculpin	<i>Cottus cognatus</i>	insectivore	cold
spoonhead sculpin	<i>Cottus ricei</i>	insectivore	cold
deepwater sculpin	<i>Myoxocephalus</i>	insectivore	cold

Species Name	Scientific Names	Trophic Class	Thermal Regime
	<i>thompsonii</i>		
round goby	<i>Neogobius melanostomus</i>	insectivore	cool

(Christie, 1973; Coker et al. 2001; Cudore-Vokey and Crossman, 2000; Eakins, 2009; MTO, 2006)

Note that some fish species which are considered to only occur in the United States or which were extirpated from Ontario were not included (*i.e.* pirate perch).