

## Sampling for Muskellunge and the Nearshore Fish Community of the Lower Niagara River, 2009

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### Abstract

*Sampling efforts targeted at collecting muskellunge were conducted in the lower Niagara River for the first time since 1995. We attempted to collect adult muskellunge during the spawning period, young-of-year during the summer, and all age classes during fall. Sampling efforts were quite limited, but resulted in catches of 12 adult muskellunge and one tiger muskellunge during spring, two young-of-year during summer, and 10 young-of-year during fall. Data was also collected on the fish community at muskellunge nursery sites during summer. Standardized, annual sampling in the lower Niagara River would provide information on year-class production of muskellunge and changes to the fish community that is valuable for guiding management decisions.*

### Introduction

The New York State Department of Environmental Conservation (NYSDEC) and State University of New York College of Environmental Science and Forestry (SUNY-ESF) began a collaborative effort to survey the muskellunge (*Esox masquinongy*) population of the Buffalo Harbor, Lake Erie, and the upper Niagara River during 2007 in response to concerns about declining angler catch rates. Results of sampling for spawning-stage and young-of-year (YOY) muskellunge in the Buffalo Harbor and upper Niagara River during 2006-2008 were previously reported (Kapuscinski and Wilkinson 2008; Kapuscinski et al. 2009). We expanded the sampling program during 2009 to include the lower Niagara River; this report summarizes those efforts. Our objectives were to: 1) collect tissue samples from muskellunge for an ongoing study of the genetic structure of Great Lakes muskellunge, 2) identify muskellunge nursery sites and quantify catch rates of YOY muskellunge, 4) collect diet information from YOY muskellunge, and 5) collect data to

characterize the fish community at YOY muskellunge nursery sites. Results from the genetic and dietary analyses of YOY muskellunge will be published elsewhere.

### Methods

#### Spring Electrofishing

We electrofished along the shoreline of the lower Niagara River at sites expected to be used by spawning or juvenile muskellunge on 2 and 11 June. Sampling was conducted during daylight hours with an 18ft Smith-Root SR18E electrofishing boat with a driver and two people netting; at times a fourth person served as an observer and facilitated data collection. We electrofished in a downstream direction and used pulsed (60 pulses/sec) direct current at 500 v and 8-10 amps. Muskellunge were netted and held on board in an aerated tank until they were processed. We measured (total length for all length measurements herein) all muskellunge and attempted to determine their sex via extrusion of gametes. We also collected scale samples and fin-clips (genetic samples) from all muskellunge, and

applied a uniquely numbered Floy billfish style tag at the base of the dorsal fin. In addition, muskellunge received an unnumbered, orange anchor T tag to aid in the determination of tag loss upon recapture.

#### Seining for YOY Muskellunge and the Nearshore Fish Community

We sampled the fish community at three different sites (Figure 1) on 30 July using a standardized seining protocol (Farrell and Werner 1999). A fine mesh bag seine (30 ft long, ~1/32 in mesh) was pulled downstream at 100 ft long intervals (hauls) in vegetated areas that were typically < 5 ft deep. We identified fish to the species (rarely genus) level and counted them in two separate categories: YOY and all other age classes. We measured the length of all muskellunge and collected fin-clips for a genetic sample.

#### Fall Electrofishing for YOY Muskellunge

We conducted four electrofishing runs for muskellunge along the shoreline of the lower Niagara on 12 November; all sampling locations were downstream of Lewiston. Sampling was conducted during daylight hours with an 18 ft Smith-Root SR18EH electrofishing boat. A driver operated the boat while two people netted, and a fourth person served as an observer and facilitated data collection. We electrofished in a downstream direction and used pulsed (60 pulses/sec) direct current at 500 v and 8-10 amps. Young-of-year muskellunge were netted and held on board in an aerated tank until they were processed. The YOY muskellunge were measured, a fin-clip was taken for genetic analysis, and stomach contents were removed via gastric lavage. A small tube (0.06 in diameter) attached to a water bottle was inserted into the stomach and contents were gently flushed out. Light pressure was exerted on the abdomen with the thumb to assist in release of diet items, and forceps were used to remove items lodged in the throat or mouth. Prey items were identified and their length measured in the field.

### **Results and Discussion**

#### Spring Electrofishing

Our spring electrofishing efforts consisted of eight runs totaling 220 min or 3.67 hr. We captured 12 muskellunge and one tiger muskellunge (*E.*

*masquinongy x E. lucius*), resulting in a total catch rate of 3.55 / hr. All muskellunge captured were males, and they averaged 40.2 in long (range 32.4-44.6 in); the tiger muskellunge was 46.9 in long and of unknown sex. The average length of the 12 male muskellunge captured from the lower Niagara River was longer than the average length of 17 males captured from the upper Niagara River during spring 2009 (average length 35.0 in; two sample t-test assuming equal variances,  $P = 0.0013$ ; Kapuscinski et al. *In press*). Most muskellunge were collected in shallow water < 4 ft deep, in close proximity to the shoreline, and frequently associated with submerged tree trunks and other woody debris in the water.

#### Seining for YOY Muskellunge and the Nearshore Fish Community

Efforts to seine the lower Niagara River were largely unsuccessful because most areas with submerged aquatic vegetation were too deep to seine effectively. We captured 3,557 fish in four seine hauls; two of those fish were YOY muskellunge. The five most common age classes / species captured were emerald shiner (*Notropis atherinoides*, n=3,427), YOY largemouth bass (*Micropterus salmoides*, n=58), YOY rock bass (*Ambloplites rupestris*, n=22), YOY spottail shiner (*Notropis hudsonius*, n=17), and YOY yellow perch (*Perca flavescens*, n=15). A total of 12 species were captured, including the non-native round goby (*Neogobius melanostomus*, n=1) and white perch (*Morone americana*, n=1 YOY).

#### Fall Electrofishing for YOY Muskellunge

We captured a total of 10 YOY muskellunge during 154 min or 2.57 hr of electrofishing effort, resulting in a catch rate of 3.90 / hr. Nine of the 10 YOY muskellunge were captured in Ontario waters. In addition to the YOY muskellunge, we also collected a grass pickerel (*Esox americanus vermiculatus*), which are considered rare in the lower Niagara River.

The catch rate of YOY muskellunge from the lower Niagara River during 2009 was greater than the catch rate obtained from the Buffalo Harbor (2.23 / hr), but less than the upper Niagara River (5.93 / hr; Kapuscinski et al. *In press*). The catch rate of YOY muskellunge from the lower Niagara River during 2009 was also much lower than that

observed during 1992 (8.00 / hr) and 1995 (11.23 / hr; Wilkinson 1996). It is important to note, however, that the 2009 sampling was conducted during November, whereas the 1992 and 1995 sampling was conducted during September. Differences in time of sampling, the relatively small amount of sampling effort, and gaps in the time series make it impossible to draw conclusions about annual variations in year-class production. Standardized, annual sampling in the lower Niagara River would provide information on year-class production of muskellunge and changes to the fish community that is valuable for guiding management decisions.

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Table 1. Data recorded on muskellunge and tiger muskellunge collected from the lower Niagara River during 2009.

Date	Location	Species	Length (in)	Sex	Tag 1 number	Tag 2 type
2-Jun-09	Peggy's Eddy	Muskellunge	38.9	M	2061	Orange T
2-Jun-09	Constitution Park to Fort Niagara Launch	Muskellunge	38.4	M	2017	Orange T
2-Jun-09	Fort Niagara to mouth of river	Tiger muskellunge	46.9	U	2065	Orange T
11-Jun-09	Ontario waters, across from Stella to mouth	Muskellunge	38.3	M	2022	Orange T
11-Jun-09	Ontario waters, across from Stella to mouth	Muskellunge	42.6	M	2008	Orange T
11-Jun-09	Ontario waters, across from Stella to mouth	Muskellunge	42.0	M	2018	Orange T
11-Jun-09	Ontario waters, across from Stella to mouth	Muskellunge	44.5	M	2014	Orange T
11-Jun-09	Ontario waters, across from Stella to mouth	Muskellunge	44.1	M	2086	Orange T
11-Jun-09	Ontario waters, across from Stella to mouth	Muskellunge	44.6	M	2009	Orange T
11-Jun-09	Ontario waters, across from Stella to mouth	Muskellunge	37.4	M	2004	Orange T
11-Jun-09	Ontario waters, across from Stella to mouth	Muskellunge	40.2	M	2083	Orange T
11-Jun-09	Ontario waters, across from Stella to mouth	Muskellunge	32.4	M	2093	Orange T
11-Jun-09	Ontario waters, across from Stella to mouth	Muskellunge	39.0	M	2060	Orange T
30-Jul-09	Smuggler's Cove	Muskellunge	3.4	U	-	-
30-Jul-09	Smuggler's Cove	Muskellunge	3.4	U	-	-
12-Nov-09	Downstream of Stella	Muskellunge	10.4	U	-	-
12-Nov-09	Smuggler's Cove	Muskellunge	10.9	U	-	-
12-Nov-09	Smuggler's Cove	Muskellunge	10.2	U	-	-
12-Nov-09	Smuggler's Cove	Muskellunge	12.1	U	-	-
12-Nov-09	Smuggler's Cove	Muskellunge	10.6	U	-	-
12-Nov-09	Smuggler's Cove	Muskellunge	8.9	U	-	-
12-Nov-09	Across from Stella - Joseph Davis	Muskellunge	10.9	U	-	-
12-Nov-09	Across from Stella - Joseph Davis	Muskellunge	11.7	U	-	-
12-Nov-09	Across from Stella - Joseph Davis	Muskellunge	10.7	U	-	-
12-Nov-09	Across from Stella - Joseph Davis	Muskellunge	10.4	U	-	-

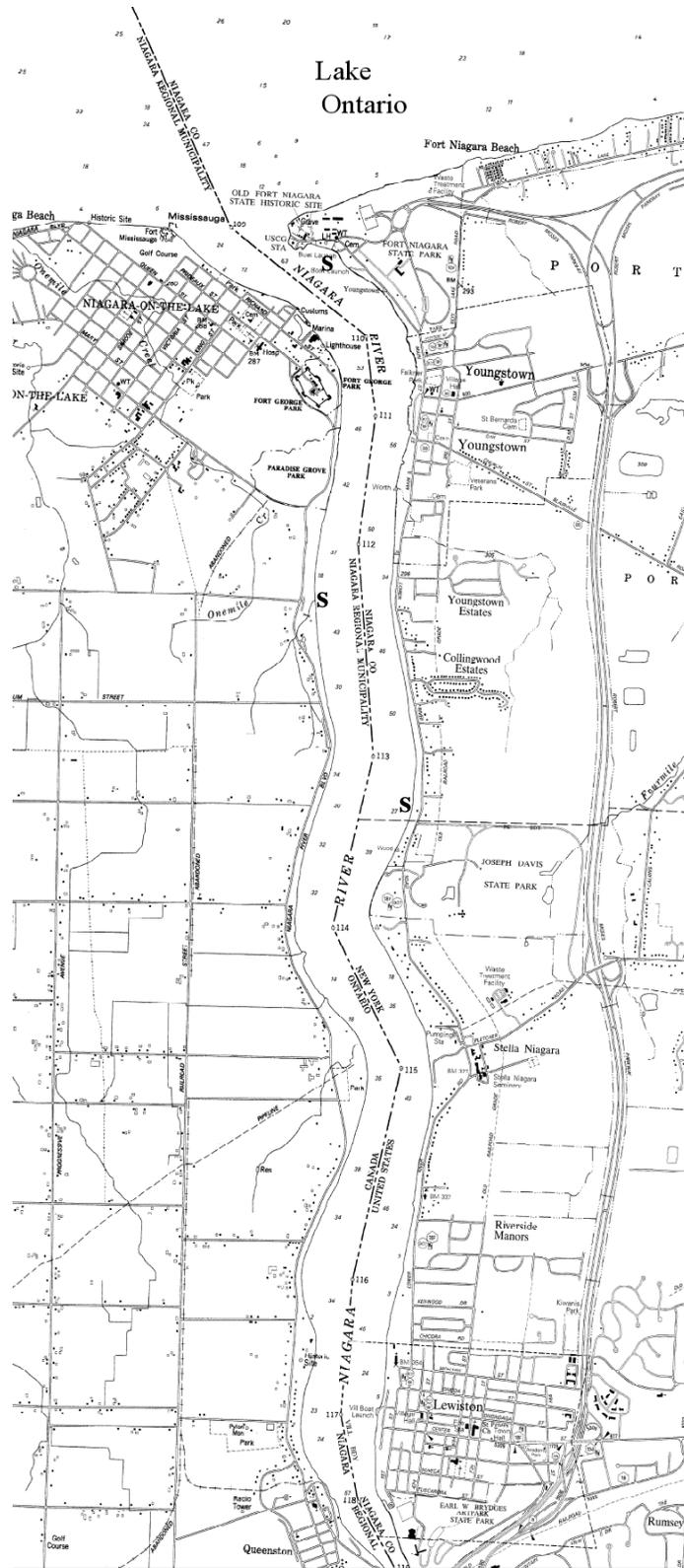


Figure 1. Image of a portion of the lower Niagara River, depicting seining (S) locations.