Bureau of Fisheries Technical Brief #tbm1372

Buffalo Harbor and Niagara River Young-of-year Muskellunge Survey (Survey #'s: 919207, 919208, 919209, and 919210)

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The upper Niagara River and Buffalo Harbor support a variety of warmwater sportfish species, most notably walleye, smallmouth bass, and muskellunge. The population of muskellunge in this area is a unique resource and is considered one of a few self-sustaining populations in New York, and the Great Lakes. Historically, the Niagara River and Buffalo Harbor supported an excellent muskellunge fishery, yet angler catch rates have decreased considerably since the early 1990's. Decreased angler catch rates, coupled with recent declines in catch rates of young-of-the-year (YOY) muskellunge during electrofishing and seining surveys, have heightened the concern about this muskellunge population. To gather more information about this population, New York State Department of Environmental Conservation (NYSDEC) conducted several seining and electrofishing surveys targeting YOY muskellunge in the upper Niagara River and Buffalo Harbor.

Seining was conducted between July 31 and August 29, 2019 at pre-established index sites. A total of eight sites were sampled in the upper Niagara River, and one site in the Buffalo Harbor. Unfortunately, high water levels prevented several sights from being sampled in 2019. A fine mesh bag seine (30 ft long, 0.254 in mesh) was used to sample vegetated nearshore areas (<4 ft deep). Each haul was 100 feet in length, and all species were collected and identified to species or genus level. We captured 21,078 fish in 30 hauls in the upper Niagara and 1,008 fish in 3 hauls in the Buffalo Harbor. The most common species in the Buffalo Harbor was YOY round goby (n=280), while YOY *Notropis* (n=13,188; likely includes a large number of YOY bluntnose minnow of the genus *Pimephales*) was the most common in the upper Niagara. Only two YOY muskellunge were capture in the upper Niagara River, resulting in a catch rate of 0.07 muskellunge/haul (Figure 1). No YOY muskellunge were collected in the Buffalo Harbor.

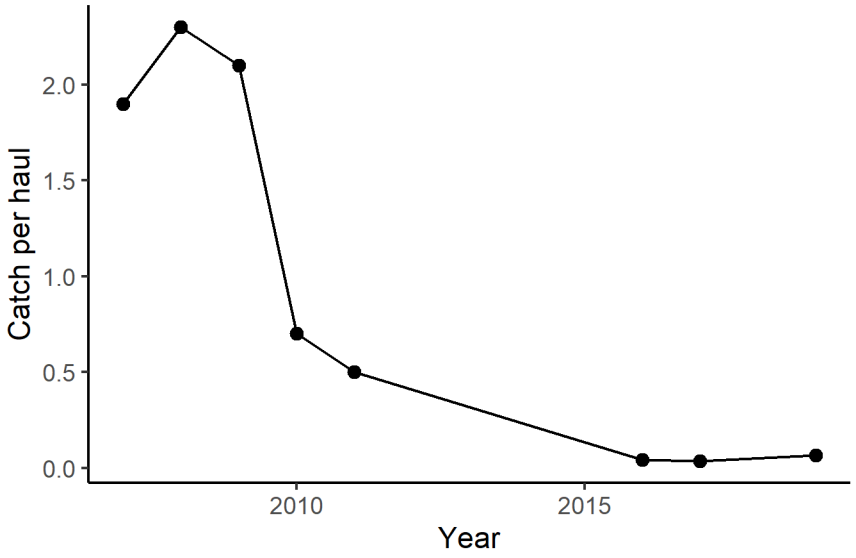

Figure 1. Mean catch of young-of-year muskellunge per seine haul at nearshore nursery sites in the upper Niagara River, 2007-2019.

In addition to the seine survey, an electrofishing survey was conducted, by boat, from September 27 to October 02, 2019. Electrofishing occurred at pre-established index sites and several new exploratory sites. Largemouth bass was the most common species in both the

upper Niagara River (n=121) and Buffalo Harbor (n=299). Only one YOY muskellunge was captured in the Buffalo Harbor and one in the upper Niagara (Table 2).

Results from the seining and electrofishing surveys tell similar tales. Recent surveys (2016-2019) have continued to document a very low level of YOY muskellunge abundance. Catch rates were noticeably higher for electrofishing and seining surveys in the mid to late-2000's. Furthermore, electrofishing catch rates in the early 1990's were the highest amongst all surveys (Table 1). This continued gradual downward trend has caused some concern. Several ecosystem changes have occurred over the past few decades, which have likely contributed to this observed reduction in YOY muskellunge catch rates in the upper Niagara River and Buffalo Harbor. Unfortunately, the effects of these changes are not easily quantified, since comprehensive long-term monitoring has not been in place. A combination of factors could be limiting muskellunge survival, which include disease (VHSV), invasive species, habitat degradation, and more. These results highlight the need for continued monitoring and research of factors limiting YOY muskellunge survival in the Buffalo Harbor and Niagara River. It is recommended that seining continues annually to monitor YOY muskellunge abundance, changes in the fish community, and to document potential habitat changes at nursery sites.

Table 1. Catch summary information from fall electrofishing surveys targeting young-of-year muskellunge in the Buffalo Harbor and upper Niagara River. Total CPUE was calculated by dividing the total number of muskellunge captured in a water by the total number of electrofishing hours. Table is modified from Kapuscinski et al. (2013).

Body of water	Year	# sites sampled	# muskellunge captured	# electrofishing hours	Total CPUE
Buffalo Harbor	1992	6	6	2.2	2.7
	1993	11	16	4.3	3.7
	2006	5	5	1.5	3.3
	2007	5	1	1.7	0.6
	2008	5	2	1.6	1.3
	2009	3	2	0.9	2.2
	2015	5	0	1.2	0.0
	2019	9	1	3.7	0.3
Upper Niagara River	1992	26	85	10.3	8.3
	1993	25	119	8.8	13.5
	1994	7	37	2.7	13.7
	2006	18	47	6.1	7.7
	2007	15	25	3.8	6.6
	2008	19	33	9.9	3.3
	2009	13	19	3.2	5.9
	2019	18	1	5.1	0.2

Literature Cited:

Kapuscinski, K. L., J. M. Farrell, and M. A. Wilkinson. 2013. Trends in muskellunge population and fishery characteristics in Buffalo Harbor (Lake Erie) and the Niagara River.