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GEORGIAN BAY SPECIAL EDITION

An Overview of Georgian Bay and its Muskies

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Georgian Bay and the North Channel of Lake Huron comprise an expansive area rich in history and amazing landscape. The mere mention of Georgian Bay elicits visions of glacier-scraped Canadian Shield granite bedrock and knotty pine deformed by the prevailing northwest winds. The area was historically part of the fur trade routes with the French River acting as a pathway from Lake Nipissing and other inland routes. Numerous settlements serving the turn of the century logging operations have all but vanished, leaving only traces of timber pilings and iron bars and rings set into the rock at what sometimes appear to be random locations. Though the fishing can be as challenging as it is rewarding, the scenery is some of the most incredible you will see while in pursuit of the majestic muskellunge!

Background and Overview

The islands and bays are extensive with the area being one of the largest freshwater archipelagos in the world. The nearshore waters along the east shoreline of Georgian Bay running roughly between the French River delta and Port Severn, often referred to as the "Thirty Thousand An incredible fish from the Moon River area measuring 55 inches and weighing 55 pounds!

Islands" area, has been designated a UNESCO Biosphere Reserve. Georgian Bay and the North Channel of Lake Huron has prime nearshore muskellunge habitat for a distance of approximately 380 kilometres stretching from the south end of Severn Sound, north to the French River mouth and west to Sault Ste. Marie. This area is also home to the largest contiguous population of muskies in the Great Lakes.

Lake Huron, including the open waters of Georgina Bay and the North Channel, would generally be considered oligotrophic to mesotrophic (low to moderate levels of nutrients, plants and fish) with some of the river mouths and bays much more eutrophic (nutrient rich and high amounts of plants and fish). The open-water areas are generally home to fish species such as trout, salmon, whitefish and herring, with the nearshore areas commonly home to largemouth and smallmouth bass, northern pike, walleye, perch and muskies. At some times of the year, and in the boundary areas between the open-water and nearshore zones, many of these species overlap.

Management, Science and Research

Effectively managing muskellunge in Georgian Bay is a challenging proposition for a variety of reasons including the sheer size of the water body, the relative low abundance of individuals, and the difficulty in capturing this species with traditional capture gear. It was not surprising then that a review of existing muskellunge information in Georgian Bay and the North Channel of Lake Huron conducted in the mid-1990s (Liskauskas 1996) revealed that very little information existed for this species. Outside of some limited habitat work, primarily conducted in southern Georgian Bay, limited creel surveys and incidental catches from a variety of netting surveys, there was not enough information available to make any meaningful assessments of population status or make any informed management decisions for this species. It was clear that a coordinated approach towards gathering information on Muskellunge was needed to ensure the survival of this species into the future.

The loss of a historically abundant population of muskellunge at the Spanish River delta, in the North Channel of Lake Huron, and subsequent efforts to restore the population through water quality improvements and stocking provided an opportunity to launch a coordinated muskellunge population assessment program in Lake Huron (Liskauskas

2017). Since 1996, close to 30 targeted muskellunge spawning surveys at ten different locations in eastern Georgian Bay and the North Channel of Lake Huron have been completed (Figure 1).

Muskellunge are obligate wetland spawners, meaning they need to have access to aquatic vegetation in order to successfully spawn, and are only accessible to nearshore nets for a short period of time during the spring. A 'roving' live-capture trap-netting protocol, referred to as Spring Muskellunge Index Netting (SMIN), was developed to try and capture adult muskellunge. It consisted of nets being set close to known or presumed muskellunge spawning habitat and moved on a regular basis depending on capture success. This method allows a large area to be covered and enhances the probability of capturing spawning muskellunge. Incidentally captured spawning muskellunge from additional spring live capture surveys targeting other species like Walleye, referred to as Spring Walleye Index Netting (SWIN), and a provincially standardized method for sampling the nearshore fish community, referred to as End of Spring Tap Netting (ESTN), have also been used to biologically characterize spawning muskellunge. To date, close to 1,000 Muskellunge have been captured, a majority (80%) coming from the SMIN surveys, followed by 13% in ESTNs and 7% in



Figure 1. Location of Muskellunge surveys conducted in eastern Georgian Bay and the North Channel, Lake Huron from 1996 to 2015. SMIN refers to Spring Muskellunge Index Netting, SWIN = Spring Walleye Index Netting, and ESTN = End of Spring Trap Netting.

SWINs. Catch rates (catch per unit effort) from SMIN surveys varied across sampling locations and between years within an area (Figure 2). The ability to capture spawning Muskellunge was likely influenced by a number of factors including differences in the location and abundance of coastal wetlands between sites, annual differences in the warming rate of spring water temperatures, as well as the observation that some previously captured Muskellunge actively avoided recapture in our trap nets. Spawning activity (number of mature fish captured) summed across all locations and years displayed two peaks, one initially at 10°C and a subsequent peak at 12-14°C for both males and females. Some evidence of spawning activity, in the form of gamete (milt and eggs) expulsion, was observed over a wide range of temperatures (6-20°C) for both males and females.



Figure 2. Number of fish caught per trap net night (CPUE) and survey year for Monitoring section have been able to determine the genetic spawning Muskellunge using the Spring Muskellunge Index Netting survey structure of muskellunge in Lake Huron. This work has protocol in Eastern Georgian Bay and the North Channel of Lake Huron.

Length (in)

Total

Some interesting insights into the biological characteristics of spawning Muskellunge have been gained as a result of these surveys. Sex ratios across all locations and years consistently favored males, with an overall

male to female ratio of 1.6:1. Females were consistently larger than males, with total length averaging 46.8 inches for females compared to 40.0 inches for males. Total length of females ranged from 32.3 - 55.5 inches compared to 21.3 -49.9 inches for males. Close to a third (27.8%) of mature females were =50.0 inches in total length, whereas no males =50.0 inches were ever captured. Based on length-at-age relationships for Georgian Bay populations developed by Casselman et al. (1999), who estimated ages using cleithra bones, an average spawning female was age-14 compared to age-10 for males. Surprisingly, considering the

females and males did not differ greatly between survey areas and across years with the exception of the Spanish River, Strawberry Channel and Serpent Harbour areas (figure 3). The Spanish River supports a Muskellunge population that is in its early stages of recovery, which may account for the smaller overall size of fish. The Strawberry Channel and Serpent Harbor surveys were only conducted once with small numbers of fish encountered, which may account for the absence of larger fish due to small sample size effects.

The recapture of tagged fish, both from ongoing netting surveys and recreational fishers, including Muskies Canada members, have provided important insights into the habits of Muskellunge. Of the 925 Muskellunge tagged to date, 14% have been recaptured in MNRF

> netting surveys and approximately 8% by anglers. A majority of recaptured fish (74%) were recaptured once, but 4% were recaptured 4 or more times. In several instances, individual fish were recaptured multiple times in survey nets and by anglers, providing evidence that Muskellunge can survive multiple handling events. Tag retention rates can be difficult to accurately establish but one angler-caught recapture occurred 17 years after its original tagging date. The processing of recapture data is a work in progress and promises to continue to shed light on movement and survival of muskellunge and encouraging the continued reporting of tag recapture muskellunge. In addition to acquiring basic information on Muskellunge biological attributes and distribution of spawning adults, these surveys have also provided an opportunity to contribute towards collaborative research. One such collaboration involved determining the genetic characteristics of Muskellunge populations throughout eastern Georgian Bay and the North Channel of Lake Huron. By using scale and tissue samples collected during these surveys, scientists at the MNRFs Aquatic Research and

> revealed substantial spatial genetic structure and diversity suggesting that muskellunge in Lake Huron and Georgian Bay

are comprised of small populations with limited ranges and high spawning site fidelity, and should be managed accordingly (Wilson et al., 2016).



large expanse of sampling area, Figure 3. Muskellunge mean, maximum and minimum total length by survey area using the Spring average and maximum size of Muskellunge Index Netting survey protocol in Eastern Georgian Bay and the North Channel of Lake Huron.



Another major collaboration has involved researchers at McMaster University investigating the early life history and spawning habitat of muskellunge. Aquatic vegetation is a critical component of nursery habitat for young-of-the-year (YOY) muskellunge and has been in decline due in part to an unprecedented period of sustained low water levels in Lake Huron since 1999. One completed study has shown that these sustained low water levels and increased shoreline modifications experienced in parts of southeastern Georgian Bay may have contributed to the recent disappearance of YOY muskellunge at many sites (LeBlanc et al. 2014). Another ongoing study has been focusing on examining the behaviour of adult spawning muskellunge and their propensity for displaying spawning site fidelity whereby adults return to the same areas to spawn year after year (Weller et al. 2016). Adults captured during recent spring spawning surveys have been outfitted with radio telemetry tags and tracked for up to 3 years. Nearly all tagged fish have returned to the same locations over consecutive years and could be localized to specific activity centers during the spawning period. The results of this study are one of the first that confirms the strong spatial association between spawning and nursery habitat in Georgian Bay and reinforces the importance of identifying and protecting both spawning and nursery habitats in order to maintain selfreproducing, trophy-status populations of muskellunge in Georgian Bay.

Over the past 20 years there has been substantial progress in managing, assessing, and advancing research on Muskellunge in Georgian Bay and the North Channel. Early efforts to identify knowledge gaps have been helpful in developing survey programs to collect much needed information on the distribution and biological characteristics of Muskellunge in this area. The designation of this area as a 'Record Class Fishery' with a 54 inch Minimum size limit in 2002 was a substantial management milestone. Assessment and research efforts continue and will be necessary to address emerging future challenges including climate change, ongoing habitat loss, invasive species and expanding angler interest in pursuing the noble Muskellunge.

Musky Fishing Overview

The musky fishing opportunities between Severn Sound and Sault Ste. Marie are numerous and varied. One of the challenges of this area is the extensive amount of water and the incredible abundance and diversity of "fishy" structure. The southern portions of Georgian Bay and some of the larger bays and tributary rivers house extensive areas of aquatic vegetation while the vegetated areas on the northern areas of Georgian



Bay and North Channel tend to be smaller and more isolated. Due to the geology of the area, there is an abundance of bays, islands and shoal complexes present. As is true for muskies everywhere, the more key structural elements you can find in close proximity, the greater the likelihood that a musky may be present. The first time you fish these areas, you would swear there should be fish everywhere! So much water and so little musky angling pressure. The vast majority of musky angling pressure takes place in the southern portion of Georgian Bay, from Severn Sound north to the Moon River Basin, with very limited pressure throughout the rest of Georgina Bay and the North Channel for most of the season. Although this may be partly due to the proximity of these areas to the Greater Toronto area, anglers in the know will focus on key seasonal periods in various other locations along the entire shoreline with opportunities for big muskies throughout the entire area. It is relatively easy to pick a spot and not worry about seeing many, if any, other musky anglers throughout most of the season in most areas. There have been numerous documented catches of large muskies from Georgian Bay and the North Channel over the years. The most famous is likely Ken Obrien's Ontario record Muskie weighing 65 pounds and measured 58 inches in length with 30.5 inches in girth caught in Georgian Bay's Blackstone Harbour of the Moon River Basin on October 16, 1988. Martin Williamson captured a very large fish on November 26, 2000 in Honey Harbour weighing 61 pounds, 4 oz., and measuring 56 inches long with a 31.5 inch girth. Other notables include



Gary Ishii's 55 pound Moon River fish on October 11, 1981 and Mark Kontianen's, 54 pound, 8.5 oz., Moon River fish caught on October 15, 1977. There have also been numerous other large fish caught within recent memory, many of which go unreported by local anglers. An incredible fish from the Moon River area measured 55 inches and weighed 55 pounds!

A Final Word on Safety

No article on Georgian Bay and the North Channel would be complete without a note on safety. I once heard a wise, old, Georgian Bay angler say "You don't have to know where all of the rocks are, you just have to know where they 'aint!" A truer statement has never been spoken. The number of shoals and rocks is absolutely mind-blowing and if you are not familiar with the area, it is critical that you navigate safely by reviewing your paper charts, as required by law, to ensure that you don't end up losing your lower unit or just your prop if you are lucky. (Editor's note – I never fish the area without a spare prop and paper charts in the boat.) The modern GPS electronic charts have gone a long way to making

navigation in a new area safer but please be aware that many of the shoal areas with great fish potential are not fully charted. This area is also part of a large expanse of open water and wind and waves can present a hazard at times. Exercise caution and don't venture into exposed areas if your boat is not equipped to handle big waves or if the forecast is calling for high winds. In addition to the physical challenges presented by the numerous rocks and shoals, much of the area is remote and if you have boat troubles, help is rarely close at hand. It would be a good idea to make sure someone knows where you will be and that you have a VHS radio on board: Many of the lodges around the more remote areas of Georgian Bay and the North Channel monitor Channel 16. So there you have it. Georgian Bay and the North Channel are a unique and wonderful place full of history, lore and big muskies! They are an incredible resource for us to enjoy and protect for future generations.

REFERENCES

Casselman J. M., C. J. Robinson, and E. J. Crossman. 1999. Growth and ultimate length of muskellunge from Ontario water bodies. North Am J Fish Manage 19:271–290.

Leblanc, J. P., J. D. Weller, and P. Chow-Fraser. 2014. Thirtyyear update: Changes in biological characteristics of degraded muskellunge nursery habitat in southern Georgian Bay, Lake Huron, Canada. Journal of Great Lakes Research 40 (2014) 870–878.

Liskauskas, A. P. 1996. Muskellunge in Georgian Bay and the North Channel. pp. 123-136. In Kerr, S.J. and Olver, C.H. (eds.). Managing Muskies in the '90s. Workshop Proceedings. Ontario Ministry of Natural Resources, Southern Region Science & Technology Transfer Unit Workshop Proceedings Report WP-007.

Weller, J. D., Leblanc, J.P., Liskauskas, A.P. and Chow-Fraser, P. 2016. Spawning Season Distribution in Subpopulations of Muskellunge in Georgian Bay, Lake Huron, Transactions of the American Fisheries Society, 145:4, 795-809.

Wilson, C. C., Liskauskas, A.P., and Wozney, K.M. 2016. Pronounced Genetic Structure and Site Fidelity among Native Muskellunge Populations in Lake Huron and Georgian Bay. Transactions of the American Fisheries Society, 145:6, 1290-1302.



