West Watjask Lake – Evaluation of the 2017 Muskellunge Stocking

In part of reporting for FES Project 18-043 - Fisheries Projects within the North Parkland

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Summary

Muskellunge (*Esox masquinongy*) is one of the most valued sport fishes in Canada and sought after by many Manitoba anglers. With limited opportunities in the province, muskie introductions became a topic of discussion in 2014 for SVSFE members. SVSFE proposed to re-introduce muskie to the Duck Mountains and found a suitable candidate lake, West Watjask Lake along the west edge of the escarpment. The objective of the musky introduction was to provide anglers with a unique opportunity to target this "exotic" species.

Figure 1: Musky stocked in 2017

In 2017, SVSFE received a small stock of muskie destined for West Watjask Lake in the Duck Mountains. This planting was only considered experimental as the project objective was to stock 450 muskellunge, but due to high mortality at the hatchery facility only 35 were received. In 2019, SVSFE technicians conducted a short trap netting survey to assess growth and survival of muskellunge planted on June 22nd, 2017 and test catchment methods. The survey was in part of FES Project 18-043, while the stocking of the muskie is part of an ongoing FWEF Project 16-019 West Watjask Lake – Musky Introduction. This report is to document the growth and survival of the 2017 planting and identify any future management considerations.

Background

The initiative for the Musky Introduction Project was to stock 450 non-sterile Leech Lake spotted muskellunge in 2016 to establish a muskie fishery in the Western Region of the province. The fish were sourced from the Minnesota Muskie Farms Inc. in Alexandria, Minnesota. Unfortunately, due to high mortalities at the hatchery both in 2016 & 2017 the stock was not available to fulfill the order in full. The supplier was still willing to supply the organization with the remaining musky (age 1+) in the spring of 2017, which equated to 35 fish. SVSFE agreed to stock the small number of muskie to evaluate growth and survival in West Watjask Lake.

All 35 fish were healthy and averaged 260 mm (10") in fork length (Figure 1). On June 22nd, 2017 fish were scattered stocked in seven separate locations of the lake. With the stocking rate dramatically reduced, SVSFE understood this planting was only experimental and would not be considered or promoted as an attempt to re-introduce musky. Efforts continued following the 2017 stocking to source the appropriate stock for introductions. Please refer the project summaries from 2015 & 2016 on lake investigations and musky habitat suitability surveys leading to the Musky Introduction Project and the "Interim Report – Project 16-019 West Watjask Lake Musky Introduction" for more details on the 2017 stocking.

Methods

Muskie are known to be difficult to collect using scientific methods. Trap nets are the gear type most commonly used to sample muskellunge fisheries in Pennsylvania lakes and also represent the primary gear used in many out-of-state studies (Haas 1978, Hanson 1986, Hoff and Serns 1986 and Siler and Beyerle 1986). For this reason, technicians developed a netting program utilizing two types of spring-haul trap nets, the standard end of spring trap nets (46m lead, 6' wide trap with $2^{1/2}$" mesh) and custom trap nets (30 m lead, 4' wide trap with $1^{3/4}$" mesh). Both were equally fished overnight for a minimum of 22 hours. The survey consisted of setting twelve trap nets (six standard and six custom) at random locations within suitable depths (<3 meters)(Figure 2). Weather, site parameters and water conditions were documented at each site.

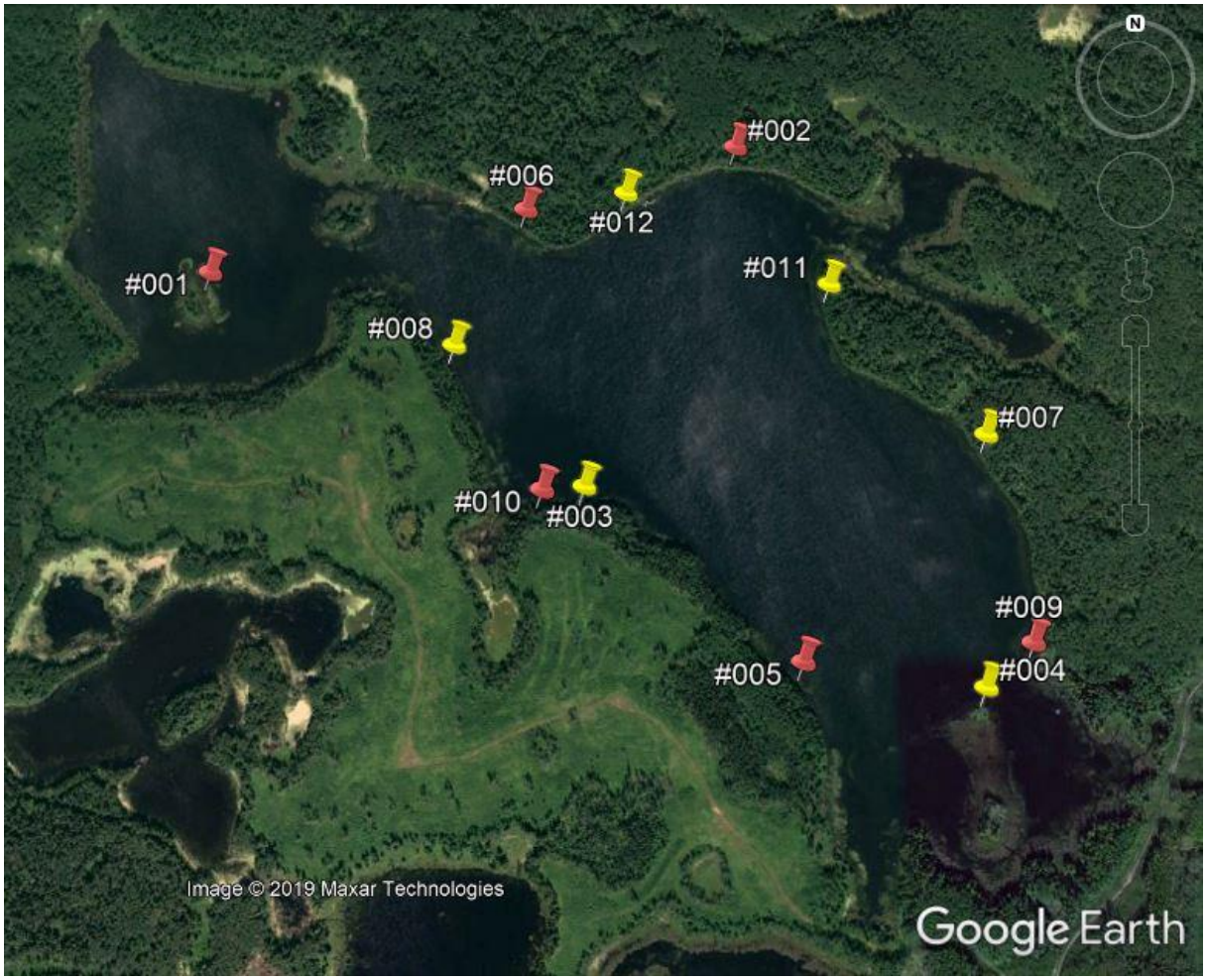

Figure 2: Trap net locations for 2019 survey (red = standard net, yellow=custom net)

All musky caught were sampled for fork and total length, weight and overall condition. No age structures were collected as ages were known (3+ years). A subsample of fork lengths for yellow perch was taken by sampling ten perch from each trap net. All remaining perch were bulk weighed and released.

Results

The netting program was completed between June 10th – 13th, 2019. Total effort included 271.1 hours of netting, with nets fishing for an average of 22.6 hours. Weather and water conditions remained favourable during the survey with clear calm days averaging 18°C and water temperatures averaging 17°C.

A total of 1,444 yellow perch were caught with a CPUE of 5.32 fish/hour. Perch ranged from 134 – 305 mm or an average of 192 mm in fork length from the 122 fish subsampled (Figure 3 & 3). The total biomass of perch caught equated to 109.4kg, with an average weight of 74 g. Both black spot and yellow grub were present on perch.

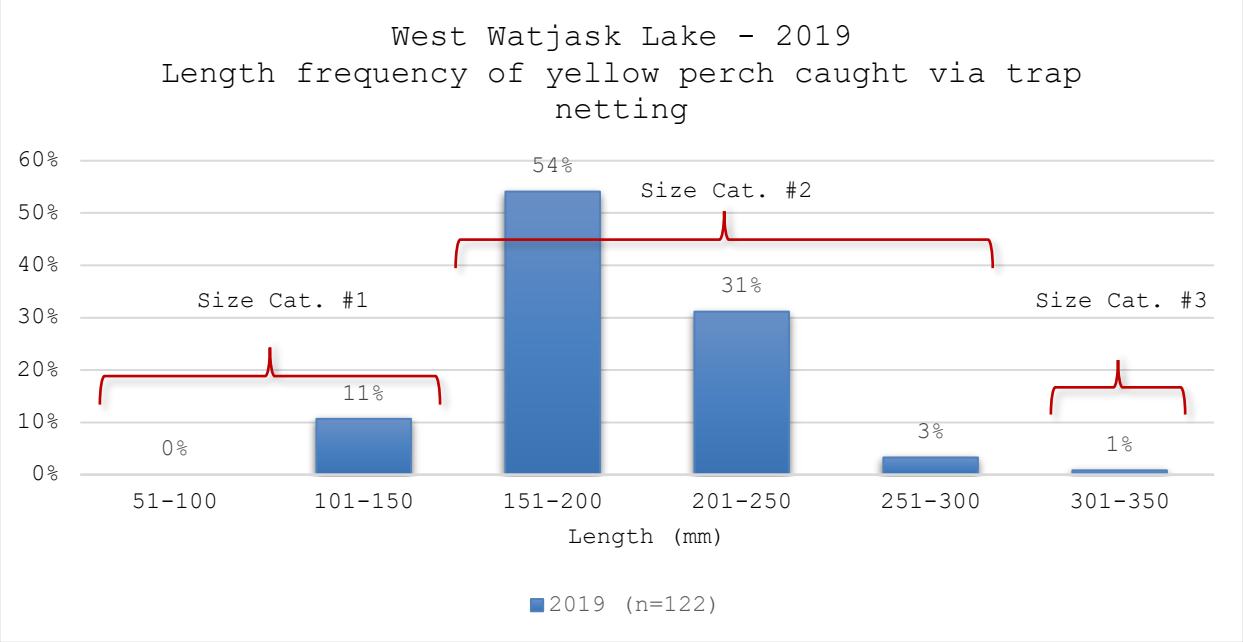

Figure 3: Yellow perch length frequencies

Figure 4: Typical yellow perch in size category 2

In total, two muskellunge were captured in the netting survey, both being healthy specimens. One musky (fish #014), caught at site #002 measured 610 mm fork length, 665 mm total length and weighed 2000 g (Figure 5 & 6).

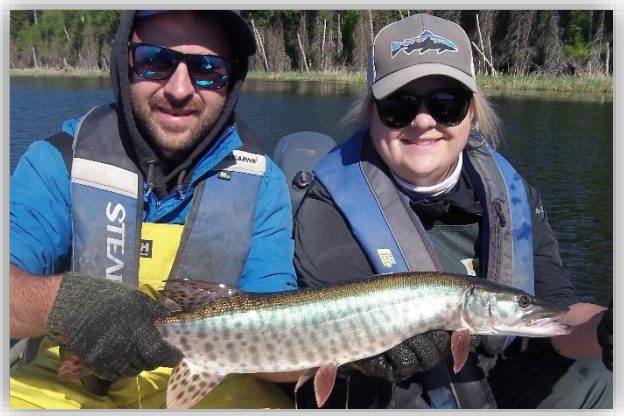

Figure 5: Musky #014

Figure 6: Musky #014

The other musky (fish #060) was caught on the opposite shoreline at site #005. This fish was similar in size at 590 mm fork length, 640 mm total length and 1750 g (Figure 7 & 8).

Figure 7: Musky #060

Figure 8: Musky #060

The muskie caught within the survey equated to 5.7% return of the stock planted in 2017 and displayed a catch or CPUE of 0.00738 fish/hour. Growth indicated these fish more than doubled in size with an average growth of 340 mm (13.4”) between June, 2017 and June, 2019.

Discussion

Predator/Prey Considerations

Muskellunge are apex predators and Kerr (2016) states "predation is largely based on whatever species is available at the preferred size". It is widely believed that muskie prefer cylindrical, soft-rayed prey over larger spiny-rayed fishes (Oehmcke et al. 1958, Kerr and Grant 2000), though yellow perch, catostomids and cyprinids were consistently found to be important in the diet of Wisconsin muskellunge (Bozek et al. 1999). Yellow perch are abundant throughout the natural range of muskie and highly vulnerable to predation. In three regions in Canada, yellow perch were also the most frequently eaten food by muskellunge (Hourston 1952).

Yellow perch populations in West Watjask Lake appear to be stable post stocking. The potential effect of muskellunge on yellow perch was beyond the scope of this assessment due to the differences in methodology (trap net mesh size) between the 2016 and 2019 surveys. The need for such evaluations should be discussed with managers. Growth and survival of larger muskellunge is often impaired when prey of adequate size is not available (Scott and Crossman 1973). Lack of large bodied prey may limit adequate growth for larger muskie but introducing an additional species to the mix requires special considerations.

Catch Per Unit Effort

Muskellunge carry the reputation of being an elusive species to both anglers & researchers and are usually present at low densities. Woomer (2012) stated "it is important to emphasize the rarity of collecting muskellunge". Catch per unit effort is meant to compare relative abundance over time. The 2019 findings indicated a CPUE of 0.0073 fish/hour. In Pennsylvania, the median catch value of 0.01 muskellunge (purebred or tiger) per trap net hour is recommended as the minimum benchmark to maintain the listing of a lake in the stocking program. The mean trap net catch value of 0.03 per hour for purebred muskellunge is recommended as the benchmark for a "high quality" muskellunge fishery and is the ultimate target catch rate when managing muskellunge as a directed fishery (Woomer 2012). These benchmarks follow a dataset review on lakes managed for musky from 1977-2007 which indicated a median catch value of 0.01387 fish/hour or one muskellunge for every four-24hr trap net set. The 2019 rates would equate to 0.7 muskellunge for every four-24hr trap net set. It is apparent that catch rates for muskellunge can be quite low even in the best fisheries. With results from the small 2017 planting close to the minimum benchmark, one could speculate there was fair survival.

Growth of Muskellunge

A number of factors, including size, habitat availability, genetics, the length of growing season and an abundance of suitable forage, determine the capability of a waterbody to produce a trophy-sized muskellunge (Kerr 2011). The muskellunge grows most rapidly during the first three years of life, after which time its rate of growth gradually decreases (Schloemer 1936). They typically reach sexual maturity at age 3-4 for males and 4-5 for females. The two muskie caught at West Watjask display average growth (>640 mm or 25” total length) compared to other southern jurisdictions possessing longer growing seasons.

In Wisconsin, average standard length for northern Wisconsin muskellunge at age three is 503 mm and range from 406 – 762mm. Furthermore, Wisconsin muskie in average producing lakes, reach the 76cm (30”) growth within 5 years (Becker 1983). On average, muskellunge in Pennsylvania reach 30 inches (760 mm) between ages three and four and reach 40 inches at around age eight (Woomer 2012). Canadian muskellunge usually reach legal size in 5 years, but this may vary from 4-7 years (Hess and Heartwell 1978). It is unknown whether the West Watjask Lake muskie will reach the master angler size of 790 mm (31”) by next year but is anticipated by 2021. Initial findings indicate these few fish have adjusted well to the available forage base and habitat present in West Watjask Lake.

Follow-up

Moving forward, future considerations and follow-up steps are required in order to achieve the objective of establishing a muskellunge fishery at West Watjask Lake.

Stock muskellunge at an appropriate rate for introductions

Stocking rates vary considerably among various jurisdictions where esocids are stocked (Kerr 2001). SVSFE is working with the Minnesota Muskie Farm Inc to receive advanced fingerlings (10-12”) (Figure 9) for the fall of 2019. The agreed upon rate with Fisheries Branch was approximately 2 fish/acre with 450 fish ordered (1.9 fish/acre). This is within the range of stocking rates in other jurisdictions;

a. Wisconsin - 2 large fingerlings surface acre
b. Michigan waters – 2 - 4 fingerlings (6-9") acre
c. Minnesota waters - 1 young-of-year (3-7/lb.)/ Minnesota DNR littoral acre
d. North American waters - 0.25-5.0 fingerlings ha.
e. Ontario – 2-5 small fingerlings (<8”)/ha or 1 – 3 large (>8”) fingerlings/ha

Figure 9: Advanced muskie fingerling

Frequency of stocking also deserves consideration if required in future years. Kerr (2011) stated “generally it would appear that esocid stocking should not be conducted on an annual basis”. Stocking frequency recommendations from various jurisdictions vary from every two – four years. Ideally, stocking densities and frequency of stocking would be formulated based on the objective of the project, size and life stage of fish being utilized as well as characteristics of the waterbody being stocked (Kerr 2011). Preferably, a self-sustaining fishery would be optimal and supplemental stocking of muskie is generally not recommended in waters having adequate natural reproduction. Future monitoring will help identify the need for future stocking.

Improve lake access for anglers

West Watjask Lake is unique and not like typical muskie fisheries in neighbouring jurisdictions. The lake is located along an active logging road 9 km off highway #83. Today, the lake is easily accessible by truck under dry conditions or ATV/snowmobile under wet/frozen conditions. Logging operations are scheduled to continue for the next three to five years. Notice of logging operations are well marked at the beginning of the road and anglers are advised to use caution when accessing the lake during active operations.

When anglers approach the lake, at current there is 1) a gate prior to the access trail and 2) a small, but short "turkey trail" leading to the lake which lacks a launch or dock (Figure 11). In accordance with the project funding, SVSFE's contribution includes the development of infrastructure to include a dock and boat access to the lake. SVSFE is

Figure 11: Lake access (trail facing lake)

Figure 10: Lake access (trail facing road)

currently working with the local forestry company, Louisiana Pacific and government personnel to develop a plan which will allow anglers continued access to the lake following the completion of harvesting in the area. Tentatively, this plan includes relocating the gate just beyond the access trail, developing a landing area for anglers to safely unload their gear, developing a level trail and appropriate dock to launch small watercraft (ie. small boats, canoe, kayak, kick boat) and informational signage. SVSFE intends to have the dock and signage installed in 2020 and trail/landing area improvements shortly to follow.

Management considerations

The long-awaited return of the muskie to Manitoba is a unique initiative in itself. One that deserves special considerations to ensure success. Muskellunge are not native to Manitoba and regulations are very minimal in the province due to this rarity. For that reason, SVSFE is recommending monitoring and management changes specific to muskellunge management strategies similar to Ontario's. The Ontario guidelines are based on scientific knowledge and effective for managing muskellunge to maximize angling opportunities while protecting muskellunge populations. Identifying and maintaining key objectives specific to West Watjask Lake will help manage this fishery for the future.

Monitor muskellunge populations

The true success of a stocking project relates to the post-stocking survival and its contribution to the anglers catches and natural recruitment. Kerr (2011) stated "assessments should be a component of every esocid stocking or transfer project". For example, in Ontario muskellunge management plans monitor the fishery with two types of assessments; fishery – independent and fishery – dependent data. This approach would be suitable for monitoring the introduced muskie at West Watjask Lake.

Fishery independent data –

Muskellunge are not easily captured by traditional sampling programs (ie. index netting) (Kerr 2011). Trap netting and electrofishing surveys are non-lethal and utilize standard sampling protocols which provide measures of relative abundance, recruitment and growth over time. Electrofishing is most suitable for forage and recruitment surveys although lake access limits use of the SR20 therefore trap netting will be the most suitable for future monitoring.

The 2019 trap netting survey provided some insight on site selection and gear suitability when trapping muskie. One observation was both muskie were captured in the larger ESTN trap nets. The size of the trap and/or length of the lead may influence muskie catches and may be more beneficial to use for the post-stocking assessments. In addition, utilizing the fine mesh trap (1/4" mesh) used in the 2016 baseline surveys will aid in monitoring the quality and dynamics of forage species and muskie recruitment. If an electrofishing boat suitable for West Watjask Lake is ever available, conducting young of the year or yearling fall electrofishing surveys would be more appropriate for evaluating natural recruitment.

Another consideration for a monitoring program is time of year/water temperature. The 2019 survey was completed in June when water temperatures were fairly warm (18°C). Within the muskie management plan in Wisconsin (Simonson 2013), it is recommended to trap net in the spring when water temperatures are between 50-55°F (10-13°C). Collection of biological data on muskie should include length, weight, sex, and age structures (scales). It is also recommended to mark muskie with

passive integrated transponder (PIT) tags to determine growth and ages in future monitoring. Scales are only accurate for muskellunge and northern pike younger than age 10 (Frost and Kipling 1959, Johnson 1971, Laine et al. 1991), although age estimates for muskellunge as young as age 3 were found to be inaccurate (Fitzgerald et al. 1997). Determining age classes during initial monitoring will help determine population dynamics in the future.

It is recommended to evaluate the muskie two years following the 2019 planting of 450 fish. Subsequent assessments should occur every two years until managers believe the population is established, where monitoring rotations can be extended. West Watjask Lake is a small waterbody (96.2 ha) and understanding the growth and recruitment potential may take some time but would identify future management requirements.

Fishery dependent data

Collecting this data involves participation from anglers. Voluntary angler surveys are vital in monitoring the fishery. This data will help understand estimated angling pressure, angling quality and health of the population. Surveys should include hours fished, how many fish seen/caught, measurements, overall condition and photos if possible. Anglers are aware of this initiative and anxious to explore this muskie fishery in Manitoba. This provides a great opportunity to share management strategies and get anglers involved. Once the fishery is suitable for promotion, various media; signage, articles and social media will inform the public on muskie characteristics, management strategies, proper catch and release techniques and angler involvement. A great investment would be to promote SVSFE's "daily catch" angler survey for anglers to document their angling experiences on West Watjask Lake. Once proper stock is acquired and fish reach trophy sizes of (31" or 79cm), the Manitoba Master Angler Database will provide invaluable information on the state of the fishery as well.

Maintain a healthy population of large muskellunge

Maintaining a healthy population truly comes down to management through regulations. As stated previously, muskellunge are not native and rare in Manitoba, therefore regulations are minimal compared to other jurisdictions.

Limits

The limit for muskellunge in Manitoba is zero therefore no changes are necessary, and the lake will be managed as a catch and release fishery. In comparison, the Ontario standard possession limit of muskellunge is one fish, with the exception of a few catch and release fisheries. Many surrounding jurisdictions have a one fish limit but also impose a minimum size restriction depending on management objectives (ie. 30”, 40”, 48” or 50” minimum restriction). These restrictions are created with the goals to protect spawning fish, prevent harvest of fish before they mature and to help contribute to spawning multiple times through a fish’s lifespan. It is widely documented that the majority of muskie anglers practice catch and release regardless of state limits.

Seasons

At current, the Southern Division season opens the second Saturday of May and is open through to early April. This Manitoba closure is very marginal compared to Ontario standards. In Ontario, Fisheries Management Zones (FMZs) similar to West Watjask Lake, the muskellunge season is open between the 3rd Saturday in June to December 15th. Muskellunge are spring spawners at water temperatures between 9.4 and 15.0°C (Kerr and Grant 2000) and documented to spawn later than native esocids (northern pike). In Ontario, closed seasons are used to protect their vulnerable reproductive period as they move to spawning areas, spawn and disperse to summer feeding areas (Ontario, 2005). Due to concerns regarding mortality of released fish caught while ice fishing, a mid-December closing is believed to be appropriate across Ontario (Ontario 2005).

Winter closures may not be favoured by Manitoban anglers, “though even modest exploitation can impact the size-structure of populations” (Simonson 2013). During correspondence with Gordon Pyzer, former senior manager of Ontario Ministry of Natural Resources (OMNR) for over 30 years (also known as Canada’s most scientific angler), he expressed his concern of how “muskie are much more fragile than most anglers think”. Muskie go into a state of torpor in the winter (Pyzer 2019) unlike northern pike. Pyzer also noted John Cassleman (the world’s expert in muskie management), “worries that muskie caught in the late fall period (early December before freeze up) may abort their eggs the following spring”. Given these facts, incorporating a season closure from November 15th to the third Saturday in June has been recommended.

Special Regulations

Special regulations can include bait & gear restrictions. Current Manitoba wide regulations state anglers may only use barbless hooks and only two hooks or lures may be used per line. Spear fishing muskellunge is not permitted. In addition, the Southern Division regulations do not allow live bait in the Duck Mountains. Gord Pyzer strongly recommended to impose a one hook tackle restriction …"so many of the big muskie lures have two or three and it is purely an ego thing"(Figure 13). Dead bait or pike hooks (Figure 12) may encourage fish to engulf and swallow the hook while lures with multiple treble hooks can complicate a timely release for muskie. One research paper (Tomcko 1997) found pike hooks caused the highest mortality (33%) in pike, increasing chances of post-release mortality. The next highest estimate of hooking mortality (30%) was for muskellunge where the fish were more extensively handled than they would be by the typical angler (Beggs et al. 1980). Special regulations encouraged at this time are to restrict bait to artificial lures only and limit gear to two barbless hooks per lure. The objective is to limit post-release mortality while still allowing anglers the ability to hook onto the elusive muskie.

Figure 13: Typical muskie lure with multiple hooks

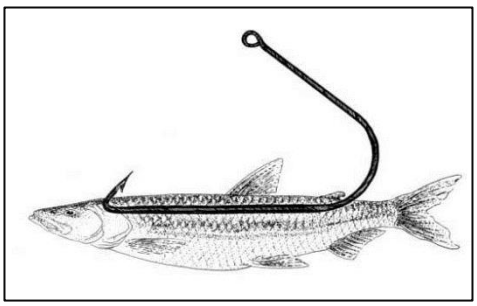

Figure 12: Example of a "pike hook"

Conclusion

Muskie are referred to as "the fish of ten thousand casts" due to the challenge and chase they infect into anglers. Anglers obsession with this exceptional species will in turn, provide economic and tourism benefits to the area. Bringing this species back to the province has been a topic of discussion since 2014 for SVSFE. With the anticipated stocking this fall, future management strategies and public awareness, SVSFE anticipates West Watjask Lake will one day grow master angler muskie in the Parkland, making this small stretch of the Western Region an even greater angling destination.

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