



Muskellunge Stock Evaluation West Watjask Lake 2021

In part of reporting for FES Project 20-040
SVSFE Recreational Angling Initiatives 2021

Table of Contents

List of Figures	2
Executive Summary	3
Background Information	4
Methods	5
Netting Survey.....	5
Voluntary Creel Survey.....	6
Results	7
Netting Assessment.....	7
Voluntary Creel Program.....	10
Discussion	12
Muskellunge:.....	12
Yellow perch.....	13
Dissolved Oxygen.....	13
Infrastructure & Regulations.....	14
Future Monitoring.....	14
Literature Cited	15

List of Figures

Figure 1: 2017 stock in 2019	4
Figure 2: 2021 effort map	5
Figure 3: Voluntary Creel Program public boat	6
Figure 4: 2019 stock in 2021	7
Figure 5: Yellow perch haul 2021	8
Figure 6: Perch size distribution 2021	9
Figure 7: Perch size distribution 2021	9
Figure 8: Perch length frequencies 2015, 2016, 2019, 2021	10
Figure 9: Muskie from voluntary angler program 2021	11

Executive Summary

In spring 2021, SVSFE set out to assess stock abundance and condition of muskellunge in West Watjask Lake. Four days were allocated to the assessment which consisted of nine overnight trap nets. Six nets were standard ESTN traps used to target muskie. Three fine mesh traps were used to monitor perch populations. In total, two muskellunge were captured in the ESTN trap nets which equated to a CPUE of 0.014 fish/hour. The muskie measured 542mm and 530mm total length, which both correlated to the 2019 muskie planting.

In early July, the West Watjask Voluntary Creel Program was initiated. For this initiative a boat was stashed for public use, and several anglers were contacted advocating participation. In total, two anglers provided creel information. On August 26th a hard tackle angler caught 2 (~24") muskie and saw one other in 5 hours fishing. The second angler fished with fly gear for 3 hours on September 20th, and 4 hours on October 29th. The first outing yielded nothing, and in the second four muskie were observed with one "significantly larger" than the others.

As it turns out muskie are not only difficult to catch on rod-n-reel, but through traditional scientific methods as well. Regardless, it appears the lake is very close to being an established fishery. SVSFE can anticipate a significant increase in angling pressure in coming years. Following are suggested recommendations for research and development at West Watjask Lake.

- Continue to monitor late winter dissolved oxygen levels
- Conduct a variation of Ontario's "Spring Muskie Spawning Index" (SMSI) protocol to monitor muskie population trends.
- Replicate the three fine mesh trap nets to monitor forage response to predator introductions and changes to population dynamics
- Conduct shoreline cruises in early spring to identify spawning habitat/activity for future assessment planning
- Determine a long-term monitoring strategy for both muskie and forage base (yellow perch) based on 2022 netting results
- Continue to monitor for evidence of muskie natural recruitment
- Install docking/landing infrastructure in early summer 2022
- Continue to work with MFFA and MEA with signage development - to include regulation and catch/release information signage
- Install directional and parking signage
- Install "caution" signage at Designated Route S landing
- Map beaver activity from adjacent inflowing wetlands. If drought conditions continue this information may become useful for lake level remediation efforts

Background Information

Muskellunge are one of the most valued sport fishes in Canada and sought after by many Manitobans. With limited opportunities in the province, muskie introductions became a SVSFE agenda item in 2014. SVSFE proposed to investigate West Watjask Lake as a potential candidate lake in the Duck Mountains. In late 2015, a preliminary survey was conducted (PRJ-15-004 Watjask Lake Investigation Summary). Following this survey, several questions remained, therefore a follow-up investigation was completed in 2016 (PRJ-15-036 - West Watjask Lake Muskellunge Suitability Assessment).

Following lake investigations, the consensus was that an experimental stocking of muskie would likely be successful. In 2016, SVSFE had successfully received grant dollars from FWEF to source and pay for muskie stock (PRJ-16-019). In June of 2017, SVSFE received the first stock of muskie from Rob and Debbie Jost of Minnesota Muskie Farms in Alexandria, Minnesota. The stocking objective of 450 muskellunge (2 fish/area) was not met due to high mortality at the hatchery. In late June 2017, 35 (~10") non-sterile spotted muskellunge of the Leech Lake strain were stocked into West Watjask Lake.

In 2019, SVSFE technicians conducted a short trap netting survey to assess growth and survival of the 2017 stock (PRJ-18-043). The results were promising, as 2 muskellunge were captured, measuring 665mm and 640mm (total length). Both fish had shown exemplary growth and were in excellent condition.

The West Watjask Muskie Introduction Project (PRJ-16-019) had been extended multiple times because of supplier issues and stock mortality. By July 2019, Minnesota Muskie Farms were confident they would be able to fill the order of 450 muskellunge by fall. On October 25th, 2019 the stock were picked up at the Emerson border and were destined for West Watjask. Around 5pm, various SVSFE directors and volunteers successfully scatter stocked 450 (~12") spotted muskie into West Watjask Lake.



Figure 1: 2017 stock in 2019

Methods

Netting Survey: Muskie are known to be difficult to collect using scientific methods. Trap nets are the gear type most used to sample muskellunge 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). 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 a 1cm mesh size). The standard ESTN trap nets were used to target muskie, while the custom trap nets were used to monitor perch response to predator introductions. The program was developed to be achievable within one work week. Six muskie sites were replicated from the muskie assessment in 2019 and three custom net sites were replicated sites from the forage assessment originally conducted in 2016 (Figure 2). Weather, site parameters, and water conditions were documented at each site. All muskie caught were sampled for fork and total length and weight. All yellow perch were sampled for fork length, while a subsample of 100 were measured (FL and TL) and weighed. Age structures were not collected.



Figure 2: 2021 effort map

Voluntary Creel Survey: Following the trap netting survey it became evident that more information on the status and condition of stocked muskellunge would be valuable. As an effort to acquire more information, a voluntary creel program was initiated. First, because of the remote nature of the waterbody, a boat was stashed for public use. It was assumed that having a boat at the lake would increase angler participation. The boat was locked, and the key was hidden nearby. Shortly after, an email was sent to various groups including: the SVSFE board of directors and volunteers, the Roblin Sport Fishing club (still unnamed), Intermountain Sport Fishing Enhancement (ISFE), Manitoba Fly Fishers Association (MFFA), and Manitoba Esox Association (MEA). Within the email included directional information, information on the boat and the hidden key, and that SVSFE was seeking for information on the stocked muskie. Information sought after was date, hours fished, number of muskie caught, number of muskie seen, and any other relevant observations. We asked that folks be hesitant to who they share this information with as we did not want to see an influx of pressure to the fishery until it was considered established and parking/launching infrastructure was completed.

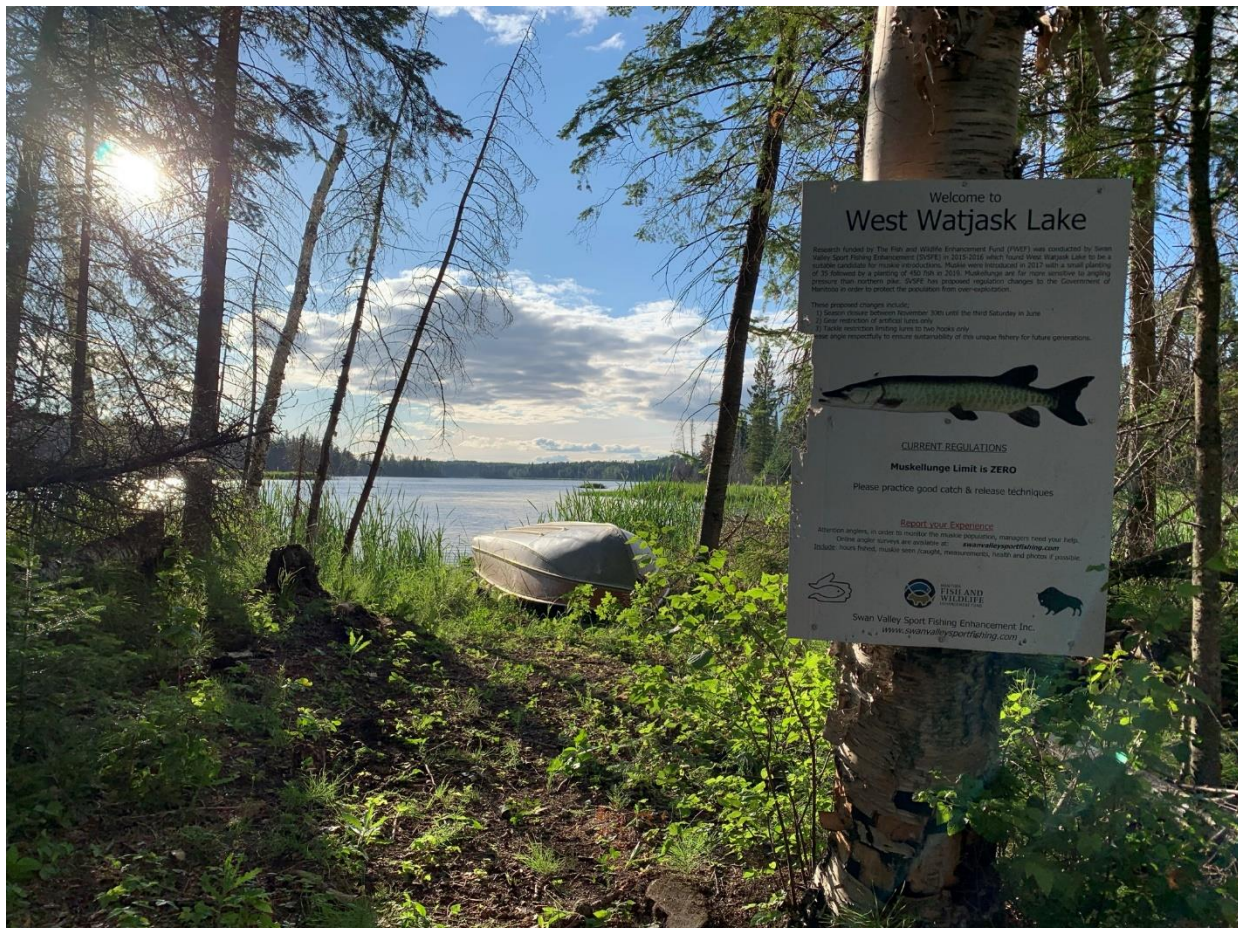


Figure 3: Voluntary Creel Program public boat

Results

Netting Assessment The netting program was completed between June 7th – 10th, 2021. Total effort included 202.1 hours of netting, with nets fishing for an average of 22.4 hours. The six muskie nets fished for a total of 135.4hrs, and the three perch nets fished for a total of 66.7 hours.

Weather conditions remained favourable during the survey, however the warm spring resulted in water temperatures higher than ideal for muskie sampling with a max water temperature measuring 19.8°C and an average of 18.01°C over the course of the survey.

In total, two muskellunge were captured in the netting survey, both being healthy specimens and caught at site #5. Fish #026 measured 503/542mm and weighed 1080g. Fish #027 measured 490/530mm and weighed 810g. In total, CPUE for muskie over the 6 muskie nets equated to 0.0147 fish per hour. Interestingly, over the 6 ESTN nets from the muskie assessment in spring of 2019, the CPUE equated to 0.0147 fish/hour as well. Based on fish length, it was concluded that both fish correlated with the 2019 planting, determining these fish were 2+ years at the time of sampling.



Figure 4: 2019 stock in 2021

A total of 2,864 yellow perch were caught with a CPUE of 14.17 fish/hour total over all trap nets. For comparative purposes, a total of 1,970 yellow perch were caught in the perch nets exclusively, equating to a CPUE of 29.5 fish/hour. These nets were replicated from a perch survey conducted in 2016. In 2016, over these three nets a total of 1,686 yellow perch were sampled equating to a CPUE of 26.9 fish per hour.

All perch captured were measured and ranged from 53 - 286 mm (FL) with an average of 152.6mm (FL). From the 100 perch subsample, fish ranged from 88-265mm (FL) with an average of 169.10mm (FL). Fish weight ranged from 10-220g with an average of 69.3g.

Perch were noted to be in healthy condition with the exemption of parasite loads (black spot and yellow grub). From the random n=100 subsample 27/100 were infected with blackspot, 21/100 were infected with yellow grub, and 12/100 had both parasites present on their exterior.



Figure 5: Yellow perch haul 2021

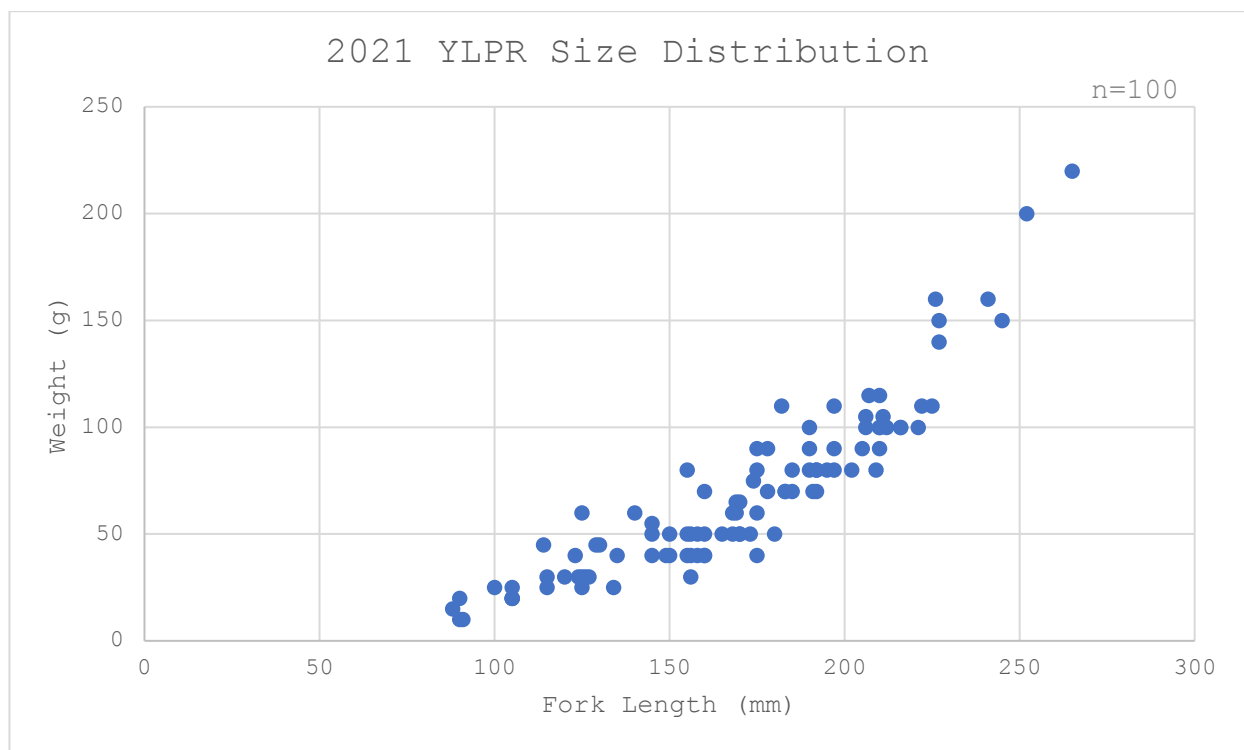


Figure 6: Perch size distribution 2021

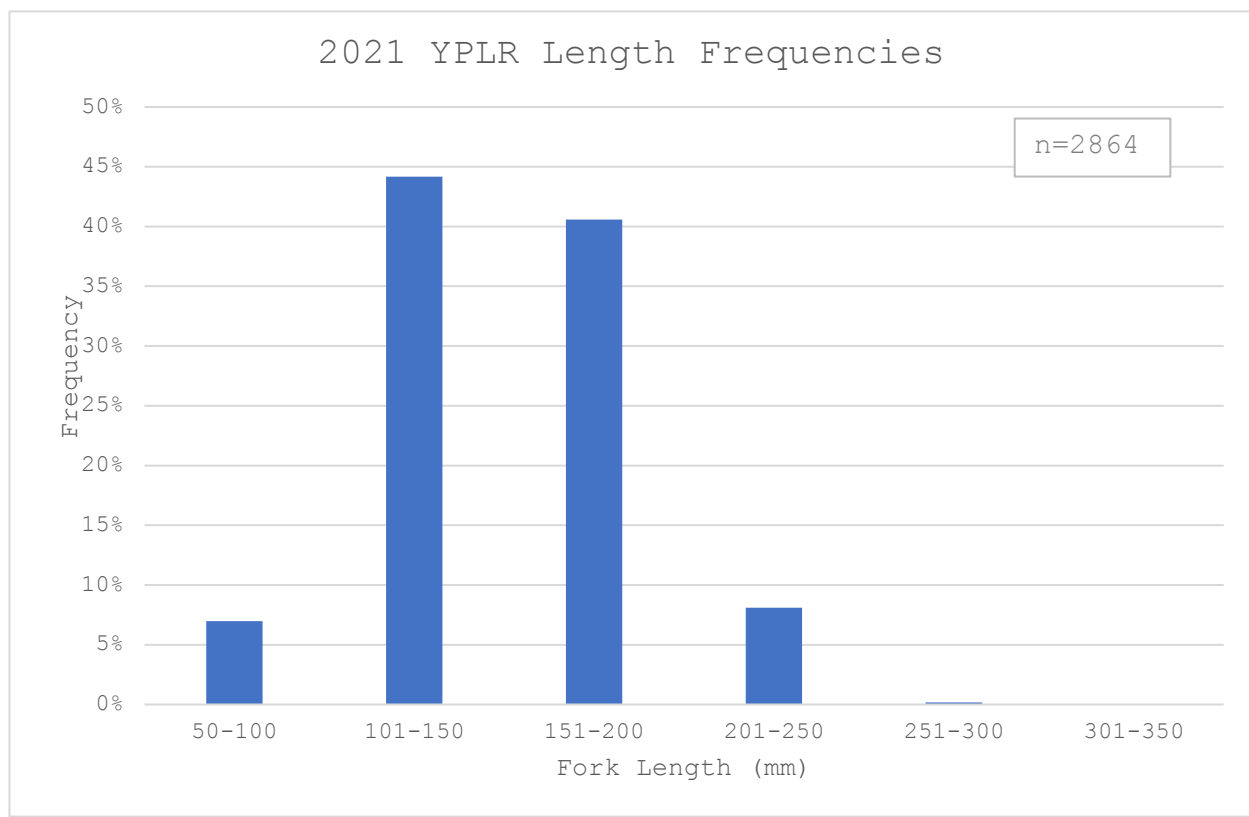


Figure 7: Perch size distribution 2021

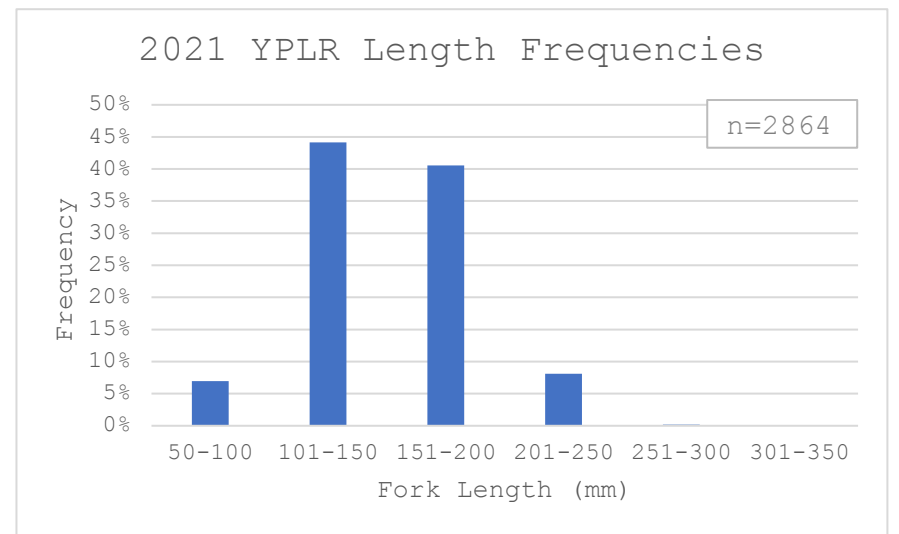
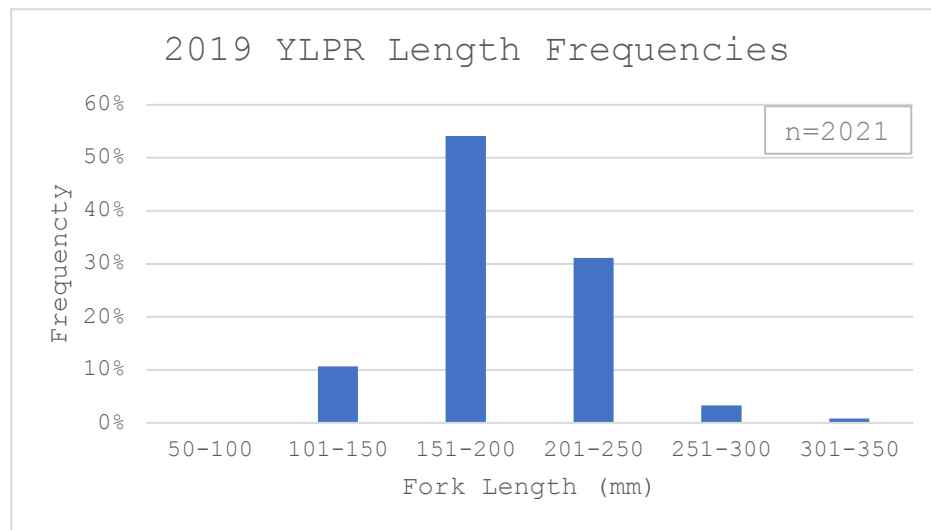
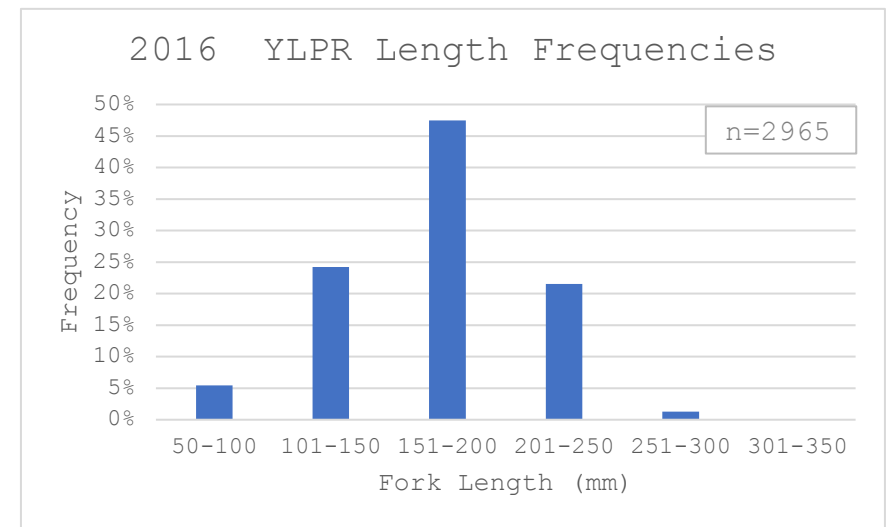
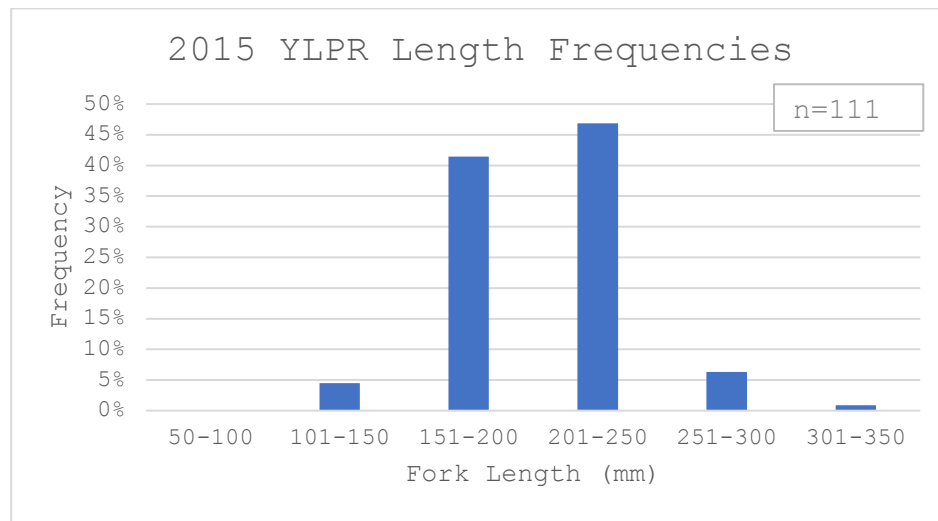


Figure 8: Perch length frequencies 2015, 2016, 2019, 2021

Voluntary Creel Program: Unfortunately, the voluntary creel initiative did not catch the attention of as many anglers as hoped. In total, 2 different anglers submitted 3 different angling reports from July until late October 2021. The fishing reports are summarized below:

On August 26th, angler # 1 fished for approximately 5 hours. Hard tackle was used with a combination of casting and trolling. In total, two muskie were caught, and another was observed. Both fish caught measured approximately 24" total length (Figure 9). The fish seen was similar in size to the two others caught. Angler # 1 also mentioned that he saw what looked like two young-of-year muskellunge sitting in about 6" of water tucked in the bulrush on the north shore.

On September 19th angler # 2 fished for approximately 3 hours. The chosen method was casting flies, and the angler mentioned that he focused on fishing shallow on this outing. The angler also mentioned that this trip was more of a "scouting mission" and that he spent more time looking than actual fishing. On this outing no fish were visualized however the angler mentioned he may have had one bite.

On October 29th, angler #2 returned to the lake for a second outing. On this trip, he decided to bring his own jon boat for more stability when fly casting. Over the course of 4 hours, angler #2 had four different follows. He mentioned that two fish were ~24", one fish was a little smaller, and one fish was "considerably bigger". His estimation was the larger fish was around 28", and the smaller was around 22". The larger fish would likely be from the original planting of 35 fish in 2017 (which would be 5+ years in 2021). Angler # 2 mentioned with the flies and line type he brought made it difficult to "figure 8" on retrieves. Angler # 2 also mentioned on 2 occasions he was able to lure the muskie back to the boat multiple times by anchoring and working those areas.



Figure 9: Muskie from voluntary angler program 2021

Discussion

Muskellunge: 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 2021 findings indicated a CPUE of 0.0147 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 2021 rate would equate to 1.42 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. It is also important to note that muskie surveys are generally completed earlier in spring, while mature fish are moving to/from spawning sites. In 2021, it became evident that this window was missed as water temperatures were particularly high during the survey period. With netting results, alongside data acquired from the voluntary creel program, one could speculate fair survival from both 2019 and 2017 muskie plantings.

Several 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 (>530 mm or 21" total length) compared to other southern jurisdictions, which possess longer growing seasons.

In Wisconsin, average standard length for northern Wisconsin muskellunge at age 3+ 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). Of course, a greater sample size would be beneficial, but based on current growth rates we can likely expect the 2017 to reach 30" by 2022 (age 6), while the 2019 stock will likely reach 30" by 2023-2025.

In summary, consistent, low effort, non-intrusive monitoring will determine stock growth and condition.

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 success of natural recruitment and therefore the requirement for future stocking.

Yellow perch SVSFE plans to continue monitoring yellow perch response to predator introductions. Perch surveys will occur in conjunction with muskie surveys and will provide not only information on prey response but may potentially provide additional information on muskie and muskie natural recruitment success. Early in the fishery development stages, it was discussed with a predator introduction, the perch population dynamics may change and promote growth of the largest Individuals. It is also important to monitor the effects on abundance after introducing a top predator. 2021 survey results found very similar estimates of abundance in terms of CPUE. Also, there appears to be no notable changes in population dynamics as result of stocking muskellunge. Perhaps, in time these trends may become evident, but in terms of the 2021 surveys no trends were noted.

Dissolved Oxygen SVSFE has been monitoring late winter dissolved oxygen since 2016. In addition, late winter dissolved oxygen testing was also monitored on occasion in the late 1980's and mid 1990's. DO's have never appeared to be an issue, however in both late winter 2021 and 2018 readings may have been stressful for muskellunge in specific areas and depths within the lake. With current drought conditions and low water, this is something that should not be overlooked. If drought conditions continue, and water levels continue to drop, it becomes imperative that lake managers monitor these trends. If lake levels become concerning, it may be valuable to map beaver activity in the waterbodies adjacent to the lake, and if found plausible, blast beaver dams to bring up water levels prior to freeze up. This may seem non-traditional, but if it's the difference between loosing and saving a fishery, it is something to keep in mind.

Infrastructure & Regulations In fall 2021, the new road and landing area were cleared. In addition, SVSFE built three docks to be installed at the launching area. In early 2022, plans are to complete final touch-ups at the landing area along with the installation of docking infrastructure. Informational signage will also be of top priority. Being that the road is an active logging road, signage aimed to keep anglers safe will be prioritized. Beginning at the landing of Designated Route S, SVSFE plans to install a large "eye-catching" sign designed to warn anglers of the dangers associated with travelling active logging roads. At current, discussions amongst SVSFE, LP, and Forestry Branch are taking place as to exactly how this sign should be set up. Secondly will be directional signage. Directional signs plan to be installed at both km 2.5, and km 8. An "overflow parking sign" will likely be installed at km 8 as well. In addition, SVSFE is in works with the Manitoba Fly Fisher's Association (MFFA), and the Manitoba Esoc Association (MEA) about installing information signage at the lake's landing area. Included on this signage will be generic lake information, lake regulations, and proper catch and release techniques. SVSFE's proposed regulations for a winter closure and a one hook tackle restriction has been received by the province and are under review.

Future Monitoring Shortly after 2021 surveys began, it was noted the ideal sampling period had been missed. In general, through Ontario and the United States within the muskellunge natural geographic range, sampling protocols target mature individuals travelling to/from spawning sites. Now that SVSFE can expect a portion of the West Watjask population to be mature, we can also expect to target these fish in shallow spawning habitat during this period. For 2022, SVSFE has proposed to continue to monitor the fishery using Lake Superior Spring Haul trap nets, however earlier in the spring before water temperatures reach 15°. This effort will target pre-spawn muskie in suitable spawning habitat shortly after ice out (12-15 °). The province of Ontario has provided SVSFE with their spring sampling protocol - Spring Muskie Spawning Index (SMSI). SVSFE will use this methodology to conduct future stock assessments. Three perch nets will also be set to monitor response of the forage base. In addition, time will be spent observing shallow spawning habitats to document spring areas used by muskie, which will also help determine netting sites for future years.

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