WDNR Lake Superior Nearshore Comprehensive Report 2019

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Introduction

The Bayfield office of the Lake Superior Fisheries Management Team has historically focused most of its monitoring efforts on cold-water (primarily Lake Trout) fisheries. However, this approach has left the team with little information regarding the cool-water, nearshore fishery, which is a large component of the recreational fishery in Wisconsin waters of Lake Superior. Thus, the team dedicated new staff and more effort to monitoring the nearshore fishery starting in 2018, chiefly in the Chequamegon Bay area.

Chequamegon Bay is an approximately 13,750 ha, shallow (mean depth of 8.5 m) embayment on Wisconsin's south shore of Lake Superior (Figure 1). It is a very productive area of the lake and supports a diverse assemblage of fishes as well as serves as a restricted use area from high-efficiency fishing gears. The species targeted in the nearshore fishery assessment were Walleye, Smallmouth Bass, Yellow Perch, Northern Pike, and Lake Sturgeon. The assessment consists of a suite of sampling techniques during a period from spring ice-out to early October.

Methods

Summer Index - The summer index gillnet survey rotates between sampling the western arm during odd-numbered years and the Apostle Islands region (including two stations within Chequamegon Bay) during even-numbered years. These stations were sampled with 3,600 ft monofilament gangs composed of a series of 300 ft nets constructed with 1.5 to 7.0-inch mesh (stretch measure), by 0.5-inch increments. All stations were bottom sets fished for a 24 hr period using the R/V Hack Noyes in July or August. This survey has been conducted since 1973 and is the only survey that has representative time-series data for relative abundance of the nearshore fishery. Catch-per-unit-effort (CPE) was calculated using only the northernmost station (227, Washburn) for Smallmouth Bass and Walleye (total number of fish; i.e., no replicates), and the mean of both stations (i.e., including 273, Ashland Breakwall; two stations as replicates) for Yellow Perch and Northern Pike (Figure 1). These stations were selected because they are the only index stations that catch a representative number of the target species.

Ashland Walleye Assessment – The Ashland Walleye stock is primarily maintained by stocking of fingerlings by the WDNR, and spawning individuals have been surveyed sporadically in the past after spring ice-out with the most recent survey occurring in 2019. Spawning Walleye were sampled at four stations (Figure 1) using 5 ft fyke nets (2-inch stretch mesh; 4 hoops) with either 75 or 100 ft leads. Biological information was collected from all nearshore target species using standardized protocols, and fish were tagged with uniquely numbered Floy tags. Walleye dorsal spines (five fish per 0.5-inch length bin of each sex) and Northern Pike anal rays (five fish per 1-inch length bin of each sex) were collected and aged via cross-sections for age and growth analyses.

Smallmouth Bass Assessment – Smallmouth Bass were surveyed using nighttime (beginning 0.5 hour after sunset) boat-mounted electrofishing (pulsed DC current; 8-12 amps, duty = 25%, speed ~ 2.0 mph) along three transects on the Chequamegon Bay shoreline (each transect approximately 3.25 miles; Figure 1) during late May to early June. CPE was calculated as mean number of bass per mile sampled and was summarized for each individual transect (samples as replicates) as well as an overall mean CPE (transect means as replicates). Biological information was collected on all Smallmouth Bass using standardized protocols, and fish were tagged with uniquely numbered Floy tags. Dorsal spines were collected from ten Smallmouth Bass per 0.5-inch length bin and aged via cross-sections for age and growth analyses.

Lake Sturgeon Assessment – Lake Sturgeon were surveyed using gillnets near the Ashland Breakwall in late May. Gillnets were 400 or 800 ft monofilament gangs composed of 100 or 200 ft panels of 8, 10, 12, and 14 in mesh (stretch measure). This survey has been conducted in standard stations annually since 1988 with variable amounts of effort each year. CPE was calculated as number of sturgeon per 100 ft of gillnet for each mesh size (no replicates). Biological information was collected from all Lake Sturgeon using standardized protocols, and fish were tagged with uniquely numbered Floy tags and passive integrated transponder (PIT) tags.

Yellow Perch and Panfish Assessment – Yellow perch and other panfish game species were surveyed using fyke nets in the summer and fall in the southwest portion of Chequamegon Bay (i.e., Ashland/Whittlesey area), the eastern Kakagon/Sandcut wetland area, and the Sioux Sloughs outside of Chequamegon Bay (Figure 1). Fyke nets were 4 ft tall with 1-inch stretch mesh, three hoops, and either 50 or 75 ft leads. Nets were lifted for multiple days in the same stations, and CPE was calculated as mean number of fish per 24 hr net night (station/day combinations as replicates) grouped by location. Biological information was collected from fish using standardized protocols, and Yellow Perch > 7.0 in were tagged with uniquely numbered Floy tags. When possible, either otoliths or scales were collected from 15 Yellow Perch per 0.5-inch length bin. Age structures from other species captured in the survey were collected as time allowed.

October Gillnet Index – The October gillnet assessment was designed to create a relative abundance index for all target species (Walleye, Smallmouth Bass, Yellow Perch, and Northern Pike) during a season that is less biased regarding spawning dynamics (i.e., spring) and population distribution (e.g., summer) with adequate spatial coverage of Chequamegon Bay. Six stations distributed across the bay (Figure 1) were fished overnight (24 hr period) with bottom nets during the begining of October. Gillnets were 400 ft monofilament gangs composed of 50 ft nets constructed with 1.5 to 5.0-inch mesh (stretch measure), by 0.5-inch increments. CPE was calculated as mean number of fish per 100 ft of net (stations as replicates). Biological information was collected from fish using standardized protocols, and fish were tagged with uniquely numbered Floy tags.

Salmonid Nearshore Electrofishing Survey - Coaster Brook Trout and other nearshore salmonids were targeted with nighttime electrofishing under the LSTC Coaster Brook Trout Sampling protocol in the spring and fall. Locations for this survey were chosen to maximize spatial coverage among both the Red Cliff Band of Lake Superior Chippewa Fisheries Department and the Ashland Fish and Wildlife Conservation Office collaborating under the same protocol. Electrofishing specifications and sample design were in accordance with the LSTC Coaster Brook Trout Sampling protocol; however, we collected all salmonid species and all nearshore target species while sampling. Complete biological data was collected for each individual fish and each target fish of suffcient size received a uniquely numbered Floy tag. Data was summarized in the fashion laid out in the LSTC protocol and sent to appropriate collaborators. A summary of the catch data is laid out in this report.

Other Analyses – Age data from Walleye, Smallmouth Bass, and Yellow Perch were used to construct age-length keys (multinomial logistic regression models). Age-length keys were applied to all fish from the sample to assign each fish an age estimate. An adequate sample size of Northern Pike was not available to build an age-length key. Walleye and Smallmouth Bass growth rates were assessed using von Bertalanffy growth functions (nonlinear least squares regression models). Smallmouth Bass mortality was assessed using the standard catch curve method. An adequate sample size for Northern Pike was not available to assess mortality. Variable recruitment for Yellow Perch and Walleye violated the constant recruitment assumption of the catch curve method, so mortality was not assessed in this report.

Several measures of variation were also calculated along with mean CPE: relative standard error (RSE), standard error (SE), and lower and upper 95% confidence intervals. RSE can be interpreted similarly to a coefficient of variation (CV).

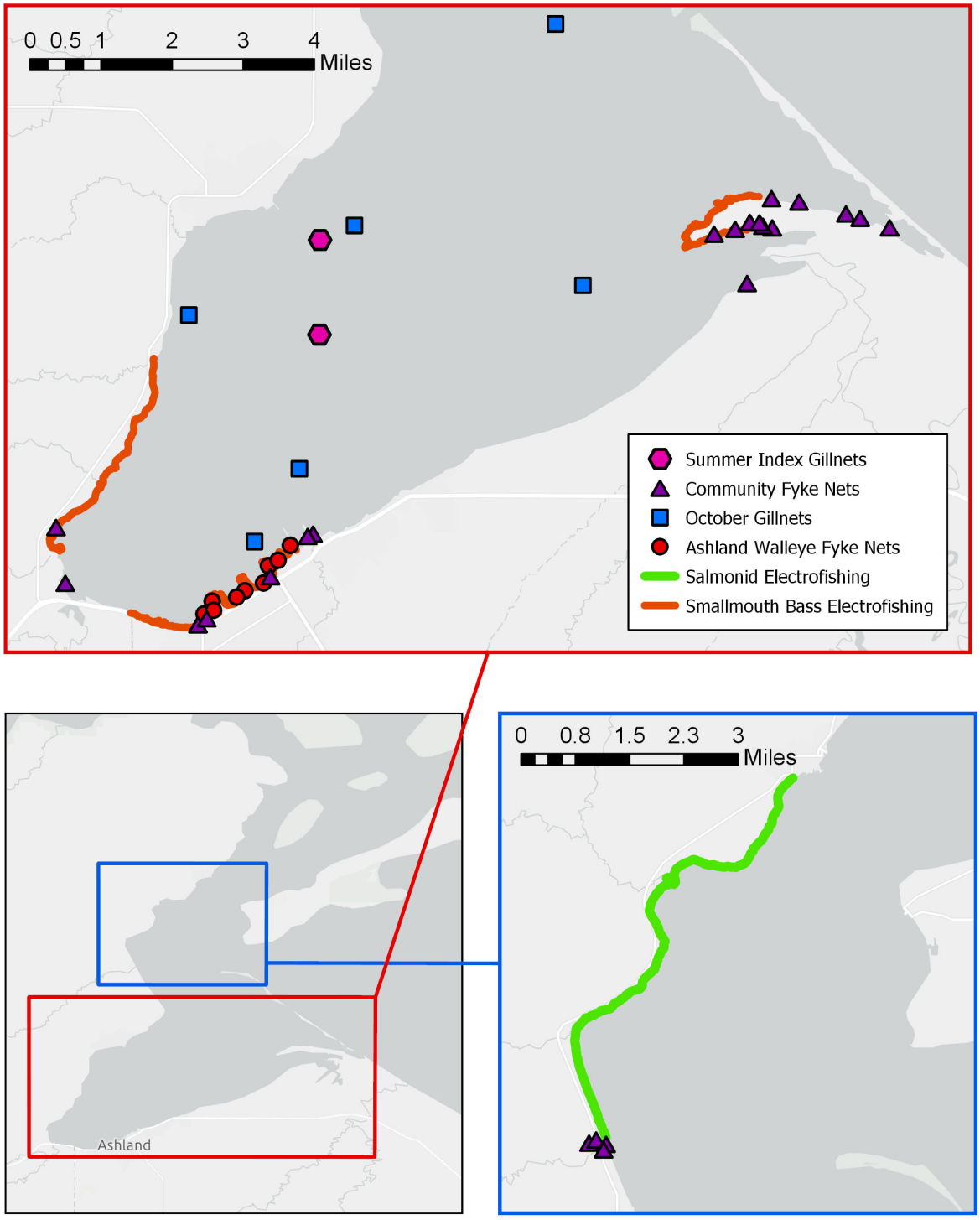

Figure 1. Map of the locations of six nearshore fishery assessments.

Results

Summer Index – The Chequamegon Bay stations are only sampled during even years so there is no 2019 update for this section. During the 2018 summer index gillnet survey, we caught a total of 47 Walleye, 30 Smallmouth Bass, 154 Yellow Perch, and 15 Northern Pike. Walleye relative abundance has been variable since 1973 (Figure 2), but it has been relatively stable for the past 12 years. The number of Smallmouth Bass caught at station 227 was similar to catches in the past 6 years (Figure 3). Smallmouth Bass abundance increased dramatically following establishment of more conservative harvest regulations and has been relatively stable since. The mean catch of Yellow Perch was similar to catches in the past 6 years (Figure 4). Yellow Perch relative abundance was high and variable in the 1970's and 1980's, but it has decreased since with less annual variation in abundance. The mean catch of Northern Pike has been variable throughout the time-series due to small sample sizes (Figure 5). However, Northern Pike abundance appears higher than in the 1970's and early 1980's. Even though small sample sizes and lack of replication make interpretation of these data difficult, the summer index is the only true time-series data for the nearshore fishery, and these stations should continue to be monitored.

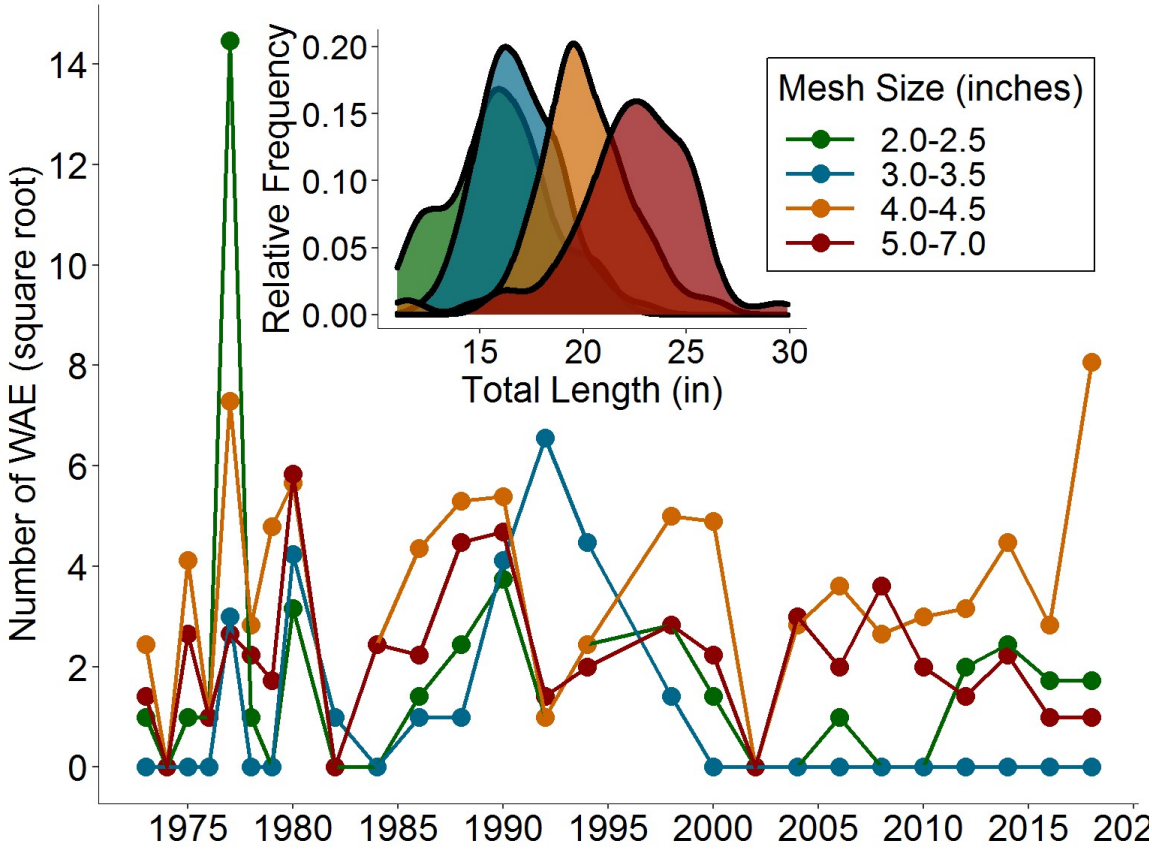

Figure 2. Time-series data from 1973 to 2018 of Walleye abundance (square-root transformed) by mesh size from the summer index gillnet assessment (Washburn station, 227). Inset figure represents size-selectivity of Walleye among gillnet mesh sizes.

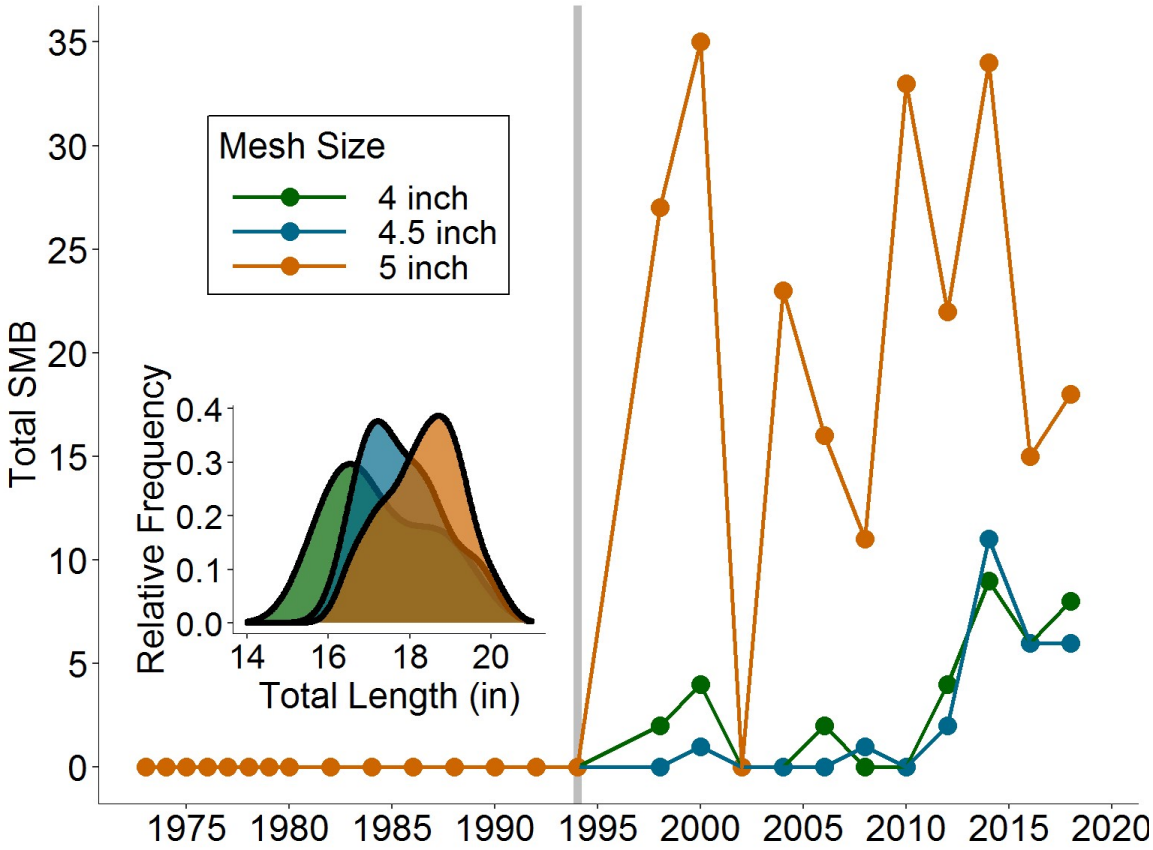

Figure 3. Time-series data from 1973 to 2018 of Smallmouth Bass abundance by mesh size from the summer index gillnet assessment (Washburn station, 227). Inset figure represents size-selectivity of Smallmouth Bass among gillnet mesh sizes. Vertical grey line represents 1994 when harvest regulations for Smallmouth Bass were changed to current, conservative regulations.

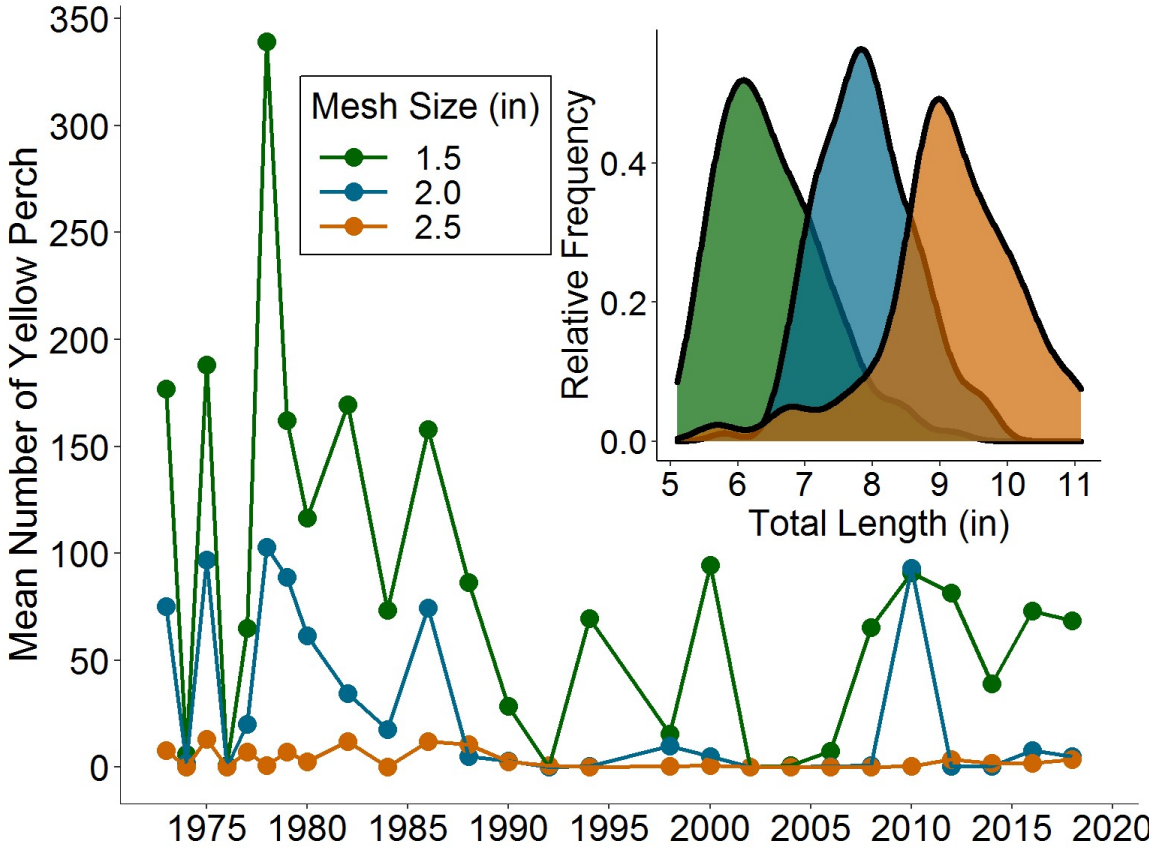

Figure 4. Time-series data from 1973 to 2018 of Yellow Perch abundance by mesh size from the summer index gillnet assessment (Washburn and Breakwall stations, 227 and 273). Inset figure represents size-selectivity of Yellow Perch among gillnet mesh sizes.

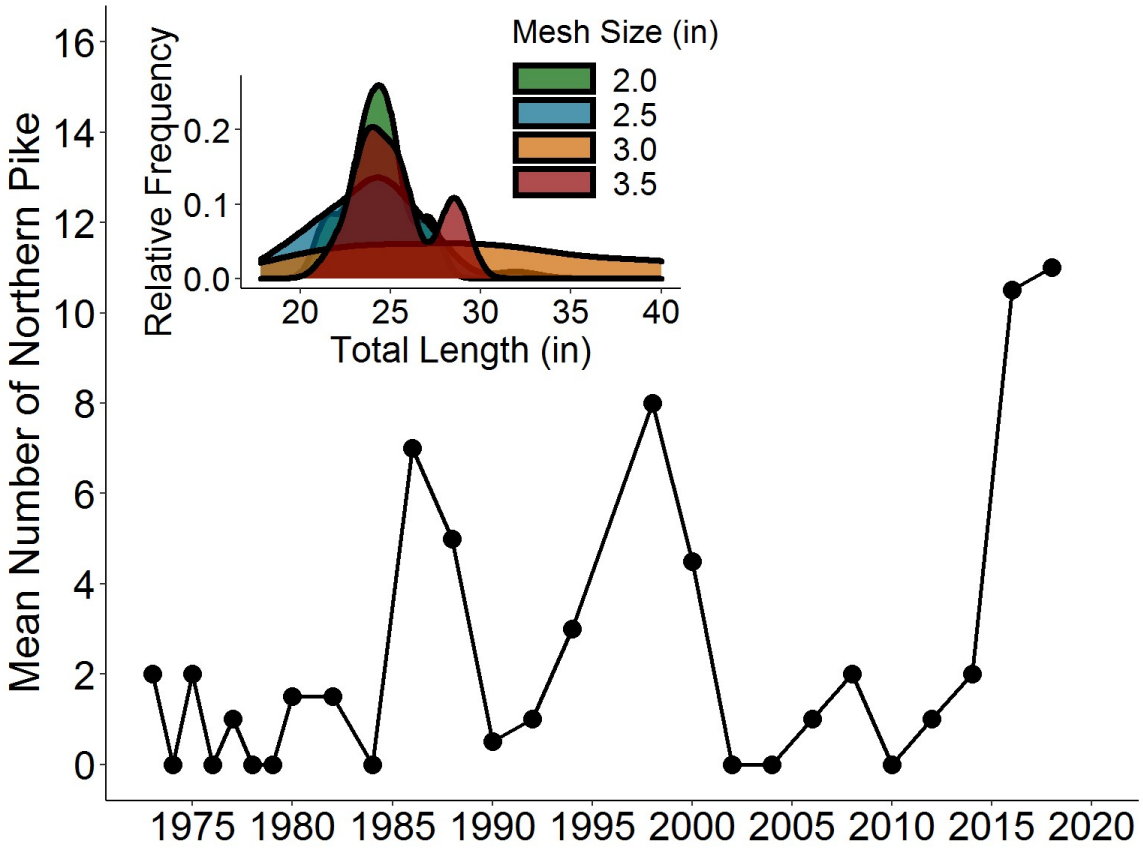

Figure 5. Time-series data from 1973 to 2018 of Northern Pike abundance from the summer index gillnet assessment (mean from Washburn and Breakwall stations, 227 and 273). Northern Pike did not exhibit gillnet mesh size-selectivity trends in this assessment (inset figure).

Ashland Walleye Assessment – During the 2019 Ashland spawning Walleye fyke net assessment we captured 3549 Walleye (400 males, 3128 females, and 21 unknown sex). A total of 2754 Walleye individuals were tagged with uniquely numbered Floy tags. The male Walleyes in the Ashland stock measured between 10.9. and 26.8 inches, with a mean size of *18.3* inches (Figure 6). Likewise, female Walleye in the Ashland stock measured between 14.9 and 31.9 inches, with a mean size of *21.3* inches (Figure 6).

Dorsal spines were collected from 215 Walleye (81 males 134 females) for aging. Male Walleye ages ranged from 2 and 25 with a mean age of 8 while female Walleye ages ranged from 3 and 25 with a mean age of 9. Despite the wide range in ages, the population was mainly comprised of ages 5 through 9 cohorts, and age-10 and older Walleye were rare (Figure 6). Chequamegon Bay Walleye are managed with a 5-fish daily creel, 15-inch minimum length, and 1 over 20-inch regulation. Growth trajectories of the Ashland Walleye stock indicate both males and females are over 15 inches before age 4, males on average reach 20 inches at age 8, and females on average reach 20 inches at age 6 (Figure 7). Mortality could not be assessed with a catch curve from this assessment due to erratic recruitment but will be investigated in detail in an upcoming comprehensive Chequamegon Bay Walleye analysis.

During the Ashland spawning Walleye Fyke Net assessment we captured 80 Northern Pike (12 males, 1 female, and 67 unknown sex). A total of 76 Northern Pike were tagged with uniquely numbered Floy tags. Male Northern Pike length ranged from 19.4. and 33.3 inches, with a mean size of *25.1* inches (Figure 8). The one known female that was captured was 25.5 inches (Figure 8). Chequamegon Bay Northern Pike are managed with a 2-fish daily creel, 26-inch minimum length limit. Based on 2018 data, individual Northern Pike reach 26 inches on average by age 4, but this is also likely sex-dependent. More data will be collected during a targeted spring Northern Pike spawning survey when conditions allow.

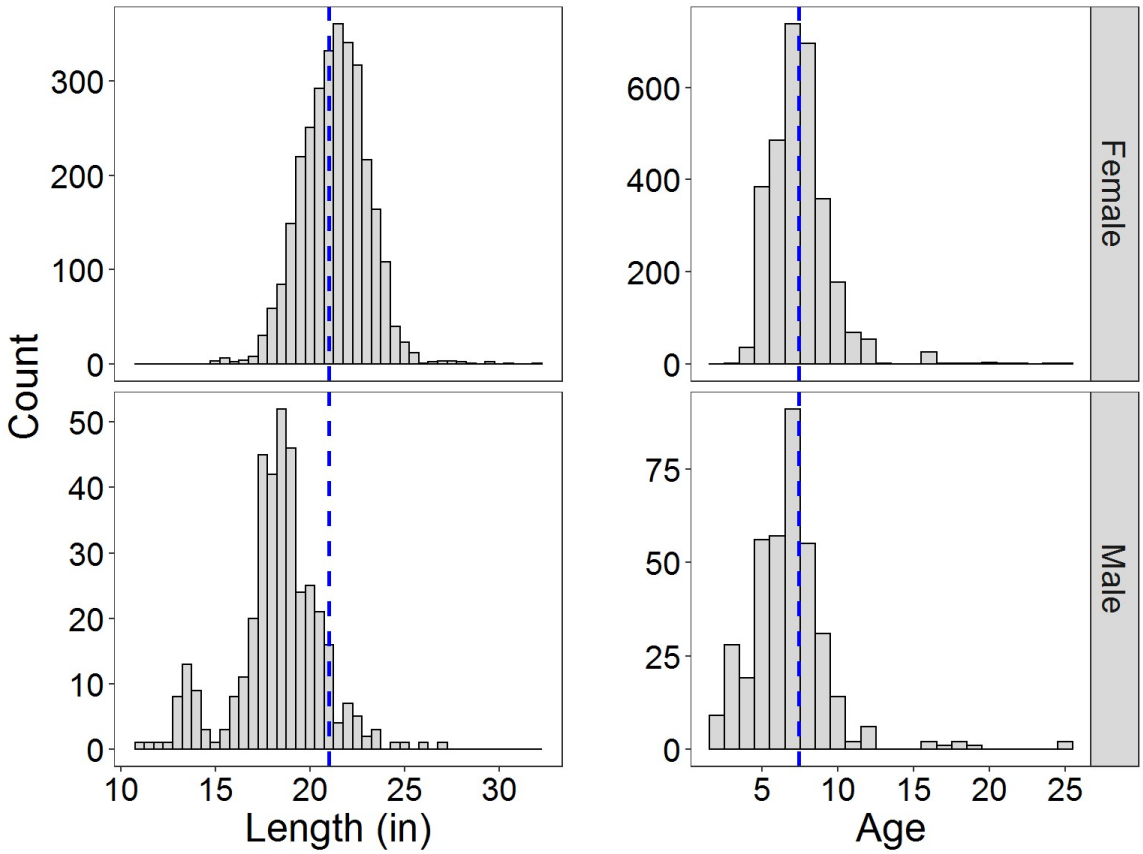

Figure 6. Length and age frequency histograms of male and female Walleye from the 2019 Ashland spawning Walleye fyke net assessment. The blue line represents the mean length and age of all Walleye sampled.

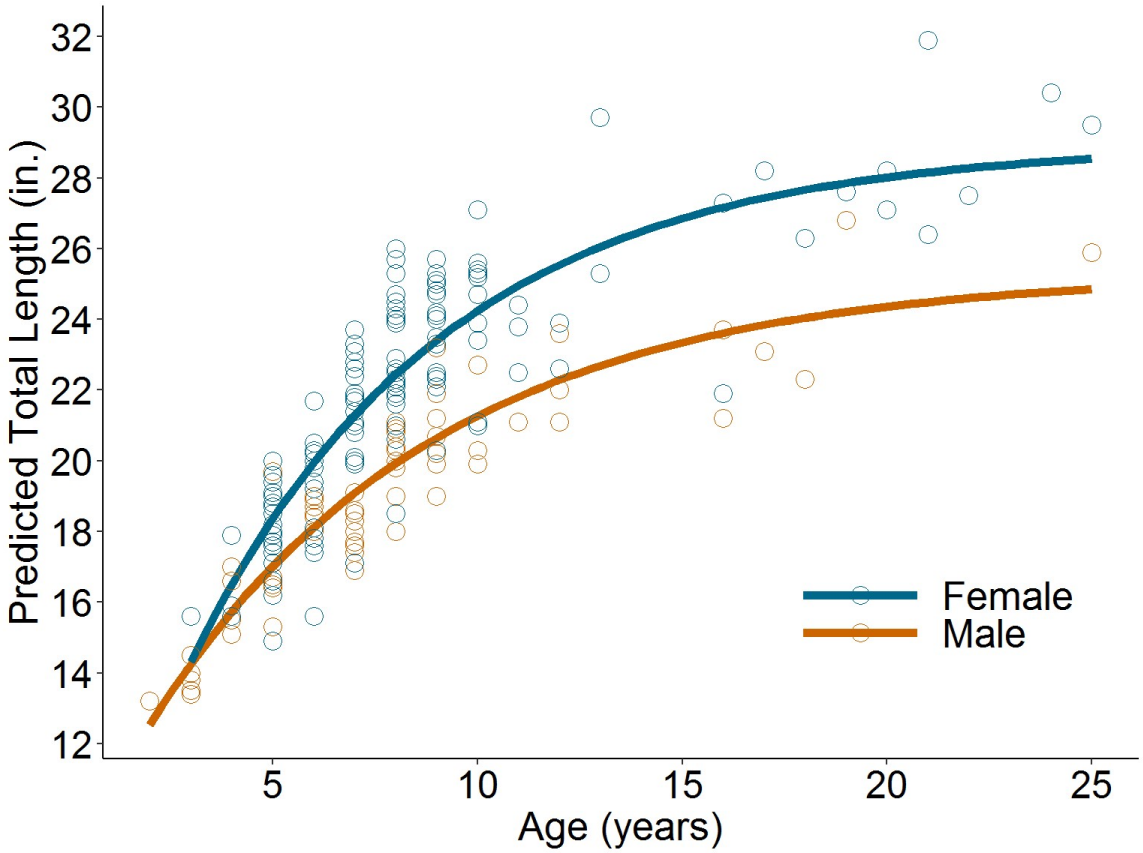

Figure 7. Male and female Walleye von Bertalanffy predicted growth trajectories (solid lines) and individual lengths-at-ages (circles) from the 2019 Ashland spawning Walleye fyke net assessment.

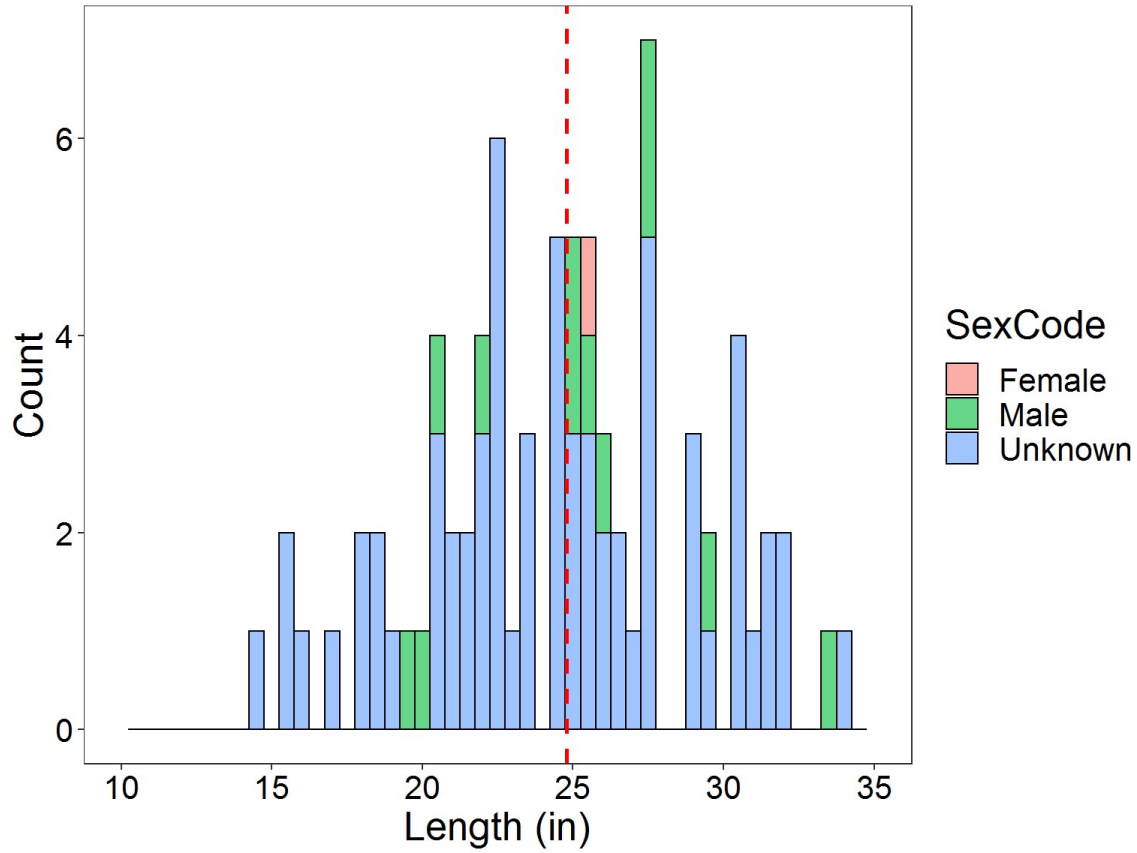

Figure 8. Length frequency histogram of all Northern Pike from the 2019 Ashland spawning Walleye fyke net assessment. The red line represents the mean length of all Northern Pike sampled.

Smallmouth Bass Assessment – During the 2019 spring Smallmouth Bass electrofishing survey we captured 219 Smallmouth Bass and tagged 216 with uniquely numbered Floy tags. The overall mean CPE from the three electrofishing transects was 10.48 bass/mile in 2018 and 11.51 bass/mile in 2019 (Table 1). The similarity in relative abundance between years indicates that this survey could be a reliable index of relative abundance for studying trends in the Chequamegon Bay Smallmouth Bass population. However, when looking at the spatial distribution of Smallmouth Bass between years, CPE was highest along the Ashland shoreline in 2018, but in 2019, the Kakagon/Sandcut shoreline had the highest CPE (Table 2) so tracking relative abundance by specific locations might not be possible if there is high variation by location between years. The relative abundance of the Chequamegon Bay Smallmouth Bass population ranks at approximately the 88th percentile when compared to all Wisconsin inland lakes (median 2.2 bass/mile; 160 lakes sampled in 2018-2019).

Length of Smallmouth Bass captured in the survey ranged between 6.8 inches and 20.3 inches with a mean length of *15.3* inches, and the majority of the individuals measured between 13 and 19 inches (Figure 9). One way to quantify size structure and compare with other populations is using Proportional Size Distribution (PSD) indices. These are based on standards of North American lengths for Smallmouth Bass. The size structure of the Chequamegon Bay population is excellent with many fish falling within the preferred" (14-17 inch; P) and “memorable” (17-20 inch; M) categories and some falling within the “trophy” (>20 inch; T) category. Compared to Wisconsin inland lakes, Chequamegon Bay Smallmouth Bass PSD (92), PSD-P (72), and PSD-M (30) ranked at approximately the 90, 95, and 93 percentiles, respectively (105 lakes sampled in 2015-2019 with > 30 fish in the sample). Size structure is much higher than in the early 1990’s before conservative harvest regulations were established. Smallmouth Bass growth has been stable throughout the past decade, and the 22-inch minimum length limit created a trophy fishery that is primarily catch-and-release (Figure 10). Overall, the Smallmouth Bass population has high abundance and large size structure compared to most populations in Wisconsin. In 2018 the most abundant age class in the survey was the age-5 cohort, and abundance decreased gradually and consistently in the following cohorts, suggesting consistent recruitment (Figure 9). In 2019, the most abundant age was still age-5, which is another indication of consistent patterns in recrutiment and mortality (Figure 9). Total mortality Z was 0.36 which is equivalent to an annual mortality A of 30.04% (Figure 11, Table 3). Since the 22-inch minimum length limit was put in place in 1994, Smallmouth Bass mortality has decreased, size structure has increased, and growth rates have remained relatively stable. For more detail on this assessment, such as comparisons to the long-term hook-and-line assessment, see the Chequamegon Bay Smallmouth Bass report.

Table 1. Overall mean CPE (fish/mile) estimates for each year, including error estimates and confidence intervals.

Year	Mean	Miles	RSE	SE	L 95% CI	U 95% CI
2018	10.48	19.30	44.85	4.70	1.27	19.69
2019	11.51	16.17	53.08	6.11	-0.47	23.49

Table 2. Mean CPE (fish/mile) estimates for each transect, including error estimates and confidence intervals from the 2018 and 2019 spring Smallmouth Bass electrofishing survey. Each transect was replicated except the Western transect.

Transect	Mean	Miles	RSE	SE	L 95% CI	U 95% CI
2018						
Ashland	19.49	9.39	9.90	1.93	15.71	23.27
Western	3.65	3.29	NA	NA	NA	NA
Kakagon	8.31	6.62	34.54	2.87	2.68	13.94
2019						
Ashland	9.90	6.26	38.69	3.83	2.39	17.41
Western	1.82	3.29	NA	NA	NA	NA
Kakagon	22.81	6.62	93.38	21.30	-18.94	64.56

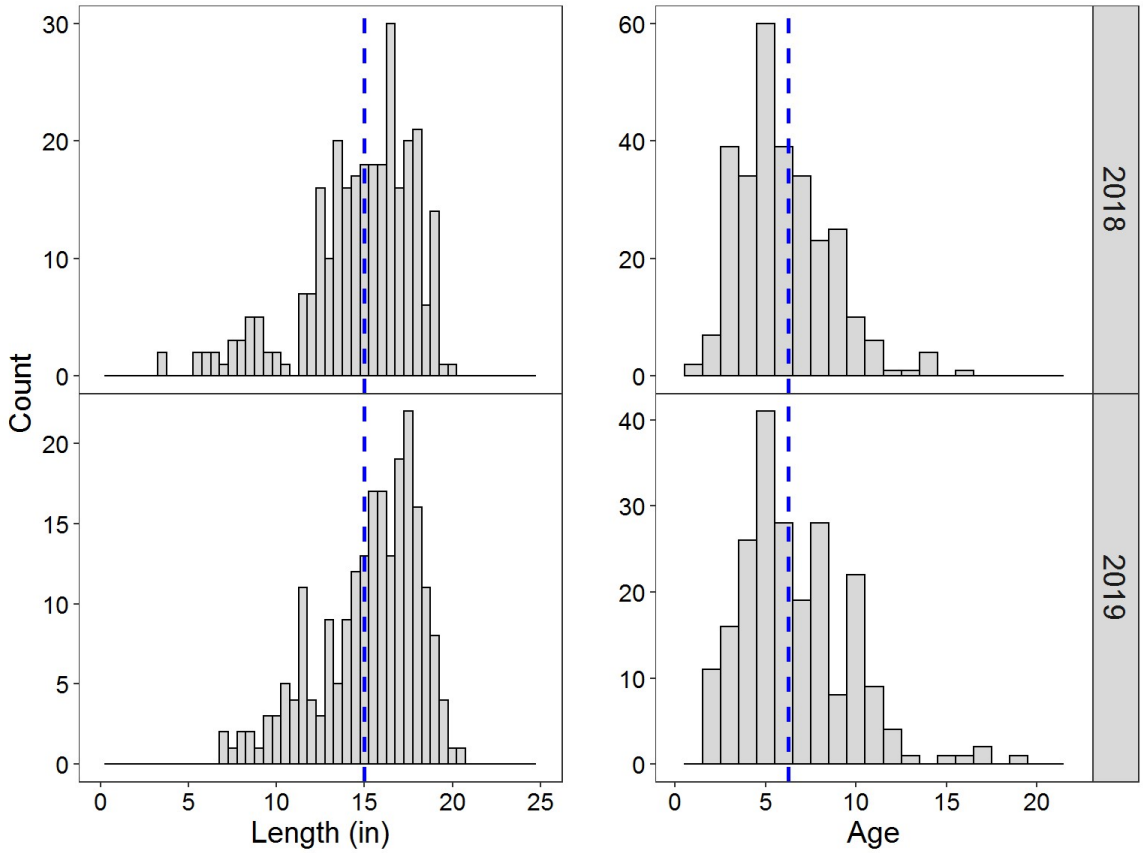

Figure 9. Length and age frequency histograms of Smallmouth Bass from the spring Smallmouth Bass electrofishing survey. The blue line represents the mean length and age of all Smallmouth Bass sampled.

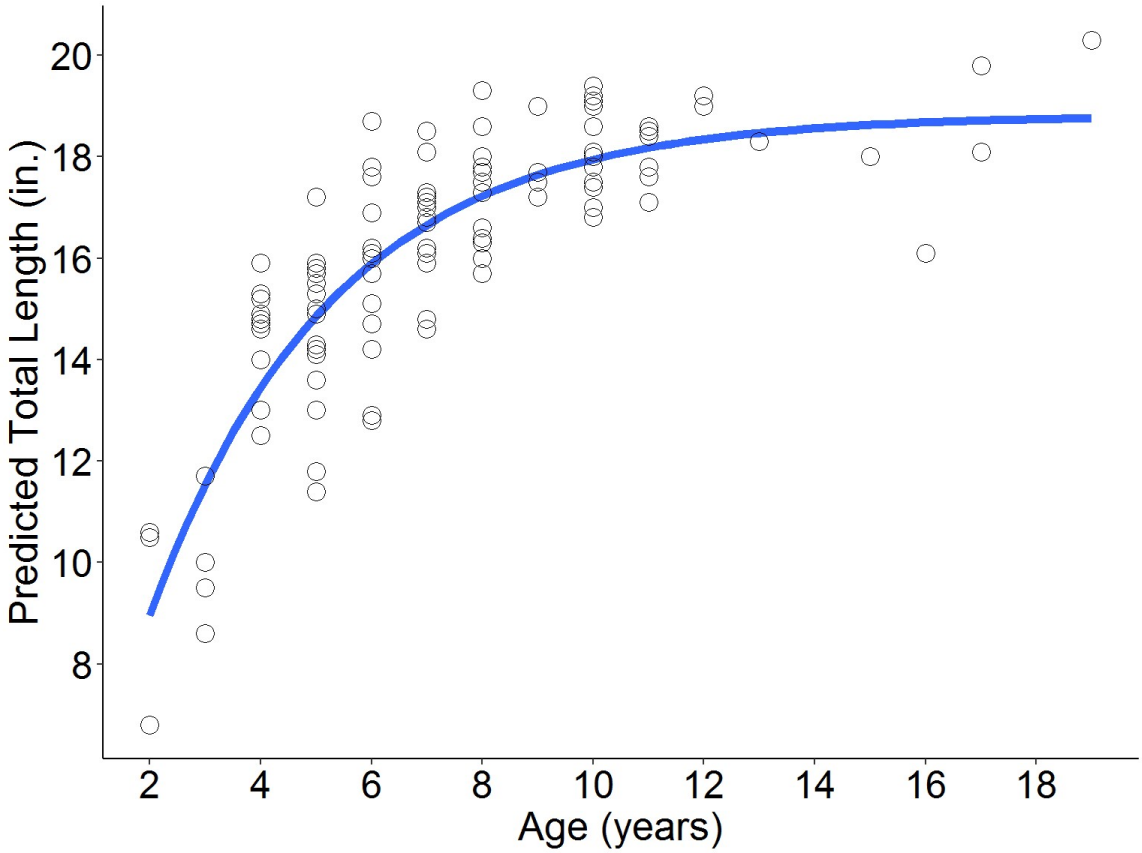

Figure 10. Smallmouth Bass von Bertalanffy predicted growth trajectory (solid line) and individual length-at-ages used to predict the growth trajectory (circles) from the 2019 spring Smallmouth Bass electrofishing survey.

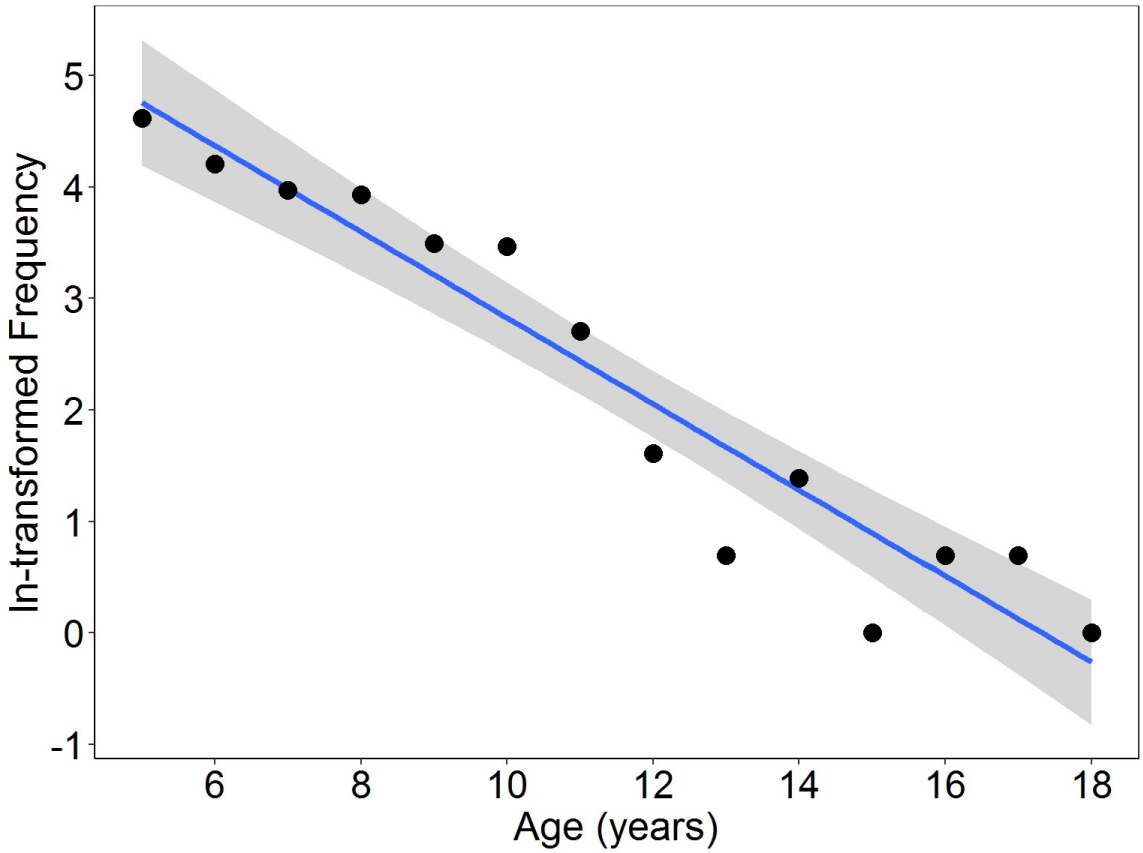

Figure 11. Smallmouth Bass catch curve (solid line) with 95% confidence interval (shaded area) from the 2019 spring Smallmouth Bass electrofishing survey. Z (instantaneous mortality) and A (annualized) are reported in the table below.

Table 3. Smallmouth Bass mortality rates and 95 percent confidence intervals estimated using a catch curve from the 2019 spring Smallmouth Bass electrofishing survey. Z is instantaneous mortality and A is annualized mortality.

	Mortality Rate	Standard Error	L 95% CI	U 95% CI
Instantaneous Z	0.36	0.03	0.29	0.42
Annualized A (%)	30.04	NA	25.41	34.39

Lake Sturgeon Assessment – During the 2019 Lake Sturgeon spring gillnetting assessment, we captured 33 sturgeon including 6 recaptures. Lake Sturgeon CPE has increased since 1998, but variable sites each year may influence CPE trends (Figure 12). Mean total length of Lake Sturgeon from the 2019 survey was *45.9* inches (range = 28.2 – 58.6 inches) but is influenced by mesh size selectivity (Figure 13). Lake Sturgeon are not believed to spawn in Chequamegon Bay during spring, but they likely reside here between seasonal movements along the south shore of Lake Superior. The approved regulation change from a 50-inch minimum length limit to a 60-inch minimum length limit in 2020 could help continue the increase in CPE observed since the increase from 40 inches to 50 inches in 1991.

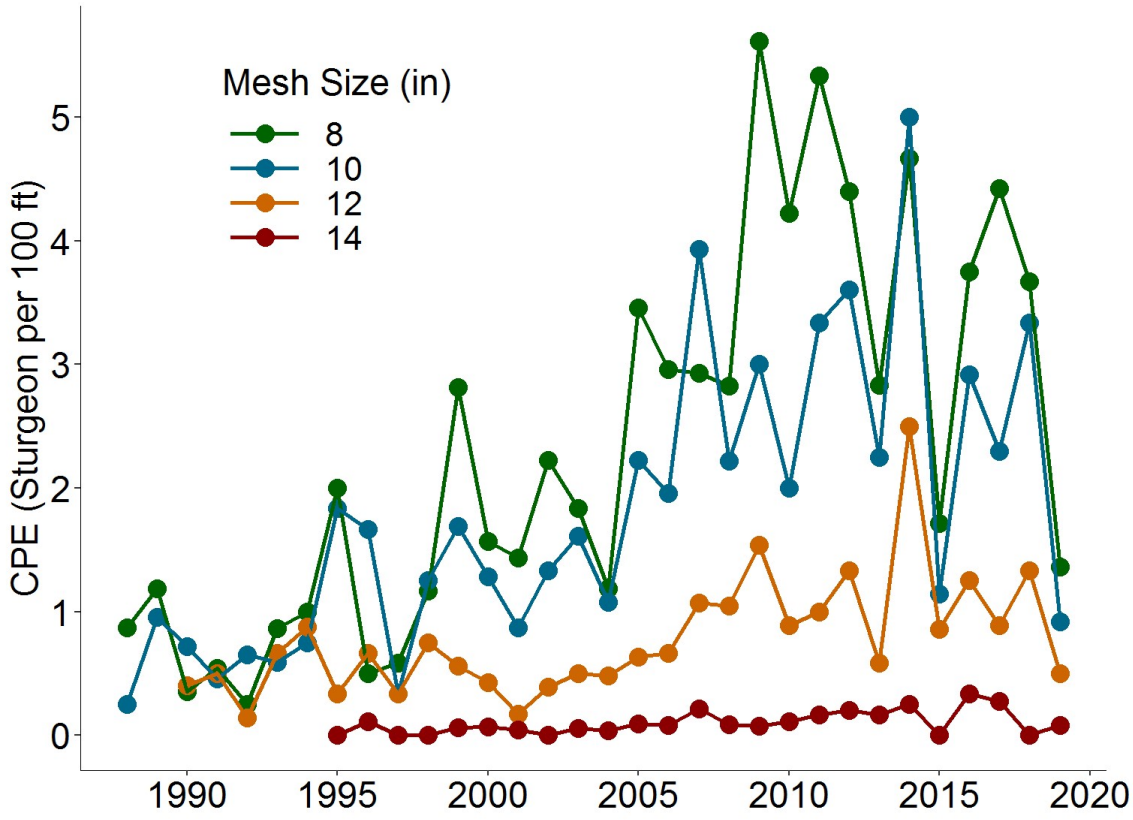

Figure 12. Time-series data from 1988 to 2019 of Lake Sturgeon CPE by mesh size from the Chequamegon Bay Lake Sturgeon spring gillnet assessment.

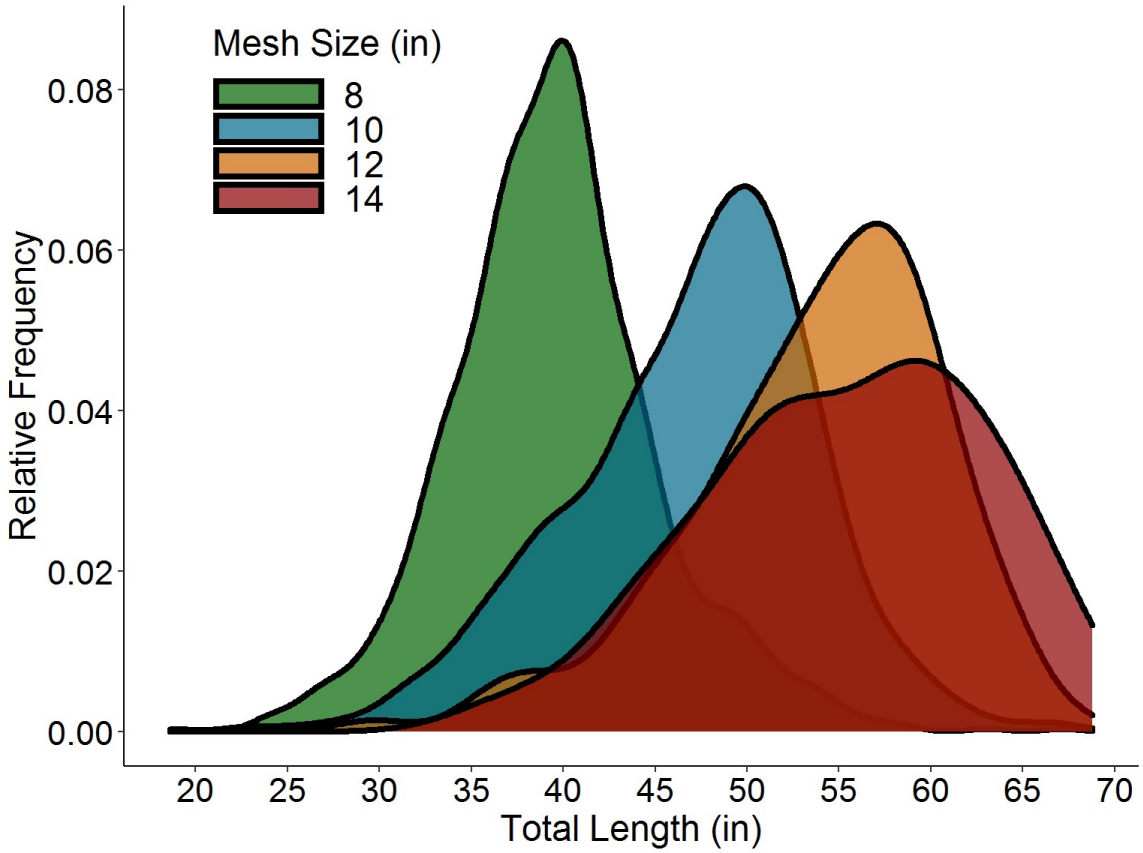

Figure 13. Size-selectivity among gillnet mesh sizes from the Chequamegon Bay Lake Sturgeon spring gillnet assessment during 1998 to 2019.

Yellow Perch and Panfish Assessment – During the 2019 Yellow Perch and Panfish fyke net assessment we captured 2264 Yellow Perch, 569 Pumpkinseed, 190 Rock Bass, 24 Smallmouth Bass, 85 Bluegill, and 14 Black Crappie. Mean CPEs were similar during both years of sampling for almost all species including the target species of the assessment (Table 4; Figure 14). Yellow Perch were the most abundant species captured in the assessment followed by Bullhead spp and Pumpkinseed (Figure 14). The similarities in CPEs between both years shows the potential for this survey to serve as an index of relative abundance of the target species. When broken down by location, variation in CPE decreased for the target species indicating high spatial variability of the nearshore populations (Table 5). Although Table 5 only shows 2019 data due to the desire to limit the length of the table, the substantial decrease in variation in CPE when grouping by location was also seen in 2018. When looking at species' dominance by location, Yellow Perch were dominant in the Ashland Shoreline, Sioux Sloughs, and Whittlesey Shoreline sets while Bullhead spp were dominant in the Kakagon/Sandcut Sloughs sets (Figure 15). Length distributions of Bluegill, Pumpkinseed, Rock Bass, and Yellow Perch were similar both years of the survey (Figure 16). Low sample sizes of Black Crappie and Smallmouth Bass in 2019 prevents length distribution comparisons between years for these species. Using scale and otoltih ages, a growth curve was constructed for Yellow Perch (Figure 17). The Yellow Perch collected in this assessment reached approximately 7 inches by age-4 and 9 inches by age-6 (Figure 17).

Table 4. Mean CPE (fish/net night) estimates of six species from all sampling locations during each year of the Yellow Perch and Panfish fyke net assessment (station/day combinations as replicates) along with measures of variation (details in methods).

Species	Mean	Net Nights	RSE	SE	L 95% CI	U 95% CI
2018						
Black Crappie	2.09	35	28.23	0.59	0.93	3.25
Bluegill	3.49	35	48.71	1.70	0.16	6.82
Pumpkinseed	16.54	35	27.21	4.50	7.72	25.36
Rock Bass	3.77	35	14.06	0.53	2.73	4.81
Smallmouth Bass	2.71	35	34.69	0.94	0.87	4.55
Yellow Perch	60.40	35	39.21	23.68	13.99	106.81
2019						
Black Crappie	0.28	50	39.29	0.11	0.06	0.50
Bluegill	1.70	50	45.29	0.77	0.19	3.21
Pumpkinseed	11.38	50	28.82	3.28	4.95	17.81
Rock Bass	3.80	50	17.63	0.67	2.49	5.11
Smallmouth Bass	0.48	50	37.50	0.18	0.13	0.83
Yellow Perch	45.28	50	40.55	18.36	9.29	81.27

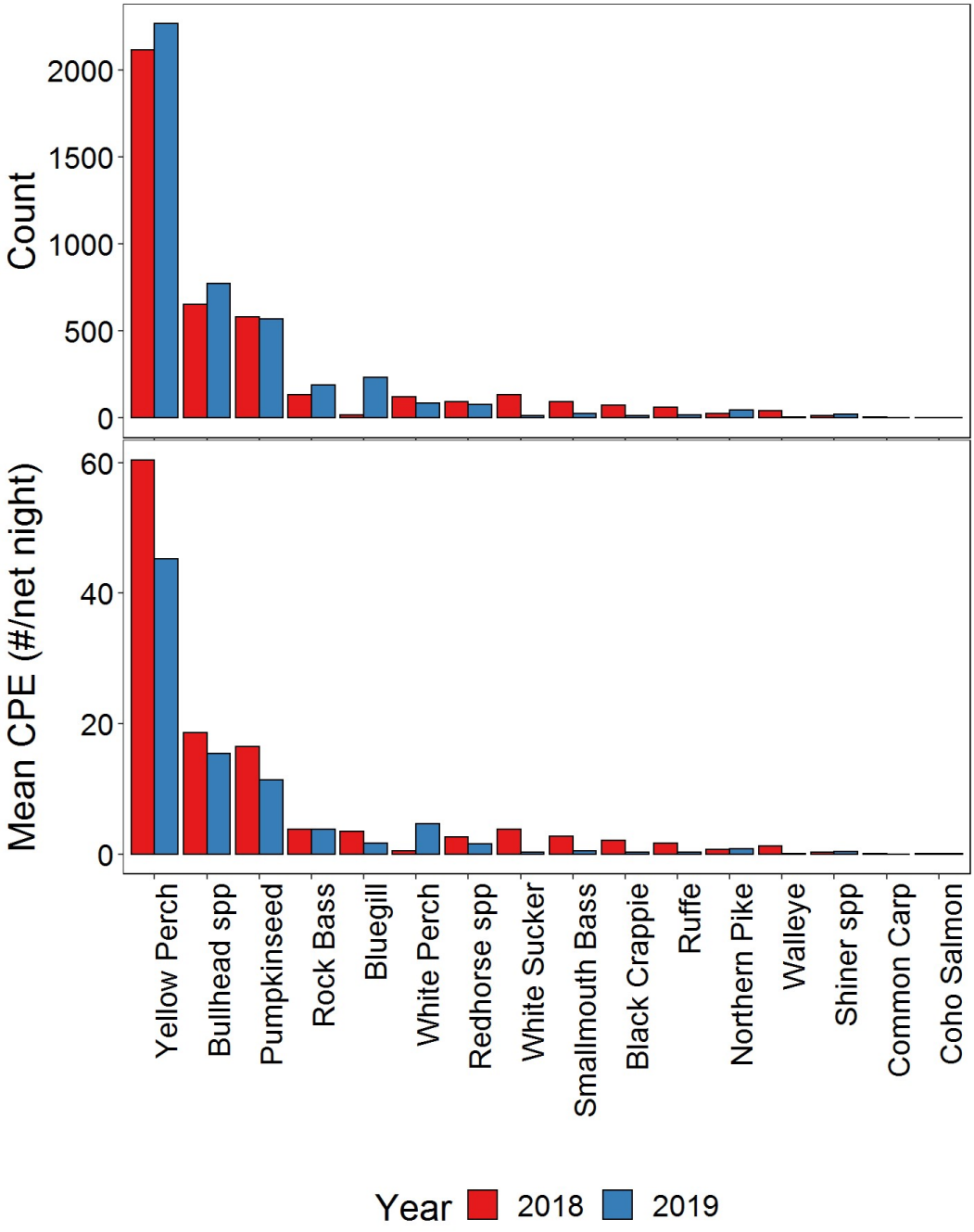

Figure 14. Counts and mean CPEs (#/net night) of all species captured in the Yellow Perch and Panfish fyke net assessment for each year.

Table 5. Mean CPE (fish/net night) estimates of six species by general sampling locations during the 2019 Yellow Perch and Panfish fyke net assessment (stations as replicates) along with measures of variation (details in methods).

Area	Mean	RSE	SE	L 95% CI	U 95% CI
Black Crappie					
Ashland Shoreline	0.21	38.10	0.08	0.05	0.37
Kakagon/Sancut Sloughs	0.19	63.16	0.12	-0.05	0.43
Bluegill					
Ashland Shoreline	2.50	82.40	2.06	-1.54	6.54
Kakagon/Sancut Sloughs	0.07	57.14	0.04	-0.01	0.15
Pumpkinseed					
Ashland Shoreline	11.27	49.16	5.54	0.41	22.13
Kakagon/Sancut Sloughs	1.01	56.44	0.57	-0.11	2.13
Whittlesey Shoreline	7.92	81.06	6.42	-4.66	20.50
Rock Bass					
Ashland Shoreline	2.91	17.87	0.52	1.89	3.93
Kakagon/Sancut Sloughs	2.51	36.65	0.92	0.71	4.31
Sioux Sloughs	0.17	58.82	0.10	-0.03	0.37
Whittlesey Shoreline	2.50	80.00	2.00	-1.42	6.42
Smallmouth Bass					
Ashland Shoreline	0.61	86.89	0.53	-0.43	1.65
Kakagon/Sancut Sloughs	0.33	45.45	0.15	0.04	0.62
Whittlesey Shoreline	0.06	100.00	0.06	-0.06	0.18
Yellow Perch					
Ashland Shoreline	6.84	34.94	2.39	2.16	11.52
Kakagon/Sancut Sloughs	7.69	40.96	3.15	1.52	13.86
Sioux Sloughs	14.83	24.81	3.68	7.62	22.04
Whittlesey Shoreline	131.06	68.24	89.44	-44.24	306.36

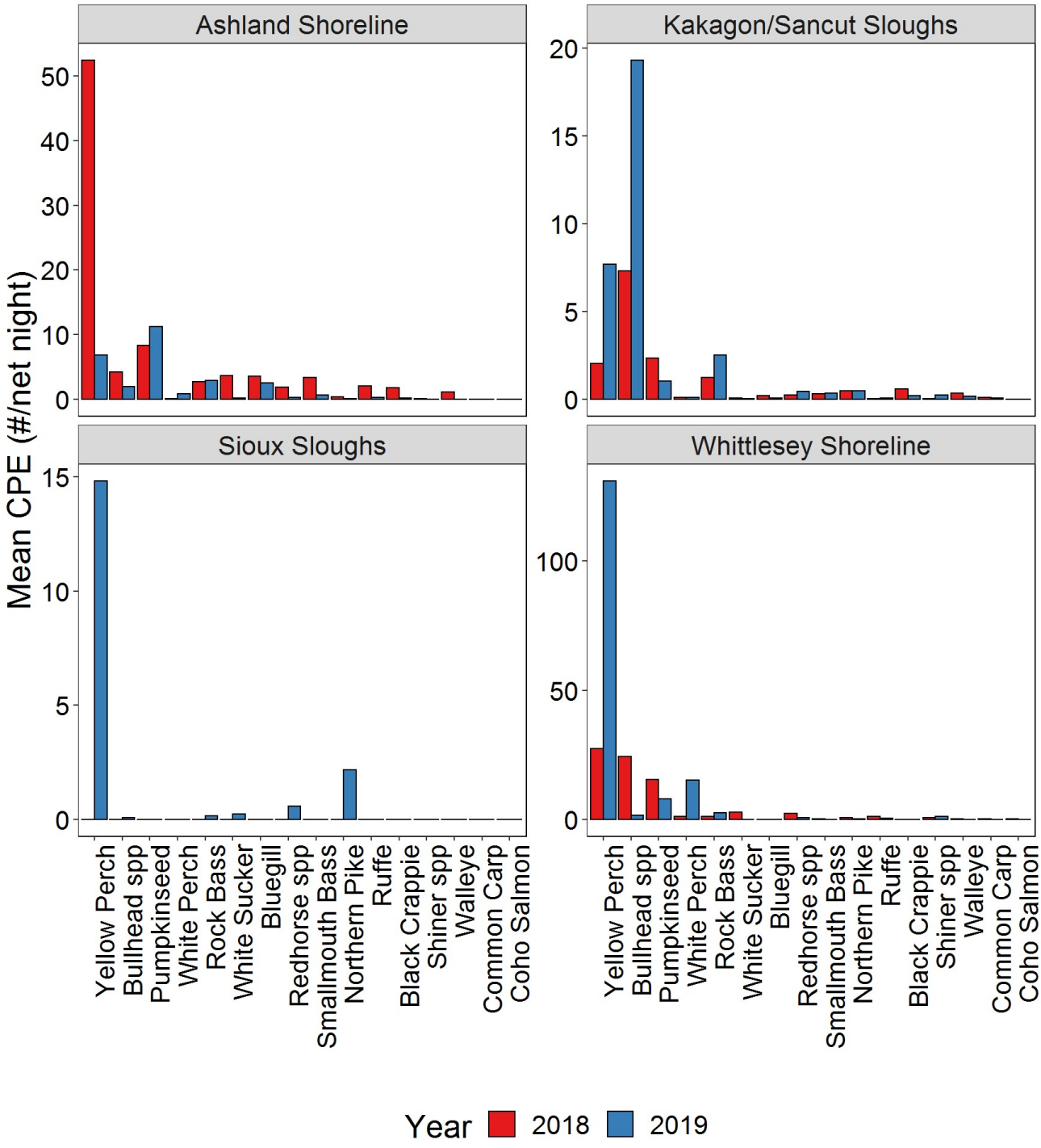

Figure 15. Mean CPE (#/net night) for each location sampled by year during the Yellow Perch and Panfish fyke net assessment.

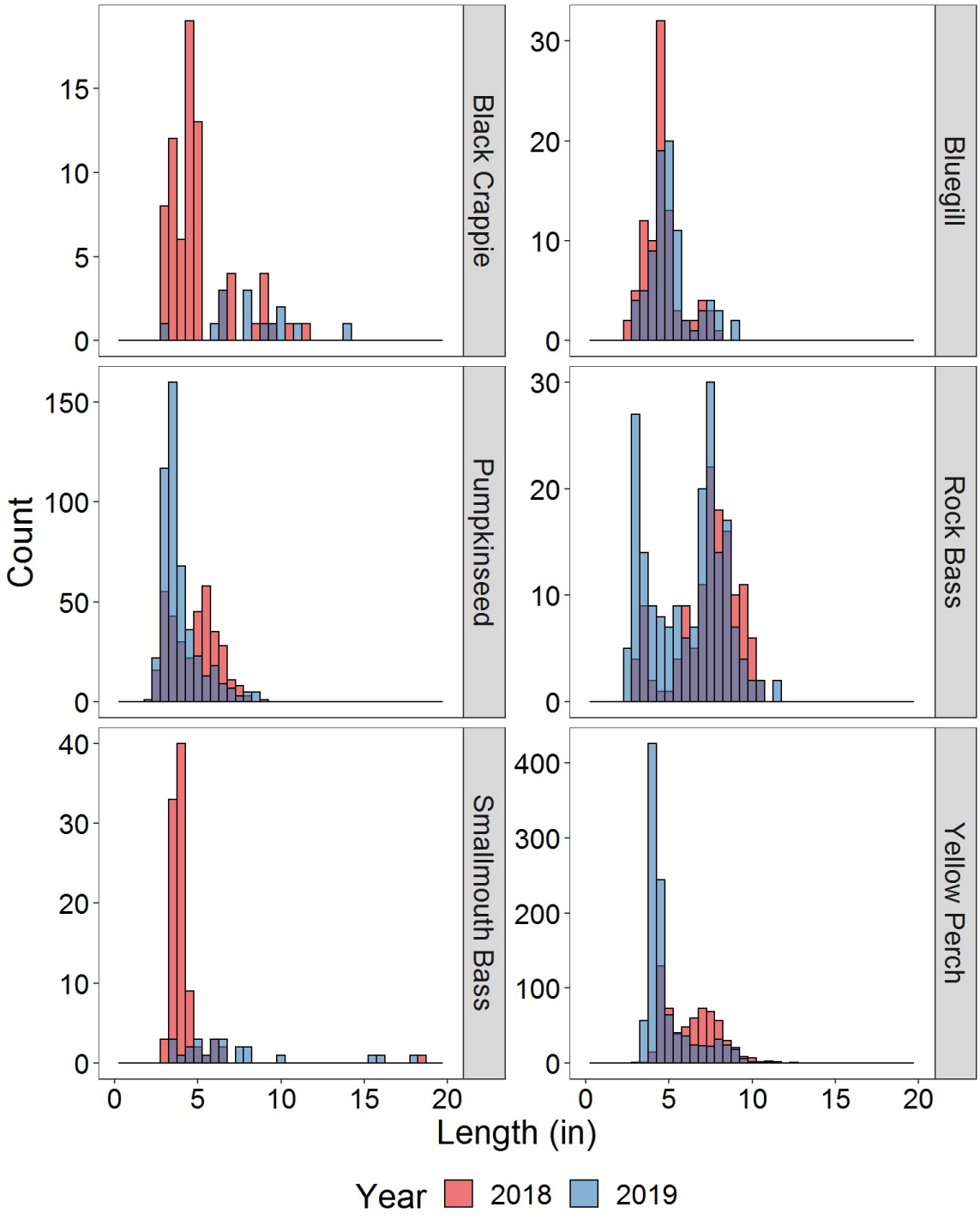

Figure 16. Length distributions of the target species of the Yellow Perch and Panfish fyke net assessment.

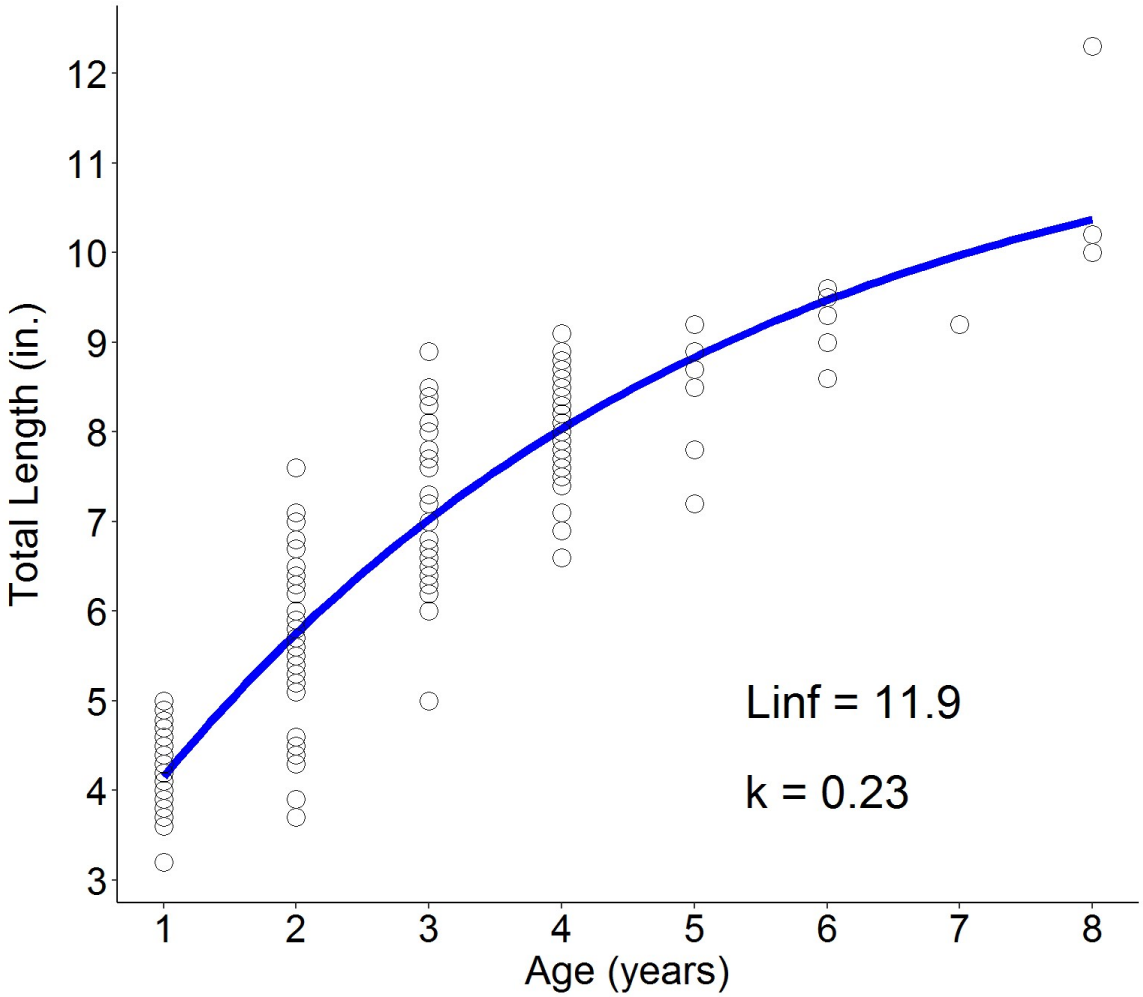

Figure 17. Von bertallanfy growth curve for Yellow Perch collected during the 2019 Yellow Perch and Panfish fyke net assessment.

October Gillnet Index – During the 2019 October Gillnet Index, we captured 46 Walleye, 66 Yellow Perch, 21 Northern Pike, and 9 Smallmouth Bass (Table 6). The overall counts were similar in 2018 and 2019, however six station were sampled in 2019 so CPE was much lower in 2019 than 2018 (Table 6). Length frequencies of the target species were similar between years (Figure 18). Only two years have been completed so far with all six sites completed in only 2019, therefore it is difficult to assess trends in CPE. Preliminary results suggest this survey could provide adequate estimates of relative abundance for the four target species throughout Chequamegon Bay.

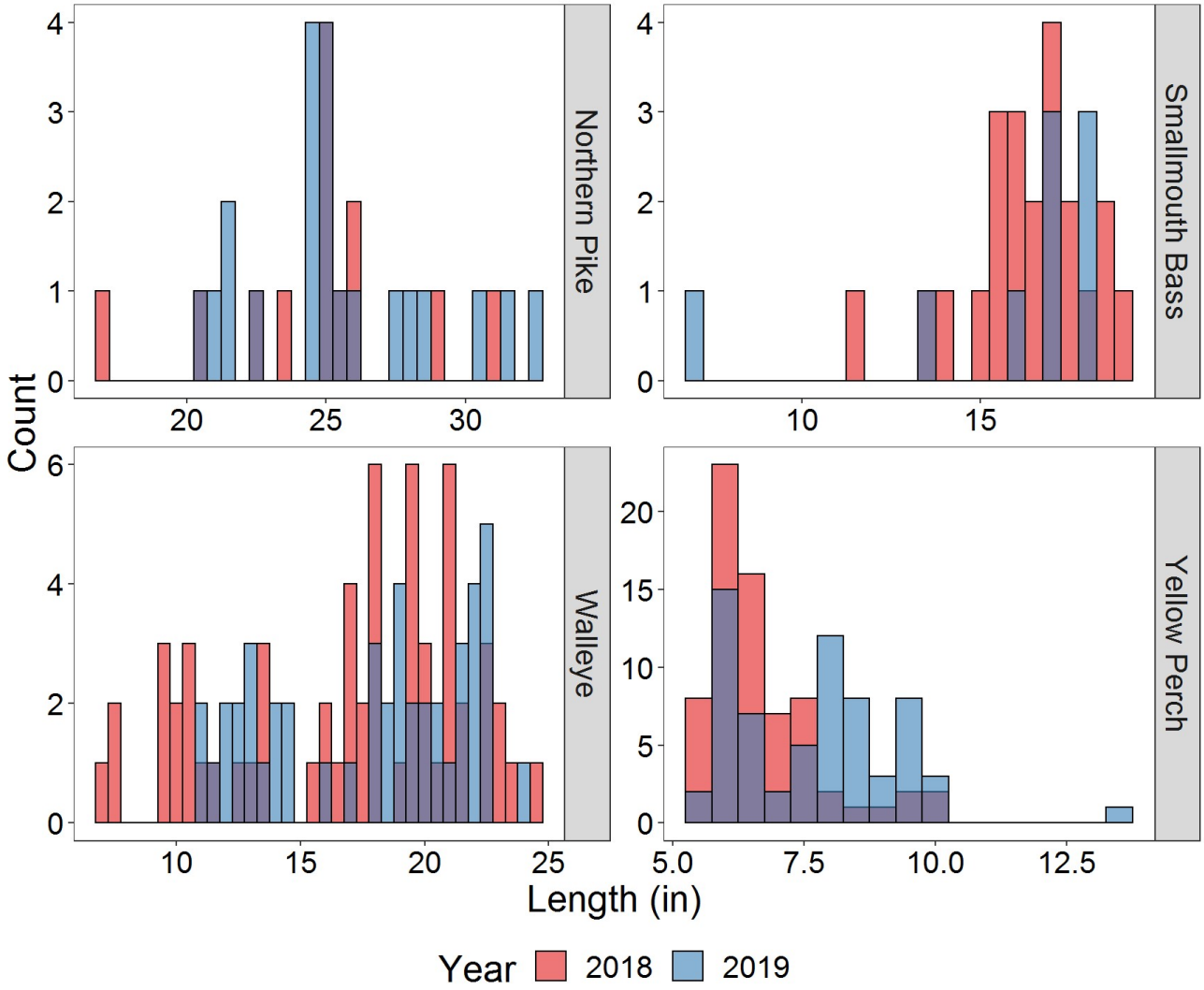

Figure 18. Length frequency histograms of target species from the October gillnet index for each year.

Table 6. Mean CPE (fish/100 ft) estimates of target species fron the October gillnet index (stations as replicates) along with measures of variation (details in methods). Only two of the six stations were sampled in 2018 due to weather constraints.

Species	Counts	Net Nights	Mean CPE	RSE	SE	L 95% CI	U 95% CI
2018							
Northern Pike	13	2	1.62	38.46	0.62	0.40	2.85
Smallmouth Bass	22	2	2.75	45.45	1.25	0.30	5.20
Walleye	60	2	7.50	66.67	5.00	-2.30	17.30
Yellow Perch	70	2	8.75	14.29	1.25	6.30	11.20
2019							
Northern Pike	21	6	0.88	42.22	0.37	0.15	1.60
Smallmouth Bass	9	6	0.38	63.83	0.24	-0.09	0.84
Walleye	46	6	1.92	26.87	0.52	0.91	2.93
Yellow Perch	66	6	2.75	56.04	1.54	-0.27	5.77

Nearshore Salmonid Electrofishing Survey

During the 2019 spring Nearshore Salmonid Electrofishing Survey, fish captured included 1 Brown Trout and 3 Coho Salmon (Table 7). During the 2019 fall, fish captured included 15 Brown Trout, 27 Coho Salmon, and 38 Rainbow Trout (Table 7). Fall mean CPE was higher than Spring CPE and the amount of variation in CPE among transects was higher in the Spring due to the low number of fish captured (Table 7). A wide range of length distributions were observed for Brown Trout and Rainbow Trout; however, most Coho Salmon captured in the fall were similar in size (Figure 19). Because only one year of the survey has been completed, we can not assess trends in CPE. Based on the first year, it appears that the salmonid species are more vulnerable to this sampling method in the fall. Completing additional years of sampling will be beneficial to fully understand how this survey could be utilized. As of right now, the survey is mainly being conducted to assist the LSTC Coaster Brook Trout Working Group but could potentially be used to assess relative abundance of salmonids along the shoreline in the spring and the fall, and more survey locations will be added to this assessment.

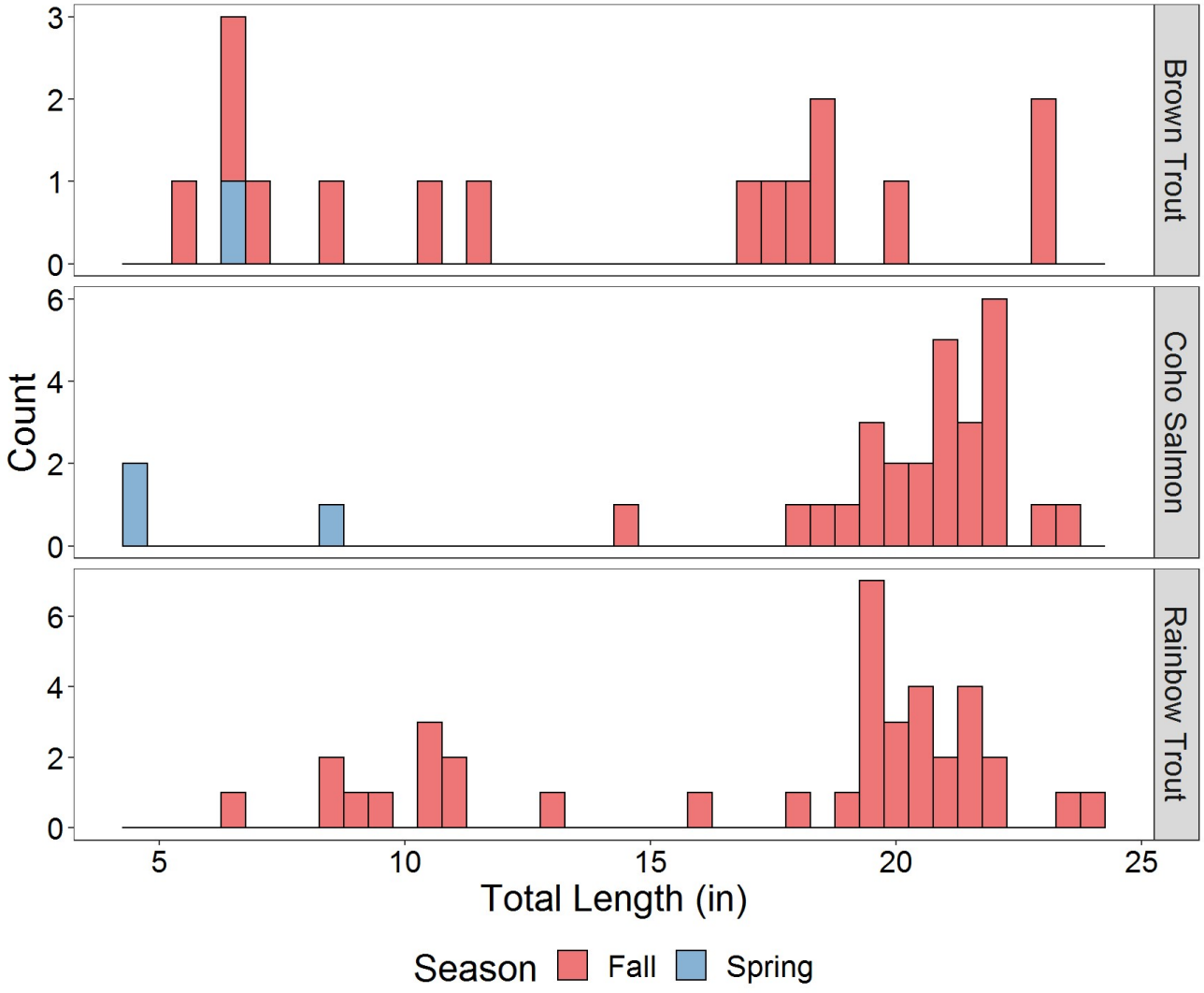

Figure 19. Length frequency histograms of salmonid spp from the Nearshore Salmonid Shocking survey.

Table 7. Mean CPE (fish/mile) estimates of salmonid spp (km transects as replicates) along with measures of variation (details in methods) from the Nearshore Salmonid Shocking survey. Distance is reported in miles in this report for consistency although one km transects were surveyed as per LSTC protocol.

Species	Counts	Miles	Mean CPE	RSE	SE	L 95% CI	U 95% CI
2019 Fall							
Brown Trout	15	6.21	2.41	34.85	0.84	0.76	4.06
Coho Salmon	27	6.21	4.35	60.69	2.64	-0.82	9.52
Rainbow Trout	38	6.21	6.12	28.27	1.73	2.73	9.51
2019 Spring							
Brown Trout	1	4.35	0.23	100.00	0.23	-0.22	0.68
Coho Salmon	3	4.35	0.69	69.57	0.48	-0.25	1.63