

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

CHEQUAMEGON BAY FALL ASSESSMENT REPORT 2020

DRAY CARL

DNR Lake Superior Fisheries Management Team

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INTRODUCTION

Chequamegon Bay is a 34,000-acre, shallow (mean depth of 28 feet) embayment on Wisconsin's south shore of Lake Superior (Figure 1). It is a productive, nearshore area of the lake, supports a diverse assemblage of fish and serves as a restricted use area from high-efficiency commercial gears. The Chequamegon Bay Fall Assessment was developed to provide an index of relative abundance for important recreational species (Walleye, Yellow Perch, Northern Pike and Smallmouth Bass) using a gear that is effective at capturing representative amounts of all nearshore target species during a season that is not biased by spawning dynamics. The use of gill nets in Chequamegon Bay also provides better spatial coverage of the study area relative to other types of sampling gears.

METHODS

In 2018, 2019 and 2020, Walleye, Smallmouth Bass, Northern Pike and Yellow Perch were targeted with graded-mesh, monofilament gill nets (400-ft gangs composed of 50-ft nets constructed with 1.5 to 5.0-in. mesh by 0.5-in. increments). Gill nets were fished overnight (24-hrs) in six fixed locations (Figure 1) using the R/V Hack Noyes to avoid unnecessary cancellation of sampling due to typical fall weather (3 sites/day; 2 overall days) during the beginning of October.

All target species were measured (nearest 0.1 inch), weighed (when possible; nearest gram) and tagged with a uniquely numbered Floy tag on the left side of the dorsal fin. Tag and mark data were recorded for all recaptured fish. Non-target species were also measured or counted depending on the total number and time constraints. Dorsal spines were taken from Walleye and Smallmouth Bass and anal rays were taken from Northern Pike. Sagittal otoliths were taken from all deceased individuals of each target species. External marks or diseases (e.g., sea lamprey wound, lympho sarcoma, etc.) were noted.

Relative abundance (mean CPE) was calculated as mean number of fish per 100 ft of gill net (stations as replicates). Several measures of variation were also calculated along with mean CPE: relative standard error (RSE), standard error (SE), lower and upper 95% confidence intervals, and number of replicates in order to achieve an RSE of 25 ($N \text{ RSE}[25]$) or 10 ($N \text{ RSE}[10]$) which can represent the number of replicates needed in order to detect a 50% or 20% change in CPE, respectively. RSE can be interpreted similarly to a coefficient of variation (CV).

RESULTS/DISCUSSION

During the 2020 Chequamegon Bay Fall Assessment, we captured 81 Walleye, 59 Yellow Perch, 14 Northern Pike and 8 Smallmouth Bass (Table 1). Mean CPE of Northern Pike, Smallmouth Bass and Yellow Perch were similar to mean CPE's in 2019, which is the only other year all six stations were sampled. However, Walleye mean CPE increased by almost double from 2019 to 2020.

Size structure of Northern Pike was similar among years, and a majority of the Northern Pike sampled were between 23 and 27 inches total length (Figure 2). The 2020 sample was comprised of larger (~18 inches) Smallmouth Bass than the previous two years, and most Smallmouth Bass sampled were between 14 and 19 inches total length. The progression of a relatively large year-class of Walleye was evident, starting with the 10-11 inch peak in 2018, growing to

the 12-13 inch peak in 2019, and now resulting in a proportionally high abundance of 15-16 inch Walleye in the 2020 sample (Figure 2). Yellow Perch size structure in 2020 was comprised of mostly 6-7 inch individuals, similar to 2018. The 2019 sample was comprised of proportionately more 8-10 inch Yellow Perch than the other two sampling years.

Based on the first three years of sampling, it appears that the Chequamegon Bay Fall Assessment could serve as a method for monitoring trends in relative abundance of the target species in Chequamegon Bay. Future work could involve including more stations for better spatial coverage and more replicate samples or comparing results to other surveys (e.g., USGS Chequamegon Bay trawling). It is impossible to interpret trends in relative abundance after only two full years of completing this survey. The six survey stations may represent enough replicates to infer trends in CPE in the future, but variance metrics also suggest including another lifting day (i.e., 3 additional stations/replicates) could improve confidence in relative abundance estimates.

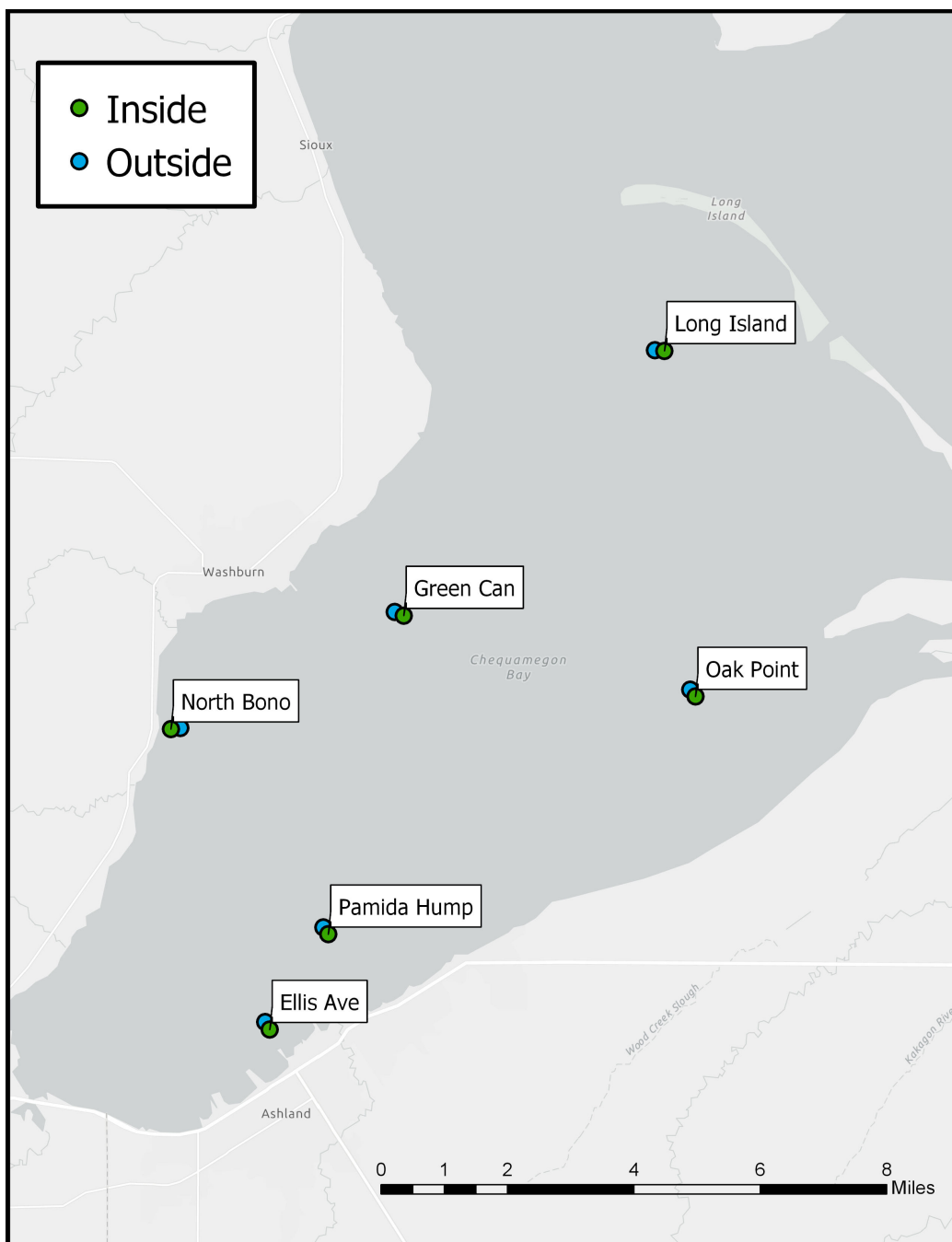


Figure 1. Gill net stations for the Chequamegon Bay Fall Assessment.

Table 1. Mean CPE (fish/100 ft) estimates of target species in the Chequamegon Bay Fall Assessment (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	Stations	Mean CPE	RSE	SE	L 95% CI	U 95% CI	N RSE(25)	N RSE(10)
2018									
Northern Pike	13	2	1.62	38.46	0.62	0.40	2.85	5	30
Smallmouth Bass	22	2	2.75	45.45	1.25	0.30	5.20	7	41
Walleye	60	2	7.50	66.67	5.00	-2.30	17.30	14	89
Yellow Perch	70	2	8.75	14.29	1.25	6.30	11.20	1	4
2019									
Northern Pike	21	6	0.88	42.22	0.37	0.15	1.60	17	107
Smallmouth Bass	9	6	0.38	63.83	0.24	-0.09	0.84	39	244
Walleye	46	6	1.92	26.87	0.52	0.91	2.93	7	43
Yellow Perch	66	6	2.75	56.04	1.54	-0.27	5.77	30	188
2020									
Northern Pike	14	6	0.58	28.57	0.17	0.26	0.91	8	49
Smallmouth Bass	8	6	0.33	74.16	0.25	-0.15	0.82	53	330
Walleye	81	6	3.38	32.05	1.08	1.26	5.49	10	62
Yellow Perch	59	6	2.46	43.26	1.06	0.37	4.54	18	112

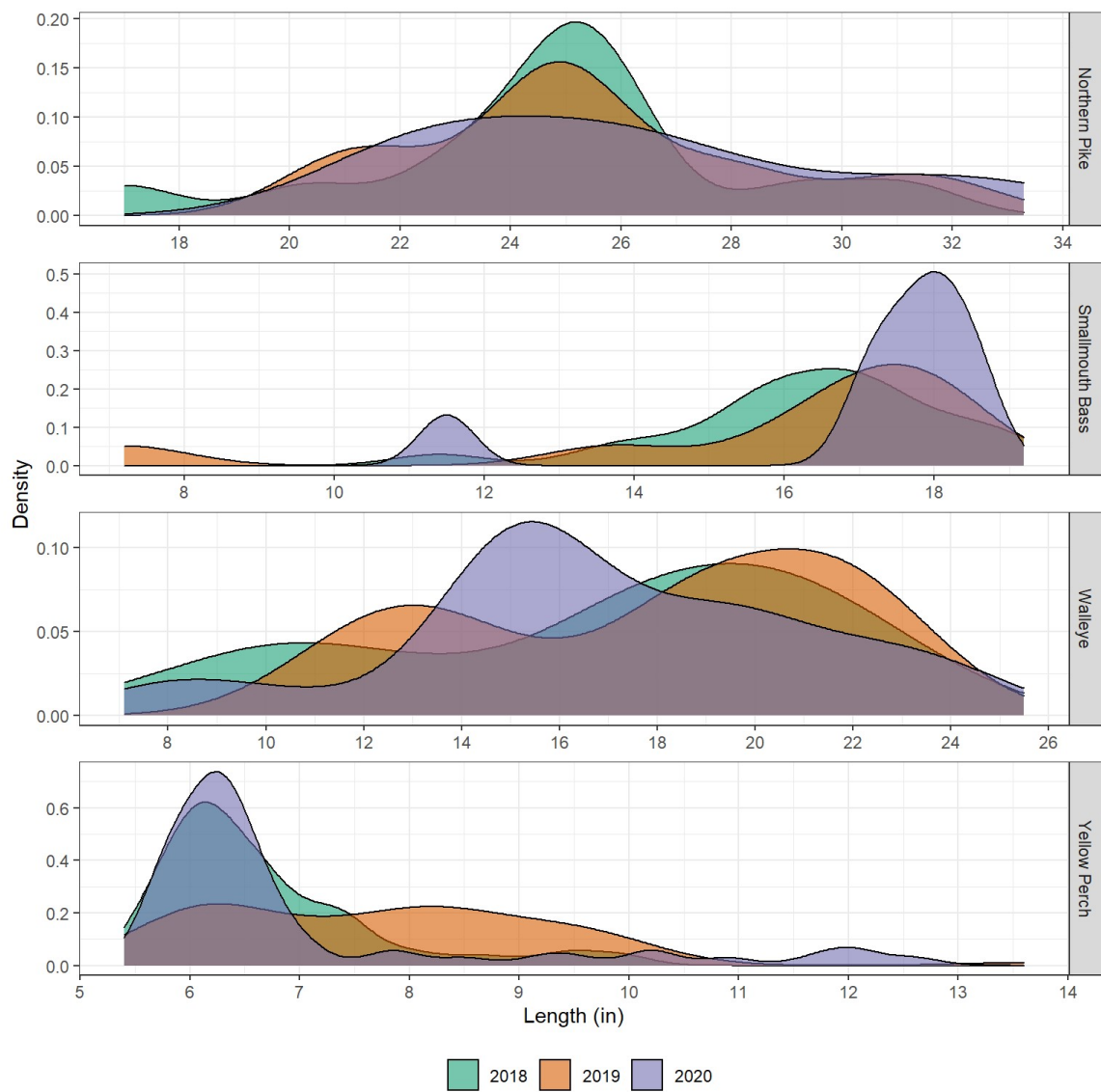


Figure 2. Length frequency density plots of target species from the 2018, 2019, and 2020 Chequamegon Bay Fall Assessment.