



Big Panfish Initiative: Concurrent Trap Net and Fyke Net Sunfish and Crappie Catch Assessment, 2021



Bureau of Fisheries
January 17, 2023

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Bureau of Fisheries Report #: CR1932

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Introduction

The recently implemented Big Panfish Initiative (BPI) required the development and use of standard sampling procedures for monitoring sunfish and crappie populations in study waters (NYSDEC 2022). Oneida Lake (OL) trap nets (described in Forney et al. 1994) and standard American Fisheries Society (AFS) fyke nets (described in Bonar et al. 2009) were the two gears considered because both are generally effective for sampling panfish populations and are likely the most effective gears for sampling crappie populations (Brooking et al. 2017). The OL trap net is believed to be the best option by many Bureau of Fisheries staff for capturing large numbers of panfish and it was believed to be more effective than AFS fyke nets at capturing larger sized fish – important for representative size structure assessments. Therefore, this was the gear selected for BPI sampling (Loukmas 2021). However, AFS fyke nets are much easier to set, check and move than the bigger and bulkier OL trap nets, and thus there was interest in determining if these nets could be used as a viable alternative. The objective of this study was to determine if AFS fyke nets could be used as a viable alternative to OL trap nets by comparing the catch per unit effort (CPUE) and size structure of sunfish and crappie samples concurrently collected with each net type from four BPI study lakes.

Methods

Sunfish (bluegill and pumpkinseed¹) and black crappie samples from concurrently set OL trap nets and standard AFS fyke nets were collected by Bureau of Fisheries staff during BPI surveys on Blydenburgh Lake (Region 1), Muscotoot Reservoir (Region 3), Saratoga Lake (Region 5) and Honeoye Lake (Region 8) in April, May and June 2021. Initial surface water temperatures were consistent, ranging from 54° – 58° F among study lakes. OL trap nets and AFS fyke nets were set in pairs with nets placed 50 – 100 feet apart in each pair. Nets were set and checked according to methods in the Bureau of Fisheries standard Sunfish and Crappie Trap Netting Protocol (Loukmas 2021). Netting effort ranged from 4 net nights on Blydenburgh Lake to 8 net nights on Muscotoot Reservoir for each net type. The mean CPUE (number of sunfish and crappie caught per net-night) among lakes was compared between gears using a two-sample t-test (significance level (α) = 0.05). Length-frequency distributions for sunfish and crappie, both as the total number collected and the percent of the total sample within each inch group, also were derived for each gear on each lake^{2,3}. A Kolmogorov-Smirnov two-sample test was used to compare length-frequency distributions (percent of the total sample only) between net types (significance level (α) = 0.05). Statistical tests were performed using R (R Core Team 2022).

Results

Over a total of 24 net nights of effort for each net type, there were 1,483 sunfish and 1,476 black crappies collected in OL trap nets, and 296 sunfish and 179 black crappies collected from AFS fyke nets. The overall mean CPUEs (\pm standard deviation) for sunfish were 61 \pm 33 for OL trap nets and 13 \pm 11 for AFS fyke nets (Figure 1, Appendix 1). The overall mean CPUEs for black

¹ Sunfish species were combined for analyses.

² Size structure of sunfish and crappie populations was not quantified using proportional stock density (PSD) due to small sample sizes in the fyke nets.

³ There were 338 sunfish and 147 black crappie collected from Honeoye Lake that were recorded on Bulk Fish data forms in multiple inch length categories. The number of fish in each multiple inch length category was divided by the number of inches in each category, and that number of fish was added to the number collected by each inch for length frequency determinations. For example, there were 120 5- to 7-inch black crappie recorded in bulk from trap nets, so 40 black crappie were added to the totals in the 5, 6, and 7-inch categories, each, for Honeoye Lake.

crappie were 57 ± 23 for trap nets and 7 ± 3 for fyke nets (Figure 2, Appendix 1). The overall mean CPUEs in trap and fyke nets were significantly different for both sunfish ($p=0.01$) and crappie ($p<0.01$). For individual lakes, sunfish and black crappie CPUEs were significantly different between net types in all instances except for Muscoot Reservoir ($p=0.11$) and Blydenburgh Lake ($p=0.07$) sunfish.

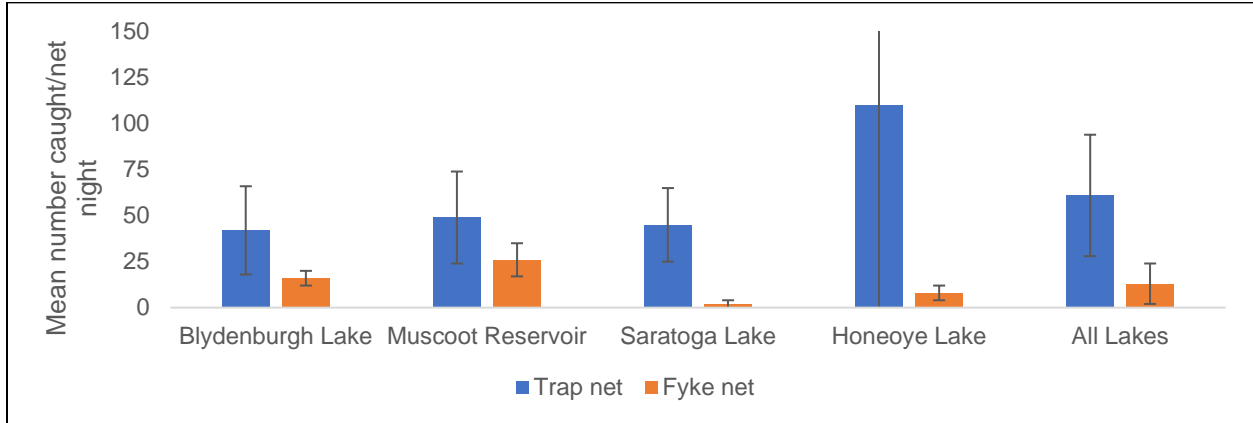


Figure 1. Mean CPUE of sunfish in OL trap nets and AFS fyke nets, 2021.

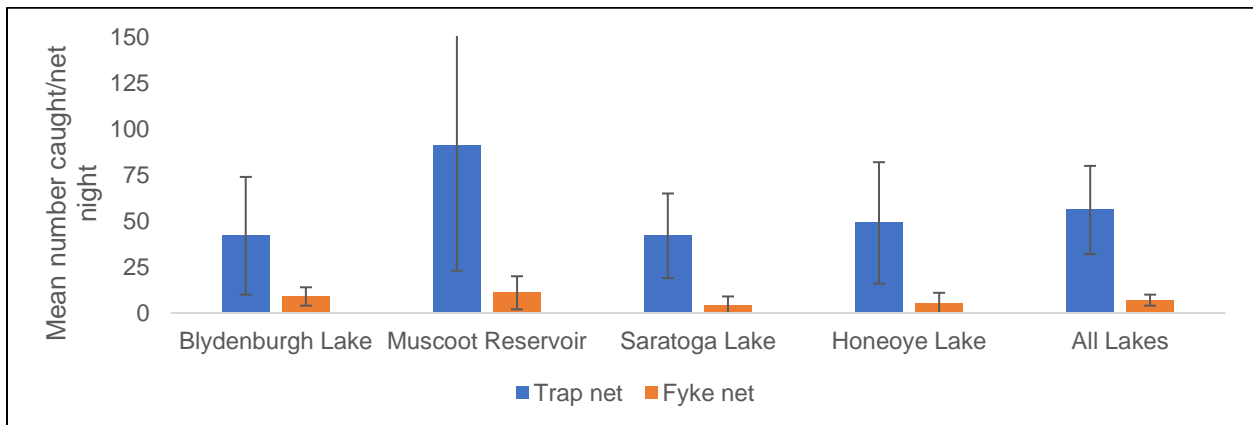


Figure 2. Mean CPUE of black crappie in OL trap nets and AFS fyke nets, 2021.

Length frequency distributions, measured as number caught per inch group, varied among lakes for both sunfish (Figure 3) and black crappie ((Figure 4). Sunfish were predominantly 6-7 inches on Muscoot Reservoir, 7-8 inches on Blydenburgh Lake and Honeoye Lake, and 8-9 inches on Saratoga Lake (Figure 3). Black crappie were primarily 7-10 inches on Blydenburgh Lake, 5-9 inches on Muscoot Reservoir, 6-8 inches on Honeoye Lake, and more evenly distributed between 6-12 inches on Saratoga Lake (Figure 4). For all lakes combined, length frequency distribution peaked at 7-8 inches for both sunfish and crappie. Overall, the size ranges of captures were similar for both net types for both species groups, with the only exceptions being relatively few 3 inch sunfish caught only in AFS fyke nets, and similarly few 13 inch black crappie caught only in OL trap nets. There were no significant differences in length frequency distributions measured as a percent of the sample in each inch group for both net types for all individual lakes and all lakes combined for both species groups (KS test p-values ranged from 0.34 for Saratoga Lake black crappie to 1.00 for Honeoye Lake sunfish, Figures 5 and 6).

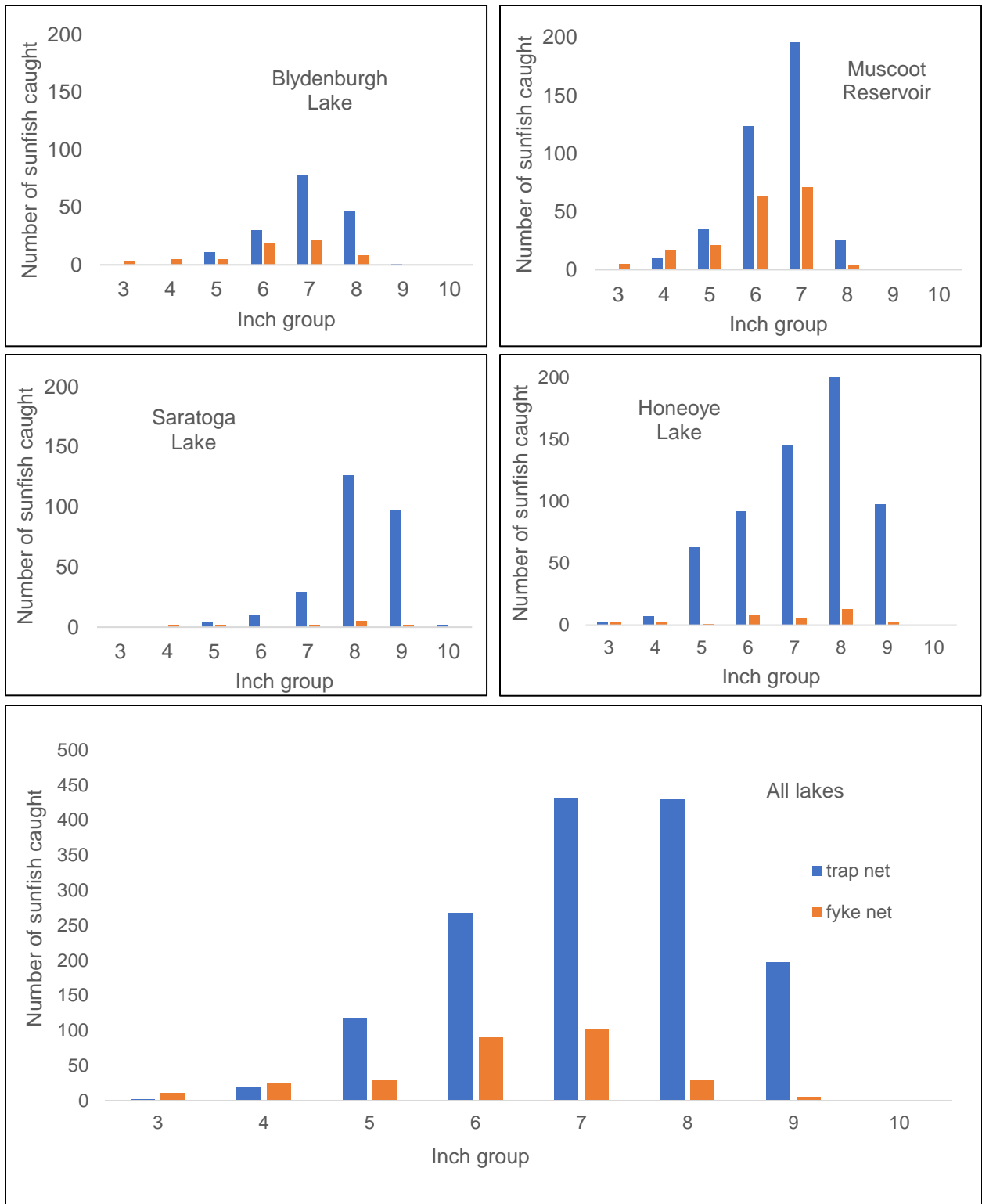


Figure 3. Length frequency distribution (number caught per inch group) of sunfish in OL trap nets and AFS fyke nets in individual and all study lakes combined, 2021.

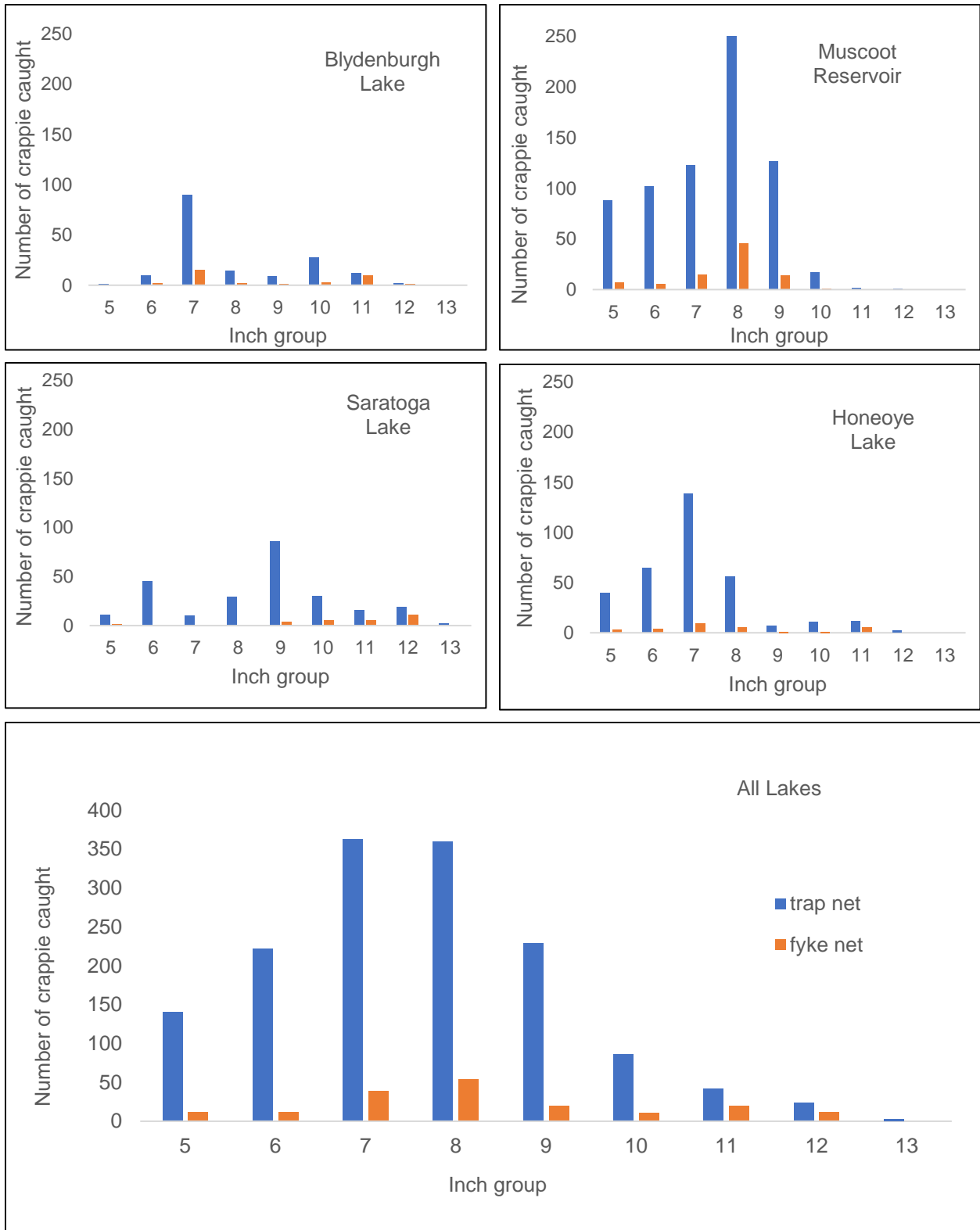


Figure 4. Length frequency distributions (number caught by inch group) of black crappie from OL trap nets and AFS fyke nets from individual and all study lakes combined, 2021.

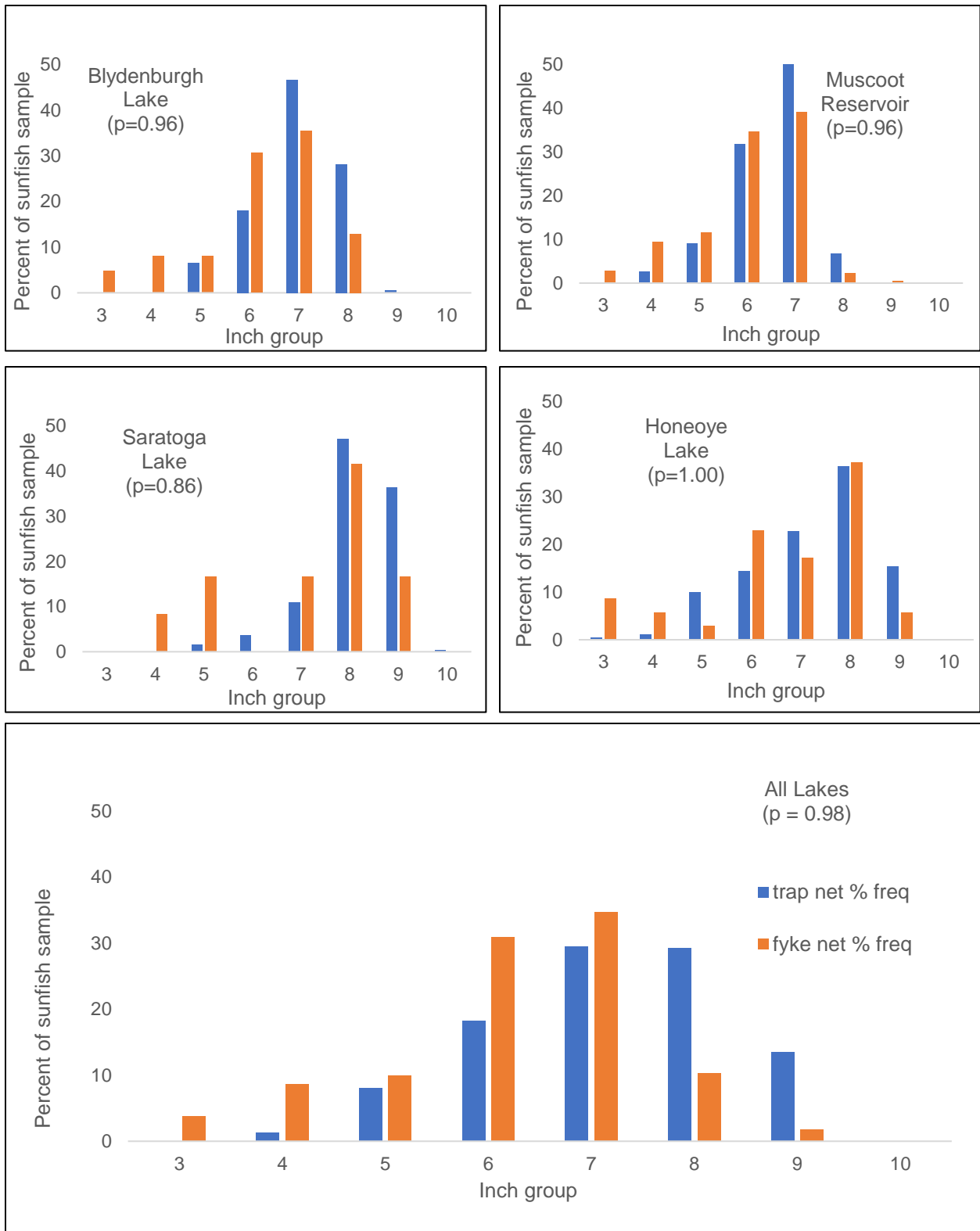


Figure 5. Length frequency distribution (percent of sample by inch group) of sunfish in OL trap nets and AFS fyke nets in individual and all study lakes combined, 2021. P-values are from Kolmogorov-Smirnov two-sample tests to compare length-frequency distributions.

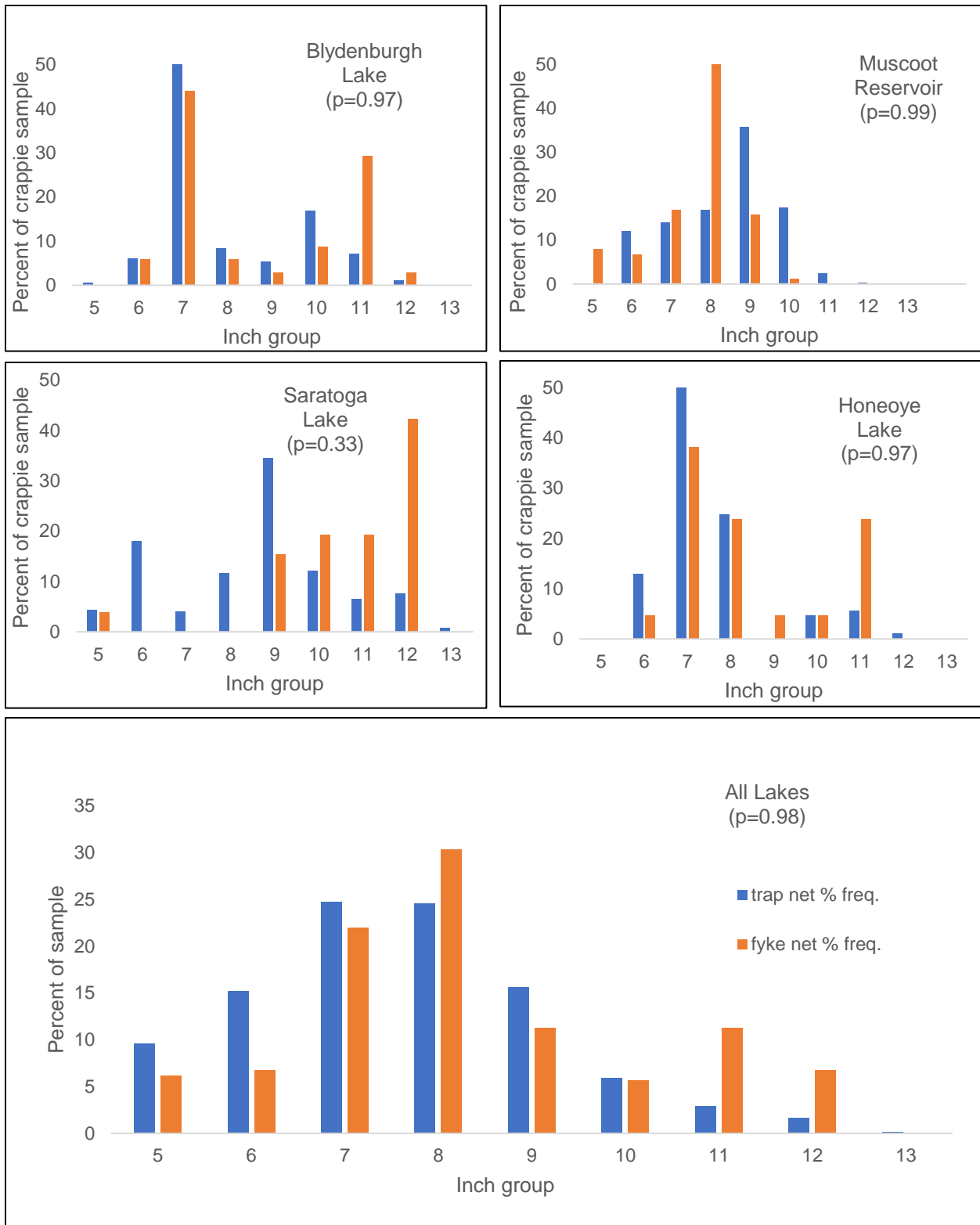


Figure 6. Length frequency distributions (percent of sample by inch group) of black crappie from OL trap nets and AFS fyke nets from individual and all study lakes combined, 2021. P-values are from Kolmogorov-Smirnov two-sample tests to compare length-frequency distributions.

Discussion

Oneida Lake trap nets were much more effective at catching sunfish and black crappie than the AFS fyke nets. Results suggest that it would take about 4 times the AFS fyke netting effort to catch the same number of sunfish, and almost 8 times the effort to catch the same number black crappie, as OL trap nets (Appendix 1). However, the size structures of the samples in each net were similar which suggests that AFS fyke nets could be used in place of trap nets if the amount of effort was sufficient to collect an adequate sample size for population assessments. The minimum required sample size for size structure index assessments (proportional stock density, relative stock density) in the Sunfish and Crappie Trap Netting Protocol is 100 stock length fish (Loukmas 2021). With overall means of 13 sunfish per fyke net night and 7 black crappie per fyke net night (Appendix 1), a minimum of 8 net nights would be needed for a sufficient sample of sunfish and 15 net nights would be needed for a sufficient sample of black crappie (as opposed to 2 OL trap net nights for each species group for a similar sample size). Albeit limited in scope, the results of this study support the use of AFS fyke nets as an alternate gear for BPI sunfish and crappie sampling. However, OL trap nets should continue to be considered the default standard gear unless there is strong justification to use AFS fyke nets. This may include a need or desire to sample many different locations on a waterbody, or a need to use the shorter net in shallow water sampling locations (AFS fyke net are 3 feet high whereas OL trap nets are 4 or 6 feet high). In these cases, staff should determine and plan for the additional effort needed for adequate samples beyond the recommended effort in the sunfish and crappie trap netting protocol (Loukmas 2021).

Literature Cited

- Bonar, S. A., W. A. Hubert, and D. W. Willis. 2009. Standard methods for sampling North American freshwater fishes. American Fisheries Society. Bethesda, MD.
- Brooking, T., J. Loukmas, R. Jackson, T. VanDeValk. 2018. Black bass and sunfish electrofishing protocol for lakes and ponds. New York State Department of Environmental Conservation, Albany, NY.
- Forney, J. L., G. Rudstam, D. M. Green and D. L. Stang. 1994. Percid Sampling Manual. Chapter 3 *in* Fish Sampling Manual. New York State Department of Environmental Conservation, Albany, NY.
- Holst, L. and J. Loukmas. 2013. Lake and pond fish community surveys. New York State Department of Environmental Conservation, Bureau of Fisheries, Albany, NY.
- Loukmas, J. 2021. New York sunfish and crappie trap netting protocol. New York State Department of Environmental Conservation, Bureau of Fisheries, Albany, NY.
- R Core Team (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.

Acknowledgements

I would like to thank the many Regional Bureau of Fisheries staff who contributed to this sampling effort, especially the Biologists who lead the surveys: Heidi O’Riordan (Blydenburgh Lake), Michael DiSarno (Muscoot Reservoir), Christopher Powers (Saratoga Lake), and Peter Austerman (Honeoye Lake). Funding for this study was provided by a Federal Aid in Sportfish Restoration grant.

Appendix 1. Numbers caught and mean number caught per net-night for sunfish and black crappie from trap net and fyke net sampling on four Big Panfish Initiative lakes, 2021.

Waterbody	Number of net-nights per net type	Species	Net type	Number caught	Mean number caught per net-night (SD)
Blydenburgh Lake	4	Sunfish	Trap net	167	42 (24)
			Fyke net	62	16 (4)
		Black crappie	Trap net	166	42 (32)
			Fyke net	34	9 (5)
Muscoot Reservoir	8	Sunfish	Trap net	391	49 (25)
			Fyke net	182	26 (9)
		Black crappie	Trap net	729	91 (68)
			Fyke net	89	11 (9)
Saratoga Lake	6	Sunfish	Trap net	267	45 (20)
			Fyke net	12	2 (2)
		Black crappie	Trap net	249	42 (23)
			Fyke net	26	4 (5)
Honeoye Lake	6	Sunfish	Trap net	658	110 (157)
			Fyke net	40	7 (4)
		Black crappie	Trap net	332	55 (51)
			Fyke net	30	5 (5)
All lakes	24	Sunfish	Trap net	1,483	54 (19)
			Fyke net	296	13 (10)
		Black crappie	Trap net	1,476	56 (24)
			Fyke net	179	7 (3)