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Department of Environmental Conservation
Division of Fish and Wildlife

Big Panfish Initiative Study Assessment
2021 Interim Report

Bureau of Fisheries
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Jeff Loukmas, Warmwater Fisheries Unit Leader, Bureau of Fisheries
New York State Department of Environmental Conservation
Albany, New York 12233

Introduction

Sunfish (bluegill, pumpkinseed, and redbreast sunfish) and crappie (black crappie and white crappie) are widespread and abundant throughout New York and are popular with anglers. However, there are longstanding concerns that liberal harvest regulations result in suboptimal size quality in these species where angling pressure is high (Green and Brooking 1994). Studies and management programs, primarily in the Midwest, have demonstrated that implementation of restrictive daily limits and/or increases in minimum length can result in improved size structures in sunfish and crappie populations (Webb and Ott 1991, Iserman et al. 2002, Paukert et al. 2002, Jacobson 2005, Weitzel 2013, Mosel et al. 2015, Rypel 2015). To determine if a similar management approach can result in sunfish and crappie size structure improvements in New York lakes, the Big Panfish Initiative (BPI) was developed (NYSDEC 2021). This study will evaluate the impacts of a special experimental sunfish regulation (8-inch minimum size and 15/ day possession limit) and an increase in the statewide minimum size regulation for crappie (from 9 inches to 10-inches) on the size structures of the respective populations in selected lakes. These regulations were implemented on April 1, 2022 and the sunfish and crappie populations in the study lakes will be annually monitored from 2021 – 2025 to track potential changes. This report provides a summary of the results from the initial 2021 surveys.

Methods

From mid-April through early June 2021, trap net surveys were conducted to collect pre-regulation change data on sunfish populations in 11 waters and on crappie populations in 10 waters throughout the state (Figure 1, Table 1). Lakes were selected for this study by Regional Bureau of Fisheries staff based on their potential to support sunfish and/or crappie populations with a relatively high proportion of large individuals which could, in turn, provide more consistent fishing opportunities for relatively large fish. Survey methods in the New York State Sunfish and Crappie Trap Netting Protocol (Loukmas 2021) were followed. Oneida Lake trap nets (Forney et al. 1994) were set overnight and catches were processed the following day. Trapping effort varied by lake and was largely dependent on obtaining the minimum desired sample size of 100 stock length fish of the primary target species. Thus, if catch rates of target species were high, there was typically less sampling effort. When nets were reset in the same locations on consecutive nights, targeted species were marked with fin clips to determine the incidence of recapture. Species that were not specifically targeted in a particular lake were not included in this assessment. Initial surface water temperatures ranged from 52 – 55º F for surveys targeting only crappie, from 50 – 61º F for surveys targeting both sunfish and crappie, and from 52 – 72º F for surveys targeting only sunfish (Table 1).

Catch rates (number caught per net-night) of stock length fish, size structure indices (proportional stock density of quality size fish (PSD), relative stock density of preferred size fish (RSDp), and relative stock density of memorable size fish (RSDm)[1], mean relative weight (Wr) of stock size and larger fish, crappie length at age 4, and sunfish length at age 5 were calculated for targeted species for each lake. The minimum sample size for calculation of

[1] Proportional stock density (PSD) and Relative Stock Density (RSD) are size structure indices that provide the percentage of "stock-length" fish that are also equal to or longer than a specified length (Anderson 1980). For example, if there are 100 stock length and greater fish in a sample and 50 of these are quality length and greater, the PSD is 50. The length categories for size tructure calculations for sunfish are: stock – 3 inches, quality – 6 inches, preferred – 8 inches, memorable – 10 inches. Length categories for crappie are: stock – 5 inches, quality – 8 inches, preferred – 10 inches, memorable – 12 inches.

metrics was 50 stock length fish of each targeted species. Metrics were calculated for individual species and then compared across study lakes and with population objectives in the study plan (NYSDEC 2021). The population objectives for sunfish included:

- achieving size structure indices of 70 PSD, 30 RSD_8, 5 RSD_{10},
- reaching 7 inches in length by age 5, and
- maintaining a Wr of 100.

Crappie population objectives included:

- achieving size structure indices of 60 PSD and 20 RSD_{10},
- reaching 10 inches in length by age 4, and
- maintaining a Wr of 100.

To more broadly compare sunfish and crappie populations among lakes, size structure indices (RSD_8 for sunfish; RSD_{10} for crappie), Wr, and length at age metrics were ranked for each population and then ranks for these metrics were combined into a final composite rank. Final composite ranks were used to compare populations within each species group to gauge relative status related to the suite of population metric objectives.

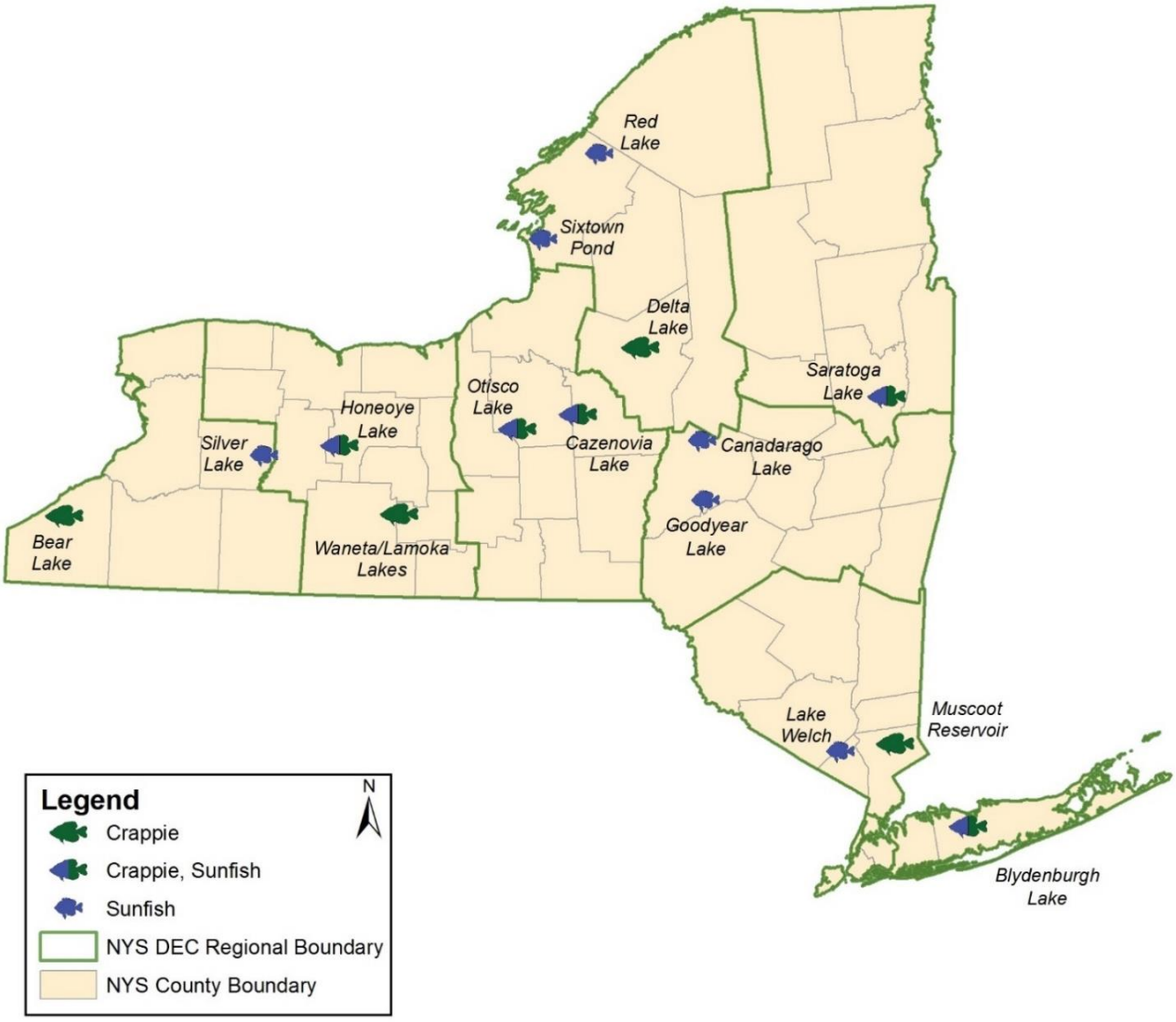

Figure 1. Locations and species targets of Big Panfish Initiative lakes.

Table 1. Big Panfish Initiative trap net surveys conducted in 2021.

Water	Region	Survey number	Survey dates	Number of net-nights	Daytime surface water temperature (ºF)	Targeted Species
Blydenburgh Lake	1	121005	5/10/2021 - 5/11/2021	4	58	Sunfish, Crappie
Lake Welch	3	321002	6/1/2021 - 6/4/2021	12	62	Sunfish
Muscoot Reservoir	3	321001	4/19/2021 - 4/22/2021	8	55	Crappie
Goodyear Lake	4	421011	6/1/2021 - 6/3/2021	9	62	Sunfish
Canadarago Lake	4	421010	5/24/2021 - 5/26/2021	8	66	Sunfish
Saratoga Lake	5	521003	4/13/2021 - 4/14/2021	6	54	Sunfish, Crappie
Delta Lake	6	621202	4/19/2021	3	52	Crappie
Sixtown Pond	6	621002	5/10/2021, 5/17/2021-5/18/2021	7	52,65	Sunfish
Red Lake	6	621003	5/19/2021	3	72	Sunfish
Cazenovia Lake	7	721005	5/11/2021 - 5/13/2021	9	50	Sunfish, Crappie
Otisco Lake	7	721006	5/18/2021 - 5/19/2021	6	61	Sunfish, Crappie
Honeoye Lake	8	721006	5/3/2021 – 5/6/2021	6	55	Sunfish, Crappie
Waneta Lake	8	821005	4/13/2021 - 4/16/2021, 4/20/2021 - 4/21/2021	18	53	Crappie
Lamoka Lake	8	821014	5/10/2021 – 5/13/2021	6	55	Crappie
Silver Lake	9	921202	6/1/2021 - 6/2/2021	6	63	Sunfish
Bear Lake	9	921101	5/4/2021 – 5/6/2021	6	57	Crappie

Results

Sunfish

A total of 4,587 sunfish (3,253 bluegills, 1,324 pumpkinseeds, and 10 redbreast sunfish) were collected from the 11 study lakes where sunfish were targeted. All 10 redbreast sunfish were collected from Goodyear Lake, and because the collection was so limited this species was not

included in the assessment and will not be part of the assessment going forward. Also, recaptures were not considered in catch rate calculations for both sunfish and crappie because very few fish returned to the nets. A summary of the numbers of sunfish caught and population metrics is provided in Appendix 1.

Both bluegills and pumpkinseeds were caught in all study lakes. The number of bluegills caught ranged from seven in Canadarago Lake to 1,272 in Otisco Lake, and catch rates ranged from 0.9/net-night in Canadarago Lake to 212.0/net-night in Otisco Lake (Figure 2). The number of pumpkinseeds caught ranged from 35 in Cazenovia Lake to 329 in Canadarago Lake, and catch rates ranged from 3.9/net-night in Cazenovia Lake to 41.1/net night in Canadarago Lake. Population metrics were calculated in eight lakes each for bluegill and pumpkinseed populations. There were five lakes where sample sizes were sufficient to calculate metrics for both sunfish species.

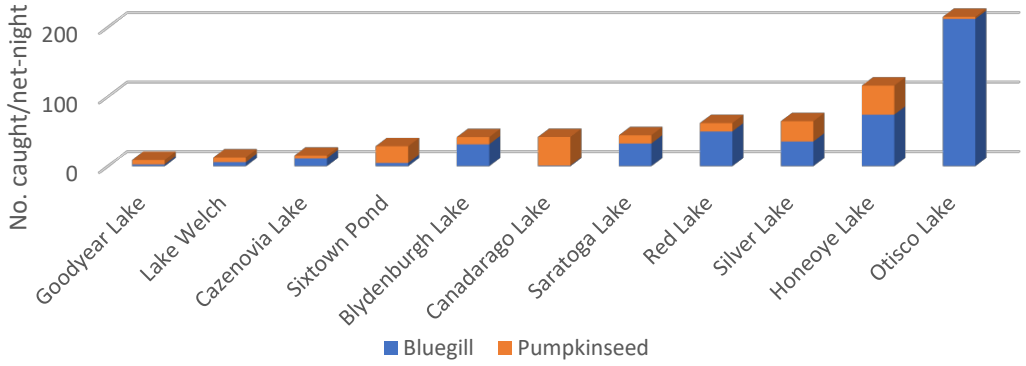

Figure 2. Trap net catch rates of bluegills and pumpkinseeds in Big Panfish Initiative lakes, 2021.

For bluegills, PSDs ranged from 51 in Lake Welch to 99 in Saratoga Lake (Figure 3). RSD_8 ranged from 8 in Red Lake to 90 in Saratoga Lake. Saratoga Lake, with an RSD_{10} of 1, was the only lake with an RSD_{10} above 0. Only Lake Welch did not meet the PSD objective of 70. Blydenburgh, Honeoye and Saratoga lakes exceeded the RSD_8 objective of 30, but there were no lakes that met the RSD_{10} objective of 5.

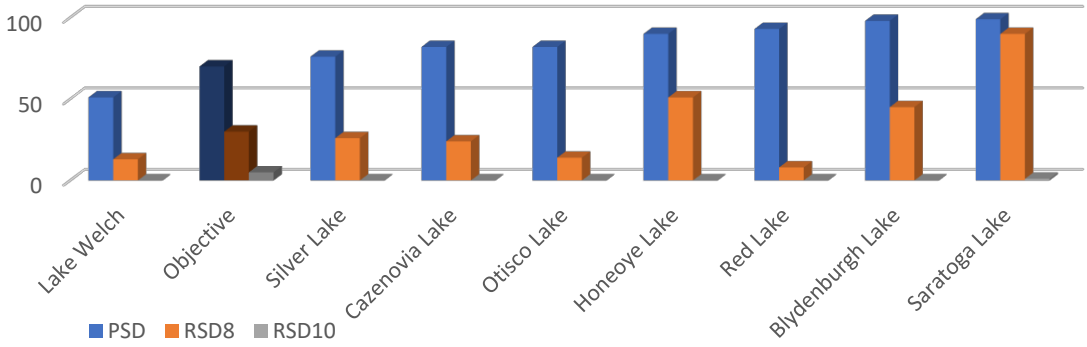

Figure 3. Size structure indices for bluegills collected from Big Panfish Initiative Study lakes, 2021. Size structure indices objective included for comparison.

Pumpkinseed PSDs ranged from 74 in Sixtown Pond to 99 in Lake Welch and Canadarago Lake (Figure 4). RSD_8 ranged from 3 in Red Lake and Sixtown Pond to 88 in Lake Welch. There were no memorable size (≥10 inches) pumpkinseeds collected from any lake. The PSD objective of 70 was exceeded in all lakes and the RSD_8 objective of 30 was exceeded in Goodyear, Honeoye, and Saratoga lakes, and Lake Welch. No lakes met the RSD_{10} objective of 5.

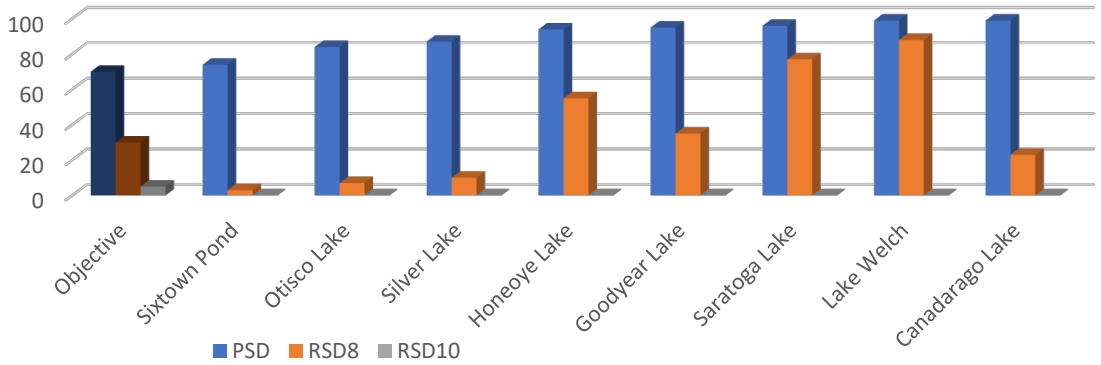

Figure 4. Size structure indices for pumpkinseeds collected from Big Panfish Initiative study lakes, 2021. Size structure indices objective included for comparison.

For bluegills, mean Wr ranged from 84 in Cazenovia Lake to 111 in Silver Lake (Figure 5). Lake Welch and Honeoye, Red and Silver lakes exceeded the Wr objective of 100. For pumpkinseeds, mean Wr ranged from 90 in Cazenovia Lake to 117 in Red Lake (Figure 6). Otisco, Canadarago, Honeoye, and Silver lakes exceeded the Wr objective of 100.

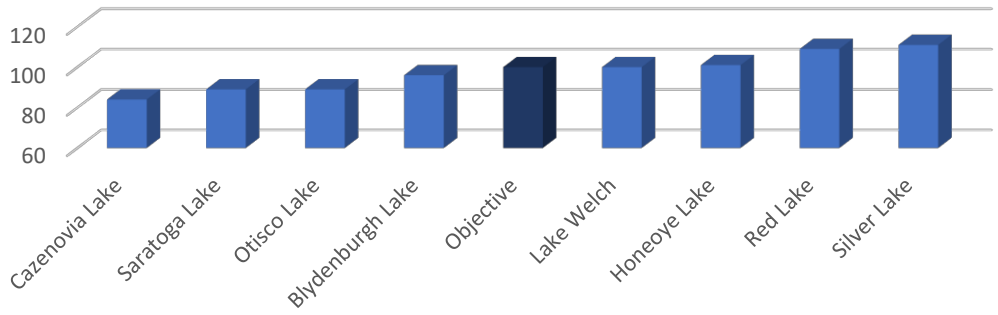

Figure 5. Mean relative weight (Wr) of bluegills collected from Big Panfish Initiative lakes, 2021. Wr objective included for comparison.

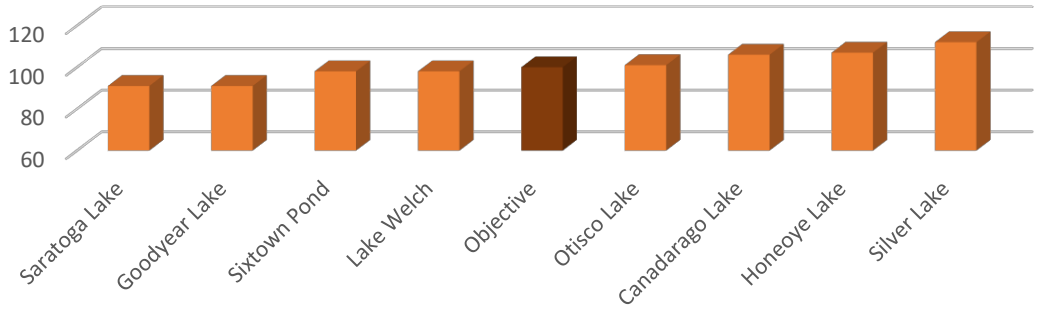

Figure 6. Mean relative weight (Wr) of pumpkinseeds collected from Big Panfish Initiative lakes, 2021. Wr objective included for comparison.

For bluegills, lengths at age-5 ranged from 5.8 inches in Otisco Lake to 8.5 inches in Saratoga Lake (Figure 7). For pumpkinseeds, lengths at age-5 ranged from 6.3 inches in Cazenovia Lake to 8.5 inches in Saratoga Lake (Figure 8). The length at age objective of 7 inches was exceeded in 5 lakes for bluegills and 6 lakes for pumpkinseeds.

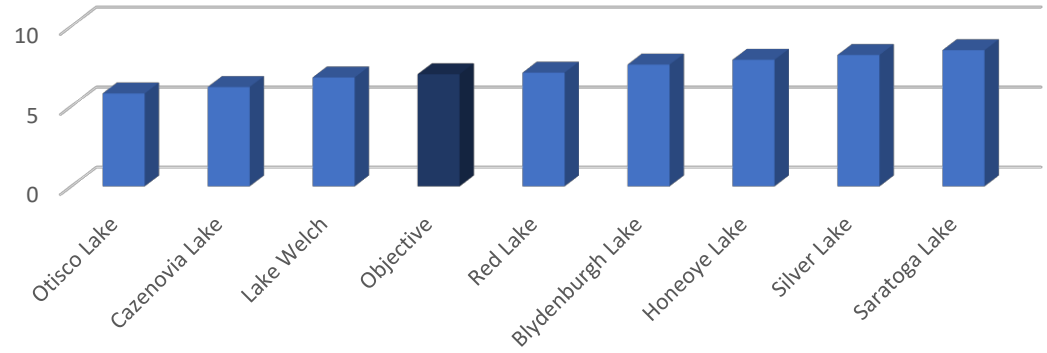

Figure 7. Length at age-5 for bluegills collected from Big Panfish Initiative lakes, 2021. Length at age objective included for comparison.

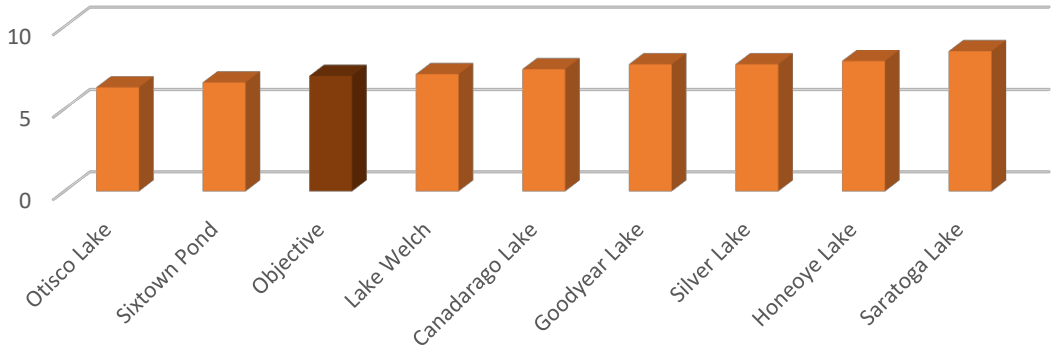

Figure 8. Length at age-5 for pumpkinseeds collected from Big Panfish Initiative lakes, 2021. Length at age objective included for comparison.

Composite ranks of population metrics were highest for bluegill populations in Silver, Honeoye and Saratoga lakes (Figure 9) and for pumpkinseed populations in Saratoga, Honeoye and Silver lakes (Figure 10). Otisco and Cazenovia lakes ranked lowest for bluegills, and Sixtown Pond and Otisco Lake ranked lowest for pumpkinseeds.

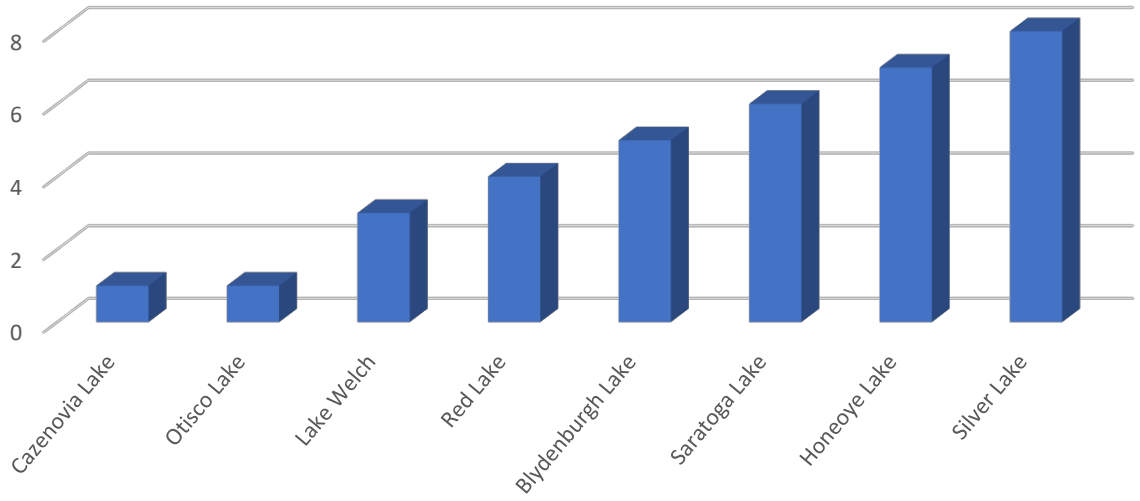

Figure 9. Composite ranks of RSD_8, Wr, and Length at age-5 for bluegill populations in Big Panfish Initiative study lakes, 2021. Higher rank scores are representative of higher values for the suite of population metrics.

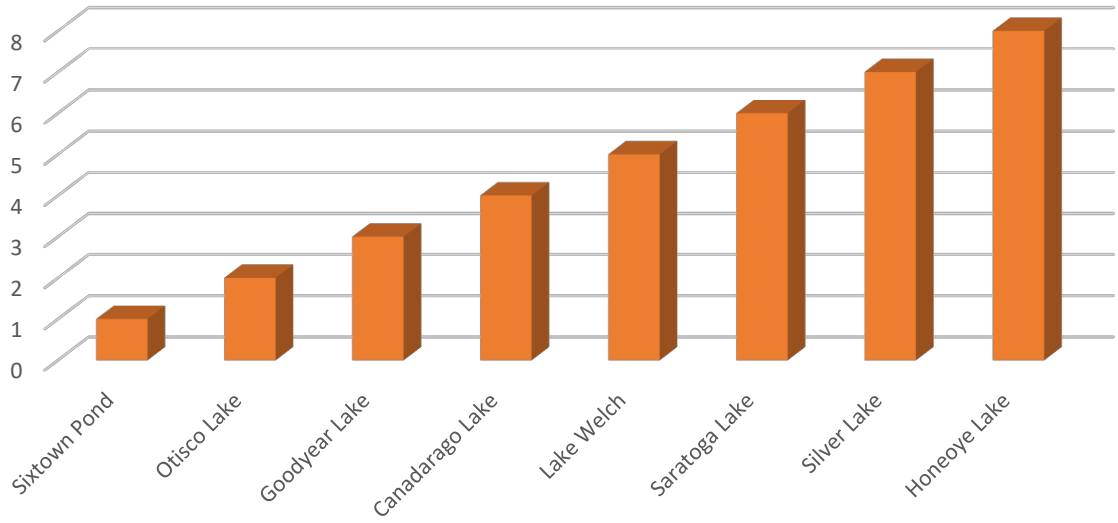

Figure 10. Composite ranks of RSD_8, Wr, and Length at age-5 for pumpkinseed populations in Big Panfish Initiative study lakes, 2021. Higher rank scores are representative of higher values for the suite of population metrics.

Crappie

A total of 3,157 crappie (3,094 black crappie and 63 white crappie) were collected from all 10 crappie study lakes. All 63 white crappie were collected from Otisco Lake and were included in the assessment. The number of black crappie caught ranged from 43 in Cazenovia Lake to 729

in Muscoot Reservoir, and catch rates ranged from 4.8/net-night in Cazenovia Lake to 124.7/net-night in Delta Lake (Figure 11). The catch rate for white crappie in Otisco Lake was 10.5/net-night. Because the minimum sample size was not reached in Cazenovia Lake, population metrics were calculated for only nine of the study lakes. Also, ages were not yet available for black crappie from Waneta and Lamoka lakes and therefore these lakes are not included in the length at age 4 assessment. A summary of the number of crappie caught and population metrics is provided in Appendix 2.

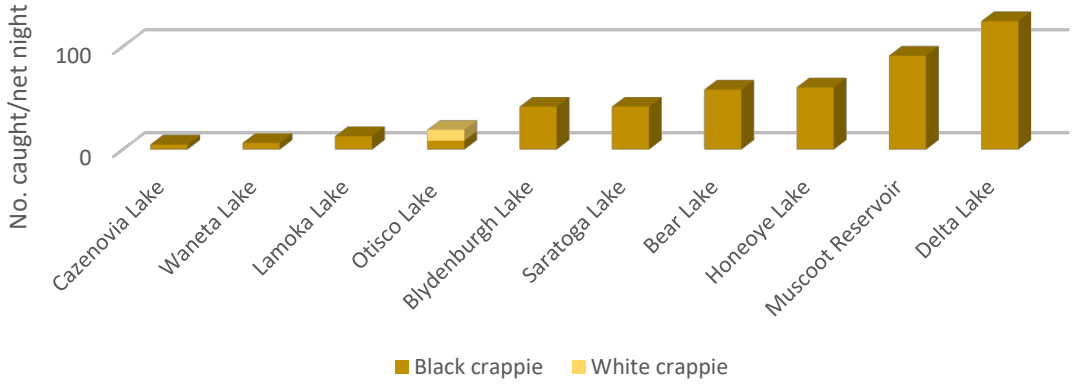

Figure 11. Trap net catch rates of black crappie and white crappie in Big Panfish Initiative study lakes, 2021.

Black crappie PSDs ranged from 23 in Bear Lake to 99 in Lamoka Lake (Figure 12). RSD_{10} ranged from 4 in Muscoot Reservoir to 81 in Waneta Lake. RSD_{12} ranged from 0 in Muscoot Reservoir to 25 in Delta Lake. PSD, RSD_{10} and RSD_{12} for white crappie in Otisco Lake were 98, 97, 83, respectively. Both size structure index objectives (PSD 70 and RSD_{10} 20) were exceeded in Saratoga, Otisco, Waneta, Delta and Lamoka lakes. The RSD_{10} objective was exceeded in Blydenburgh Lake.

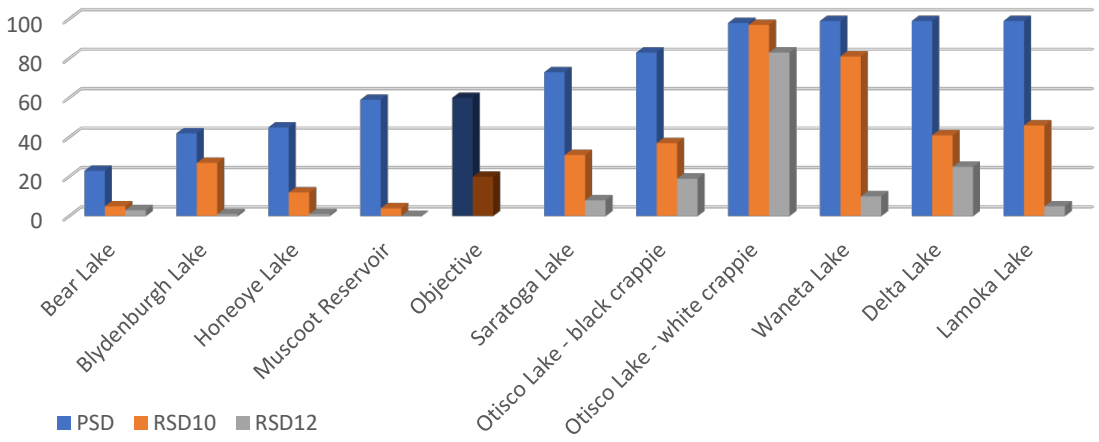

Figure 12. Size structure indices for crappie from Big Panfish Initiative lakes, 2021. Size structure indices objectives included for comparison.

Mean Wr for black crappie ranged from 81 in Bear Lake to 117 in Honeoye Lake (Figure 13). The mean Wr for Otisco Lake white crappie was 91. Crappie populations in Delta, Lamoka, Otisco (black crappie), Saratoga and Honeoye lakes exceeded the Wr objective of 100.

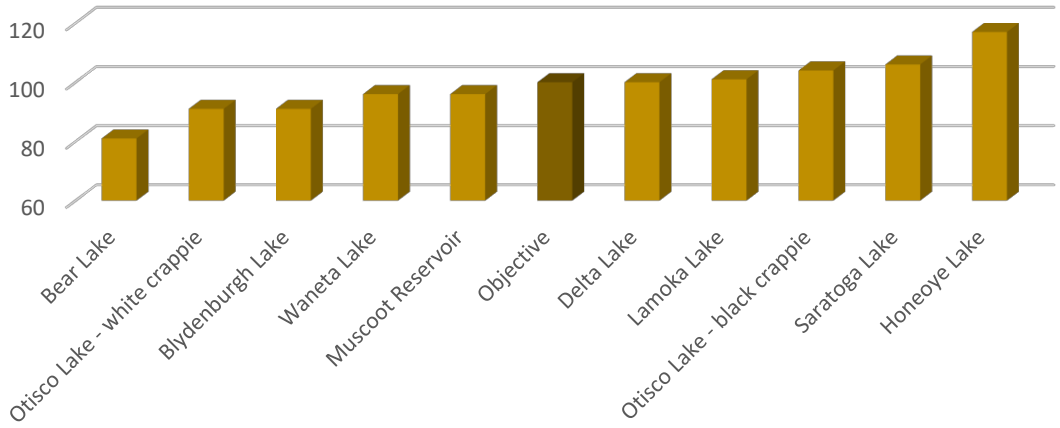

Figure 13. Mean relative weight (Wr) for crappies collected from Big Panfish Initiative lakes, 2021. Wr objective included for comparison.

Length at age-4 for black crappie ranged from 8.4 inches in Otisco Lake to 9.9 inches in Delta Lake (Figure 14). Length at age-4 for Otisco Lake white crappies was 10.4 inches. Only white crappie from Otisco Lake exceeded the length at age 4 objective of 10 inches.

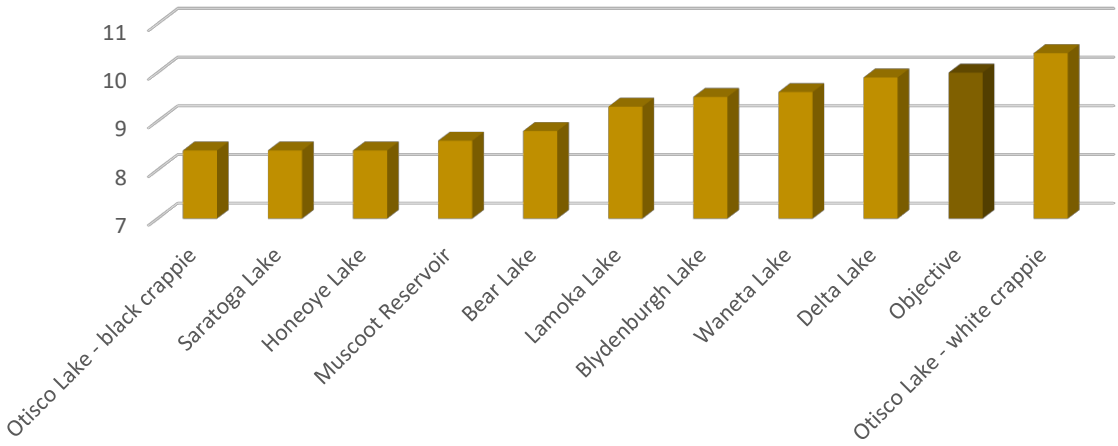

Figure 14. Lengths at age-4 for crappies collected from Big Panfish Initiative lakes, 2021. Length at age objective included for comparison.

Composite ranks of population metrics were highest for white crappie in Otisco Lake and black crappie in Delta Lake (Figure 15). Bear and Blydenburgh lakes ranked lowest for black crappie.

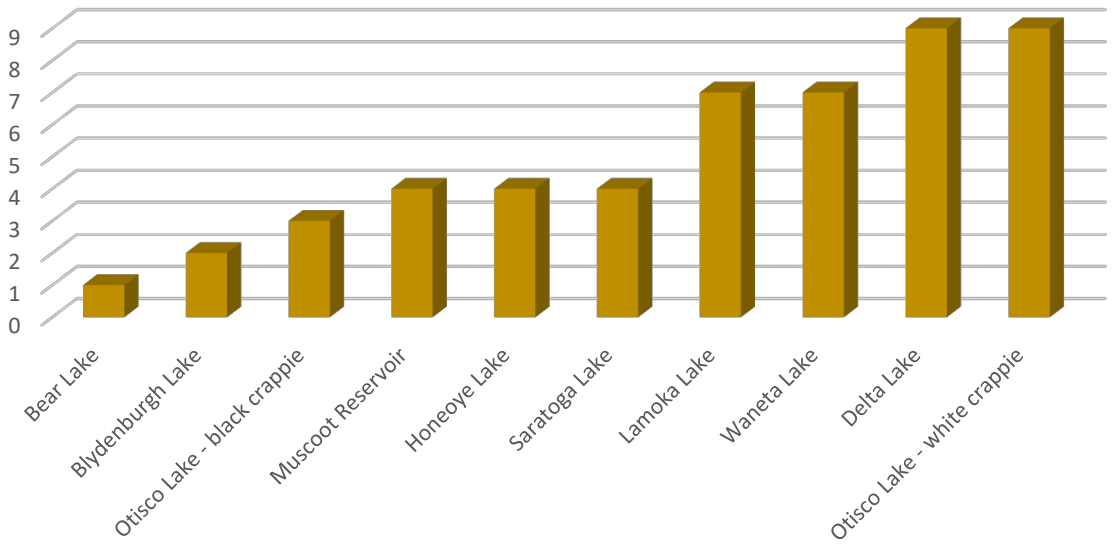

Figure 15. Composite ranks of RSD_{10}, Wr, and Length at age-4 for crappie populations in Big Panfish Initiative study lakes, 2021. Higher rank scores are representative of higher values for the suite of population metrics.

Discussion

The 2021 trap net surveys provided an initial baseline snapshot of the sunfish and crappie populations in the study lakes. Recognizing that there is inherent variability and uncertainty in how accurately a single year of trap net data represent the state of these populations, results are nonetheless a useful start to a time series of information that will ultimately be used to gauge the impacts of the regulation changes. In this initial report for the study, composite ranks of metrics derived for sunfish and crappie populations were also compared across lakes to provide a general assessment of the relative status of each population. Again, while not definitive, the insights gained provide additional perspective on how regulations may impact these populations across study lakes.

All study lakes where sunfish were targeted supported populations of both bluegills and pumpkinseeds, and sampling was instrumental in providing insight on the relative prevalence of both species in each lake. This was important because studies evaluating the impacts of conservative harvest regulations in the Midwest have focused on bluegills (Jacobsen 2005, Weitzel 2013, Rypel 2015). While pumpkinseed populations would be expected to be impacted in much the same way, this has not yet been examined. The relative prevalence of pumpkinseeds in many of the lakes supports continuing to include them in the annual assessments and will provide an opportunity to gauge the impacts of the special regulations on this species. On the other hand, the relative lack of redbreast sunfish in the collections suggests that this species is either not a prevalent component of the sunfish assemblage in these lakes or they were not vulnerable to the trap nets. In either case, redbreast sunfish were not, and likely will not be, collected in sufficient numbers to include in this assessment.

Size structure, condition and growth for both sunfish species suggest that there is room for improvement in the proportions of larger sunfish in all study lakes. PSDs were generally good, exceeding the objective of 70 in all study lakes except for bluegills in Lake Welch, but there was

a wide variation in RSD_8 among lakes and no population met the RSD_{10} objective. However, the growth objective (7 inches at age 5) was approached or exceeded on most study lakes, suggesting that size structures could be improved by limiting adult sunfish mortality. Condition was also relatively good for both species on most lakes. Overall, the assessed metrics support the selection of these lakes as good candidates for this study.

Several lakes stood out in the composite rank comparison, including Silver, Honeoye and Saratoga lakes, all of which ranked high for both sunfish species. Honeoye and Saratoga lakes have long been known to provide high quality sunfish fisheries, and it was therefore no surprise that these lakes ranked relatively high. The Saratoga Lake sunfish fishery has been managed with a 15/day, no minimum size limit special regulation since 2002, which is almost certainly contributing to its quality status. Silver Lake is a smaller, less fished[2], lake with a similar initial set of sunfish population metric values. The sunfish populations in these lakes already exhibit most of the desired characteristics of this program and it will be interesting to see if the new regulations result in the modest improvements in size structures needed to meet objectives. On the other hand, lakes including Otisco and Cazenovia lakes, and Sixtown Pond, all had relatively low composite ranks. Sunfish populations in these waters are further away from meeting study objectives, but as such, could experience the most improvement from harvest restrictions.

As with the sunfish netting, surveys targeting crappie provided insights into the relative prevalence of black crappie and white crappie in study lakes. However, unlike sunfish, only one species, black crappie, was present in all the lakes, and it appears that this will be the primary species of interest in this study.

Size structures of crappie populations in study lakes were already at levels approaching or exceeding objectives in most waters. This could be reflective of strong but relatively lightly exploited year classes. If that is the case, declines in RSD_{10} over the course of the study could be seen in some of these populations even with the implementation of the 10-inch minimum size limit as the strong older year classes are harvested and/or age out of the fishery. Sampling these populations over the next several years will provide further insight on year class strength and potential exploitation of legal-size fish. Only the Honeoye Lake, Bear Lake and Muscoot Reservoir black crappie populations didn't meet the RSD_{10} objective of 20, and these are the populations that could see the greatest positive impacts from the new minimum size limit.

In general, crappie populations were in good condition, with only one, Bear Lake, that would be considered "skinny". However, for all black crappie populations, length at age-4 was below the objective of 10 inches. Thus, in general, black crappies on these lakes don't typically reach legal size until they are at least age-5. Because most populations already have a high proportion of fish over 10 inches, it remains to be seen if slower than desired growth will affect the proportions of fish over 10 inches under the new regulation.

Delta Lake black crappie and Otisco Lake white crappie were the standout populations in the composite ranks. In addition to the highest catch rate among study lakes, the Delta Lake black crappie population nearly hit all study objectives, coming just short on growth. A balanced size structure and good condition and growth suggest that, despite its current quality status, size

[2] In 2017, Saratoga Lake was the 15th most fished waterbody in New York State and Honeoye Lake was the 36th most fished. Silver Lake was not among the top 80 most fished waters (Duda et al. 2019).

structure improvements are anticipated under the increased minimum size limit. It seems less likely that similar improvements would be seen for Otisco Lake white crappie as the size structure of this population is already heavily skewed towards large fish. Establishing and maintaining a more balanced size structure that meets objectives is the desired outcome there. Bear and Blydenburgh lakes ranked low for black crappie, but growth was moderately high relative to the other crappie populations which suggests that there is potential for improvement in size structures.

Sampling for the BPI study will continue through the next four years (2022-2025), with 2022 providing data for the year when there is a transition to the new regulations on April 1, 2022. Continued annual monitoring through the duration of the study will provide further insights on variability and trends among years and lakes, which will help determine if the new regulations are having the desired results. In addition, an angler survey will be developed and conducted in 2025 to gauge angler sentiment for the new regulations and to gather feedback on the quality of their fishing experiences on the lakes. Fish population and angler survey information will both be used to make decisions on the future of BPI management.

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Appendix 1. Numbers caught and population metrics for sunfish from trap net sampling on Big Panfish Initiative lakes, 2021.

Waterbody	Species	No. caught	No. caught per net-night	Mean Wr	PSD	RSD_8	RSD_{10}	Length (inches) at age-5
Blydenburgh Lake	Bluegill	126	31.5	96	98	45	0	7.6
	Pumpkinseed	41	10.3	107	-	-	-	NA
Lake Welch	Bluegill	69	5.8	100	51	13	0	6.8
	Pumpkinseed	79	6.6	98	99	88	0	NA
Canadarago Lake	Bluegill	7	0.9	97	-	-	-	8.1
	Pumpkinseed	329	41.1	106	99	23	0	7.4
Goodyear Lake	Bluegill	23	2.6	101	-	-	-	8.0
	Pumpkinseed	57	6.3	91	95	35	0	7.7
Saratoga Lake	Bluegill	196	32.7	89	99	90	1	8.5
	Pumpkinseed	71	11.8	91	96	77	0	8.5
Sixtown Pond	Bluegill	33	4.7	93	-	-	-	7.9
	Pumpkinseed	167	23.9	98	74	3	0	6.6
Red Lake	Bluegill	150	50.0	109	93	8	0	7.1
	Pumpkinseed	36	12.0	117	-	-	-	6.5
Cazenovia Lake	Bluegill	101	11.2	84	82	24	0	6.2
	Pumpkinseed	35	3.9	90	-	-	-	5.9
Otisco Lake	Bluegill	1,272	212.0	89	82	14	0	5.8
	Pumpkinseed	53	8.8	101	84	7	0	6.3
Honeoye Lake	Bluegill	417	69.5	101	90	51	0	7.9
	Pumpkinseed	241	40.2	107	94	55	0	7.9
Silver Lake	Bluegill	213	35.5	111	76	26	0	8.2
	Pumpkinseed	175	29.2	112	87	10	0	7.7

Appendix 2. Numbers caught and population metrics for crappie from trap net sampling on Big Panfish Initiative lakes, 2021.

Waterbody	Species	No. caught	No. caught per net night	Mean Wr	PSD	RSD_{10}	RSD_{12}	Length (inches) at age-4
Blydenburgh Lake	Black crappie	166	41.5	91	42	27	1	9.5
Muscoot Reservoir	Black crappie	729	91.1	96	59	4	0	8.6
Saratoga Lake	Black crappie	249	41.5	106	73	31	8	8.4
Delta Lake	Black crappie	374	124.7	100	99	41	25	9.9
Cazenovia Lake	Black crappie	43	4.8	97	-	-	-	8.4
Otisco Lake	Black crappie	51	8.5	104	83	37	19	8.4
	White crappie	63	10.5	91	98	97	83	10.4
Lamoka lake	Black crappie	77	12.8	101	99	46	5	NA
Waneta Lake	Black crappie	114	6.3	96	99	81	10	NA
Honeoye Lake	Black crappie	332	55.3	117	45	12	1	8.4
Bear Lake	Black crappie	349	58.1	81	23	5	3	8.8