

Promised Land Lake

Pike County

2023 Panfish and Largemouth Bass Population Evaluation: Trap Netting and Night-boat Electrofishing Surveys

Promised Land Lake is a 422-acre impoundment owned and operated by the Pennsylvania Department Conservation and Natural Resources. The lake is open to the public with three trailered-boat (electric motors only) launches (Ridgefield Point: 41.309188, -75.199229; North Shore: 41.297307, -75.188365; and Snow Shanty: 41.301761, -75.201147), public beaches, and campground. The lake is home to populations of panfish as well as Largemouth Bass and Smallmouth Bass. Panfish Enhancement and Commonwealth Inland Waters regulations are used to manage resident fish populations.

The Pennsylvania Fish and Boat Commission (Commission) Area 5 biologists employed two survey methods to determine fish abundance and length distributions. Sixteen trap nets were deployed for 24 hours each during April 23 - 28, 2023. Net leads were set directly onshore extending perpendicular to the shoreline into the lake, directing fish towards the lifting enclosure (pot) situated at depths generally less than eight feet. Night-boat electrofishing was used to survey a total of 12 single-pass transects on June 18-19, 2023. Each 10-minute transect accounted for approximately 1,150 feet of shoreline. Overall, 2.6 miles (26.7%) of shoreline was sampled. After capture, fish were enumerated, total length measured, and then released.

2023 Trap Netting

A total of 723 fish were captured representing 12 different species (Table 1). Bluegill (N = 318), Yellow Bullhead (N = 120), Pumpkinseed (N = 97), and Black Crappie (N = 42) were the most commonly captured species. Brown Bullheads, Chain Pickerel, Yellow Perch, and Largemouth Bass were observed infrequently (N ≤ 30). Low catch rates of black bass were expected as trap nets are not effective in capturing these species.

Total length measurements were used to gain insight into species-specific size distributions (Table 1). Bluegill captured ranged from less than one inch up to 10 inches with the majority (74%) of fish being in the 8-inch and 9-inch length groups. Yellow Perch were primarily (76%) 10-12 inches long. Seventy-nine percent of collected Yellow Bullheads were in the 10-inch and 12-inch length groups. The majority (89%) of Pumpkinseeds were 7 inches or longer; falling into harvestable length for anglers. Captured Black Crappie were 6 to 14 inches while the majority (64%) fell in the 9-inch to 11-inch length classes.

2023 Night-boat Electrofishing

The night boat electrofishing survey collected a total of 31 Largemouth Bass and six Smallmouth Bass in approximately 2 hours of effort (Table 2). The majority (61%) of Largemouth Bass were between 8 and 12 inches long, with three bass 15 inches or longer, or 10% of the catch (Table 2). Captured Smallmouth Bass mostly (83%) fell into the 6-inch and 7-inch length groups. Relative abundance of Largemouth Bass has increased from its low during the 2007 survey (Figure 3). The lack of sampling for the 2005 season and the extended decadal time-lapse between the 2007 and 2023 estimates precludes inferences of strong conclusions. Fortunately, the Largemouth Bass population appears to have recovered.

Evaluation of Panfish Enhancement Regulation Objectives

Means of species-specific catch rate (fish/h), as a measure of relative abundance, allows for comparison among survey years. Brown Bullhead, Yellow Bullhead, and Black Crappie trap net catch rates appear to follow similar patterns over the time-series (Figure 1). Each of these species peak catch rates occurred in 2023, though the Yellow Bullhead catch rate is alone in being significantly higher. Bluegill catch rates have

been lower during the last two surveys (i.e., 2007 and 2023), but likely not significantly given the broad uncertainty around annual means (Figure 1). Pumpkinseed catch rates have gotten lower with each survey, with the peak catch rate observed in 2003 (0.7 fish/h) to the low in 2023 (0.2 fish/h; Figure 1). The 2023 catch rate of Yellow Perch lowest among surveys, which appears to represent a significant decline in that population (Figure 1).

The consistency of observed length distributions among surveys was readily apparent for most species (Figure 2). Both Bluegill and Pumpkinseed peak modal length classes were routinely 8 and 7 inches, respectively. Yellow Bullhead and Yellow Perch were also generally demonstrated modal peaks at 11 inches and 10 inches, respectively, but 12-inch Yellow Perch were also commonly observed in 2023. Conversely, Black Crappie and Brown Bullhead both were suggestive of multiple modal peaks, but generally represented by the 10 to 12-inch and 12 to 14-inch length classes, respectively. Most encouraging was evidence of juvenile size classes that eventually recruit into adult sizes.

Interannual variation in relative abundance and size distribution of fishes is expected. Natural processes such as recruitment of juveniles into the adult population and/or losses from natural mortality are primary factors dictating interannual trends of relative abundance. Additionally, potential losses from angler harvest and delayed mortality following release also can influence fish populations. Inferences to those processes cannot be adequately characterized by available collected data. Examination of length-frequency data can; however, reveal signs of excessive harvest through cropping of the population near minimum length limits. Fortunately, for most of the species, the observed trends are not suggestive of dramatic variation. There is concern for the apparent decline of Yellow Perch relative abundance. These concerns are tempered because the low sample size ($N = 16$ trap net sets) may not be adequate to fully represent relative abundance. For example, the randomization of trap net sets may have underrepresented the population if they failed to account for known congregations of Yellow Perch during spring spawning.

Promised Land Lake is managed in the Panfish Enhancement Program specifically for sunfish (inclusive of both Bluegill and Pumpkinseed), and Yellow Perch (Figure 2). Minimum length limits were established as ≥ 7 inches for sunfish or ≥ 9 inches for Yellow Perch. The majority of Bluegills ($> 81\%$), Pumpkinseeds ($> 64\%$), and Yellow Perch ($> 73\%$) exceeded the minimum length limit for respective species throughout the time-series. While the relative abundance of these fish populations appear to be in a decline, the size distribution remain supportive of the Panfish Enhancement Program regulations.

Conclusion

Resident fish populations in Promised Land Lake are stable. The apparent low relative abundance warrants further increased monitoring but observed size distributions are highly encouraging. The presence of multiple size classes is indicative juvenile recruitment continues to occur and quality-length fish in the population suggests adequate survival to support the fishery. Cohorts of 10-inch and 12-inch Yellow Perch indicate that anglers can both currently enjoy as well as look forward to continued catches of quality-length (≥ 8 inches) fish. The same can be said of both Bluegill and Pumpkinseeds, whose modal lengths are consistently between 7 and 8 inches. Variability in the range of Black Crappie length frequencies is likely a result of the importance of successful recruitment of smaller year classes, but anglers still have the chance to land fish greater than 10 inches. The increase in Largemouth Bass catch rates combined with 10% of the 2023 catch representative of 15 inches or greater bass, indicates that anglers should expect the opportunity to catch quality-length fish. Findings from the 2023 assessment support continued management of Promised Land Lake in the Panfish Enhancement Program.

Figure 1. Mean annual catch rate (fish/h) and associated 95% confidence intervals for panfish captured using trap nets from Promised Land Lake, 2003 to 2023.

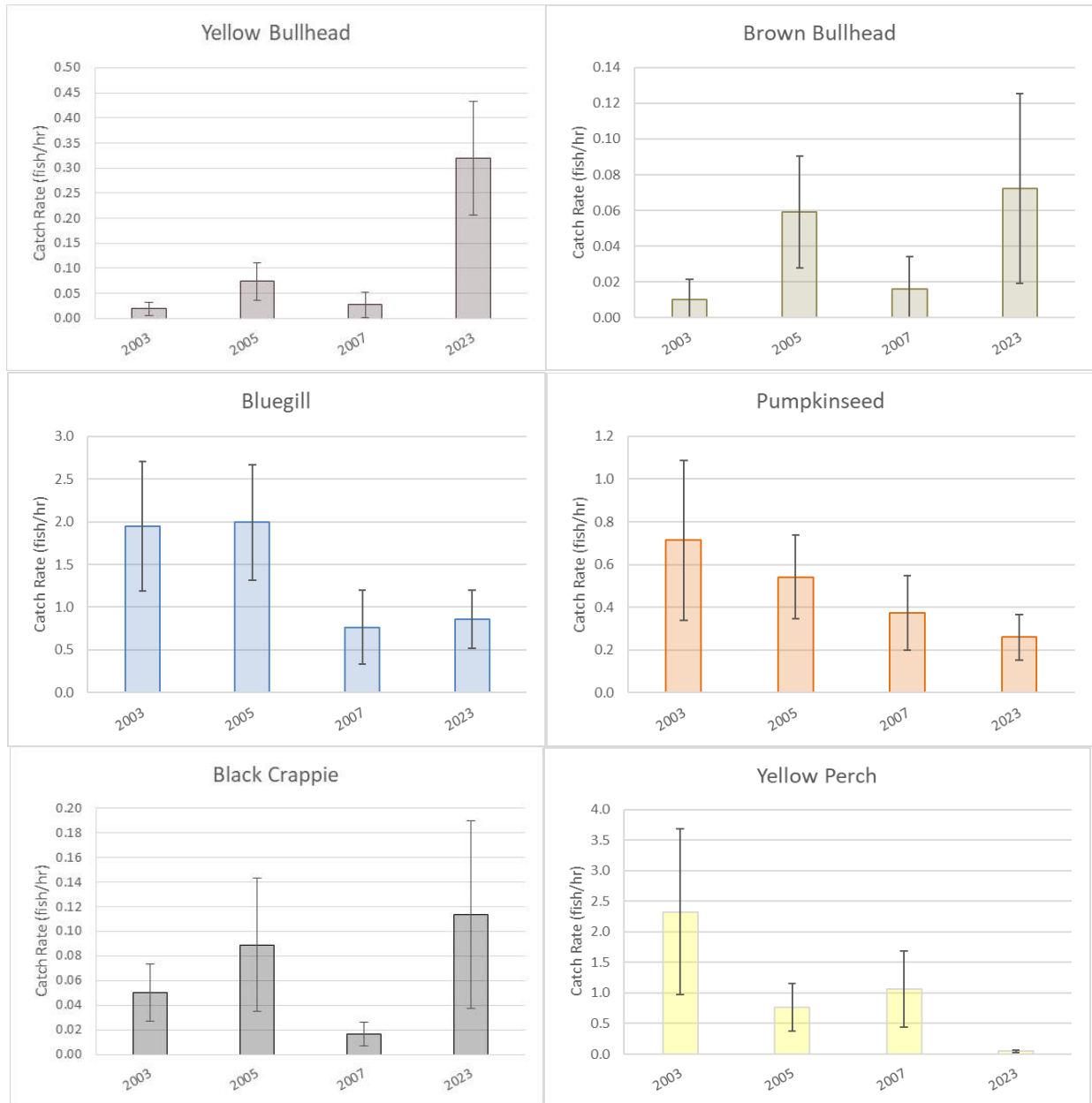


Table 1. Length-frequency distribution of various fish species captured using trap nets from Promised Land Lake, April 2023

Length (in)	Species											
	Golden Shiner	Chubsucker spp.	Yellow Bullhead	Brown Bullhead	Chain Pickerel	Rock Bass	Pumpkinseed	Bluegill	hybrid sunfish	Largemouth Bass	Black Crappie	Yellow Perch
0	0	0	0	0	0	0	0	1	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	2	0	0	0	0	0	2	3	0	0	0	0
6	9	0	0	0	0	0	6	25	1	0	2	1
7	10	0	0	0	1	0	44	51	0	0	3	0
8	3	0	3	0	0	1	43	195	4	0	2	0
9	4	3	18	0	0	0	0	41	0	0	7	2
10	3	0	23	3	0	0	1	2	0	0	10	4
11	0	1	52	0	0	0	0	0	0	0	10	3
12	0	7	20	4	0	0	1	0	0	0	2	6
13	0	12	3	10	3	0	0	0	0	0	4	0
14	0	9	1	7	3	0	0	0	0	0	2	0
15	0	9	0	3	2	0	0	0	0	1	0	0
16	0	0	0	0	3	0	0	0	0	0	0	1
17	0	0	0	0	2	0	0	0	0	0	0	0
18	0	0	0	0	2	0	0	0	0	0	0	0
19	0	0	0	0	2	0	0	0	0	0	0	0
20	0	0	0	0	1	0	0	0	0	0	0	0
21	0	0	0	0	2	0	0	0	0	0	0	0
22	0	0	0	0	1	0	0	0	0	0	0	0
Total	31	41	120	27	23	1	97	318	5	1	42	17

Table 2. Length-frequency distribution of fish captured during night-boat electrofishing transects from Promised Land Lake, June 2023

Length (in)	Species	
	Smallmouth Bass	Largemouth Bass
3	0	2
4	0	0
5	0	1
6	3	1
7	2	0
8	0	3
9	0	5
10	1	3
11	0	2
12	0	6
13	0	2
14	0	3
15	0	1
16	0	1
17	0	0
18	0	0
19	0	0
20	0	1
Total	6	31

Figure 2. Length-frequency distribution of panfish captured using trap nets from Promised Land Lake, 2003 to 2023. The vertical black bar represents Panfish Enhancement Program minimum length limit for Bluegills, Pumpkinseeds, and Yellow Perch.

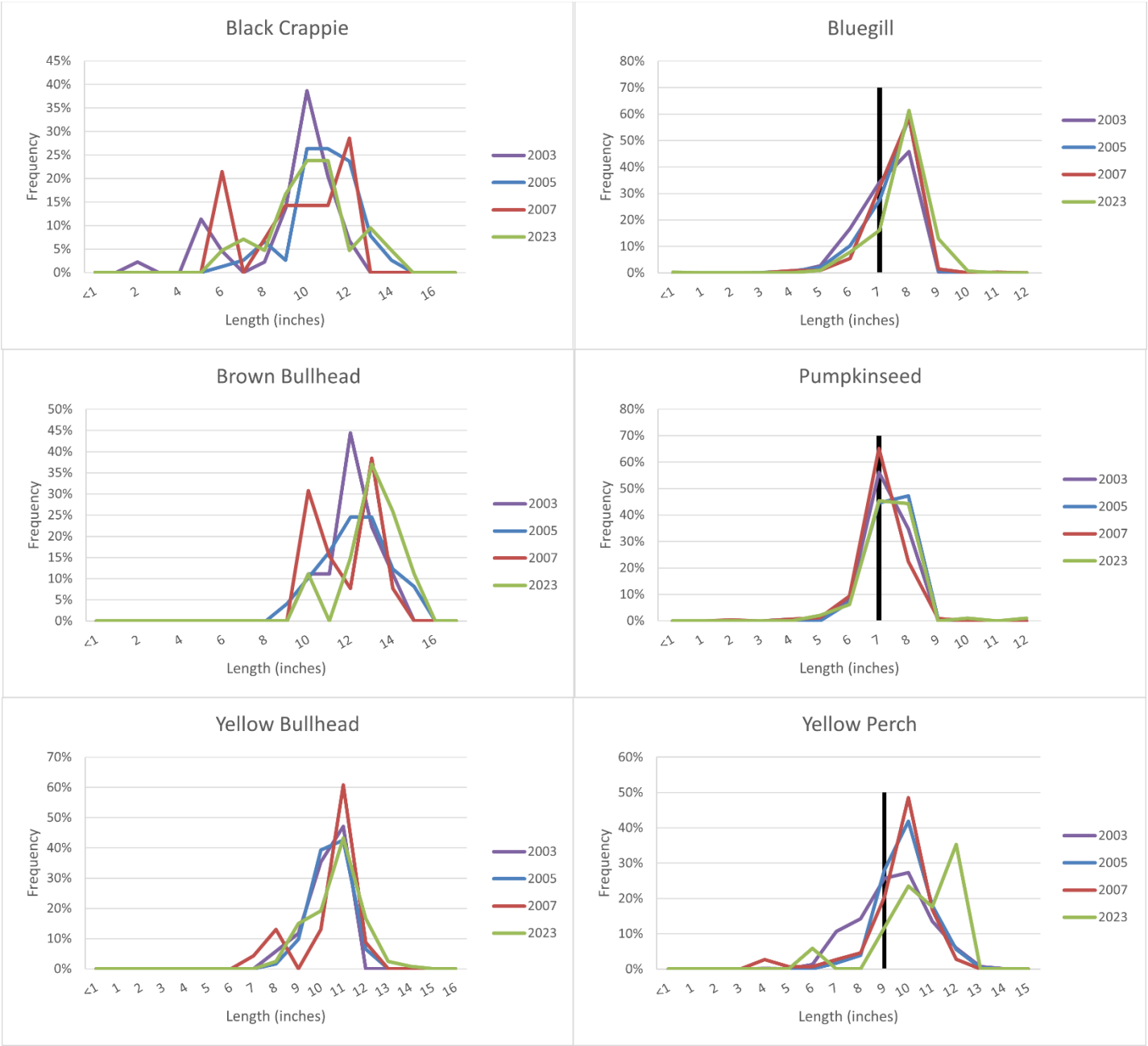
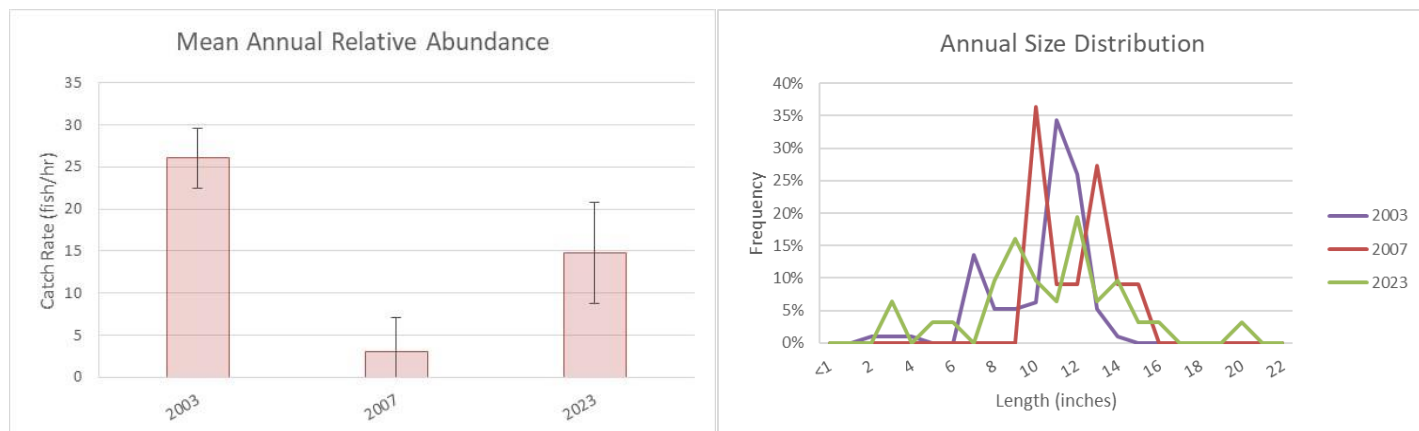


Figure 3. Mean Catch Rate (i.e. fish/h), including associated 95% confidence intervals, and size (i.e. total length) distributions for Largemouth Bass captured during night-boat electrofishing, from Promised Land Lake, 2003 to 2023.



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