Cedar Lake

Lapeer County, T08N R11E S08
Flint River Watershed, last surveyed 2017

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Environment

Cedar Lake is a 13-acre kettle lake in the Lapeer State Game Area. Kettle lakes are small potholes left in the landscape by receding glaciers. Over time, these areas fill in with water and small lakes are created. Cedar Lake is in central Lapeer County approximately 8 miles north of Lapeer, Michigan (Figure 1). There is a seasonal outlet in the southwest portion of the lake which connects to Long Lake. Cedar Lake is in the Plum Creek watershed, a tributary to the Flint River. Maximum depth in Cedar Lake is about 17 feet, with an average depth of 7 feet. Both emergent and submergent vegetation is the primary type of fish habitat at Cedar Lake and about 40% of the shoreline consists of cattails. Water lily is abundant while thin-leaf pondweed, broad-leaf pondweed, and coontail are also present. Chara spp., a macro-algae, provides another abundant cover type in Cedar Lake. There is no development along the shoreline, but there is a small gravel boat launch on the north side of Cedar Lake.

Limnological characteristics of Cedar Lake are like other lakes in the Lapeer State Game Area. Alkalinity ranges from 140-160 ppm and pH is consistently between 7.5-8.5. Temperature profiles indicate warm and cool thermal habitat, with a thermocline that develops between 10 and 14 feet. Dissolved oxygen levels below the thermocline can become fish limiting during summer.

The total catchment area for Cedar Lake is 254 acres. Michigan Forest Inventory data shows the landscape surrounding Cedar Lake is heavily forested. Mixed lowland shrubs are found adjacent to the lake and extending northward. This cover type is dominated by sedges and grasses. Beyond the lowland areas are upland deciduous species like white oak, black oak and bigtooth aspen. Limited amounts of agriculture are present to the east and have little influence around Cedar Lake, only comprising about 10% of the land use within the watershed.

History

Cedar Lake has a history of fisheries management starting in the 1960s. Originally, Cedar Lake was managed for Rainbow Trout through stocking. However, Rainbow Trout survival was poor, resulting in a management shift toward warmwater species in the 1980s. A general fish community survey in 1985 indicated the lake was dominated by Black Bullhead and slow-growing Bluegill. This resulted in a full-lake rotenone treatment. Rotenone is a fish toxicant, or piscicide, and can be used as a management tool to remove all or part of a fish population (McClay 2000). Generally, this strategy is reserved for systems with undesirable species or overabundant and stunted fish populations. After the piscicide treatment, yearling Rainbow Trout at a harvestable size (mean total length [TL] = 7 in) were stocked in 1986 to provide anglers an interim fishery while a new management regime was instituted. At this time, 850 young-of-year Largemouth Bass were also stocked as the first step towards a desirable fishery. A follow-up survey in 1988 revealed a fish community consisting of sub-legal Largemouth Bass, Black Bullhead, Green Sunfish, and Pumpkinseed. This survey only captured 27 Bluegill but mean TL was 6.7 in, a sign the post-treatment fishery was more desirable.

The next fisheries assessment occurred in 1997. Trap nets and an electrofishing boat captured 819 fish representing nine species (Table 1). Bluegill and Black Bullhead were the most common species collected. Like the 1985 survey, Bluegill were exhibiting slow growth and the population was dominated by three- to four-inch fish. Few Largemouth Bass (n=8) were collected by the two gear types, but numerous bass were observed in the lake and avoiding the sampling equipment. Regardless, it was thought the Largemouth Bass community at this time was like 1988 with many sub-legal fish present. Results from this survey prompted several management actions to improve Bluegill size-structure and provide additional angling opportunities. Channel Catfish, Largemouth Bass, and Northern Pike were stocked in 1997 to increase predator abundance. Furthermore, another chemical treatment was proposed using antimycin-A. According to the United States Environmental Protection Agency, this chemical can be applied in low doses (up to 10 ppb) to selectively reduce fish abundance, and this was carried out in 1998. Redear Sunfish were also introduced in 1997 to provide an additional fishery for larger panfish.

A survey was completed in 2003 to evaluate the success of the 1998 piscicide treatment and stocking strategy to improve Bluegill size-structure and provide a more desirable fishery. This survey again used trap net and electrofishing gear. A total of 364 fish representing eight species were captured (Table 1). Bluegill dominated the catch like previous years, but size-structure had improved (mean TL = 6.2 in). Using the Schneider Index for classifying Bluegill size-structure (Schneider 1990), Cedar Lake improved from a very poor ranking in 1997 to a satisfactory/good ranking in 2003 (Table 2). The top predators in Cedar Lake did not show the same improvements. A total of 49 Largemouth Bass were collected in this survey but only one fish met the legal harvest size of 14 in. Additionally, Northern Pike stocking had occurred in 2001 and 2002 but only three Northern Pike were captured in the survey. Moreover, no Channel Catfish were collected indicating poor survival. Management direction following this survey recommended additional Northern Pike stocking to re-establish this fishery and this occurred in 2004 (180 spring fingerlings) and 2006 (150 spring fingerlings).

A stocking evaluation was slated for 2014 in early spring but reports of a winterkill changed the survey objectives. Multiple gear types were utilized to determine the severity of the winterkill event. The spring netting survey used two large-mesh fyke nets (6 ft by 4 ft pot frame; 1.5-in mesh) with 100 ft leads (4 ft lead height; 1.5-in mesh) and a 125 ft experimental gill net (6 ft tall; 5 panels; 1.5 to 4.0-in mesh) for one night (combined gear net-nights=3), but only captured five Northern Pike and a single Pumpkinseed. In addition, a daytime electrofishing survey occurred in early June to further evaluate the fish kill. This electrofishing effort occurred around the entire shoreline and captured three Bluegill and one Pumpkinseed. From these surveys it was apparent the 2014 winterkill was severe, and drastically reduced the fish community in Cedar Lake. It was decided that the recreational value of a fishery in Cedar Lake was important enough to carry out additional stocking efforts to bolster the lake once again. Bluegill, Black Crappie, and Largemouth Bass were transferred from Long Lake, another system within the Lapeer State Game Area, in mid-summer 2015. The Bluegill were in the 6-in class, the Largemouth Bass were in the 13-inch class, and the Black Crappie were in the 9-in class.

Current Status

The most recent fish community survey for Cedar Lake was completed from 30 May to 1 June 2017. This survey utilized three large mesh fyke-nets (6 ft by 4 ft pot frame; 1.5-in mesh) with 100 ft leads (4 ft lead height; 1.5-in mesh) and a 125 ft experimental gill net (6 ft tall; 5 panels; 1.5 to 4.0-in mesh) for

two nights (combined gear net-nights=8). Fish were identified to species and total length (inch group) was recorded for all individuals.

A total of 133 fish were collected during this effort representing five different species (Table 1). Like previous surveys, Bluegill were the most abundant species (n=60). Bluegill mean TL was 5.1 in. Most of the Bluegill were in the 4-in class but fish up to nine inches were collected (Figure 2). Additionally, 50 Pumpkinseed were collected between 3 and 8 in TL (Figure 2). Mean Pumpkinseed TL was 5.9 in. Ten Black Crappie were collected from 4 to 12 in TL (mean TL=6.9 in; Figure 2). Predator abundance was low during this survey with only nine Northern Pike (mean TL=20.7 in; Figure 2) and four Largemouth Bass (mean TL=8.8 in; Figure 2) captured. Water temperature during the survey was 62°F.

Analysis and Discussion

Cedar Lake continues to support a warm- and cool-water fish community after the winterkill event in 2014. Relative abundance and species diversity from this survey suggests the fish transfer in 2015 helped support the Cedar Lake recovery. The 2015 transfer brought over larger individuals, with the assumption they were sexually mature, to promote natural reproduction. It appears this objective was achieved for some species given the capture of Bluegill and Largemouth Bass which were smaller than the stocked individuals for those species.

Large Bluegill (≥6 in) were transferred to Cedar Lake in 2015 to promote natural reproduction of this species after the winterkill event. Bluegill abundance has not reached previous levels; however, when Bluegill become overabundant in Cedar Lake, they appear to become stunted based on previous survey data. The capture of four Bluegill in the 9-in class during this survey demonstrates this species can reach harvestable size when density is low. Northern Pike are one of the top predators in Cedar Lake and are likely preying on smaller Bluegill, but it is too early to determine if this top-down control of the population will persist and provide anglers with a quality Bluegill fishery.

In addition to Bluegill, Pumpkinseed and Black Crappie provide anglers additional panfish opportunities in Cedar Lake. Based on the size-structure data, the Pumpkinseed fishery may be the best species to target by panfish anglers given a mean TL approaching 7 in. Pumpkinseed were not transferred to Cedar Lake after the most recent winterkill; therefore, the population may persevere if Cedar Lake experiences additional winterkill events in the future.

Northern Pike were also not transferred to Cedar Lake in 2015 but were collected in both the 2014 and 2017 survey. This suggests adequate numbers of Northern Pike persisted through the winterkill to maintain a remnant population. No ageing structures were collected during this survey, but the size range of Northern Pike captured in the survey (15 in to 33 in) suggests various year-classes are present. Furthermore, presence of smaller sized Northern Pike suggest natural reproduction is still occurring and stocking may not be necessary to sustain the population.

Few Largemouth Bass (n=4) were collected during this survey. Sampling occurred in late spring and is a preferred time to capture Largemouth Bass, although boat electrofishing is generally a more efficient gear to sample Largemouth Bass than nets. This difference in gear selectivity may explain the low catch rates experienced in the 2017 survey. Additionally, the Largemouth Bass captured during this survey were less than 13 in TL. No Largemouth Bass were captured in the 2014 survey, which did

utilize a boat electrofishing unit, so the smaller individuals collected in this survey suggest Largemouth Bass are naturally reproducing in Cedar Lake.

Management Direction

Cedar Lake has routinely been sampled with some level of consistency since 1985 (n=6 surveys), unfortunately a portion of these surveys were in response to winter mortality events. Given this track record, it is reasonable to assume Cedar Lake will experience additional winter kill events in the future given the small, shallow nature of the lake. Fisheries Division has played an active role in preserving the angling opportunities in the system by transferring fish when appropriate. The popularity of Cedar Lake warrants continued consideration of this practice in the future. This small, undeveloped lake in Metro-Detroit provides shore and small boat anglers an opportunity to fish in a more rural setting in the Lapeer State Game Area. Future management at Cedar Lake will be contingent on reports of dead fish, indicating another winter kill event. Previously, anglers reported these events to the office located at the Lapeer State Game Area. That office is no longer housing a permanent employee, but other modes of communication are available.

A variety of fish species have been transferred to Cedar Lake over the years. Any future transfers should focus on warmwater species like Bluegill and Largemouth Bass. These species are more tolerant of warm water temperatures that would be experienced in Cedar Lake during summer. Although still prone to mortality during periods of low oxygen, Largemouth Bass and Bluegill fisheries seem to be most popular with anglers in the area. Furthermore, minnow species are not commonly found in Cedar Lake. This may be a result of gear selectivity bias but understanding forage availability would help better understand the fish community in Cedar Lake. If future mortality events occur, mini-fyke nets or a seine should be used to target smaller species to better inform managers about the severity of the event and available forage remaining in the lake.

References

McClay, W. 2000. Rotenone Use in North America (1988-1997). Fisheries, 25: 15-21. https://doi.org/10.1577/1548-8446(2000)025<0015:RUINA>2.0.CO;2

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Technical Report No. 90-10. Ann Arbor.

Table 1. Fish species present and number of individuals captured during Cedar Lake surveys from 1985 to 2017.

	Year					
Species	1985	1988	1997	2003	2014	2017
Black Bullhead	52	99	98	3		
Black Crappie						10
Bluegill	445	27	755	254	3	60
Central Mudminnow			5			
Common Carp			6			
Creek Chubsucker	4					
Golden Shiner	59		12	1		
Green Sunfish	20	81		3		
Hybrid Sunfish		27	12			
Lake Chubsucker		2	5			
Largemouth Bass		75	8	49		4
Northern Pike				3	5	9
Pumpkinseed	49	56	15	12	2	50
Redear Sunfish				39		
Warmouth	15					
White Sucker			1			
Yellow Perch			1			

Table 2. Bluegill classification for select surveys using the Schneider Index for Cedar Lake, Lapeer County. Only Bluegill captured in trap nets were used for this analysis, therefore 2014 and 2017 are omitted. In addition, too few Bluegill were captured in 1987 to complete the analysis for that year.

Year	Number	Mean TL (in.)	% ≥ 6 in	% ≥ 7 in	% ≥ 8 in	Index	Rank
1985	445	4.8	2	0	0	1.0	Very Poor
1997	738	4.0	1	1	<1	1.0	Very Poor
2003	166	6.2	52	33	2	4.5	Satisfactory/Good

Figure 1. Cedar Lake in Lapeer County, Michigan.

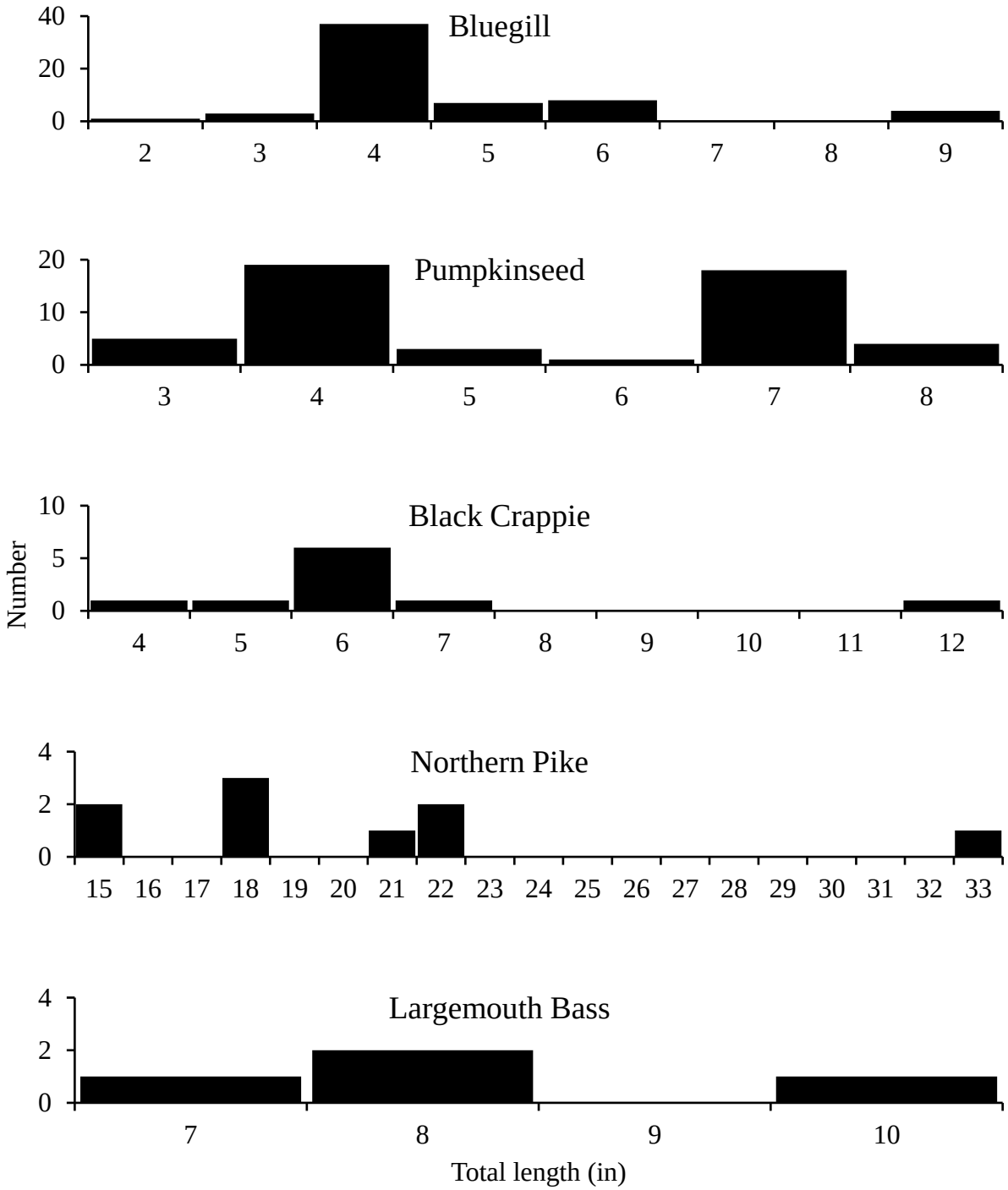

Figure 2. Length frequency for species collected in Cedar Lake during the 2017 fisheries survey.

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