Pratt Lake
Luce County, T49N, R11W, section 33
Two Hearted River, last surveyed in 2014

Cory Kovacs, Fisheries Management Biologist, MDNR Newberry

Environment

Pratt Lake is a 24-acre natural lake located approximately 22 miles north of the Village of Newberry, Michigan in Luce County. There is no inlet or outlet to this lake and it is located in the Two Hearted River watershed nestled in the middle of the Lake Superior State Forest. Pratt Lake lies within the Pretty Lakes Complex (a proposed quiet area) managed as "old growth" and considered a Special Conservation Area. Michigan DNR Forest Resources Division (FRD) recognizes the Pretty Lakes complex as Compartment 20 which consists primarily of a natural White Pine community with some mixed deciduous species. Michigan Natural Features Inventory has identified the area as the Pretty Lakes dry-mesic northern forest community. The Pretty Lakes Complex is an area set aside for special management with recreational use as a key value. Within the complex, motorized vehicles and boat motors are not allowed and this regulation is enforced by the Michigan DNR Law Enforcement Division.

Pratt Lake is bowl shaped basin dropping off to a maximum depth of 39 feet. The littoral zone consists primarily of sand with sparse submergent aquatic vegetation. In the benthic region of the lake, the substrate is primarily fibrous peat with a mix of sand and marl. There is no shoreline development as the lake is surrounded entirely by land owned by the State of Michigan state forest system. A large shallow flat exists on the northwest side of the lake where an unimproved access site is located. Parking is limited with room for about 3-4 vehicles.

The trophic status of a lake refers to overall productivity (biomass). Lakes can be described as oligotrophic, mesotrophic, and eutrophic which are defined as low, medium, or high productivity, respectively. Water samples collected in 2014 were examined for chlorophyll-a, total phosphorus, total nitrogen, and alkalinity, which are parameters used to measure a lake's productivity. Chlorophyll-a concentrations were identified as low (0.75 ug/L), where low is <1.9 ug/L, medium is 1.9-4.8 ug/L, and high is >4.8 ug/L (Wehrly et al. 2012). Total phosphorus was found to be medium (9.5 ug/L) where low is <9 ug/L, medium is 9-20 ug/L, and high is >20 ug/L. Total nitrogen was found to be medium (0.529 mg/L), where low is <0.403 mg/L, medium is 0.403-0.750 mg/L, and high is > 0.750 mg/L. Total alkalinity is a measure of buffering capacity and plays an important role in determining pH and consequently, overall lake productivity. Alkalinity values in Michigan inland lakes can be classified into low (<49.5 mg/L as CaCO3), medium (49.5-141.5 mg/L), and high (>141.5 mg/L) categories. In 2014, alkalinity was 10 mg/L in Pratt Lake. Comparably, pH was measured at 6.67 at the water surface.

Dissolved Oxygen (DO) is a critical component to suitable habitat in aquatic ecosystems. Dissolved oxygen in lakes derives from the atmosphere as well as from aquatic plants during photosynthesis. Concentration of DO in lakes can limit the distribution and growth of fish in lakes as well as the size composition and biomass of zooplankton, which is a primary food resource for juvenile and prey fishes. Concentrations of DO begin to limit fish populations at approximately 4.0 mg/L and are often

lethal below 0.5 mg/L. Summer profiles of the water column were conducted in August 1955 and September 2014 (Table 1). The profile conducted in 1955 found acceptable DO levels for fish through the thermocline to a depth of 27 feet. In 2014, suitable DO was down to 30 feet. Critical depth is defined as the depth at which DO concentrations are below 0.5 mg/L which may be lethal to fish populations. The recorded critical depth in Pratt Lake in 1955 and 2014 was 31 and 33 feet, respectively. In addition, Secchi disk readings are an excellent indicator for primary production occurring in the water column. Secchi disk readings were 18 and 17 feet in 1955 and 2014, respectively. Using the above parameters, Pratt Lake can be characterized as an oligotrophic lake, which typically supports a relatively simple fish community and low biomass.

History

For a relatively small lake, Pratt Lake has received much attention from fisheries managers over the past 80 years. Management details for Pratt Lake during 1930-1960 are sparse in Michigan DNR office files. The management direction at that time appeared to be intended to promote a warmwater fishery comprised of Bass (Largemouth and Smallmouth) and Bluegill (Table 2). Sometime around 1940, brush shelters were installed by the Civilian Conservation Corps to improve fish cover. Those brush shelters were investigated in 1955 and were found to be nearly disintegrated which resulted in 111 new brush shelters being installed in 1956.

Prior to 1957, anglers reported catching many "nice" sized Smallmouth Bass and Bluegill were caught. The fisheries manager at that time conducted angling surveys as much as possible. Between 1949 and 1958, five angling surveys were completed. Each trip varied in length from an hour to all day. In every report catches of Smallmouth Bass, Yellow Perch, and Bluegill were documented. In 1955, a fish community survey was conducted using gill nets. Smallmouth Bass were captured with fish up to 18 inches with an overall average length of around 10 inches. However, since 1957 angler reports to the Newberry Office indicated a decline in the overall fishery and it was derived that heavy angler harvest was believed to be the cause of the decline.

In August 1968, a netting survey was conducted using gill nets to evaluate the fishery ahead of stocking Splake (Brook Trout x Lake Trout hybrid) to create a coldwater species component in this fishery. This survey captured Bluegill and Yellow Perch found to be growing slightly below statewide average. In September 1968, Splake were stocked for the first time in Pratt Lake. Initially Splake survival was good, but as years went on an increase of the Yellow Perch population created more competition with Splake resulting in poor survival.

From 1971-1977, two netting surveys were conducted to evaluate the success of the stocked Splake. The 1971 survey captured five Splake (8-10.5 inches) and the 1977 survey captured one Northern Pike (excellent condition), two Splake (poor condition), and found very slow growth for Smallmouth Bass and Bluegill. Angler reports over this period were positive stating "good catches" of Splake up to 12 inches. In 1977, a chemical reclamation was conducted to shift management to a simple community of Largemouth Bass, Bluegill, Northern Pike, and Rainbow Trout. Largemouth Bass, Northern Pike, Bluegill, and Rainbow Trout were all stocked in 1978.

In the fall of 1978, another netting survey was conducted to evaluate the success of the stocked Rainbow Trout fingerlings. This survey captured twenty-seven, 10 inch Rainbow Trout. These results supported the positive angler reports that came to the Newberry Office of anglers catching many fish.

In 1980, another netting survey was conducted to evaluate the growth of the Largemouth Bass stocked in 1977 and 1979. No Largemouth Bass were captured. Later that fall, electrofishing equipment (EF-boat) was used around the entire perimeter of the lake. Zero Largemouth Bass were collected or observed. Another effort was made to capture Largemouth Bass with netting gear in 1983, but again zero were captured. The fishery was managed as a warmwater fishery through 1984 when another chemical reclamation was conducted and it was then decided to shift management to a monoculture fishery for Rainbow Trout.

Rainbow Trout stocking began in 1985 and has continued until present day. Stocking rates have remained at 63 fish per acre on an annually basis. Netting surveys were conducted in 1986, 1988, 1995, 2001, and 2014 (see Current Status). Each of these surveys found similar results in number of fish caught, total length range (fish up to 19 inches), above statewide average growth, and overwinter survival. Additional management actions include chemical reclamations conducted in 1989 and 2002 to eradicate Yellow Perch which compete with stocked Rainbow Trout for forage resources. The fishery during this time has been very popular and has provided an exceptional Rainbow Trout fishery with many fish exceeding 15 inches.

Current Status

The most recent fish community survey was conducted using Status and Trends protocol from May 27-30, 2014. The survey effort consisted of: 1 experimental gill net lift, 4 small mesh fyke net lifts (2 nets), 9 large mesh fyke net lifts (3 nets), and 2 seine hauls (Wehrly et al. 2015). A total of 87 fish comprissed of Golden Shiner and Rainbow Trout were captured during the survey (Table 3). Golden Shiner comprised 69% of the survey catch by number and 10% of the total catch by weight. Rainbow Trout comprised 31% by number and 90% by weight. Rainbow Trout average total length was 13.8 inches with a length range of 10-16 inches. A total of 24 fish (89%) were greater than legal size (>12 inches). Age determination by scales found Rainbow Trout to be growing slightly below statewide average (-0.4 inches; Figure 1, Schneider 2000). Three year classes of Rainbow Trout were captured; ages II, III, IV. Golden Shiner averaged 5.2 inches in length with a length range of 2-6 inches. No other species were observed or captured during this survey.

Analysis and Discussion

Pratt Lake is a small natural, low productivity lake in Michigan's eastern Upper Peninsula. Because of its low productivity, the lake is likely only capable of supporting sparse vegetation and low diversity fish community. The fish community today exists as a result of many years of stocking. The fishery here can be characterized as a monoculture trout fishery for Rainbow Trout, with Golden shiners present. Generally speaking, the Rainbow Trout fishery is maintained through stocking, which exhibits good carryover (overwinter survival) and near average growth rates. Growth potential for Rainbow Trout in Pratt Lake is similar to that of other stocked inland lakes with fish reaching quality size (>16 inches). Pratt Lake carries a Type-A regulation which allows harvest of 5 trout with no more than 3 trout greater than 15 inches. The minimum size limit for Rainbow Trout in Pratt Lake is 12 inches. The fishing season is open from the last Saturday in April through September 30 each year. The use of minnows as bait is not allowed on this designated trout lake which helps to prevent the introduction of non-desirable species (e.g., Yellow Perch, Bluegill, Suckers), which have posed issues for management of this lake in the past.

Following many different management strategies since 1937 in Pratt Lake, fisheries managers have maintained a fishery for Rainbow Trout. Continued stocking efforts will be needed to sustain the Rainbow Trout fishery because no natural reproduction has been documented and is likely a result of spawning habitat limitations.

Based on angler reports through 2014, the Rainbow Trout fishery is very popular and offers an excellent opportunity for harvest. The lake is easily accessible with a hand-carry vessel or fishing from shore. Because of its location in the Pretty Lake Complex, much attention directed towards managing the surrounding forest which also provides additional protection to this fishery.

Management Direction

No changes in fisheries management is recommended for Pratt Lake at this time. Stocking of Rainbow Trout yearlings at the current rate of 63 fish per acre annually, appears to be providing an acceptable fishery for anglers without overcrowding the available habitat. It is recommended that the Type-A regulation is maintained for Pratt Lake. Consideration for improving the amount of large woody debris in the littoral zone should be made through FRD, Compartment Review process. Felling of trees or brush bundle creation could be utilized to improve available woody debris offering fish cover. Fisheries managers should continue to monitor the presence of any non-desirable fish in the lake which could interrupt the successful Rainbow Trout fishery. The Michigan DNR should continue to manage the Pretty Lakes Complex as a Special Conservation Area with considerations for further protections. Continued management as a Special Conservation Area will provide a unique and scenic fishing opportunity in the eastern Upper Peninsula.

References

Schneider, J. C., P. W. Laarman, and H. Gowing. 2000. Age and growth methods and state averages. Chapter 9 in Schneider, James C. (ed.) 2000. Manual of fisheries methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

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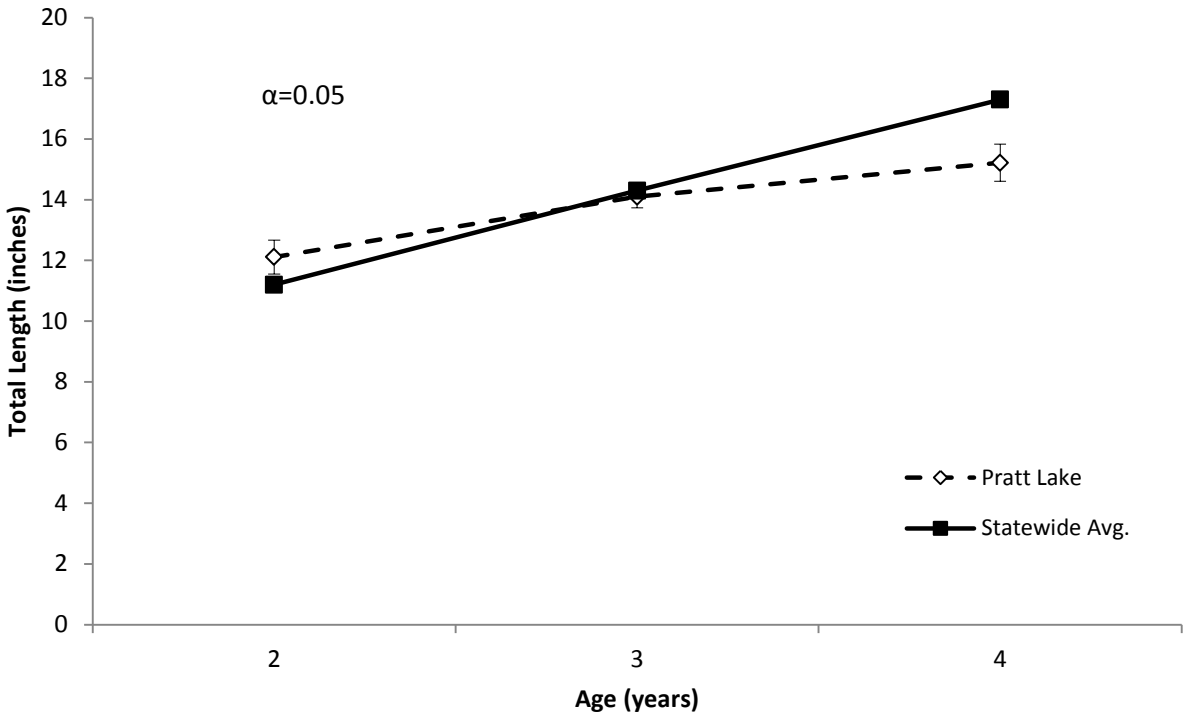

Figure 1.-Mean length at age for Rainbow Trout captured during the Status and Trends survey conducted on Pratt Lake on May 27-30, 2014. Statewide average lengths for Jan.-June are from Schneider 2000. Error bars denote the 95% confidence intervals about the average total length.

Table 1.-Vertical profiles conducted on Pratt Lake, Luce County on August 3, 1955 and September 2, 2014.

9/2/2014

Depth (ft)	Temperature (F)	Dissolved Oxygen (mg/l)	pH
0	68.8	9.3	6.7
3	68.8	9.3	6.3
6	68.1	9.3	6.4
9	67.9	9.3	6.4
12	67.7	9.2	6.3
15	67.5	9.3	6.4
18	66.7	11.1	6.6
20	64.2	13.6	6.8
21	61.0	13.4	6.7
23	59.2	13.2	6.4
27	56.0	7.7	5.3
30	54.8	4.3	5.2
33	53.7	0.5	6.1

8/3/1955

Depth (ft)	Temperature (F)	Dissolved Oxygen (mg/l)	pH
0	79.5	5.9	7
10	77.0	-	-
15	76.0	-	-
20	74.5	-	-
25	72.0	7.5	-
27	-	6.6	-
28	68.0	0.9	-
31	64.2	0	6
32	62.5	-	-

Table 2.-Stocking history for Pratt Lake, Luce County.

Year	Number	Species	Age	Average Length (inches)
1937	900	Smallmouth Bass	Fingerling	-
1937	12,000	Bluegill	Fingerling	-
1938	12,330	Bluegill	Fingerling	-
1939	1,250	Largemouth Bass	Fingerling	-
1939	5,000	Bluegill	Fingerling	-
1940	450	Smallmouth Bass	Fingerling	-
1940	3,600	Bluegill	Fingerling	-
1941	750	Smallmouth Bass	Fingerling	-
1941	4,000	Bluegill	Fingerling	-
1942	500	Smallmouth Bass	Fingerling	-
1968	5,000	Splake	Fall Fingerling	-
1976	1,200	Splake	Yearling	6.5"
1978	1,250	Rainbow Trout	Yearling	-
1978	2,500	Largemouth Bass	Fall Fingerling	-
1978	5,000	Northern Pike	Fingerling	-
1978	8,000	Bluegill	Fall Fingerling	-
1979	5,000	Bluegill	Yearling	-
1979	500	Largemouth Bass	Fall Fingerling	2.1"
1981	600	Largemouth Bass	Fall Fingerling	1.9"
1981	1,955	Largemouth Bass	Fall Fingerling	2.0"
1985	1,500	Rainbow Trout Shasta	Yearling	5.9"
1986	1,500	Rainbow Trout	Yearling	6.8"
1987	1,512	Rainbow Trout Shasta	Yearling	7.2"
1988	1,500	Rainbow Trout Wytheville	Yearling	7.8"
1990	1,500	Rainbow Trout Wytheville	Yearling	8.0"
1991	1,350	Rainbow Trout Arlee	Yearling	7.8"
1992	1,500	Rainbow Trout Shasta	Yearling	7.8"
1993	1,500	Rainbow Trout Shasta	Yearling	7.2"
1994	1,500	Rainbow Trout Shasta	Yearling	8.2"
1995	1,500	Rainbow Trout Arlee	Yearling	8.3"
1996	1,500	Rainbow Trout Eagle Lake	Yearling	7.4"
1997	1,500	Rainbow Trout Eagle Lake	Yearling	7.1"
1998	1,460	Rainbow Trout Eagle Lake	Yearling	7.1"
1999	1,500	Rainbow Trout Gerrard Kamloops	Yearling	8.4"
2000	1,500	Rainbow Trout Eagle Lake	Yearling	6.8"
2001	2,000	Rainbow Trout Eagle Lake	Yearling	6.6"
2003	1,750	Rainbow Trout Eagle Lake	Yearling	7.2"
2004	1,750	Rainbow Trout Eagle Lake	Yearling	6.0"
2005	1,925	Rainbow Trout Eagle Lake	Yearling	6.3"
2006	1,500	Rainbow Trout Eagle Lake	Yearling	6.6"
2007	1,700	Rainbow Trout Eagle Lake	Yearling	6.4"

Table 2.-Stocking history for Pratt Lake, Luce County (continued).

Year	Number	Species	Age	Average Length (inches)
2008	1,000	Rainbow Trout Eagle Lake	Yearling	8.2"
2009	1,700	Rainbow Trout Eagle Lake	Yearling	7.2"
2010	1,600	Rainbow Trout Eagle Lake	Yearling	6.3"
2011	1,700	Rainbow Trout Eagle Lake	Yearling	6.5"
2012	1,600	Rainbow Trout Eagle Lake	Yearling	6.5"
2013	990	Rainbow Trout Eagle Lake	Yearling	7.0"
2014	1,012	Rainbow Trout Eagle Lake	Yearling	7.8"

Table 3.-Numbers, calculated weights, total lengths, and percent legal for fish species collected during the netting survey conducted on Pratt Lake from May 27-September 2, 2014.

Species	Number	Percent by number	Weight (lb)	Percent by weight	Total length range (inches)	Percent legal size*
Golden shiner	60	69	2.7	9.6	2-6	-
Rainbow trout	27	31	25.2	90.4	10-16	88.9
Total	87		27.9			

*Percent legal or acceptable size for angling (Legal Rainbow trout= 12 inches).