Clark Lake

Chippewa and Luce Counties, T49N, R07-08W, Sec 19, 30, 24, 25
Betsy River Watershed, last surveyed 2009

James R. Waybrant

Environment

Clark Lake is located within the Tahquamenon Falls State Park, on the border of Luce and Chippewa Counties north of state highway M-123 and the Upper Falls of the Tahquamenon River (Figure 1). It lies within the Tahquamenon Natural Area, where motorized vehicles (including boats) are restricted. For that reason, access is only available at the southeast corner of the lake via a 0.5 mi hike from a small parking lot.

The lake is 145 acres in size and very shallow, with only a small spot deeper than four feet. The difficult access, combined with modest fishing potential, means that Clark Lake remains only lightly fished. The north and south shoreline areas are hard sand while the east and west shores are pulpy peat with bog shoreline. Since wader fishing is limited and only possible in areas without soft organic substrate, carrying a canoe or kayak into the lake is the most effective way to fish. The lake is stained dark brown and is usually quite turbid as a result of prevailing winds blowing over the shallow body of water. There is very little aquatic vegetation, likely due to the shallow, dark water which prohibits light penetration and plant growth. The aquatic plants that do grow in the lake consist of small patches of wild celery, sedge, lily pads, and pondweeds.

History

The local climate (an intensive lake effect snow area that annually receives an average of well over 200 inches of snow) and shallow depth throughout the lake create a high likelihood for periodic winterkill and limit potential fisheries management opportunities such as stocking. Limnological samples taken through the ice on March 14, 1967 showed that both the dissolved oxygen concentration (2 mg/L) and pH (4.8), taken at a depth of three feet, were very low. More recent data collected on March 7, 2006 revealed higher dissolved oxygen concentrations of 5-6 mg/L two feet below the thick ice cover, but samples at a depth of four feet found a concentration of only 1 mg/L. Although the pH reading (6.8) was higher than it was in 1967, the extremely low dissolved oxygen concentration limits fish occurrence and survival to the most tolerant species.

Early fisheries management records state that Clark Lake was stocked with smallmouth bass and bluegills from 1937-1939, but no bass or bluegill have ever been documented in any survey report. The first recorded netting survey occurred in 1966, during which only two northern pike and three yellow perch were captured from three experimental (variable mesh) gill nets. A 1991 netting survey captured 895 fish, of which 708 (566 lbs) were brown bullheads. The bullheads, all of which were removed during the survey, comprised 80% of the catch biomass. The remainder of the catch consisted of one 32 in northern pike, 117 pumpkinseed sunfish, and 69 yellow perch (64% of which were greater than 7 in total length). The large proportion of small bullheads in the 1991 survey prompted a manual removal effort in 1994 where a total of 574 lbs of bullheads were captured and removed.

Current Status

Fisheries Division conducted an intensive survey utilizing multiple survey gear including fyke nets, fine-mesh maxi-mini fyke nets, and seines in July 2009 to obtain a comprehensive description of the fish community of Clark Lake. The netting efforts (Figure 2) resulted in the capture of 5,207 fish, 3,943 of which were brown bullheads. The brown bullheads comprised 89% (857.5 lbs) of the catch biomass and were followed by yellow perch, pumpkinseed, northern pike, golden shiner, and Iowa darter in abundance by weight (Table 1). One of the two northern pike captured was legal-sized (>24 in), and 27% of the yellow perch were greater than 7 in total length. None of the 698 pumpkinseed captured were greater than 6 in long.

Age and growth information were also collected during the survey, making length-at-age analyses possible for the pumpkinseed and yellow perch populations. Both populations were growing at roughly 0.5 in slower than the state average for each species (Table 2). The pumpkinseeds were represented by all age classes from 2-5, while yellow perch were represented by all age classes from 1-13, except age 12.

Analysis and Discussion

There have been two manual removal efforts in the past 20 years targeting the bullhead population; the netting survey in 1991 where all bullheads were removed, and the targeted removal effort in 1994. Although nearly 4 lbs/acre of bullhead biomass was removed during each effort, the biomass in 2009 was higher than that which existed in either of the previous surveys. It is unknown whether there were any short-term changes to the fish community resulting from the removals, but if so they were likely short-lived since the bullhead population exceeded its original condition in the fifteen year interval between the last removal and the 2009 survey. Fisheries research suggests that a bullhead-yellow perch-pumpkinseed fish assemblage is representative of the typical fish community expected in small, isolated north temperate lakes prone to periodic winterkill (K. Wehrly, MDNRE, personal communication; Tonn and Magnuson 1982). Since Clark Lake is very isolated, with difficult public access and only a modest fishery typical of other water bodies with similar physical and chemical characteristics, conducting another manual bullhead removal is not a viable fisheries management option. It is unlikely that such an effort will ever be scheduled in the future.

In addition to a thriving bullhead population, northern pike continue to persist in Clark Lake in relatively low numbers. The number of age classes of yellow perch present in Clark Lake suggests good annual recruitment of young individuals to older ages, but their slow growth implies intense competition for food resources among surviving individuals. Over four times the number of yellow perch were captured in 2009 compared to 1991, and their average size decreased from 8.7 in to 6.0 in. Despite the decrease in the average length of yellow perch, individuals up to 14 in long were captured (Table 3) which would provide an attractive quarry to the angler.

Given little evidence of shoreline angling activity and the difficult access to Clark Lake, the weighted age frequency of pumpkinseeds suggests high natural mortality between ages 3-4 (Table 2). Their numbers dropped from 523 at 4 in to 14 at 5 in, with no individuals larger than 5 in captured (Table 3). Since pumpkinseed (as well as northern pike, brown bullhead, and yellow perch) are relatively tolerant of low dissolved oxygen concentrations, it is difficult to determine whether or not natural mortality at older age classes is due to periodic winterkill or some other factor such as inter- or intraspecific competition.

Management Direction

Clark Lake provides an unusually pristine, aesthetically-pleasing opportunity to enjoy the northern wilderness with a low likelihood of encountering another human being during the visit. Although the lake provides only a modest fishery, such an experience may be ideal for anglers seeking a peaceful fishing experience in an isolated setting. No further management effort is recommended at this time.

References

Tonn, W. M. and J. J. Magnuson. 1982. Patterns in species composition and richness of fish assemblages in northern Wisconsin lakes. Ecology 63:1149-1166.

Figure 1. Road map of general area around Clark Lake, Chippewa and Luce Counties.

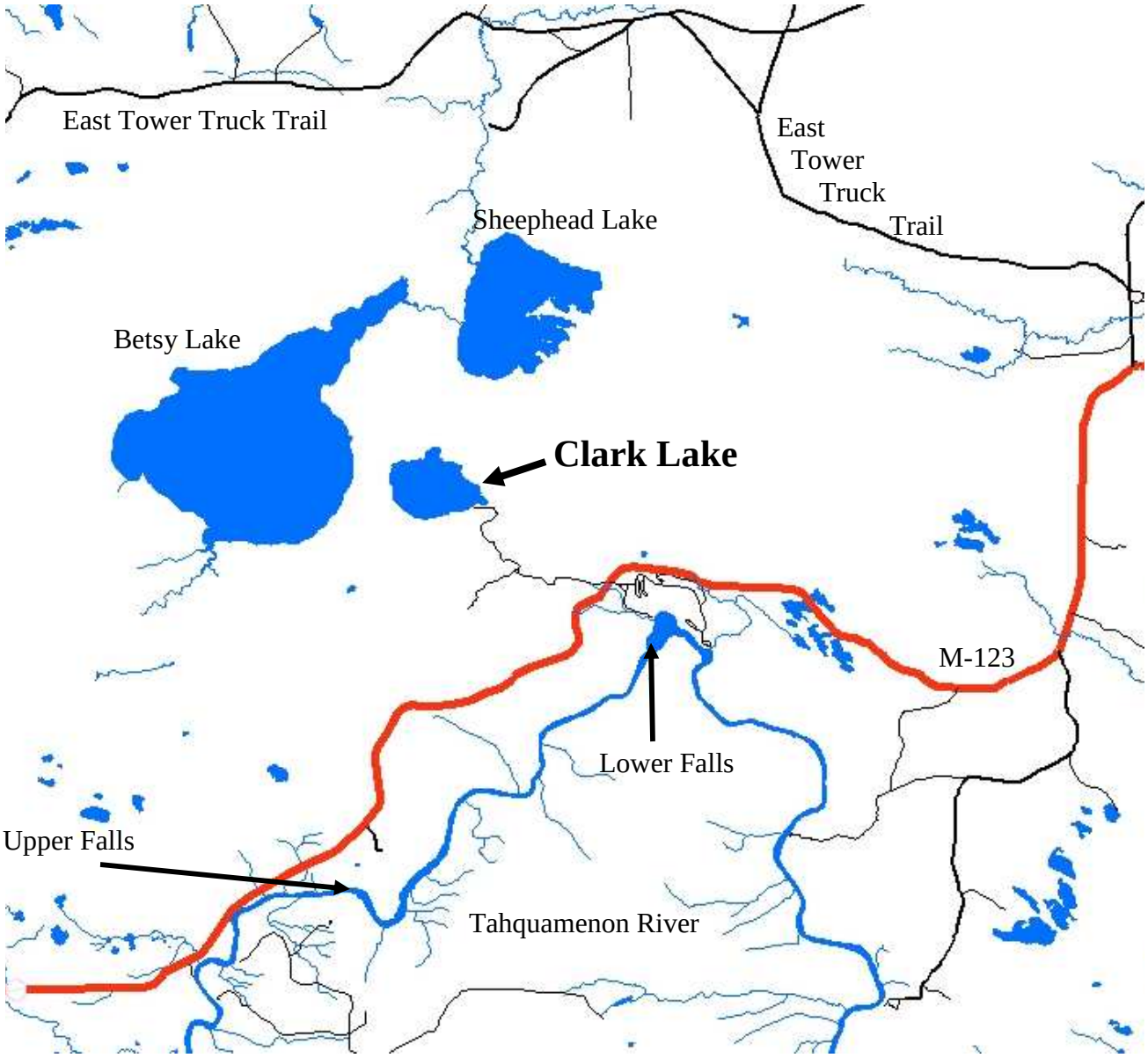

Figure 2. Aerial photograph of Clark Lake, Luce and Chippewa Counties, 2005.

Table 1. Number, weight, and length indices of fish collected from Clark Lake with fyke nets, maxi-mini fyke nets, and seine, July 7-10, 2009.

Species	Number	Percent by number	Weight (lbs.)	Percent by weight	Length range (in.)*	Average length	Percent legal size**
Brown bullhead	3,943	75.6	857.5	88.6	4 – 12	7.4	60
Golden shiner	283	5.4	7.0	0.7	3 – 5	4.3	---***
Iowa darter	4	0.1	0.0	0.0	1 – 2	2.3	---
Northern pike	2	0.0	9.6	1.0	22 – 31	27.0	50
Pumpkinseed	698	13.4	43.0	4.4	3 – 5	4.3	0
Yellow perch	277	5.3	50.6	5.2	0 – 14	6.0	27
Total		99.8		99.9			

* Note some fish were measured to 0.1 inch, others to inch group: eg., "5"=5.0 to 5.9 inches; "12"= 12.0 to 12.9 inches; etc.

** Percent legal size or acceptable size for angling harvest.

*** "---" signifies a species for which there is no minimum legal/acceptable harvest size.

Table 2. Weighted mean length and age composition for three species of fish sampled from Clark Lake with fyke nets, maxi-mini fyke nets, and seine, July 7-10, 2009.

Species/Age	Number aged	Length range (in.)	State average len. (in.)	Weighted mean len. (in.)	Weighted age freq. (%)	Mean growth index*
Northern pike						---
Age V	2	22.8 – 31.2	26.1	27.0	100	
Pumpkinseed						-0.7
Age II	13	3.3 – 4.2	4.2	3.8	46	
Age III	7	4.0 – 4.5	5.2	4.3	52	
Age IV	7	5.0 – 5.5	5.8	5.2	1	
Age V	7	5.3 – 5.9	6.3	5.5	1	
Age IX	1	22.5	22.6	22.5	11	
Yellow Perch						-0.5
Age I	8	3.0 – 3.7	4.0	3.3	11	
Age II	21	3.8 – 6.0	5.7	4.9	50	
Age III	9	4.9 – 6.8	6.8	5.5	8	
Age IV	9	6.4 – 7.6	7.8	7.0	4	
Age V	8	7.7 – 9.4	8.7	8.9	3	
Age VI	9	8.6 – 10.2	9.7	9.2	4	
Age VII	9	9.3 – 10.7	10.5	10.1	4	
Age VIII	3	8.8 – 10.7	11.3	10.1	1	
Age IX	12	11.2 – 13.1	11.7	12.0	7	
Age X	11	9.0 – 13.6	12.1	11.9	7	
Age XI	1	14.1		14.1	1	
Age XIII	1	11.9		11.9	1	

* Mean growth index is the average deviation from the state average length at age.

Table 3. Length frequency of six species from Clark Lake, captured during a netting survey using fyke nets, maxi-mini fyke nets, and seines, July 7-10, 2009.

Species	Inch group	Number caught	Lbs. caught
Brown bullhead	4	12	0.6
	5	437	36.9
	6	1,126	154.0
	7	1,023	211.4
	8	996	295.3
	9	270	110.3
	10	56	30.6
	11	12	8.5
	12	11	9.9
Average length 7.4 in	Totals	3,943	857.5
Golden shiner	3	88	1.1
	4	171	4.7
	5	24	1.2
Average length 4.3 in	Totals	283	7.0
Iowa darter	1	1	0.0
	2	3	0.1
Average length 2.3 in	Totals	4	0.1
Northern pike	22	1	2.5
	31	1	7.2
Average length 27.0	Totals	2	9.7
Pumpkinseed	3	161	5.0
	4	523	36.2
	5	14	1.8
Average length 4.3 in	Totals	698	43.0
Yellow perch	0	3	0
	2	24	0.1
	3	35	0.6
	4	79	2.7
	5	51	3.3
	6	11	1.2
	7	8	1.4
	8	9	2.3
	9	12	4.4
	10	9	4.6
	11	18	12.2
	12	12	10.6
	13	5	5.7
	14	1	1.4
Average length 6.0 in	Totals	277	50.5