Nestor Lake
Clare, T18N/R03W/10
North Branch Tobacco River, Surveyed June 2013

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Environment

Nestor Lake is located 4 miles south, and 7 miles east of Harrison in Clare County (T18N, R03W, Sec 10). The lake is a part of a series of small ponds connected by a drainage. The portion of Nestor Lake that was surveyed was the larger 15 acre lake located along Mannsiding Road. There is a DNR public access site located on the east end of the lake (DNR Access 18-12) (Figures 1 and 2).

Nestor Lake (West) is oval to kidney shaped. There is an inlet or a wetland complex to the north of the main basin, and a nameless outlet at the south end, which flows to the North Branch Tobacco River. The shoreline has no cottages or development. The shallows are filled with vegetation including cattails, rushes, and lily pads. The surrounding area is wooded. There is beaver and muskrat activity in this area. Logs and stumps are numerous, and the shallows are difficult to navigate with a boat. The bottom is soft organic and marl. There were 9 submerged logs, and one dock counted in the habitat assessment.

Surficial geology of the area is 95.5% glacial moraine and 4.5% ice-contact. These are soils dominated by 95.5% fine textured soils and 4.5% coarse soils. The terrain ranges from 0% slope to 18% slope, but most is between 0 and 6% slope. The wetland and wetter areas are Lupton Muck. The soils are a variety of loamy sands and loams. The catchment area is 260 acres and the lake has a calculated fetch of .73 miles, a perimeter of 1.9 miles, and the surface area of the lake is recorded as 29 acres although much of this is not navigable. Land use in the watershed is 30.9% agriculture, 7.1% urban, 24.9 % forested, 17.5% wetland, 1% water, and 18.6% grassland.

The hydrographic map of Nestor Lake shows a fairly regular shoreline, with more aquatic vegetation on the west side. There are 2 distinct basins, which support depths of over 20 feet. A maximum depth of 27 feet was recorded. The lake stratified thermally at roughly 12 feet. The dissolved oxygen was too low to support fish below 21 feet and the critical oxygen level was reached below 25 feet (Table 1).

Measurements of Secchi disk (12.8 ft), total phosphorus (0.0051 mg/l), and total chlorophyll-a (9.5 ug/l) yielded a Carlson Trophic Status Index of 40.2. Trophic status parameters collected show Nestor Lake as a mesotrophic lake (Fuller and Minnerick 2008). Mesotrophic lakes are typically those that have good water quality and medium biological productivity. Furthermore, lakes in the mesotrophic range are moderately clean, with some chance of hypolimnetic anoxia in summer, and are fully supportive of all swimming and aesthetic uses. The pH of Nestor Lake ranged from 6.6 in the lower water column to 7.3 at the surface. Alkalinity was 210 mg/l indicating excellent capacity to be buffered and is consistent with the marl bottom.

History

Past management and fisheries information is scant for Nestor Lake. The lake was mapped in 1961. The public access site was developed in June, 1964. There were two accounts of partial winterkills, one in 1965, and the other in 1978. An early lake survey was conducted in 1969 using only gill nets. The first more complete status and trends general survey was conducted in 2002. Comparisons will be made with the 2002 survey as similar methods were used. There are no records of fish being stocked into Nestor Lake.

Current Status

This survey was as a part of Fisheries Division's Status and Trends Monitoring Program. The Status and Trends Monitoring Program seeks to randomly sample various sized lakes, using similar protocol, to determine trends among lakes at the regional and statewide levels.

Status and Trends protocol incorporates a variety of gear to sample the fish community within a recommended temperature range (55º-80º F). Large mesh trap and fyke nets are used to capture larger (> 3 inches) species that inhabit the littoral zone or that move inshore at night. Gill nets are used to sample fishes that occupy offshore waters and are particularly effective at capturing perch, salmonids, and northern pike. Night electrofishing is used to capture all size ranges of species and life stages that inhabit the littoral zone or that move inshore at night. Seining and small mesh fyke nets are used to capture representative samples of small-bodied nongame species and smaller size classes (< 3 inches) of sport fishes that inhabit the littoral zone. Collectively, the catch composition from these gears presents a general picture of the overall fish community.

The fish community of Nestor Lake was sampled June 11-13, 2013 with trap, fyke, and gill nets. Seining was eliminated due to the difficulty of wading through the littoral zone. Small mesh fyke nets were used to assess the minnow or forage fish. Three electrofishing stations were sampled the evening of July 10. Habitat sampling occurred August 16, 2013.

A total of 586 fish representing 11 species were collected in this assessment (Table 2). Bluegill were the most abundant species collected, composing nearly 42% of the total catch. Largemouth bass composed14%, pumpkinseed sunfish comprised 6.7%, black bullhead 3.1%, brown bullhead composed .9%, and yellow bullhead composed 6.3%. Forage species captured included bluntnose minnows (23.5%), and a single tadpole madtom.

A total of 247 bluegills averaging 5.0 inches were collected with all survey gear (Table 2). Average size of the electrofishing catch was 5.0 inches. Only 11 % of bluegill catch met or exceeded the acceptable harvest size of 6 inches. Age and growth analysis indicated bluegill were growing below the State average having a mean growth index of -0.6 (Table 3). Multiple year classes (ages 1-10) were found suggesting acceptable recruitment to the harvestable fishery. Another way to look at the size structure of bluegill is to use the Schnieder Index (Schneider,1990) using just the trap or large mesh fyke net catches (Table 4). The Schneider index was 5 for both 2002 and 2013 which rates the lake as good on the scale. It appears the population size structure has not changed significantly.

A total of 39 pumpkinseed sunfish averaging 5.7 inches were collected (Table 2). Seventy-four percent of the total catch met or exceeded the acceptable harvest size of 6 inches. Age and growth analysis indicated pumpkinseed sunfish were growing above State average having a mean growth index of +0.3

(Table 3). Multiple year classes (ages 1-7) were found suggesting acceptable recruitment into the harvestable fishery.

A total of 7 yellow perch averaging 5.9 inches were collected (Table 2). Forty-three percent of the catch met or exceeded the acceptable harvest size of 7 inches. Age and growth analysis could not be calculated with too few specimens being aged.

Only 7 black crappie were captured averaging 5.3 inches (Table 2). Twenty-nine percent of the total catch met or exceeded the acceptable harvest size of 7 inches. Age and growth analysis could not be calculated with too few specimens being aged.

A total of 82 largemouth bass averaging 8.0 inches were collected (Table 2). Only 1% of catch met or exceeded the legal harvest size of 14 inches. Age and growth analysis indicated largemouth bass were growing below State average having a mean growth index of -1.2 (Table 3). Multiple year classes were found (age 1-7) suggesting acceptable recruitment into the harvestable fishery.

A total of 5 northern pike averaging 19.0 inches were collected (Table 2). Twenty percent of the total catch met or exceeded the legal harvest size of 24 inches. Age and growth analysis could not be calculated with too few specimens being aged. Multiple year classes (ages 2-7) were found suggesting fair reproduction.

A total of 37 yellow bullheads averaging 9.7 inches, 5 brown bullheads averaging 13.9 inches, and 18 black bullheads averaging 9.6 inches were collected in this assessment (Table 2). They represented roughly 10% of the total survey catch. Nearly all of the bullhead catch met or exceeded the acceptable harvest size of 7 inches. Age and growth analysis was not conducted for these species.

Analysis and Discussion

The limnological characteristics and mesotrophic status of Nestor Lake present a base view of available habitat for fish species. A mesotrophic lake is generally of medium productivity which typically results in higher overall biomass of fish and other aquatic organisms.

Temperature characteristics of Nestor Lake also influence the fish community. Mid-summer thermocline development results in insufficient oxygen concentrations for most fish below 18 feet. As a result, the epilimnion and littoral zone of the lake provide the only available habitat for fish species. The shallow weedier areas are difficult to access. Suspended fish are also more difficult to catch.

Thermal characteristics of the Nestor Lake epilimnion and littoral zone are characteristic of warmwater classification where summer temperatures approach the mid-70º F's for an extended period of time. The limnological and thermal characteristics of Nestor Lake favor warm to cool water fish species. Bluegill, bullhead (sp.), pumpkinseed sunfish, black crappie, northern pike, and largemouth bass are the prevalent sport fishes.

The sample of largemouth bass collected in this survey indicates bass to be a relatively large component of the fish population. Relative abundance was very good but size structure was dominated by largemouth in the 9 to 11 inch range. Very few legal fish were caught. Longevity was very good with several specimens aged beyond 6 years allowing them to achieve a larger size but few appear to

be. Largemouth growth was slower than State average. Vegetation and the morphology of the lake make sampling largemouth bass difficult.

Too few northern pike, black crappie, or yellow perch were captured to adequately assess their populations.

Minnow species collected with smallmesh fyke nets include bluntnose minnow.

Management Direction

Bluegill, pumpkinseed, and largemouth bass dominate the fish community in Nestor Lake and provide acceptable recreational fisheries. No further management recommendations are suggested for Nestor Lake at this time. Statewide regulations are sufficiently protective of the fish community.

References

Carlson, R.E. and J. Simpson. 1996. A Coordinator's Guide to Volunteer Lake Monitoring Methods. North American Lake Management Society. 96 pp. http://www.secchidipin.org/tsi.htm

Fuller, L.M., and Minnerick, R.J., 2008. State and regional water-quality characteristics and trophic conditions of Michigan's inland lakes, 2001-2005: U.S. Geological Survey Scientific Investigations Report 2008-5188, 58 p.

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

Figure 1. Bathymetry map of Nestor Lake, showing survey gear.

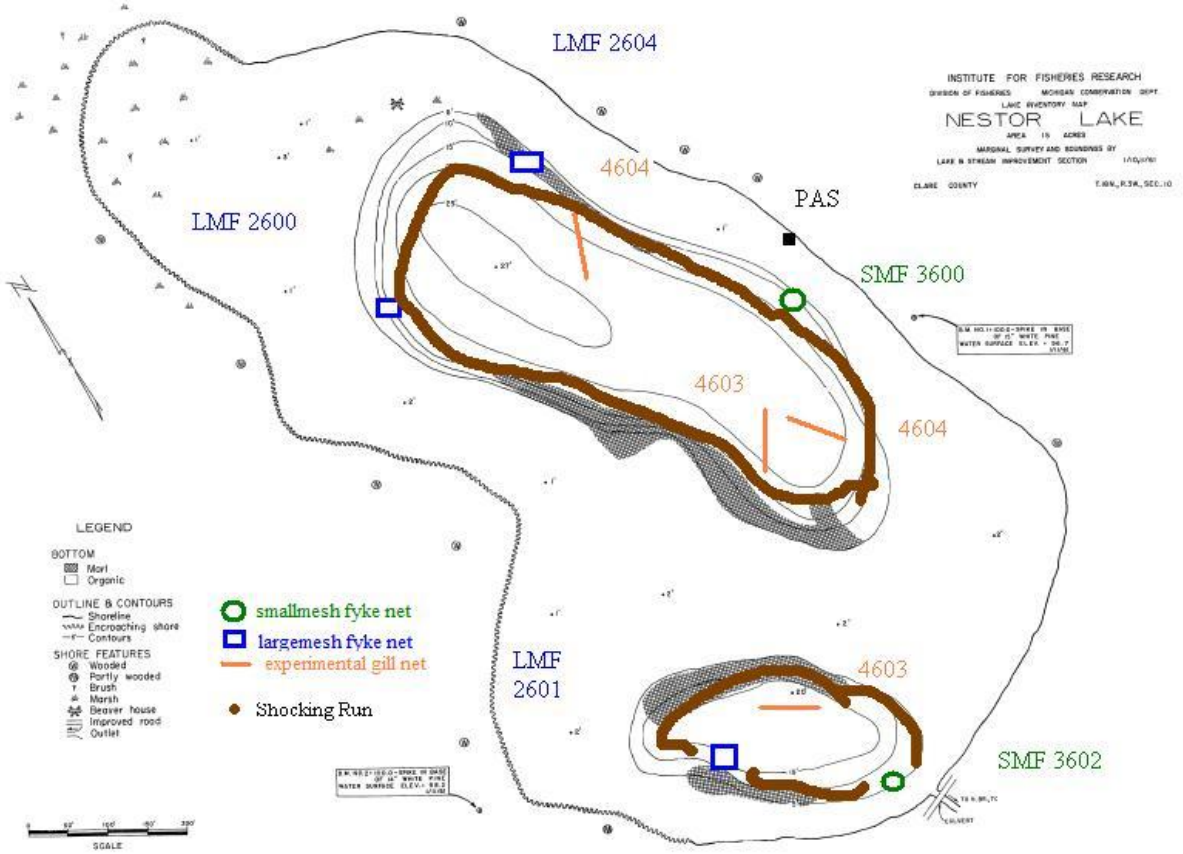

Figure 2. Location of Nestor Lake, Clare County

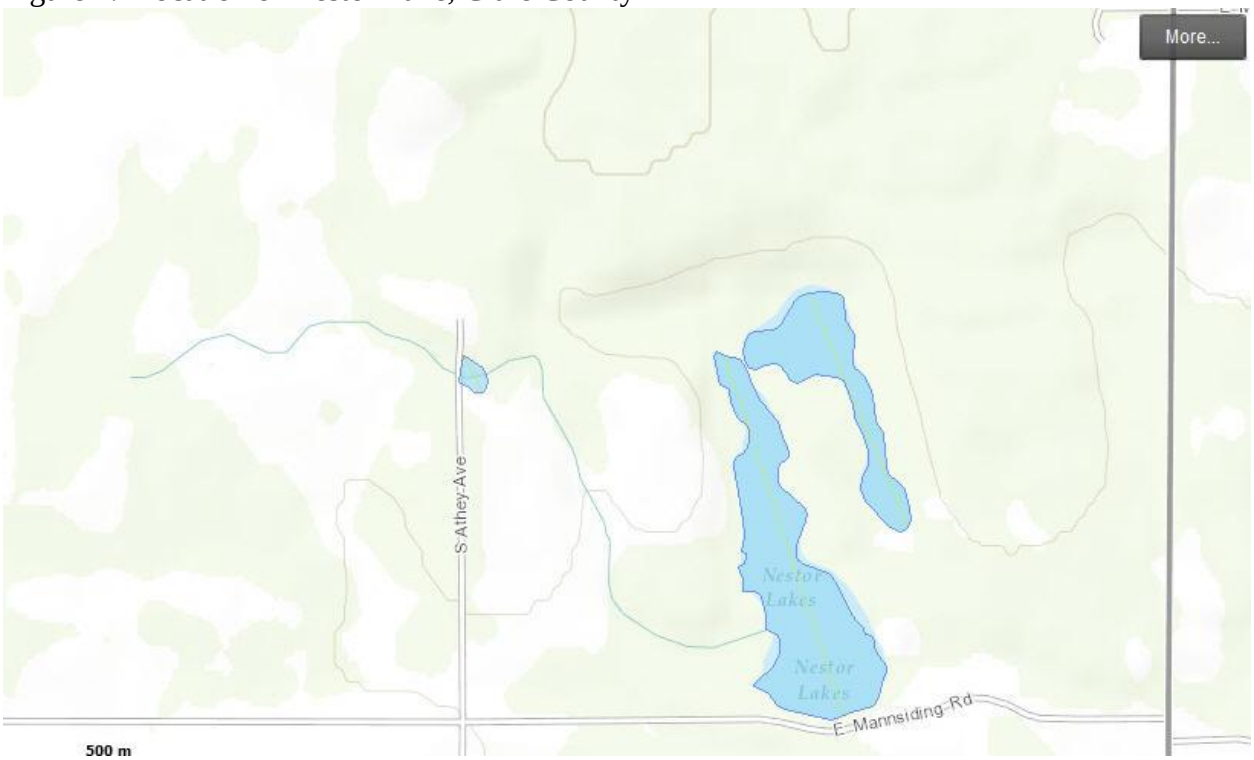

Table 1. Limnological Parameters, August 2013

Depth	Temperature	Oxygen	pH	Spcond ms/cm
0	72.91	8.17	7.34	448
3	72.67	7.9	7.2	445
6	70.57	7.14	7.18	453
9	68.52	6.37	7.15	449
12	64.11	4.98	7.09	432
15	55.13	5.65	7.01	502
18	49.46	3.98	6.93	538
21	46.91	1.81	6.84	564
24	44.44	1.07	6.67	588
27	43.85	0.46	6.64	618

Table 2. Survey catch Nestor Lake, 2013

Species	Number	Percent by number	Weight (lb.)	Percent by weight	Length range (in.)*	Average length (in.)	Percent legal size**
Black crappie	7	1.2	0.6	0.6	2-7	5.3	29
Black bullhead	18	3.1	8	7.7	7-11	9.6	100
Bluegill	247	42.2	12.1	11.7	0-9	5	11
Bluntnose minnow	138	23.5	0.1	0.1	0-2	1.3	100
Brown bullhead	5	0.9	6.1	5.9	13-14	13.9	100
Largemouth bass	82	14	40.4	38.8	1-15	8	1
Northern pike	5	0.9	9.7	9.3	8-27	19	20
Pumpkinseed	39	6.7	9.8	9.4	1-8	5.7	74
Tadpole madtom	1	0.2	0	0	2-2	2.5	100
Yellow Perch	7	1.2	0.8	0.8	2-8	5.9	43
Yellow bullhead	37	6.3	16.4	15.8	6-11	9.7	95
All species totals:	586	100	104.1	100			

Table 3. Age and growth, Nestor Lake, 2013

Species / Age	No. aged	Length range (in.)	State avg. length (in.)	Weighted mean len. (in.)	Weighted age freq.	Mean growth index*
Black crappie						--
Age I:	3	2.90-3.10	4.2	2.97	42.86%	
Age II:	2	5.00-5.40	6	5.2	28.57%	
Age III:	2	7.30-7.50	7.5	7.4	28.57%	
Bluegill						-0.6
Age I:	10	1.40-1.90	1.8	1.61	32.11%	
Age II:	13	2.30-3.70	3.8	2.63	36.86%	
Age III:	16	3.50-4.50	5	3.97	17.62%	
Age IV:	7	5.20-6.00	5.9	5.64	2.90%	
Age V:	9	5.80-7.20	6.7	6.59	3.86%	
Age VI:	4	7.00-8.00	7.3	7.54	1.47%	
Age VII:	4	6.50-8.60	7.8	7.9	1.68%	
Age VIII:	7	7.20-9.00	8.2	8.17	2.69%	
Age X:	2	8.60-8.70	8.9	8.65	0.81%	
Largemouth bass						-1.2
Age I:	6	2.90-4.70	4.2	3.66	7.50%	
Age II:	16	4.80-7.80	7.1	6.32	20.00%	
Age III:	9	8.80-10.00	9.4	9.38	17.50%	
Age IV:	17	9.50-11.30	11.6	10.36	34.00%	
Age V:	4	10.00-11.60	13.2	10.91	6.75%	
Age VI:	8	11.80-13.20	14.7	12.3	10.50%	
Age VII:	3	13.30-15.20	16.3	14	3.75%	
Northern pike						--
Age II:	1	19.00-19.00	17.7	19	25.00%	
Age IV:	1	13.20-13.20	23.4	13.2	25.00%	
Age VI:	1	23.20-23.20	27.3	23.2	25.00%	
Age VII:	1	27.60-27.60	29.3	27.6	25.00%	
Pumpkinseed						0.3
Age I:	2	1.90-2.00	1.8	1.95	5.13%	
Age II:	3	2.70-2.80	3.8	2.73	7.69%	
Age III:	5	3.70-5.60	4.9	4.76	12.82%	
Age IV:	2	6.60-6.90	5.6	6.75	7.18%	
Age V:	15	6.30-8.00	6.2	6.91	50.09%	
Age VI:	4	7.00-8.00	6.6	7.51	11.97%	

Age VII:	2	8.50-8.70	7.1	8.6	5.13%	
Yellow Perch						--
Age I:	1	2.70-2.70	3.3	2.7	14.29%	
Age II:	2	4.00-5.80	5.2	4.1	28.57%	
Age III:	1	6.80-6.80	6.5	6.8	14.29%	
Age IV:	2	7.50-8.30	7.5	7.9	28.57%	
Age V:	1	7.40-7.40	8.5	7.4	14.29%	

Table 4. Scheider Index for classifying bluegill lakes using trap net or largemesh fyke net gear

Sample date	2002	2013
Sample size	148	36
Water temp.	67F	
Ave. length (inches)	6.8 (5)	6.5 (5)
%>= 6 inches	75.6 (5)	63.9(4)
% >=7 inches	39.8 (5)	41.7 (5)
%>= 8 inches	1.75 (5)	22.2 (6)
Index score	5	5
Rank	Good	Good