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To: Bureau of Fisheries and Habitat Protection

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Subject: **2000 Lake Survey Summary - Little Star Lake, Forest County**
(T35N, R14E, sec. 19, 30; WBIC - 190900)
Headwaters GMU



BACKGROUND INFORMATION

Little Star Lake is a 20-acre, softwater seepage lake in south central Forest County. The lake has a maximum depth of 17 feet and a shoreline length of 1.02 miles, which is entirely owned by the U.S. Forest Service. Water in the lake is clear, soft (total alkalinity of 7.7 ueq/l), and acidic (pH of 5.7). Shoreline vegetation is mainly upland conifers and hardwoods, and littoral bottom types consist of sand (35%), rubble (30%), gravel (25%), boulders (5%), and muck (5%). Aquatic vegetation was sparse in the littoral area. An unimproved boat landing was available on northwest shore, off of a relatively rough access road. There was no development on the lake, though several dispersed/wilderness campsites were located along the west shore.

Past fisheries investigations have included fyke-net surveys in September 1963 and July 1968, and a fyke-net and seine-haul survey in 1979. The 1963 survey found a fishery of just largemouth bass and bluegill. Only 2 bass were sampled and the bluegill had an average length of 6.8 inches. The 'lake survey - fish collection' form stated that the lake "produces a red floating stain which resembles algae. Does not seem to affect fish. However, don't know what it is. Should be determined in future as seems to concern campers and fishermen." (form completed by Ed Wilder, USFS). No follow-up or other mention of this observation was found in the files.

The fyke-net survey in July 1968 did not capture or observe any fish. It was believed that the lake had suffered a winterkill a couple of years previous. Subsequently, 3,000 largemouth bass fingerlings and 20,000 adult golden shiners and red-bellied dace were planted in 1969.

The 1979 survey found a fishery of mainly largemouth bass and bluegill, as well as low numbers of yellow perch and white sucker. The survey report concluded that, based upon the growth and age structure of the bluegill population, the lake had an acceptable predator/prey balance. It was recommended that log-crib shelters be installed to "increase angling opportunities and predator harvest of the bluegills". Trees were also to be dropped along the shoreline to provide cover and increase survival of the bass fingerlings. Ten log-crib shelters and 10 tree drops were then installed in February of 1980. Additional log-crib shelters were added in 1989 and various half-log structures were placed in 1991. Visual observations of the devices in 1993 indicated moderate use by bluegills. No other fisheries activities have been recorded since 1993.

The 2000 fishery survey on Little Star Lake was conducted through the Chequamegon/Nicolet National Forest contract fisheries program. It was designed to inventory the fish population and identify any management problems. To gather information on the fishery, the survey utilized electrofishing runs in May and September and a fyke-net effort in June of 2000. In addition, dissolved oxygen (DO) levels and other water quality parameters were measured in August 2000 and March 2001 (ice cover).

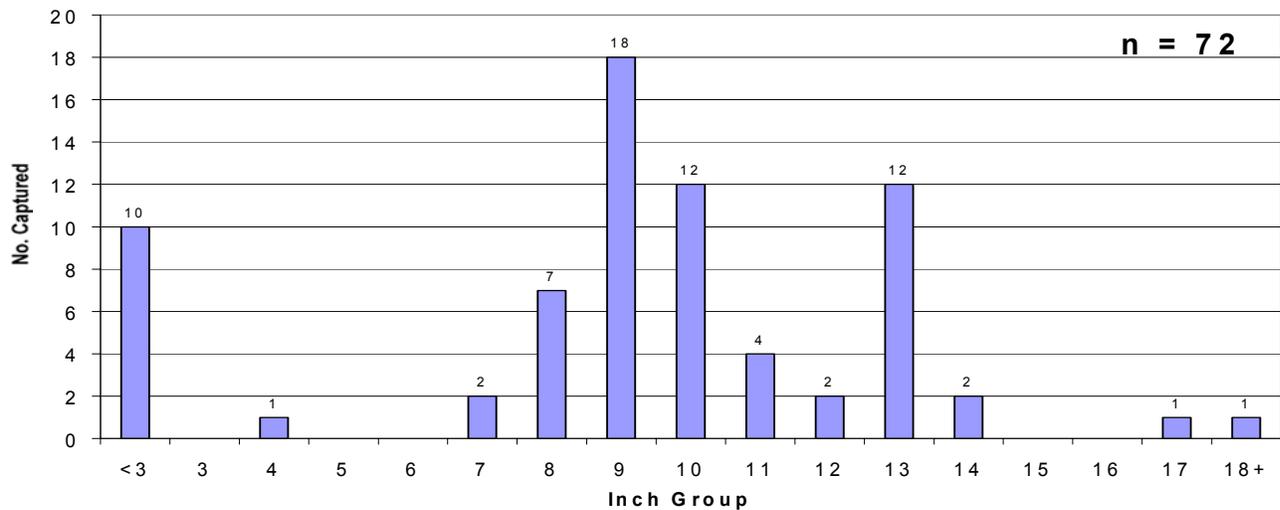
RESULTS

Only four fish species were found during the 2000 survey on Little Star Lake:

Largemouth bass	<i>(Micropterus salmoides)</i>
Bluegill	<i>(Lepomis macrochirus)</i>
Yellow perch	<i>(Perca flavescens)</i>
White sucker	<i>(Catostomus commersoni)</i>

A total of 72 largemouth bass were sampled in the 2000 survey. They ranged in length from 2.1 to 18.3 inches, with most of the fish in the 9 to 13 inch size (Figure 1). Age and growth analysis indicated slightly below average growth for Wisconsin (Figure 2). Bass had a mean length of 9.3 inches after 4 summers of growth and improved to 13.7 inches after 6 summers. Bass nests were observed near many of the half log structures during the spring shocker run and natural reproduction was good. Recruitment to the 14-inch size was considered fair and bass greater than 18 inches were present. While the log-crib shelters provided adequate deep-water cover for the bass, a lack of shallow-water woody structure was noted.

Figure 1. LMB Length Frequency
2000 Survey Totals - Little Star Lake, Forest Co.



The panfishery in Little Star Lake was dominated by yellow perch, with a significant population of bluegill also present. Yellow perch were the most numerous species found, with 156 fish being measured. They ranged from 2.5 to 8.2 inches long and most were in the 5 to 6-inch size range. Age and growth analysis indicated below average growth for Wisconsin (Figure 3), with perch reaching a mean length of just 5.9 inches after 4 summers of growth.

A total of 80 bluegill were sampled during the 2000 survey, and ranged from 1.4 to 9.8 inches in length. The June fyke-net effort collected the majority of the bluegill and yielded a PSD₆ of 70% and an RSD₈ of 59% (excellent size structure). Growth rates were above average for Wisconsin (Figure 4), with bluegill reaching a mean length of 7.4 inches after 4 summers of life. Natural reproduction was erratic, with several year-classes missing from the age structure of the population.

White suckers were considered 'present' in the lake as only 2 individuals were sampled. No other forage species were collected or observed.

Winter dissolved oxygen (DO) monitoring in March 2001 indicated relatively low oxygen levels and a moderate risk of winterkill. The DO concentration was 4.2 mg/L just under the ice and was less than 1 mg/L below the 3-foot depth. With an extended winter season in 2001, levels could have worsened and a winterkill of fish would have been possible. However, no fish mortalities were reported in 2001.

The summer oxygen/temperature profile in August 2000 showed that the lake was not stratified. There was an even temperature and oxygen concentration throughout the water column down to the bottom in 16 feet of water.

SUMMARY/DISCUSSION

The 2000 survey on Little Star Lake found a simple and fairly well-balanced fishery of largemouth bass, yellow perch, and bluegill. The bass population was self-sustaining, considered moderate in density, fish achieved satisfactory growth rates and adequate numbers of bass reached a quality size (> 14"). Yellow perch were the predominant panfish but were slow-growing and few fish reached a quality size (> 7"). Bluegill were found in low to moderate abundance. They achieved above average growth and the population exhibited an excellent size structure. Two management concerns were apparent, and included the lack of shallow-water woody cover and a tendency toward low winter oxygen conditions.

Little Star Lake should be managed as a largemouth bass and panfish fishery. The management goal should be to maintain the balanced predator-prey relationship, which should ensure continued quality angling opportunities for bass and bluegill. The slow-growing yellow perch population did warrant some concern and should be monitored in the future. However, it was believed that the perch population served an important role in the lakes' fishery. Much like Ludington Lake (just to the east), perch appear to provide a major forage item for the bass and larger bluegill and act as a predatory control on the small bluegill.

Shallow water woody structure was lacking and the installation of shoreline tree drops should be pursued. An initial goal of 30 trees is suggested. The existing half logs should receive some maintenance work as well. This could include uprighting the logs that have been tipped over and moving some structures to more suitable substrates/areas. The additional habitat improvements should benefit both the bass and panfish populations and help maintain a healthy fishery. In addition, proper riparian management should also be a management objective to ensure future natural tree-falls into the lake.

The low winter oxygen conditions warrant the greatest concern. It appears that periodic winterkills have been a problem in the past and can be expected again in the future. Long and severe winters, with early and heavy snowfall, seem to enhance low winter oxygen conditions and increase the likelihood of winterkill. Remedial action can be taken but the remote and inaccessible nature of the lake make most aeration methods impractical. Solar-powered aeration may be the most feasible alternative and could be considered if winterkills become more frequent than once per 10 years. Annual monitoring of winter oxygen levels should be conducted to determine the frequency of the problem. If a winterkill occurs, the appropriate fish species should be restocked.

MANAGEMENT RECOMMENDATIONS

1. Manage Little Star Lake as a largemouth bass and panfish fishery. The lake was considered fairly well balanced and no supplemental stocking of any species was needed at the present time. The current harvest regulation for bass of a 14-inch minimum and 5 daily bag should be adequate to maintain and enhance the bass population, provided that additional woody cover structures are installed (see #3 below). Ideally, a reduced daily bag limit to 2 fish would seem more appropriate for bass in these small, softwater lakes. (However, any change should be

delayed until the current harvest regulations are evaluated. The 14-inch minimum has only been in effect since June 1998 and fisheries are still responding to this change).

2. The panfish regulation of a 25 bag and no size limit was appropriate as well, though a 10 daily bag would be preferable on these small, softwater lakes.
3. Enhance shallow-water woody cover through the installation of shoreline tree drops. An initial goal of 30 tree drops is suggested. The Forest or WDNR fish biologist should be consulted prior to selection and placement of the tree drops. Maintenance and/or relocation of the existing half log structures should also be pursued.
4. Maintain the wild nature of the lake by limiting any further shoreline development and by following the guidelines for riparian management zones as described in "Wisconsin's Forestry Best Management Practices for Water Quality" (PUB-FR-093 95).
5. Access was considered adequate for this small, remote lake.
6. Provide periodic monitoring of winter dissolved oxygen levels. A single reading in mid to late March should be sufficient to determine the frequency of winterkill conditions.
7. Assess the status of the fishery on a periodic basis. A spring or fall shocker run every 3 years should be sufficient to keep abreast of the conditions in the lake. The USFS/WDNR contract fish program will incorporate this monitoring run into their work plans.

Little Star Lake Forest Co. 2000

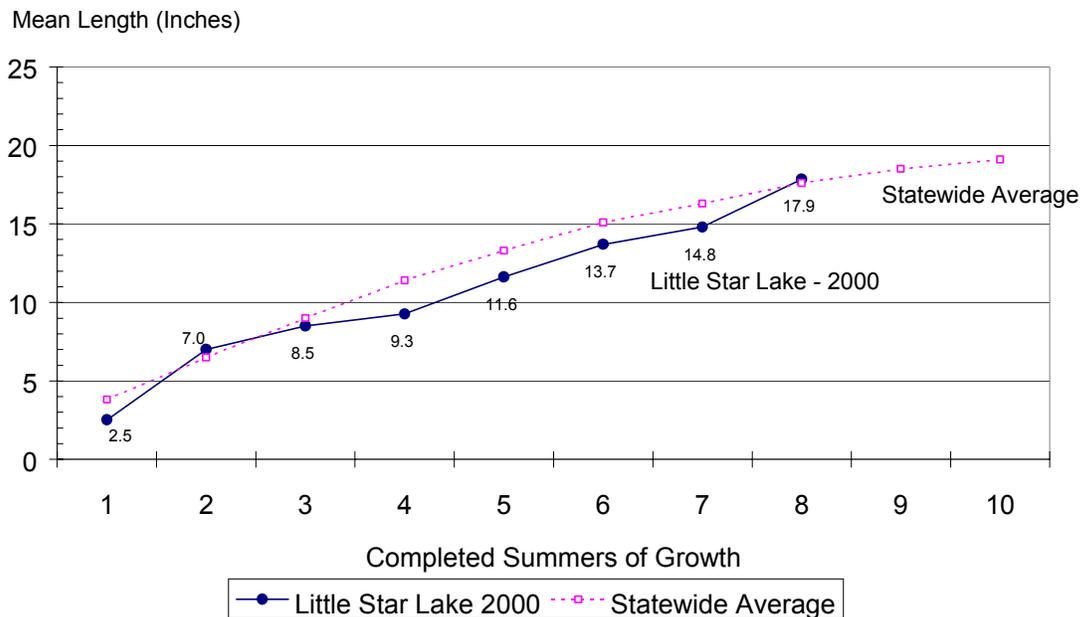
Fish Survey Totals

Species	Spring Netting	Spring BS	Summer Netting	Fall BS	Totals
Largemouth Bass Mode: Length range		32 9.7, 13.2; 7.0 - 18.4	6 7.5 - 9.9	34 2.3, 10.2; 2.1 - 13.9	72
Smallmouth Bass Length range					
Sucker Length range			2 19.5 - 23.4		2
Bluegill Mode: Length range			54 3.4, 9.4; 3.1 - 9.8	26 2.0; 1.4 - 5.3	80
Black Crappie Mode: Length range					
Pumpkinseed Mode: Length range					
Yellow Perch Mode: Length range		53 5.3; 4.2 - 7.8	59 5.7; 5.2 - 7.8	44 5.8; 2.5 - 8.2	156
Rock Bass Length range					

Table 1. Comparison of June Fyke-Net Catch Statistics
2000 vs. 1979 - Little Star Lake, Forest Co.

	LMB	Bluegill	Y Perch	White Sucker
June 26 - 29, 2000 (9 net days)				
CPE	0.7 /lift	6 /lift	6.6 /lift	0.2 /lift
Size/PSDx	0 of 6 (>12")	70% (>6")	17% (>7")	
June 26 - 28, 1979 (10 net days)				
CPE	0 /lift	136 /lift	0.1 /lift	0.9 /lift
Size/PSDx	0 (>12")	51% (>6")	1 of 1 (>7")	
Abundance Trend	Inc.	Dec.	Inc.	Dec.
Size/Growth Trend	Same?	Pos.	Same?	

Figure 2. Largemouth Bass Growth Rates
Little Star Lake, Forest Co.



**Figure 3. Yellow Perch Growth Rates
Little Star Lake, Forest Co.**

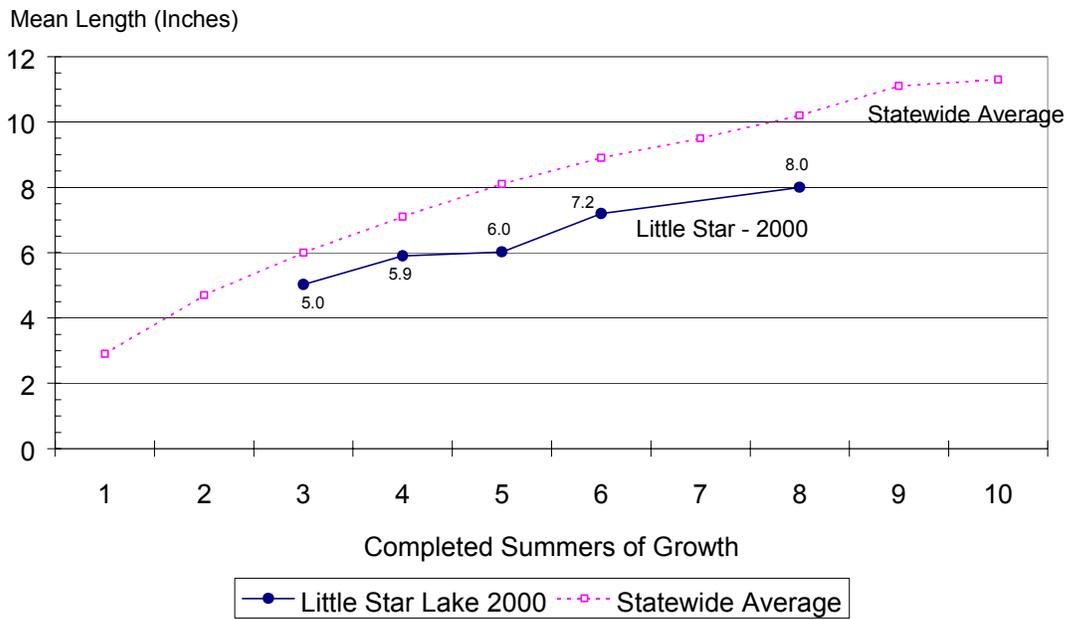
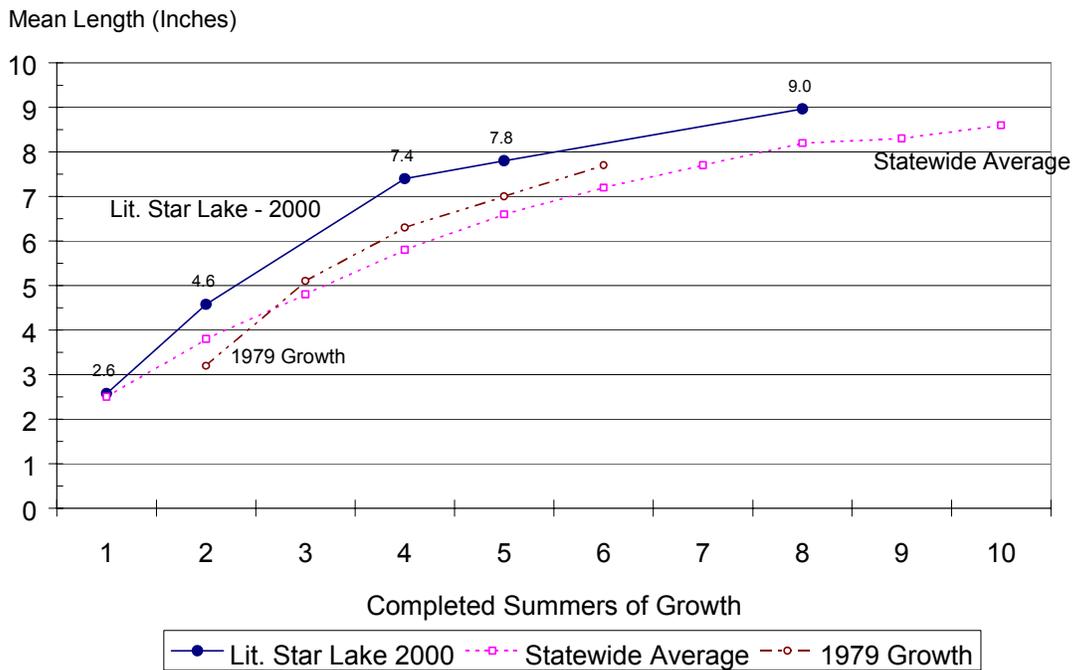
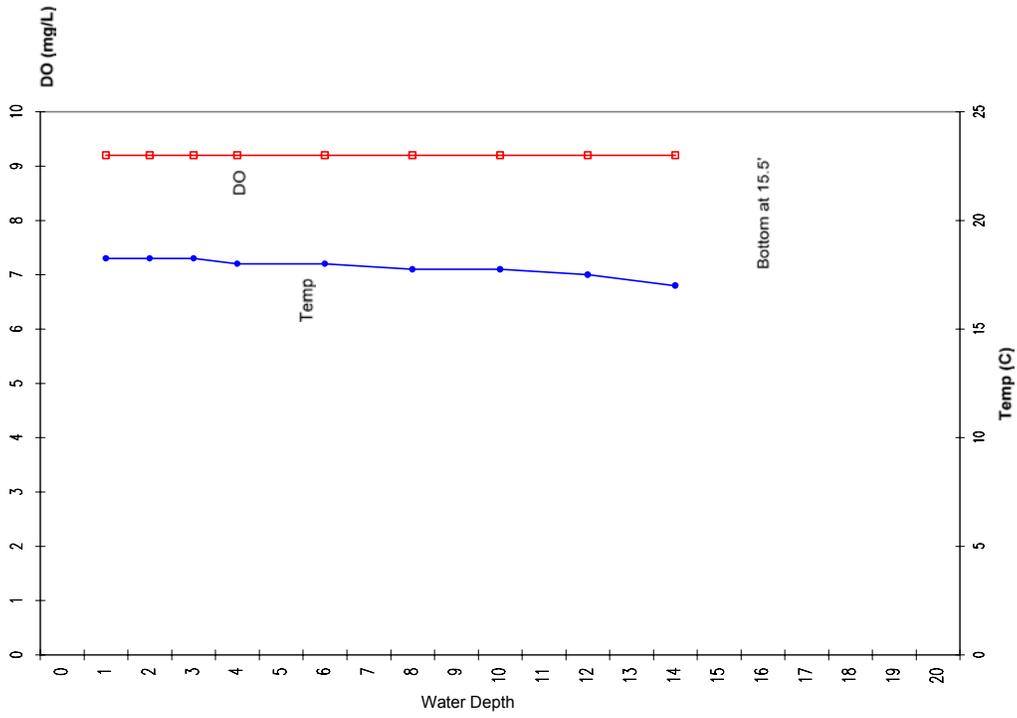


Figure 4. Bluegill Growth Rates - Lit. Star L., Forest Co.



Dissolved Oxygen and Temperature Profile

Little Star Lake, Forest Co -- August 9, 2000



Winter DO and Temperature Profile

Little Star Lake, Forest Co -- March 22, 2001

