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To: Bill Smith - Regional Director, Northern Region

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Subject:
1998 Lake Survey Summary - Bear Lake, Forest County
(T35N, R16E, sec. 17; WBIC - 0552100)
Upper Green Bay GMU

This report is submitted with the approval of Basin Supervisor (GMU Team Leader), Tom Bashaw and Regional Fisheries Expert, Steve AveLallemant. The report was written and work supervised by Thomas (Skip) Sommerfeldt, Senior Fisheries Biologist under the Chequamegon and Nicolet National Forest contract fisheries program.

NOTED: _____
Upper Chippewa Basin Supervisor, Bruce L. Swanson

APPROVED BY:

Upper Wisconsin Basin Supervisor, Tom Bashaw _____
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Fisheries Expert, Steve AveLallemant _____
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cc: Bureau of F & H Prot.
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BACKGROUND INFORMATION

Bear Lake is a 68-acre, hardwater drainage lake in southeast Forest County. It is within the Laona District of the Nicolet/Chequamegon National Forest and is located approximately 7 miles southeast of the town of Laona. The lake has a maximum depth of 24 feet and a shoreline length of 1.69 miles, of which the U.S. Forest Service owns 54% (0.91 mile). Public access is provided on the northwest side of the lake, just north of a 27-unit USFS campground. The shoreline is mostly upland hardwood and conifer (90%) with a smaller amount (10%) of swamp/bog along the north shore. Littoral bottom types consisted of rubble (50%), sand (20%), muck (20%), gravel (5%), and boulder (5%). Aquatic vegetation was moderate, but very little was found along the rocky east shore. Water in the lake was clear and had a pH of 8.3, a total alkalinity of 104 mg/l, and a secchi reading of 11 feet in late July 1998.

Past fisheries management activities have included the stocking of largemouth bass, northern pike, and bluegill, as well as fishery surveys in 1965 and 1978-80. Largemouth were first stocked in 1940 and then periodically from 1941 to 1952. Bluegill were stocked just once in 1943 and northern pike were stocked in 1942 and not again until 1967. No fish plants have been recorded since 1967. The survey in 1965 consisted of an electroshocking run and found a resident population of northern pike, largemouth bass, rock bass, bluegill, crappie, and golden shiner. Rock bass and crappie were considered especially large and a successful 1965 spawning had produced an excellent year class of largemouth bass.

The 1978-80 survey utilized fyke netting and seining in 1978 and a shoreline electrofishing run in October 1980. The survey report indicated that the lake supported an abundant and diverse fish population (major species were largemouth bass, northern pike, black crappie, and bluegill). Growth of all species was considered good and it was felt that there was a balanced predator-prey relationship. The size distribution of the fish indicated that natural reproduction was sufficient in maintaining fishable populations. No active management was recommended and periodic angler checks were suggested to keep informed on any problems with the balance of the fishery.

The 1998 fishery survey on Bear 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 summer fyke-net effort in June 1998. In addition, dissolved oxygen (DO) levels and other water quality parameters were measured in March (ice cover) and July 1998.

RESULTS

The following fish species were found during the 1998 survey on Bear Lake:

Walleye	(<i>Stizostedion vitreum</i>)
Largemouth bass	(<i>Micropterus salmoides</i>)
Northern pike	(<i>Esox lucius</i>)
White sucker	(<i>Catostomus commersoni</i>)
Bluegill	(<i>Lepomis macrochirus</i>)
Pumpkinseed	(<i>Lepomis gibbosus</i>)

Black crappie	(<i>Pomoxis nigromaculatus</i>)
Yellow perch	(<i>Perca flavescens</i>)
Rock bass	(<i>Ambloplites rupestris</i>)
Black bullhead	(<i>Ameiurus melas</i>)
Yellow bullhead	(<i>Ameiurus natalis</i>)
Golden shiner	(<i>Notemigonus crysoleucas</i>)
Common shiner	(<i>Luxilus cornutus</i>)
Green sunfish	(<i>Lepomis cyanellus</i>)
Bluntnose minnow	(<i>Pimephales notatus</i>)

Largemouth bass were the most numerous gamefish sampled with a total of 144 bass collected. They ranged in length from 2.5 inches to 20.4 inches, with a good size distribution up to 19 inches. Age and growth analysis indicated average growth for Wisconsin (Figure 1). Bass had a mean length of 11.7 inches after 4 summers of growth and improved to 16.0 inches after 7 summers. Both natural reproduction and recruitment to larger size classes were considered good. The spring electrofishing CPE of 86 bass per hour with a PSD₁₂ of 62% indicated an excellent quality fishery (Figure 7). In addition, the sampling of several bass greater than 18 inches showed that the lake does have good trophy potential.

Northern pike were second in abundance with a total of 34 pike collected during the 1998 survey. They ranged from 13.0 to 33.3 inches long and the overall PSD₂₁ was 70%. Growth rates were above average for Wisconsin (Figure 2), with pike reaching a mean length of 21.8 inches after 4 summers of growth. Natural reproduction was evident and recruitment to larger size classes was enough to sustain the low to moderate density population.

Six walleye were collected during the survey and they ranged in length from 10.5 to 21.4 inches. These fish represented four different age classes (II, VI, VII, VIII) and they exhibited average growth rates for Wisconsin (Figure 3). The overall density of walleye in the lake could be considered low and the origin of these fish was not known. In addition, it could not be determined if the species was naturally reproducing or just the result of unauthorized plants by local sportsmen.

The panfishery in Bear Lake was dominated by bluegill and rock bass, with lesser abundances of yellow perch and black crappie. Bluegill were the most numerous species found with 242 fish being measured. They ranged from 1.6 to 8.6 inches long, but most of the fish were in the 5-inch size range. Age and growth analysis indicated average growth for Wisconsin (Figure 4), with bluegill reaching a mean length of 5.8 inches after 4 summers of growth. The spring electrofishing run produced a CPE of 188 fish per hour and a PSD₆ of 17%, indicating only a fair quality fishery (Figure 8).

Rock bass were nearly as numerous as bluegill with a total of 221 fish being collected. They ranged in length from 2.0 to 10.3 inches, with most fish measuring in 5 to 6 inch sizes. No age and growth data were collected for the rock bass.

Yellow perch and black crappie were found in near equal abundances with totals of 179 and 161 fish collected, respectively. The crappie had a length range of 2.7 to 11.5 inches and the June fyke net effort produced a PSD₈ of 25% (fair to good). Growth rates were below average for Wisconsin (Figure 5), with crappie reaching a mean length of 8.7 inches after 5 summers of life. Growth seemed to appreciably slow at age 5 (about 8.5 inches in length), but some fish did reach a quality size (>10"). The perch

ranged from 3.0 to 10.1 inches long, with most measuring in the 5 to 6 inch size. Growth rates were also below average for Wisconsin (Figure 6), but perch did reach a quality size (>7") by age 6.

Pumpkinseed, black bullhead, yellow bullhead and green sunfish were considered 'present' in the lake as only a few individuals of each species were captured. White suckers were considered 'abundant' and the minnow species of common shiner, golden shiner, and bluntnose minnow were 'common to abundant'.

Winter DO monitoring indicated adequate oxygen (> 2 mg/l) to a depth of 14 feet during the late-winter period of 1998. The summer oxygen/temperature profile showed that the lake did stratify, with the thermocline occurring at the 12 to 16 foot depth. Conditions were anaerobic (no oxygen) below the 15 foot depth in late July 1998.

SUMMARY/DISCUSSION

The 1998 survey on Bear Lake found a fairly well-balanced fishery. Largemouth bass were the primary gamefish, with a low to moderate density of northern pike and a low number of walleye. The bass and northern pike populations were self-sustaining, fish experienced good growth rates, and quality and trophy size fish were available to the angler. The low number of walleye appeared to have a minimal impact on the overall fishery and it was unknown if the population was natural or the result of unauthorized stocking. Bluegill and rock bass were the predominant panfish, with lower densities of yellow perch and black crappie. Growth rates were generally average to below average but good numbers of quality size fish were found for all 4 panfish species.

The fishery in Bear Lake was very similar to what was found in the 1978-80 survey. Species composition was essentially the same and only a few slight changes were evident. The abundance of rock bass, bluegill, and yellow perch appeared to have increased while the number of black bullhead had declined. Growth rates of the panfish had shown a decline from the 1978-80 survey (Figures 4 - 6) but good numbers of quality size fish were still found in 1998. The finding of walleye was the first documentation of the species in the lake and the source of the fish could not be determined. The largemouth bass and northern pike populations were essentially the same, as they were self-sustaining and produced quality-size fish for the angler.

The management goal for Bear Lake should be to maintain the balanced predator-prey relationship. The lake should be managed primarily as a largemouth bass and panfish fishery, with secondary emphasis on northern pike. The northern pike were an integral part of the fishery but no extra protection or enhancement should be used to increase their numbers (with the small size of the lake and limited forage, there exists a chance to see a hammer-handle fishery if numbers become too high). At present, there were no major management problems and the current harvest regulations were considered sufficient to sustain a quality fishery. Shoreline and littoral habitat were adequate, as there was a good mix of aquatic vegetation, woody structure, and rock/gravel substrate. Proper riparian management to ensure future natural tree-falls into the lake should be a management objective.

MANAGEMENT RECOMMENDATIONS

1. Manage Bear Lake primarily for largemouth bass and panfish, with secondary emphasis on northern pike (meaning no stocking or special regulations to increase their numbers). Specific management objectives are as follows:
 - a. Largemouth bass - maintain a spring electrofishing CPE near 80 bass per hour (> 6") and a PSD₁₂ of greater than 40%.
 - b. Northern pike - maintain a spring electrofishing CPE of less than 10 pike per hour and the PSD₂₁ near 60%.
 - c. Panfish (bluegill, black crappie, yellow perch, and rock bass) - maintain a combined spring electrofishing CPE of less than 400 fish per hour and the PSD_x values near 40%.
2. The fishery was considered well-balanced and no supplemental stocking of any species was recommended at the present time. In addition, 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. The current regulation for northern pike (no minimum, 5 bag) was appropriate as well.
3. Since walleye were not a historical component of the fishery, any further proliferation of the species in Bear Lake should not be attempted. The lake does not provide ideal conditions for walleye due to its small size, limited deep-water habitat and abundance of other predators. The walleye were likely the result of unauthorized stocking by local sportsmen and this type of activity should be strongly discouraged. In addition, more liberal harvest regulations could be implemented to promote harvest of the walleye (i.e. no minimum size, 5 bag limit).
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. Conduct periodic monitoring of the fishery to assess its status and adherence to the above objectives (1.a,b,c). A spring electrofishing run every 3 years should be sufficient to keep abreast of the conditions in the lake.

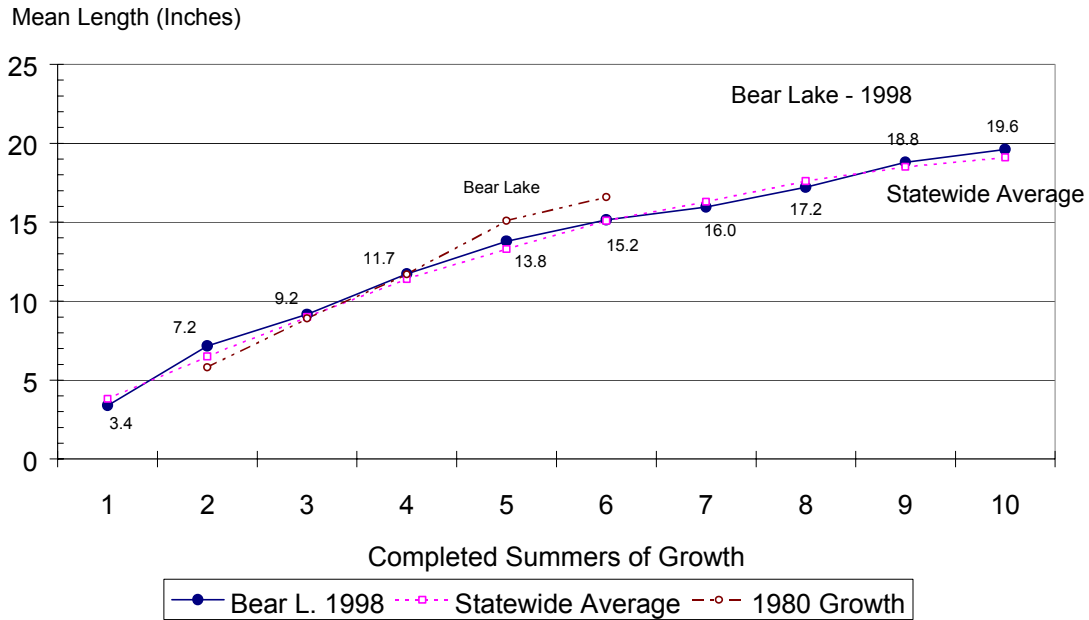


Netting on Bear Lake, Forest Co. - 1998

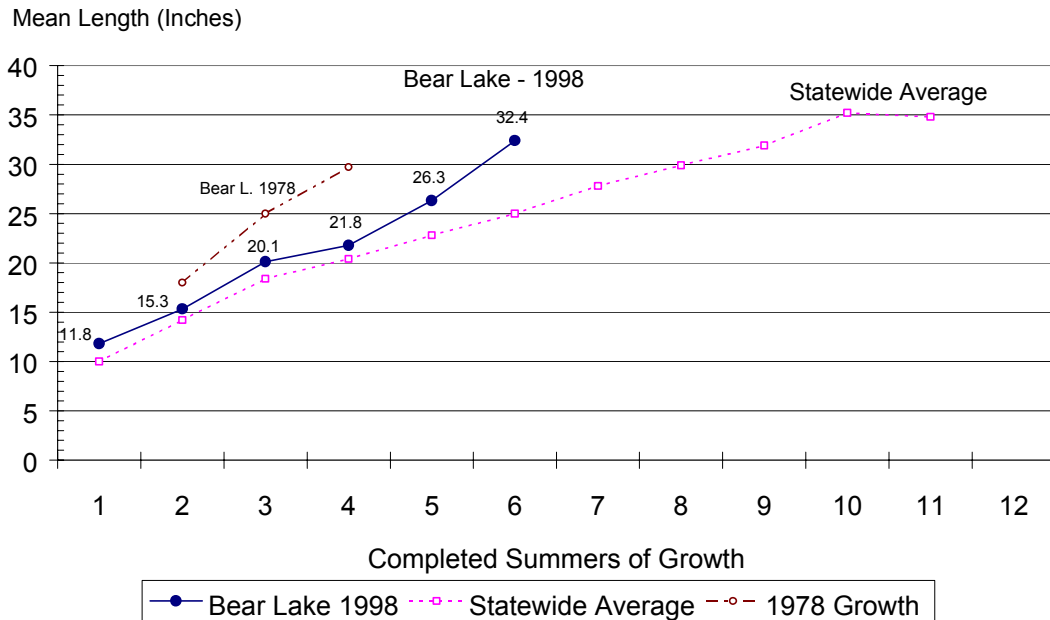
Looking toward campground & beach



**Figure 1. Largemouth Bass Growth Rates
Bear Lake, Forest Co.**



**Figure 2. Northern Pike Growth Rates
Bear Lake, Forest Co.**



**Figure 3. Walleye Growth Rates
Bear Lake, Forest Co.**

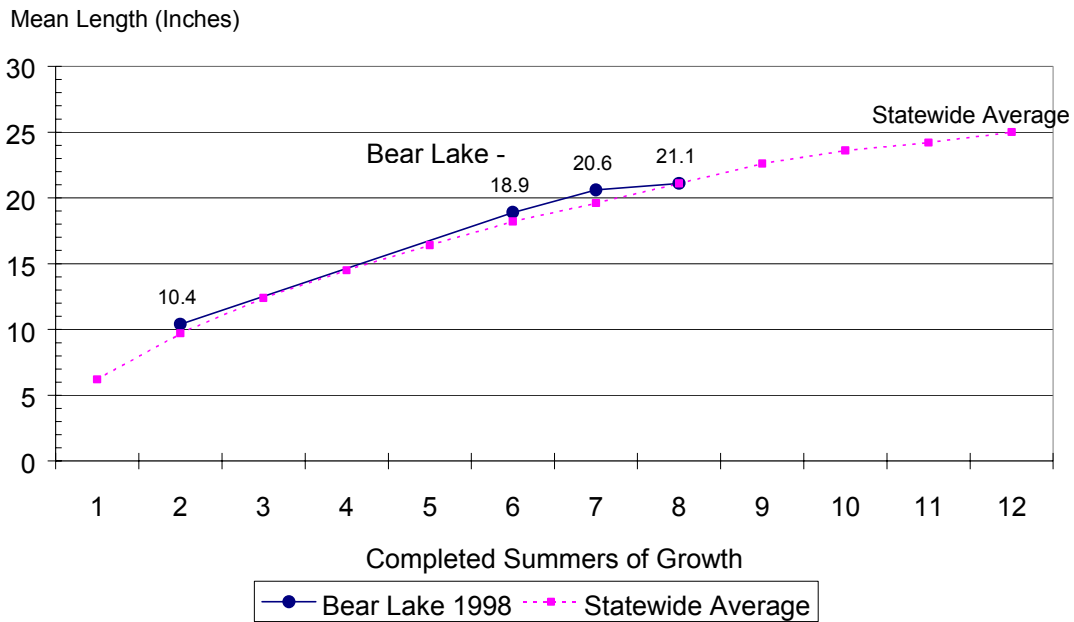
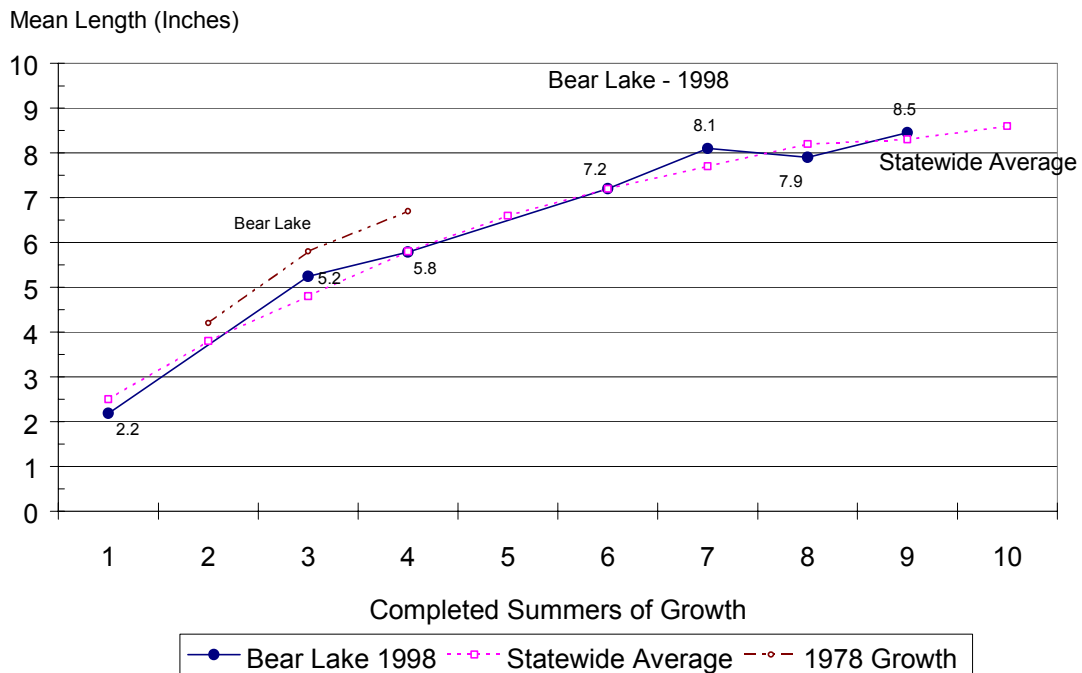
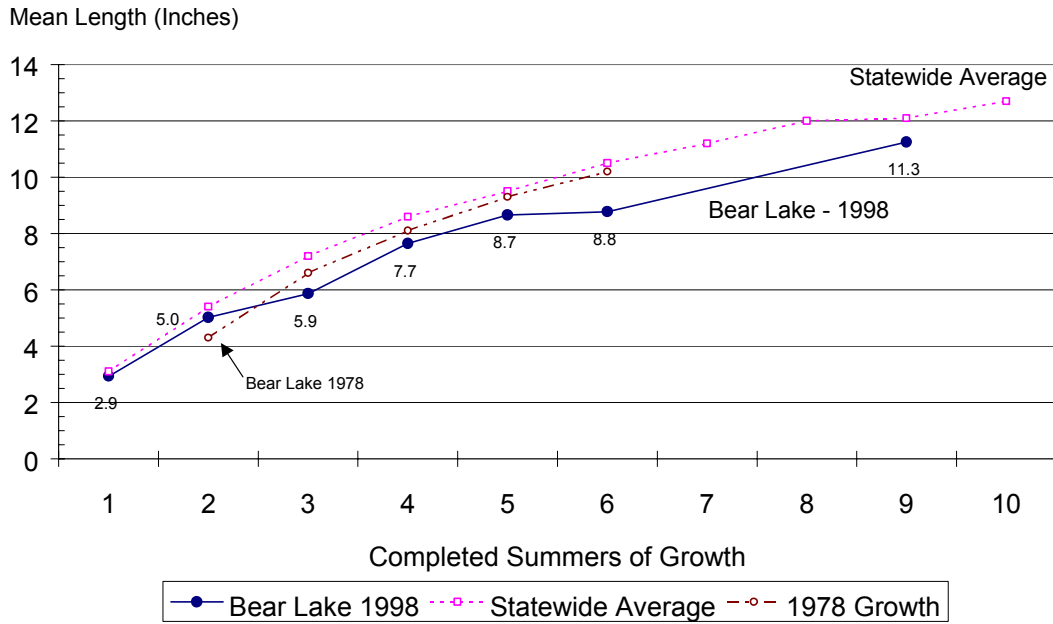


Figure 4. Bluegill Growth Rates - Bear Lake, Forest Co.



**Figure 5. Black Crappie Growth Rates
Bear Lake, Forest Co.**



**Figure 6. Yellow Perch Growth Rates
Bear Lake, Forest Co.**

