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To: Bill Smith - Regional Director, Northern Region

From: Thomas (Skip) Sommerfeldt - Senior Fisheries Biologist, Park Falls

Subject: DRAFT

1999 Lake Survey Summary - Glade Lake, Langlade County
(T33N, R14E, sec. 03; WBIC - 0421200)
Headwaters 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: _____
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APPROVED BY:

Fisheries Expert, Steve AveLallemant Date

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Antigo DNR - Dave Seibel



BACKGROUND INFORMATION

Glade Lake is a 26-acre, softwater seepage lake in northeast Langlade County, approximately 6 miles southwest of the town of Wabeno. Water in the lake is slightly acid (pH near 6.5), soft, and basically clear (though usually turbid due to recurring algae blooms). The lake has a maximum depth of 22 feet and a shoreline length of 0.95 miles, of which 0.25 mile (26%) is controlled by the US Forest Service. Upland hardwoods surround the entire lake and bottom types are mainly silt (50%), sand (20%), gravel (20%), and rubble/boulder (10%). Private development consists of 4 homes/cottages and all are located on the northeast shore. A small public boat landing is provided on the west shore, but the access ramp is narrow and difficult to negotiate.

Past fisheries management activities on Glade Lake have been minimal. There are no records of any fish stocking having taken place and only one previous fishery survey was on file. This survey was conducted in 1983 and consisted of 18 fyke-net lifts in mid-July. The survey found a fishery of largemouth bass, northern pike, bluegill, pumpkinseed, yellow perch and rock bass. The survey report concluded that Glade Lake contained an "abundant and relatively diverse fishery for its size." The physical characteristics were excellent, with abundant log and aquatic vegetation for cover. The marginal water quality didn't appear to adversely affect the fishery. Growth, condition, and natural reproduction of most species was good, and there appeared to be an acceptable predator-prey balance present." No management recommendations were offered and it was suggested that the fishery be monitored again in 5 years (~ 1988). No additional information was on record except for a note-to-file from Max (Johnson) stating that Glade Lake suffered a winterkill during the 1988-89 season. Bass (up to 4 lbs.), bluegill, and suckers were identified, with northern pike and perch not being observed among the dead fish.

The 1999 fishery survey on Glade 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 July 1999. Dissolved oxygen (DO) levels and other water quality parameters were measured in March (ice cover) and September 1999.

RESULTS

The following fish species were found during the 1999 survey on Glade Lake:

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>
Green sunfish	<i>(Lepomis cyanellus)</i>
Rock bass	<i>(Ambloplites rupestris)</i>
Golden shiner	<i>(Notemigonus crysoleucas)</i>

Largemouth bass and northern pike were found in near equal abundance with totals of 38 and 37 fish sampled, respectively. The largemouth bass ranged in length from 3.0 to 17.6 inches, with just 4 of the

total measuring greater than 12 inches (most of the bass were in the 4 to 6 inch size). Age and growth analysis indicated average to above average growth for Wisconsin (Figure 1). Bass reached a mean length of 6.5 inches after 2 summers of growth and increased to a mean of 17.0 inches after 5 summers. Natural reproduction and recruitment for the past 3 years were evident, but it appeared that some sort of lake-wide mortality had significantly reduced the entire population just prior to that. It was suspected that a partial to heavy winterkill occurred in the spring of 1996 (this followed the long, severe winter of 1995-96 when many lakes did not lose their ice cover until May of 1996).

The 37 northern pike ranged from 9.5 to 21.9 inches long, with just two of the total were greater than 21 inches. Growth rates were slightly below average for Wisconsin (Figure 2), with pike reaching a mean length of 19.0 inches after 4 summers of growth. Like the bass population, older age pike were scarce but decent natural reproduction and recruitment were evident for the past 4 years. Thus, it appeared that a spring 1996 winterkill had drastically reduced the pike population in Glade Lake as well.

The panfishery was dominated by black crappie and pumpkinseed, with fewer numbers of yellow perch, bluegill, green sunfish, and rock bass. Crappie were the most numerous species found with 421 fish being sampled. They ranged from 4.2 to 13.6 inches long, with most of the fish in the 6 to 7 inch size range. The July fyke-net effort produced the best catch of fish and yielded a CPE (Catch-Per-Effort) of 40 crappie per lift, with a PSD₈ of 12%. Age and growth analysis indicated above average growth for Wisconsin (Figure 3), with crappie reaching a mean length of 8.0 inches after 3 summers of growth. Again, very few older-aged fish were found and nearly all of the crappie were less than 4 years old.

Pumpkinseed were second in abundance with a total of 299 fish being measured. They ranged in length from 3.2 to 6.2 inches long, with most of the fish in the 3.5 to 5 inch size class. No age and growth data were collected from the pumpkinseed. Yellow perch were next in abundance with 144 fish collected. They ranged from 2.8 to 11.4 inches long and had a fairly good size distribution within that range. Growth rates were near average for Wisconsin (Figure 4), with perch reaching a mean of 8.8 inches after 6 summers of growth. A total of 94 bluegill were sampled, with a length range of 1.3 to 9.1 inches and most fish in the 3 to 5 inch size. Growth rates were near average (Figure 5), as bluegill reached a mean length of 4.9 inches after 3 summers of growth. As with the species, older age bluegill were scarce and most fish were less than 4 years old.

Totals of 48 green sunfish, 2 rock bass, and 13 white sucker were also collected during the 1999 survey. The green sunfish ranged from 3.7 to 9.6 inches in length and most were in the 4 to 5 inch size. The rock bass measured 9.6 and 9.7 inches long and could be considered remnants in the lake. The white suckers ranged in length from 9.5 to 21.4 inches with 12 of the 13 measuring greater than 17 inches. No age and growth information was collected from these latter 3 species.

Winter DO monitoring indicated adequate oxygen (> 3 mg/l) to a depth of 14 feet during the late-winter period of 1999. It should be noted however, that the winter of 1998-99 was relatively mild and 'easy' in terms of low oxygen conditions and chance of winterkill.

SUMMARY/DISCUSSION

The 1999 survey on Glade Lake found a fishery that appeared to be heavily impacted by a winterkill in the spring of 1996. Largemouth bass and northern pike were found, but their densities were relatively low and most fish sampled were less than 4 years old. The panfishery was comprised mainly of black crappie and pumpkinseed, with lower numbers of yellow perch, bluegill,

and green sunfish. Growth rates of the panfish were generally good, but all of the populations were dominated by fish less than 4 years of age. Though not documented, the apparent winterkill followed the severe winter of 1995-96 and caused a major loss of the sportfish in Glade Lake.

With the reported winterkill in 1989 and the suspected one in the spring of 1996, the fishery in Glade Lake had shown some significant changes since the 1983 survey. Northern pike and largemouth bass were still the primary gamefish but their abundance's appeared to be lower than in 1983. In addition, the panfish populations showed some obvious changes during this period as well. While bluegill and pumpkinseed were the predominant species in 1983, black crappie and pumpkinseed were predominant in 1999. Bluegill are about the least tolerant of the panfish species to low oxygen and this would explain why their abundance has dropped off significantly since 1983. Crappie, being somewhat more tolerant of low oxygen than bluegill, have since established themselves as the major panfish in the lake. Crappie were not even sampled in the 1983 survey, so they were either present in very low density or have been introduced into the lake by well-meaning sportsmen.

Without any recorded stocking following the past winterkills, it may be surmised that the winterkill events on Glade Lake are severe - but they are not total. It appears that low oxygen conditions may cause the loss of the majority of the sportfish in the lake, but a few seem to survive to help rebuild the fishery. With the suspected kill in 1996, the present survey indicated that the lake had progressed fairly well toward rebuilding a balanced fishery. However, largemouth bass abundance was still relatively low and supplemental stocking would hasten re-development of the fishery.

It appears that the lake suffers from winterkill events on the order of once every 5 years - which is the frequency at which management activities are recommended to be limited. It was felt however, that the lake possesses good potential to grow quality fish and that management activities should be implemented to insure that sportfish populations maintain a presence in the lake. The winterkill problem could be remedied through winter aeration, but local property owners or sports groups should pursue this option. Should winter aeration become a high priority for the lake, the interested property owners or sports group should contact the author or local fish biologist for assistance in development and purchase of a system. (I.e. - if electricity is available near the lake/private cottages, a diffused air system using a small blower/compressor (0.75 to 1 hp) could be installed and operated to alleviate the low oxygen problem. If electricity is not readily available, a more expensive solar-powered aeration system could be installed.)

Even in light of the potential for low winter oxygen levels, the management goal for Glade Lake should be to maintain a 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). Numbers of largemouth were relatively low and supplemental stocking of the species should be initiated to boost the population level in the lake (especially after the heavy winterkill in the spring of 1996). A 3-year stocking program using large or extended-growth fingerlings should be used. Shoreline and littoral habitat were adequate, containing 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 Glade 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 still suffering from the effects of a heavy winterkill in the spring of 1996 and the supplemental stocking of largemouth bass should be initiated to hasten re-development of the bass population. A 3-year program of extended-growth fingerlings (4+ ") at the rate of 10/acre is recommended (at minimum - large fingerling (2+ ") at the rate of 25/acre could be used). In addition, the current harvest regulation for bass of a 14-inch minimum and 5 daily bag should be adequate to enhance and maintain the bass population. The current regulation for northern pike (no minimum, 5 bag) was appropriate as well.
3. 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 2 years should be sufficient to keep abreast of the conditions in the lake. The USFS/WDNR fish program will incorporate this monitoring into their work program.
4. On an annual basis, monitor winter dissolved oxygen levels to help determine frequency of winterkill. A single measurement during the middle to late March period should be sufficient to assess winterkill potential. The USFS/WDNR fish program will incorporate this monitoring into their work program.
5. 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).

Glade Lake, Langlade County -- 1999 Survey Pictures



Landing at Glade Lake

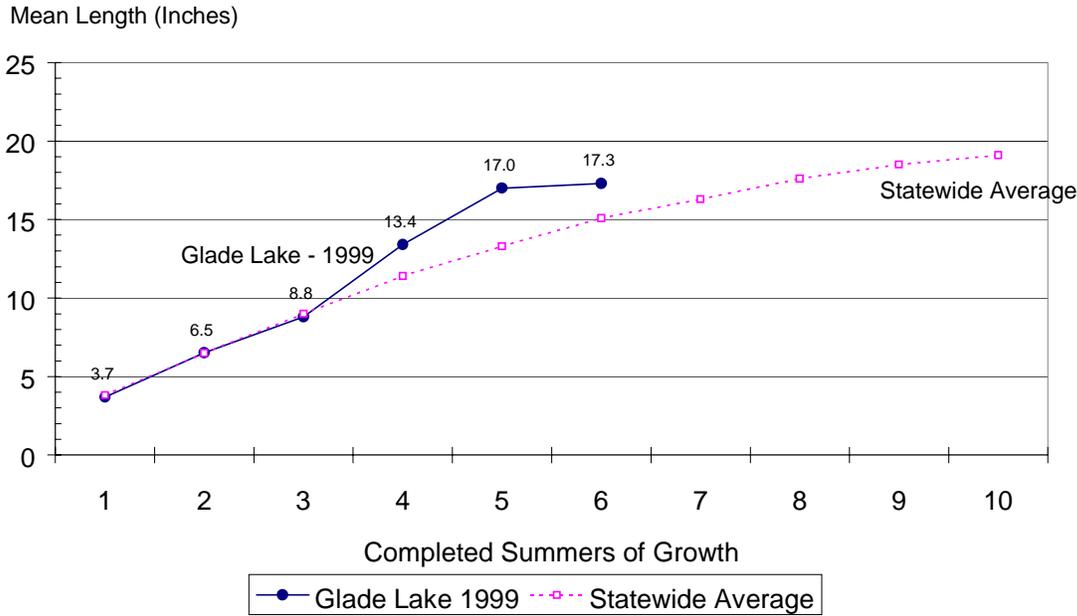


Summer Panfish Fyke Netting

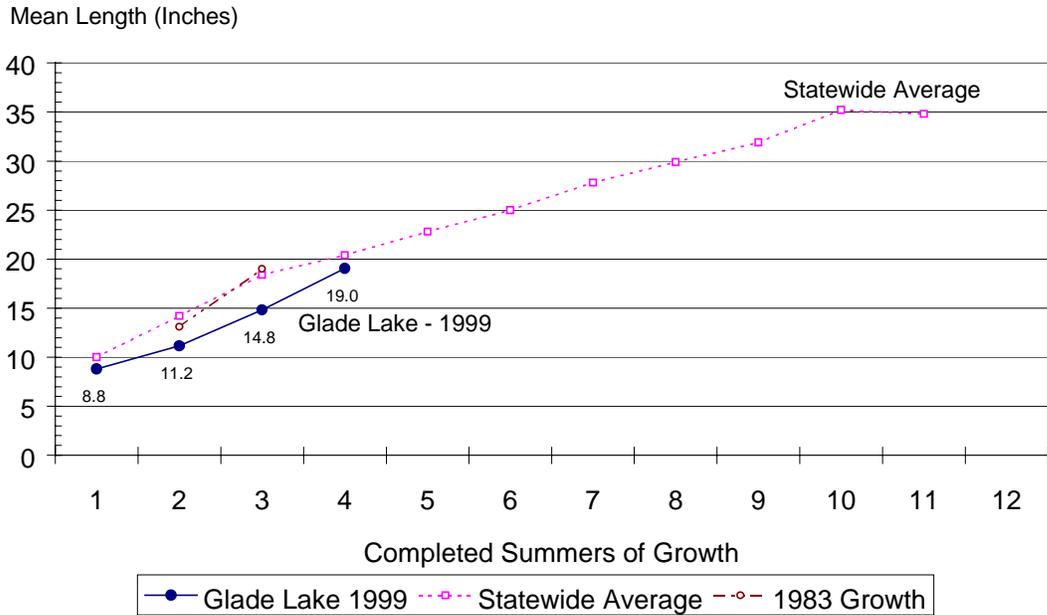
Black Crappie



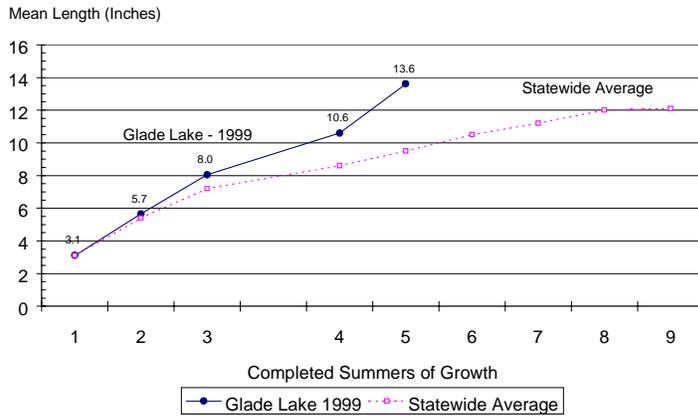
**Figure 1. Largemouth Bass Growth Rates
Glade Lake, Langlade Co.**



**Figure 2. Northern Pike Growth Rates
Glade Lake, Langlade Co.**



**Figure 3. Black Crappie Growth Rates
Glade Lake, Langlade Co.**



**Figure 4. Yellow Perch Growth Rates
Glade Lake, Langlade Co.**

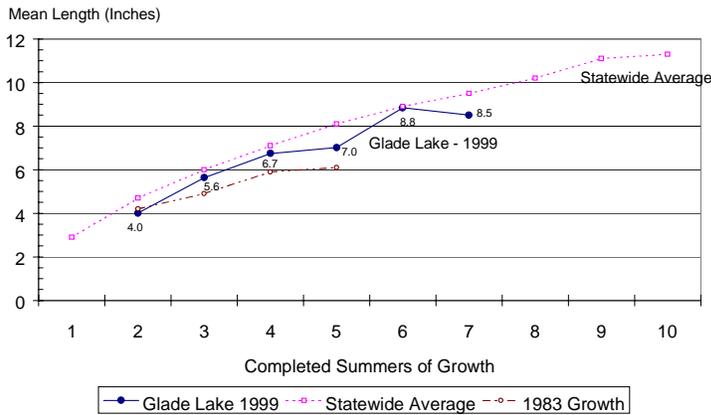
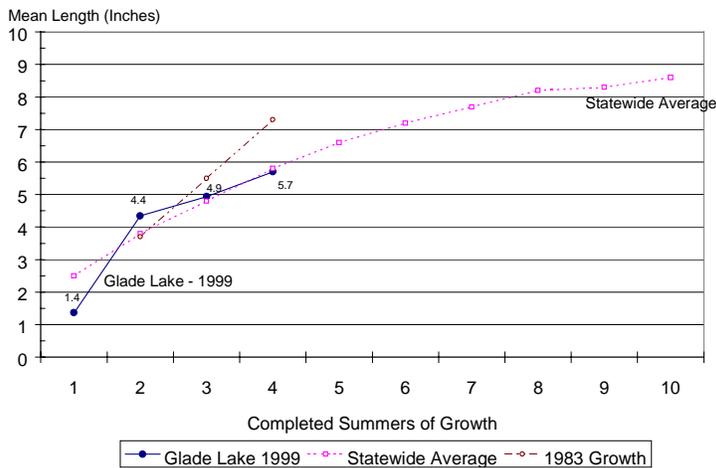


Figure 5. Bluegill Growth Rates - Glade L., Langlade Co.



Glade Lake Langlade Co.
1999

Fish Survey Totals

Species	Spring Netting	Spring BS	Summer Netting	Fall BS	Totals
Largemouth Bass Mode: Length range		6 3.0 - 16.4	8 4.7; 4.0 - 5.9	24 5.2; 3.5 - 17.6	38
Northern Pike Mode: Length range		4 12.5 - 18.4	22 12.0 - 21.9	11 9.5 - 21.4	37
Walleye Length range					
Musky Length range					
Smallmouth Bass Length range					
Sucker Length range		2 17.5 - 18.4	8 17.0 - 21.4	3 9.5 - 19.9	13
Bluegill Mode: Length range		1 3.8	80 5.2; 3.1 - 9.1	13 1.3 - 6.4	94
Black Crappie Mode: Length range		49 6.8; 6.1 - 9.7	358 6.8; 4.2 - 13.6	14 5.6 - 8.4	421
Pumpkinseed Mode: Length range		18 4.7; 4 - 5.0	239 4.7; 3.2 - 5.8	42 4.4; 3.3 - 6.2	299
Yellow Perch Mode: Length range		49 3.4; 2.8 - 9.0	36 7.2; 5.5 - 11.4	59 4.7; 4.1 - 8.7	144
Rock Bass Length range		1 9.6	1 9.7		2
Green Sunfish Length range		5 4.1 - 7.4	41 4.1 - 9.6	2 3.7 - 4.3	48
Golden shiner		C	C	C	
Bullhead					
Creek chub					
Bluntnose minnow					
Mudminnow					
Sculpin					
tadpole madtom					
Crayfish			C	P	