

DATE: November 14, 2002

Mike Vogelsang — Headwaters Basin Fisheries Supervisor

TO: Steve AveLallemant — Regional Fisheries Expert

Fisheries Management & Habitat Protection Bureau — Madison

FROM: Dave Seibel — Fisheries Biologist, Antigo**SUBJECT:** 2000 Lake Survey Summary — Alexander Lake, Lincoln County

Lake: Alexander	County: Lincoln	Waterbody Code: 1494600
Legal Description: T31N R6E S8		
Survey Dates: Fyke Net: March 22-29, 2000; April 19-21, 2000; May 23-26, 2000 Mini-Fyke Net: September 6-7, 2000		
Boom Electrofish: March 21,23,28, & 29, 2000; April 2, 7, 12, & 17, 2000; May 18 & 31, 2000; September 26, 2000 Stream Electrofish: September 6, 2000		Other: N/A
Survey Type: Comprehensive (FERC Assessment)		
Survey Objective: Assess the sportfish and non-sportfish populations in terms of species present, relative abundance, size structure, age and growth (gamefish and panfish), and condition (gamefish). Assess the overall health and condition of the fish fauna in Alexander Lake and determine management goals, objectives, and strategies in concert with the FERC relicensing process.		
Target Species: All		
Fyke Net: Gamefish, panfish, non-sportfish	Electrofish: Gamefish, panfish, non-sportfish	Other: N/A
LAKE CHARACTERISTICS		
Acres: 677	Maximum Depth: 36 feet	Mean Depth: N/A
Water Chemistry Dates: 1970-72 (From the Surface Water Resources of Lincoln County – WDNR 1982)		
MPA: 28	pH: 6.8	Winterkill: None
Lake Type: Soft water drainage lake (impoundment) on the Wisconsin River with slightly acidic, medium brown water of low transparency		

Synopsis

Thirty-two species representing 9 families and totaling 6,370 fish were surveyed. Generally, the lake has high-density predator populations of walleye, smallmouth bass, northern pike, and muskellunge and relatively low-density and high-quality panfish populations of bluegill, pumpkinseed, yellow perch, black crappie, and yellow and black bullhead. With the exception of muskellunge, all of the predatory gamefish are growing at rates below statewide averages for most of their lives. Conversely, the panfish, with the exception of yellow perch, are growing at rates at or above statewide averages for most of their lives. Members of the sucker family (silver, shorthead, and golden redbone, white suckers, and northern hog suckers) dominate the non-sportfish community. Bowfin, trout-perch, and various minnow and darter species are also common. Eleven species were reported for the first time: blackside darter, bowfin, brassy minnow, burbot, creek chub, fantail darter, finescale dace, hornyhead chub, Iowa darter, largemouth bass, and rainbow darter. Brown bullhead and emerald shiner were found in a 1978 survey but not this one.

The lake has good walleye, smallmouth bass, northern pike, and muskellunge populations, all of which are sustained through adequate natural reproduction. The total walleye population estimate (PE) was calculated at 11.5/acre (95% Confidence Interval (CI) 9.3 – 14.1 per acre; CV = 52%). The adult walleye PE (all males and females and unknowns ≥ 15 inches) was 2.4/acre (95% CI 1.6 – 3.7 per acre; CV = 57%). Of the stock size (≥ 10 inches) and greater walleye, 18% are legal size fish of 15 inches or greater. The numbers of walleye drop off sharply from 14 – 17 inches, suggesting heavy harvest once they approach or reach the legal size limit. The smallmouth bass population is a real highlight of the fishery in terms of numbers and size quality and is worthy of protection to keep it at a high-quality level. Fifty-seven percent of the smallmouth bass ≥ 7 inches are over the legal size limit of 14 inches and 22% are ≥ 17 inches. Northern pike are abundant but not of very good size quality. Only 2% of pike ≥ 14 inches are 28 inches or larger. The muskellunge population is healthy with 29% of the fish ≥ 20 inches at or over the legal length limit of 34 inches.

Fisheries management emphasis should be for smallmouth bass, walleye, muskellunge, and panfish. No stocking should take place as all sportfish species are reproducing adequately on their own. Maintaining high predator densities and size structures is important for providing the quality panfish populations present in Alexander Lake. The quality smallmouth bass and muskellunge fisheries should be maintained at or above their current levels either by maintaining current regulations or through increased size and reduced daily bag limits. The current year-round open season for smallmouth bass is being looked at for possible change. A new walleye regulation went into effect April 1, 2002. Anglers are still able to harvest 5 walleye over 15 inches, but only one may be ≥ 28 inches and all walleye from 20 – 28 inches must be released. It is hoped that this regulation will provide for better quality catch-and-release fishing for walleye in the 20 – 28 inch-range. This regulation was adopted for the entire Wisconsin River system from the Prairie du Sac Dam upstream to the Grandfather Dam.

Background Information

Alexander Lake is a 677-acre, 36 feet deep impoundment on the Wisconsin River in central Lincoln County near Merrill (Figure 1.). It is a soft water impoundment with slightly acidic, medium brown water of low transparency. There are 4 inlets in the area surveyed: Wisconsin River, New Wood River, Copper River, and Joe Snow Creek. The shoreline is 99% upland hardwoods and is heavily developed. Council Grounds State Park borders the southeast corner of the impoundment. The littoral area of the lake is small as the banks drop quickly to 7 feet. Most of the littoral areas are around the islands scattered throughout the lake and in three bays: the Copper River inlet bay, the southeast corner bay near Council Grounds State Park, and the small bay to the northeast of the big island in the center of the lake. Aquatic macrophytes are mostly limited to these areas and scattered in narrow bands along the shore. About 80% of the impoundment is deeper than 7 feet.

The first stocking of record was in 1938 when bluegill, crappie, largemouth bass, muskellunge, yellow perch, northern pike, rock bass, and walleye all were stocked (Table 1.). The only other species ever stocked were bullhead in 1941 and 1944. Since 1959, only muskellunge have been stocked. The last stocking of muskellunge was in 1997 when a private group stocked 260 8 – 14 inch fingerlings.

Fall young-of-the-year (YOY) walleye boom electrofishing surveys were done in 1994 and 1995. In 1994, 3.9 YOY per mile were caught and in 1995 1.0 YOY per mile were caught. The only other standardized survey on Alexander Lake was a comprehensive survey conducted in 1978. That survey concluded that the gamefish population was dominated by northern pike, with lesser numbers of walleye, muskellunge and smallmouth bass. The report discussed the inefficiencies of their gear (fyke nets and boom electrofishing) at sampling the walleye population despite anglers catching 5 – 15 walleye per boat per day with little difficulty. The northern pike population was estimated at 2.2 adults (≥ 10.0 inches) per acre (CV = 52%). Natural reproduction was occurring for all species and the growth of gamefish was about average for northern Wisconsin lakes. Walleye growth rates were average, or slightly below, for their first five years. The report stated that Alexander Lake should be managed for northern pike, walleye, smallmouth bass, and panfish but no management recommendations were given other than that additional walleye population data should be collected.

As part of information needed for the Federal Energy and Regulatory Commission's dam relicensing process, the owner of the dam and hydroelectric facilities, Wisconsin Public Service, paid for the survey operating costs.

Introduction and Methods

Alexander Lake was surveyed with fyke nets, boom electrofishing, mini-fyke nets, and stream electrofishing gear during the spring, summer, and fall of 2000. A total of 6,370 fish were captured representing 32 species and nine families: Centrarchidae, Percidae, Catostomidae, Esocidae, Ictaluridae, Amiidae, Cyprinidae, Percopsidae, and Gadidae. Of these, 4,480 were measured. Scales for age and growth analysis were taken from a representative sample of sportfish and a representative sample of weights were measured for walleye, smallmouth bass, largemouth bass, muskellunge, and northern pike.

Following ice-out, fyke nets targeting spawning walleye and northern pike were run from March 22nd – 29th, for an effort of 70 net nights. Boom electrofishing targeting all species of gamefish, and sometimes panfish and non-gamefish, occurred on 11 nights for a total electrofishing effort of 40.4 hours. Parts of the shoreline upstream to Bill Cross Rapids were shocked on the following nights: March 21st, 23rd, 28th, and 29th, April 7th and 12th, and May 18th and 31st. The entire shoreline up to Bill Cross Rapids, including islands, was electrofished on April 2nd and 17th, and September 26th. Fyke nets targeting spawning muskellunge were run from April 19th – 21st, for an effort of 21 net nights. From May 23rd – 26th, fyke nets targeting spawning panfish were run for an effort of 32 net nights. Sixteen net nights of mini-fyke nets were run on September 6th – 7th to sample non-sportfish, minnow, and darter species as well as YOY panfish and bass. Ten, 90 foot shoreline sites were waded and sampled on September 6th with our stream electrofishing gear (pull boat) to capture non-sportfish, minnow, and darter species.

The most abundant gamefish captured in our surveys was walleye, followed by northern pike, smallmouth bass, muskellunge, and largemouth bass. Bluegill were the most abundant panfish, followed by pumpkinseed, yellow perch, yellow bullhead, black crappie, black bullhead, and rock bass. Non-sportfish were dominated by silver redhorse, with

Figure 1. Alexander Lake



3000 0 3000 6000 Feet



Table 1. Alexander Lake Stocking History

Date	Species	Number Stocked	Size	Remarks
1938	Bluegill	500	Adult	
1938	Bluegill	2,950	Fingerling	
1938	Crappie	3,000	Adult	
1938	Largemouth Bass	1	Adult	
1938	Muskellunge	10,000	Fry	
1938	Yellow Perch	460	Adult	
1938	Yellow Perch	64,000	Fingerling	
1938	Northern Pike	14	Adult	
1938	Rock Bass	76	Adult	
1938	Walleye	60	Adult	
1938	Walleye	439	Fingerling	
1938	Muskellunge	25	Fingerling	
1939	Bluegill	3,200	Adult	
1939	Yellow Perch	100	Adult	
1939	Yellow Perch	26,000	Fingerling	
1939	Walleye	500,000	Fry	
1940	Largemouth Bass	12,000	Fingerling	
1940	Northern Pike	30,000	Fry	
1940	Walleye	650,000	Fry	
1941	Bluegill	100	Adult	
1941	Bluegill	300	Fingerling	
1941	Bullhead	1,000	Fingerling	
1941	Northern Pike	30,000	Fry	
1941	Yellow Perch	12	Adult	
1941	Yellow Perch	12,600	Fingerling	
1941	Yellow Perch	500	Fingerling	
1941	Walleye	500,000	Fry	
1942	Muskellunge	750	Fingerling	
1942	Muskellunge	50,000	Fry	
1942	Walleye	500,000	Fry	
1943	Walleye	5,588	Fingerling	
1944	Bullhead	8,000	Fingerling	
1944	Walleye	498	Fingerling	
1945	Largemouth Bass	1,000	Fingerling	
1958	Walleye	7,200		
1959	Muskellunge	400		
1960	Muskellunge	1,500		
1961	Muskellunge	100		
1962	Muskellunge	2,885	Fingerling	
1963	Muskellunge	550	Fingerling	
1964	Muskellunge	5,800	Fingerling	
1965	Muskellunge	5,000	Fingerling	
1967	Muskellunge	950	Fingerling	
1984	Muskellunge	500	11" Fgl.	Private Stocking
8/28/86	Muskellunge	1,438	11" Fgl.	
1991	Muskellunge	150	11" Fgl.	
9/16/93	Muskellunge	521		Private Stocking
10/15/97	Muskellunge	260	8-14"	Private Stocking

lesser numbers of bowfin, white suckers, shorthead redhorse, golden shiners, northern hog suckers, and logperch. Just a single or several individuals of the following species were captured: golden redhorse, trout-perch, common shiner, burbot, creek chub, hornyhead chub, brassy minnow, finescale dace, Iowa darter, johnny darter, blackside darter, fantail darter, and rainbow darter. The numbers of each species captured with the different gear types and at different times is summarized in the appendices.

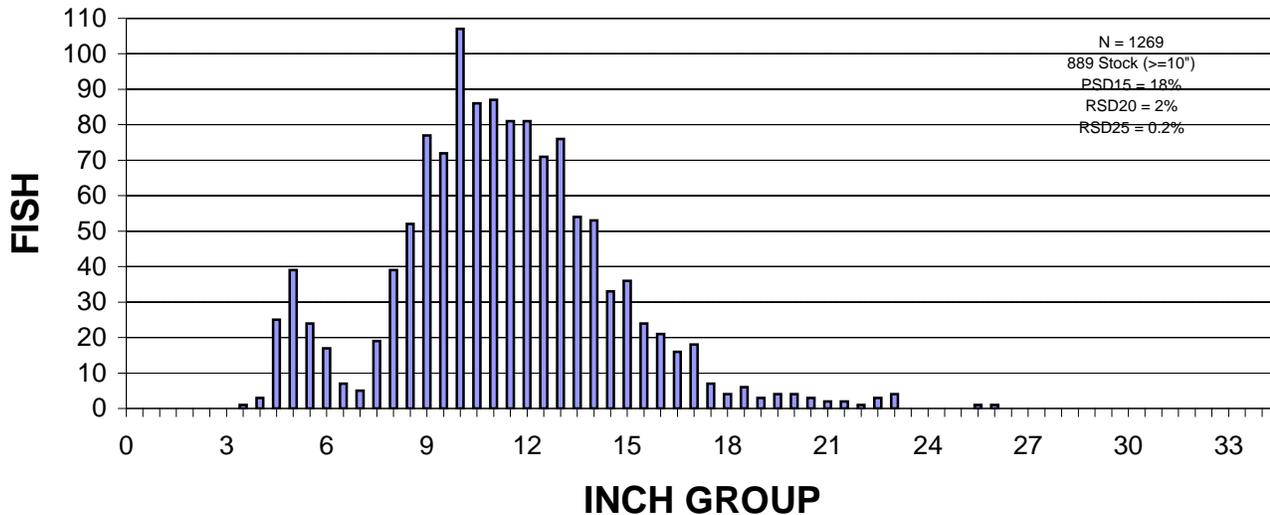
Results

Walleye

A total of 1,269 walleye were captured representing 19.9% of the total catch. They ranged in size from 3.7 to 26.3 inches. Much like in the 1978 survey, we too had difficulty sampling early ice-out walleye in fyke nets. Therefore, we spent parts of 8 nights from March 21st – April 17th boom electrofishing to sample more walleyes. Because we were not able to mark enough fish with fyke nets for a Peterson type population estimate (PE), we calculated a Schnabel PE using all gear types throughout the year. The Schnabel total walleye PE was 7,771 or 11.5 per acre with 95% confidence limits of 6,322 – 9,553 (9.3 – 14.1 per acre; CV = 52%). The Schnabel adult walleye PE (identifiable males and females and unknowns ≥ 15.0 inches) was 1,615 or 2.4 per acre with 95% confidence limits of 1,077 – 2,539 (1.6 – 3.7 per acre; CV = 57%). The walleye recruitment electrofishing survey on September 26 resulted in 1.2 YOY walleye per mile. This compares to 3.9 per mile in 1994 and 1.0 per mile in 1995.

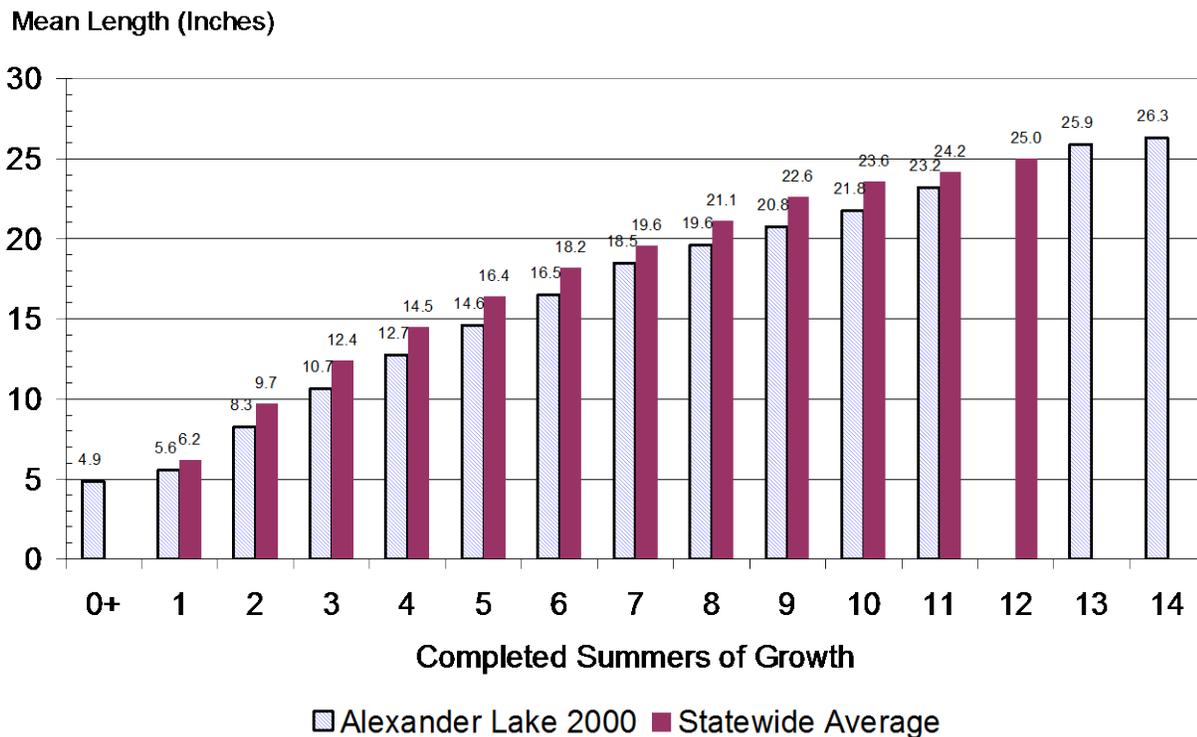
The length frequency structure of the walleye population tapers off from a peak in the 10 inches group, especially after about 14 inches (Figure 2). Stock size for length frequency comparisons is ≥ 10 inches for walleye. Of the stock size walleye we sampled, 18% were at or over the legal length limit of 15 inches (PSD15). Only 2% were 20 inches or greater (RSD20). We only sampled 21 walleye that were 20 inches or larger.

**Figure 2. Walleye Length Frequency
Alexander Lake - 2000**

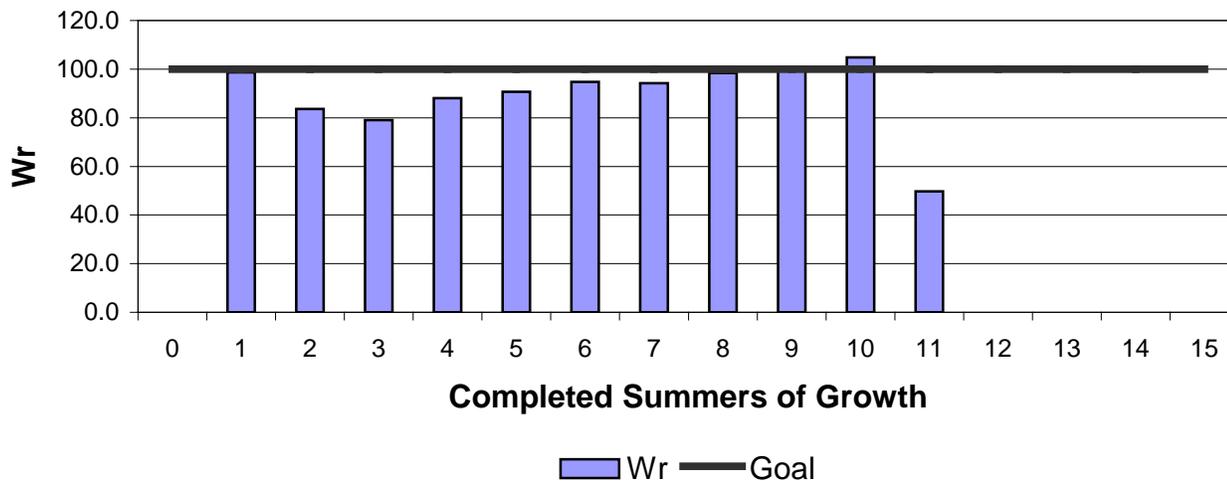


Growth of walleye is 1 – 2 inches below statewide averages for all ages through age 11 (Figure 3). Condition factors are below ideal for ages 2 – 7, and are close to ideal for age 1 and ages 8 – 10 (Figure 4).

**Figure 3. Walleye Growth Rates
Alexander Lake - 2000**



**Figure 4. Walleye Condition Factor (Wr)
Alexander Lake - 2000**

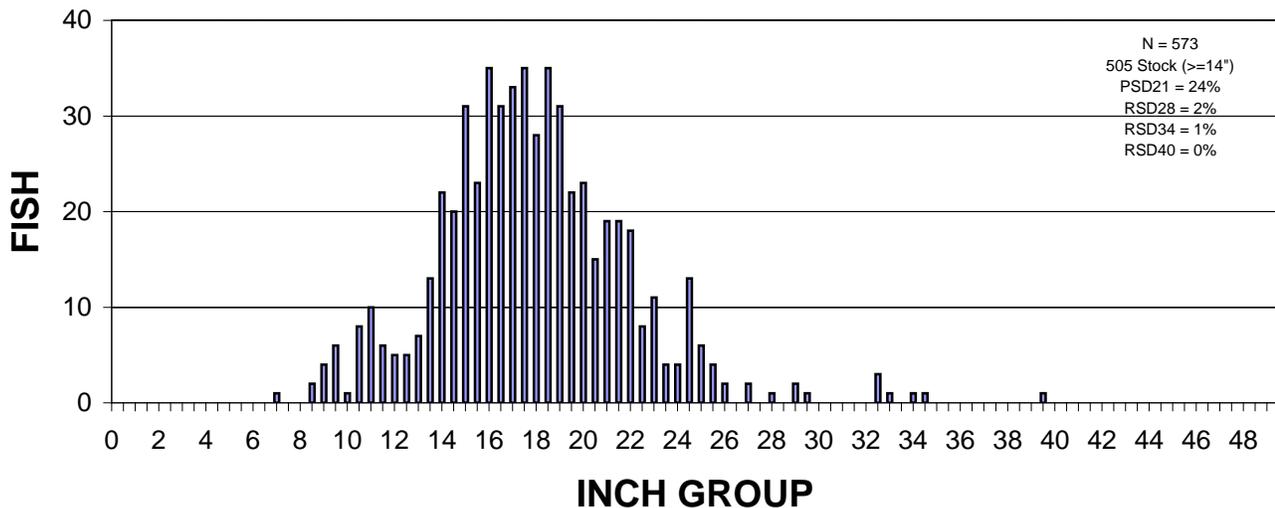


Northern Pike

Five hundred seventy three northern pike were captured which was 9.0% of the total catch. The Schnabel total PE using all gear types throughout the year was 3,095 or 4.6 per acre with 95% confidence limits of 2,327 – 4,213 (3.4 – 6.2 per acre; CV = 54%). Northern pike captured ranged in size from 7.0 to 34.5 inches.

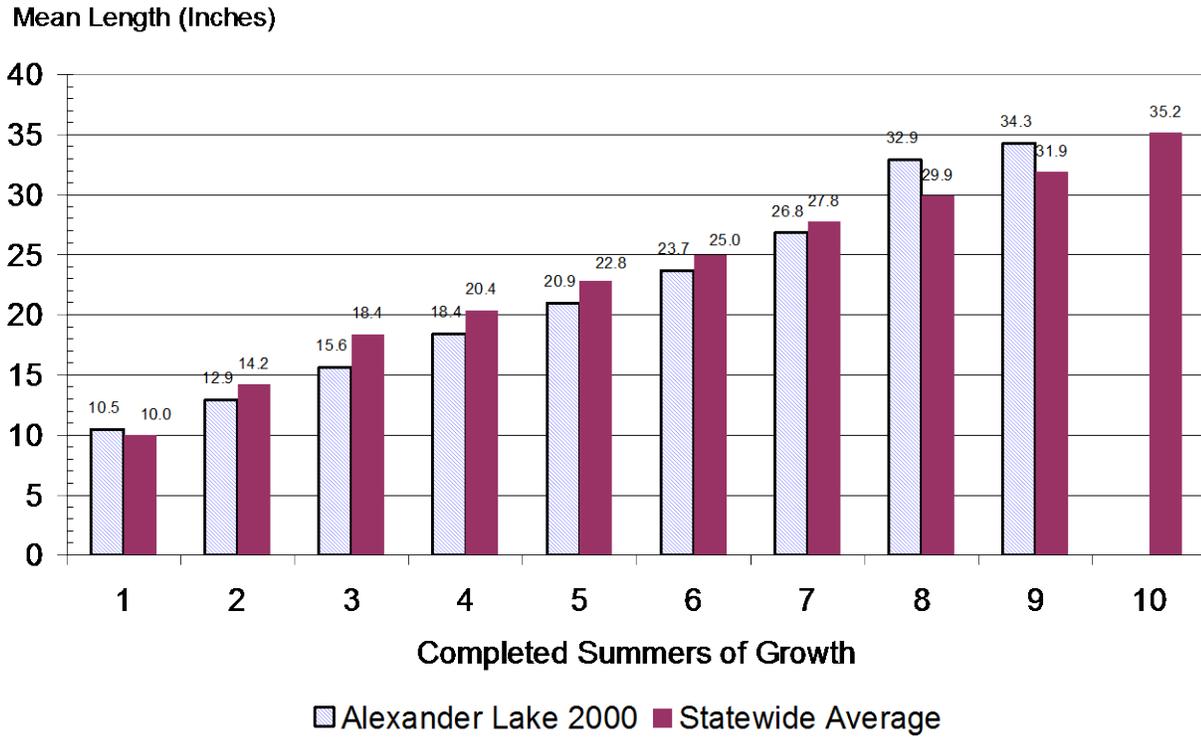
The length frequency structure of the northern pike population is pretty much a bell curve with a few larger individuals (Figure 5). Stock size for length frequency comparisons is ≥ 14 inches for northern pike. Of the stock size pike we sampled, 24% were ≥ 21 inches (PSD21). Only 2% (11 fish) were 28 inches or greater (RSD28) and only 1% (3 fish) were ≥ 34 inches (RSD34).

**Figure 5. Northern Pike Length Frequency
Alexander Lake - 2000**

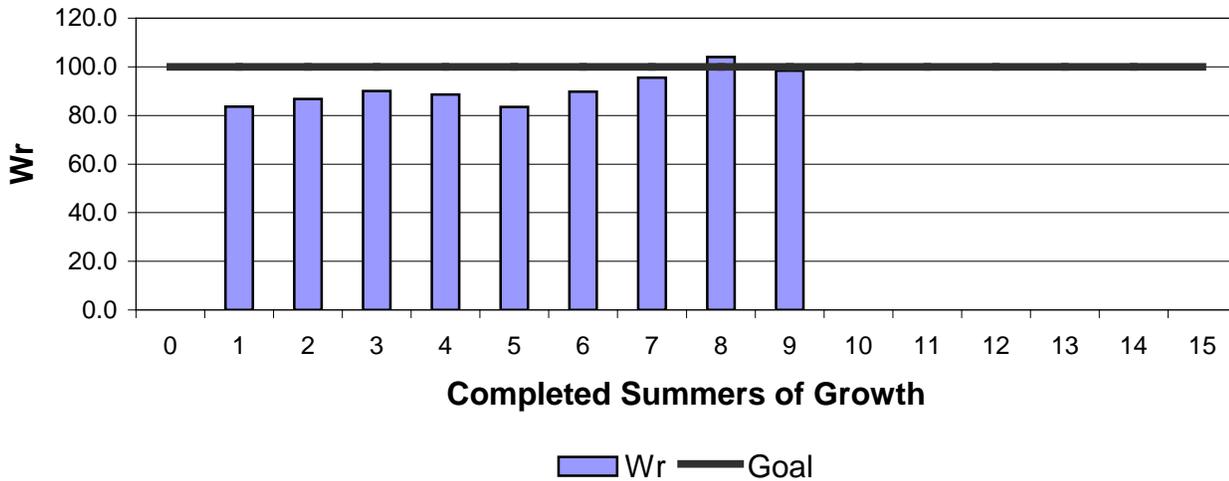


Northern pike growth rates are 0.5 – 3.0 inches above statewide averages for ages 1, 8, and 9 but 1.0 – 2.8 inches below statewide averages for ages 2 – 7 (Figure 6). Condition factors are at or above ideal for ages 8 and 9, but below ideal for ages 1 – 7 (Figure 7).

**Figure 6. Northern Pike Growth Rates
Alexander Lake - 2000**



**Figure 7. Northern Pike Condition Factor (Wr)
Alexander Lake - 2000**

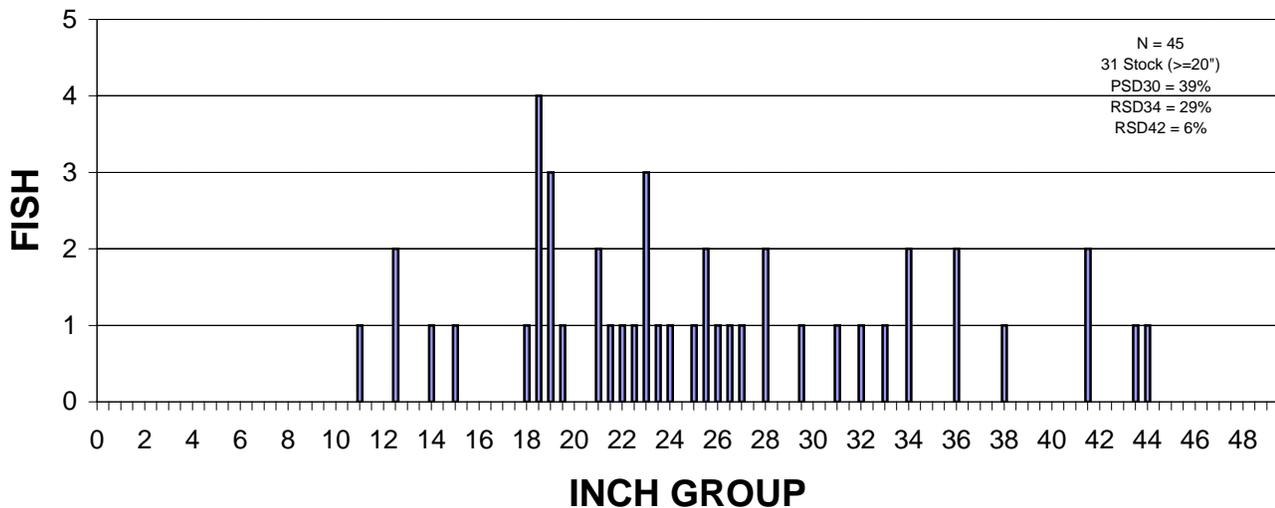


Muskellunge

A good, naturally reproducing population of muskellunge is present in Alexander Lake. We captured 45 muskellunge throughout the survey of which 2 were recaptures. From this a Schnabel total PE was calculated at 288 fish or 0.4 per acre with 95% confidence limits of 105 – 719 (0.2 – 1.1 per acre; CV = 73%). An adult PE for 20 inches and larger fish was calculated at 204 (0.3 per acre) with 95% confidence limits of 62 – 371 (0.1 – 0.5 per acre; CV = 54%). Muskellunge ranged in size from 11.3 to 44.0 inches.

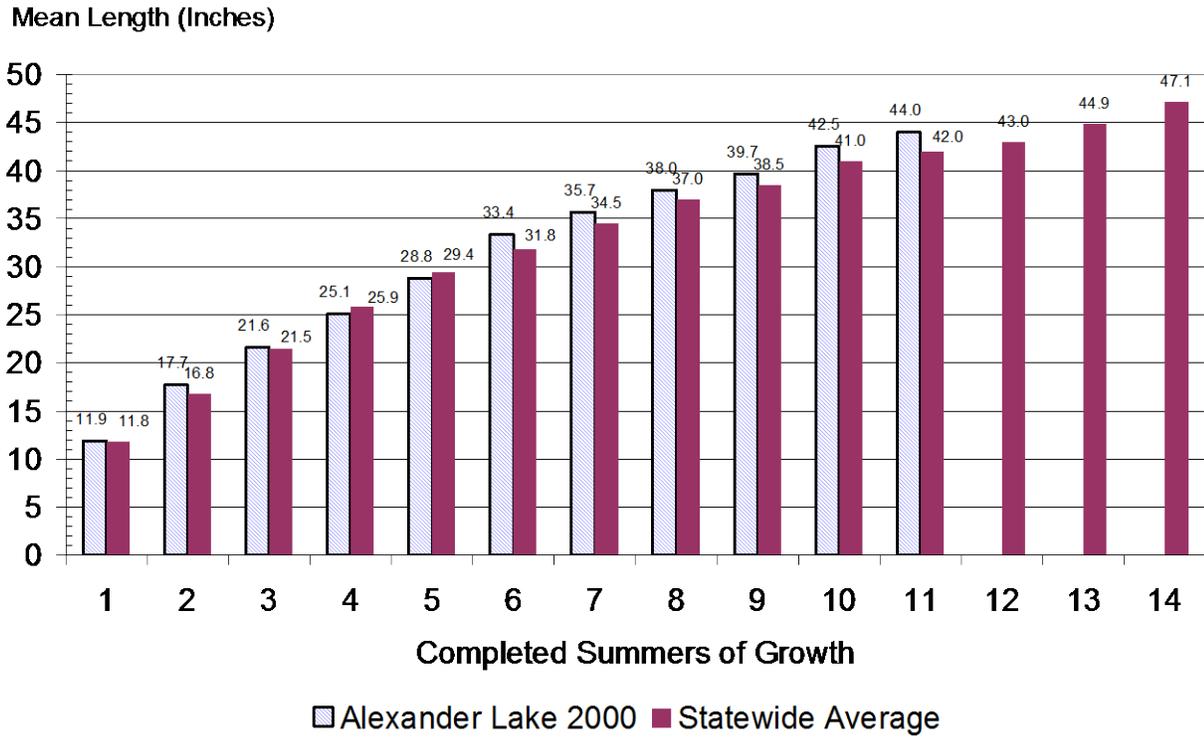
Stock size for length frequency comparisons is ≥ 20 inches for muskellunge. Of the stock size muskellunge we sampled 39% were ≥ 30 inches (PSD30) and 29% were at or over the legal length limit of 34 inches (RSD34). Two fish measured 42 inches or longer resulting in a RSD42 of 6%.

**Figure 8. Muskellunge Length Frequency
Alexander Lake - 2000**

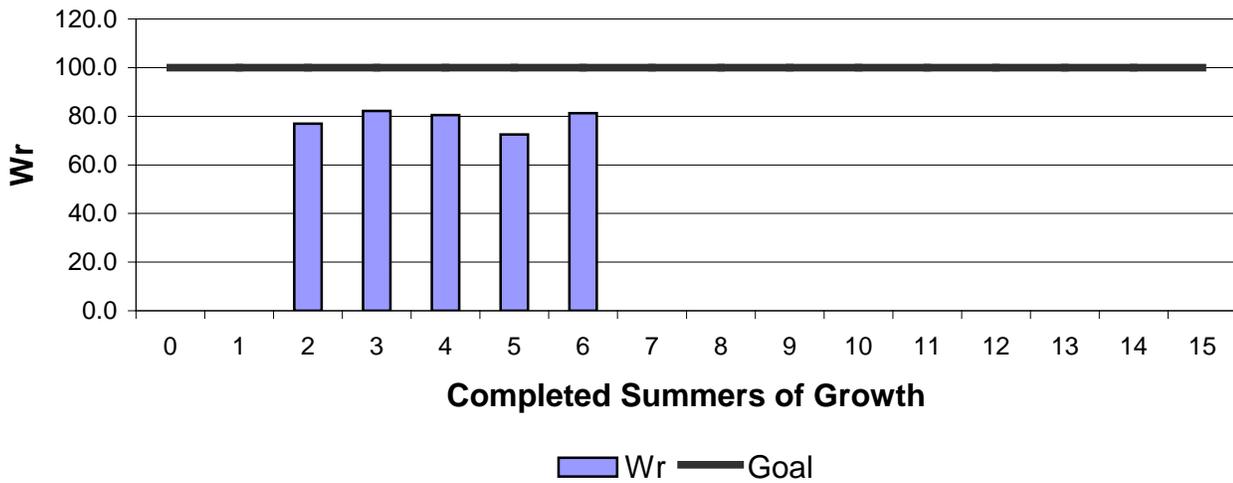


Muskellunge growth rates are very good and are 0.1 – 2.0 inches above statewide averages for ages 1 to 3 and 6 to 11 (Figure 9). Age 4 fish are 0.8 inches and age 5 fish are 0.6 inches below statewide growth averages. We only have condition factor information for ages 2 – 6, and they are all below ideal (Figure 10). The larger fish appeared to be in better body condition and likely had weights closer to ideal.

**Figure 9. Muskellunge Growth Rates
Alexander Lake - 2000**



**Figure 10. Muskellunge Condition Factor (W_r)
Alexander Lake - 2000**

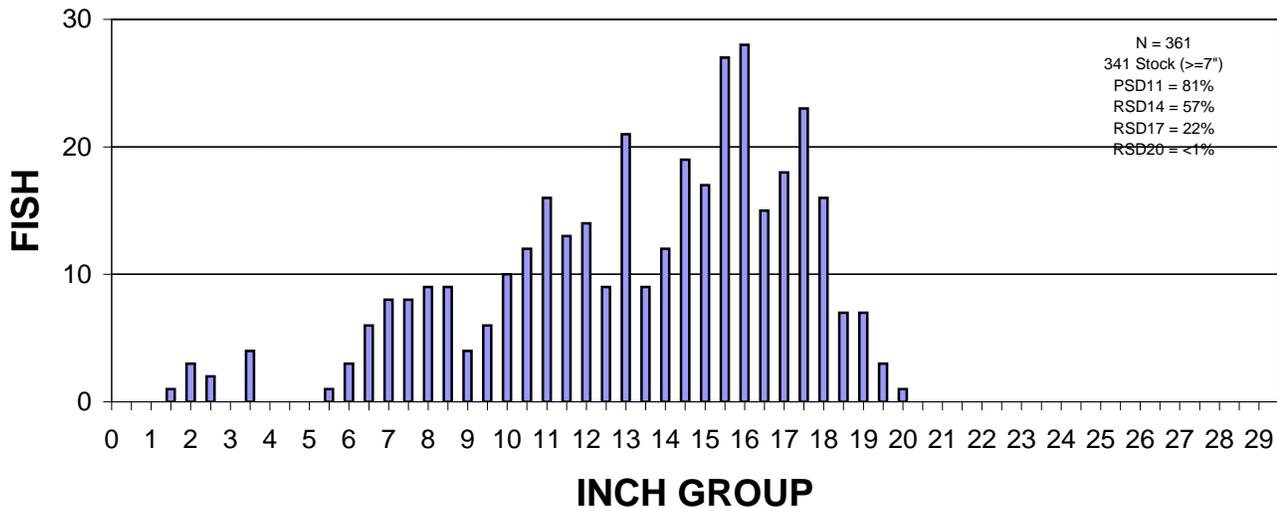


Smallmouth Bass

A total of 361 smallmouth bass were sampled representing 5.7% of the total catch. The Schnabel PE for smallmouth bass abundance for fish ≥ 6 inches was 5,811 or 8.6 per acre with 95% confidence limits of 3,018 – 12,233 (4.5 – 18.1 per acre; CV = 67%). Smallmouth bass captured ranged in size from 1.9 to 20.4 inches.

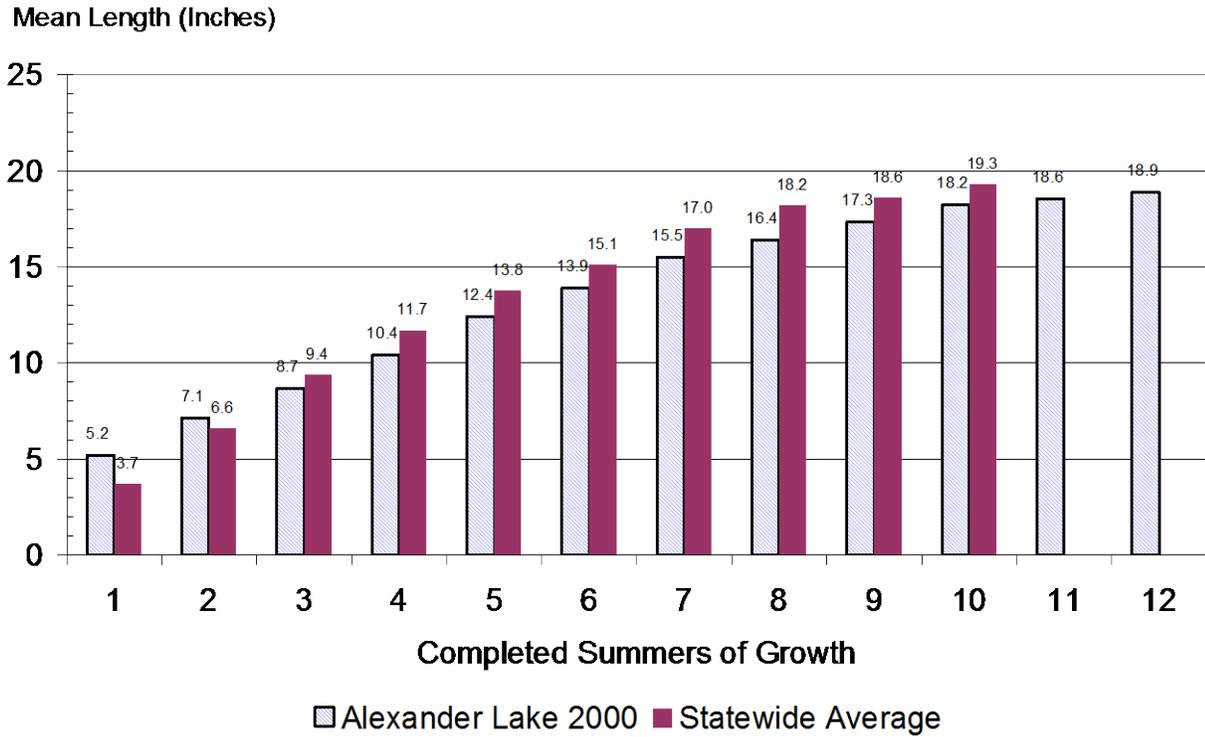
The length frequency histogram of the smallmouth bass population reveals an excellent size structure with many quality-sized fish present (Figure 11). The peak in the population is in the 15 – 16 inches size range. PSD11 (stock size for smallmouth bass is ≥ 7 inches) was 81% and RSD14 was 57%. In other words, 57% of the smallmouth bass population ≥ 7 inches is over the legal length limit of 14 inches. Even more impressive is the fact that RSD17 was 22%.

**Figure 11. Smallmouth Bass Length Frequency
Alexander Lake - 2000**

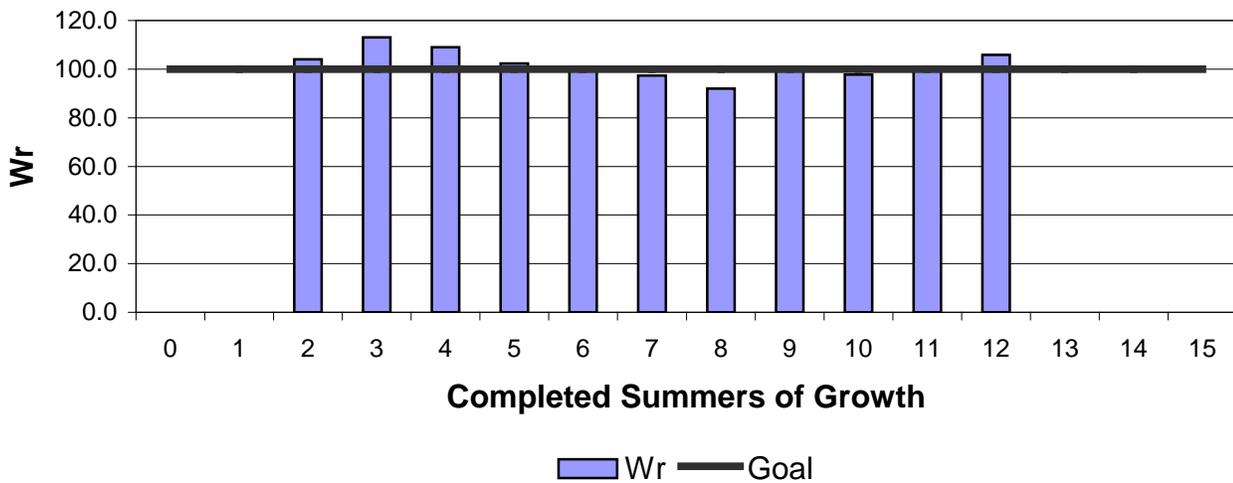


Smallmouth bass start out growing very fast at 1.5 inches above statewide averages at age 1 and 0.5 inches at age 2 (Figure 12). But between ages 3 to 10 growth rates fell to 0.7 – 1.5 inches below statewide averages. Condition factors are at or above ideal for all ages except 7 and 8 (Figure 13). The mean length at age for these 7 and 8 year old fish are 15.5 and 16.4 inches, respectively which also corresponds with the most abundant smallmouth bass in the system.

**Figure 12. Smallmouth Bass Growth Rates
Alexander Lake - 2000**



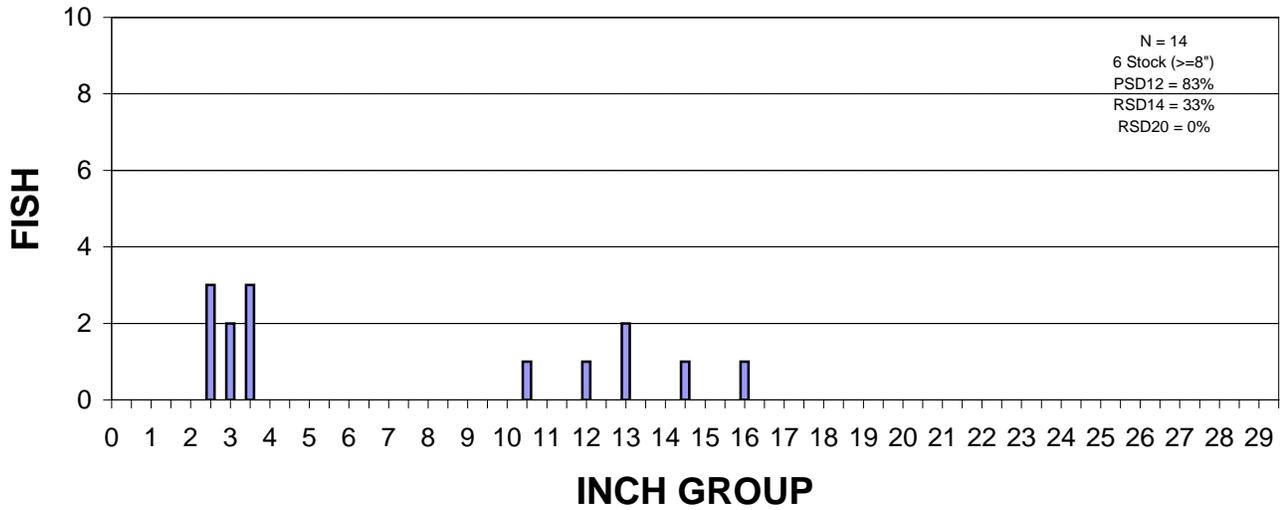
**Figure 13. Smallmouth Bass Condition Factor (Wr)
Alexander Lake - 2000**



Largemouth Bass

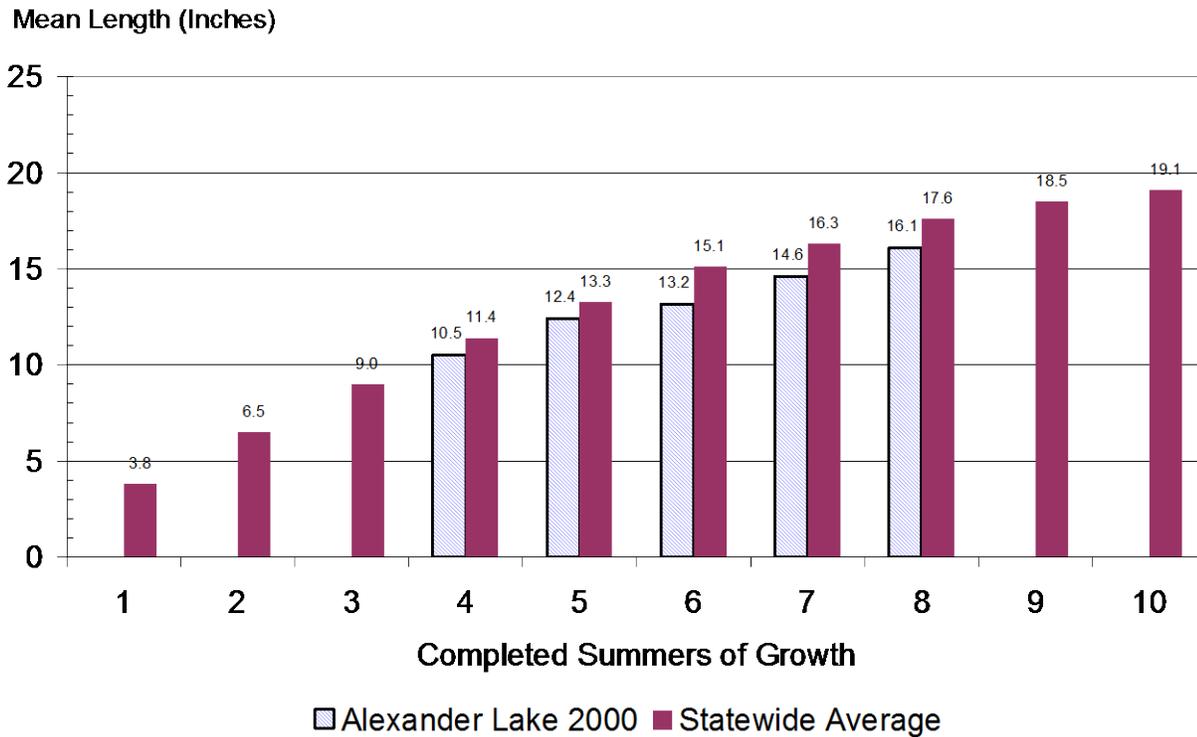
Fourteen largemouth bass were captured ranging in size from 2.5 to 16.1 inches. There was some natural reproduction in 2000 to go along with a handful of mature fish in the 10 – 16 inch range (Figure 14). PSD12 (stock size for largemouth bass is ≥ 8 inches) was 83% and RSD14 was 33%.

**Figure 14. Largemouth Bass Length Frequency
Alexander Lake - 2000**



Six largemouth bass were aged at 4 – 8 years old. Growth for all of these ages was between 0.9 and 1.9 inches below statewide averages (Figure 15).

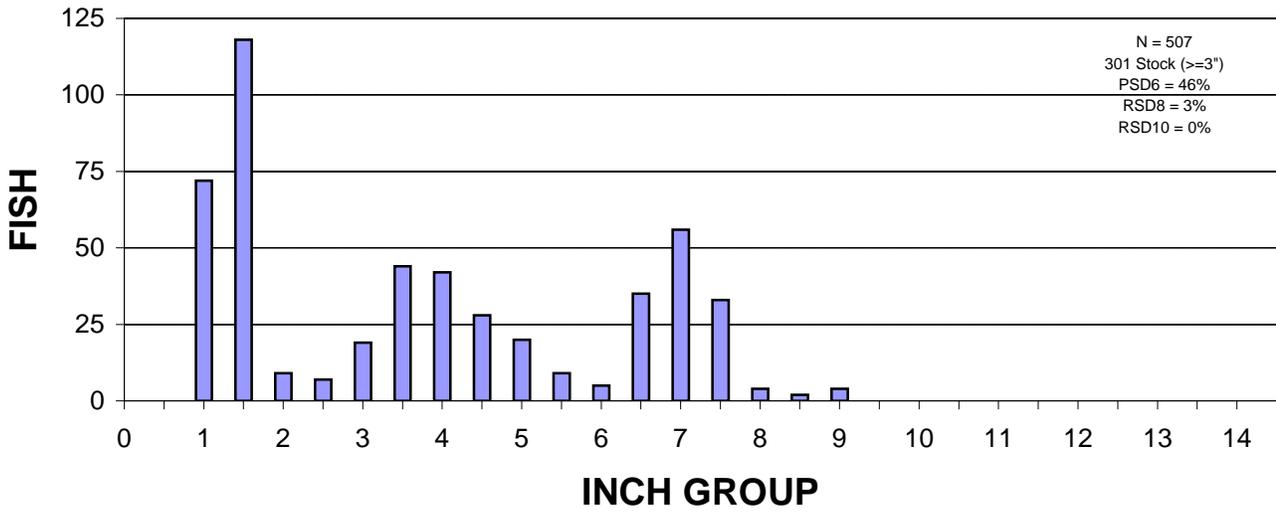
**Figure 15. Largemouth Bass Growth Rates
Alexander Lake - 2000**



Bluegill

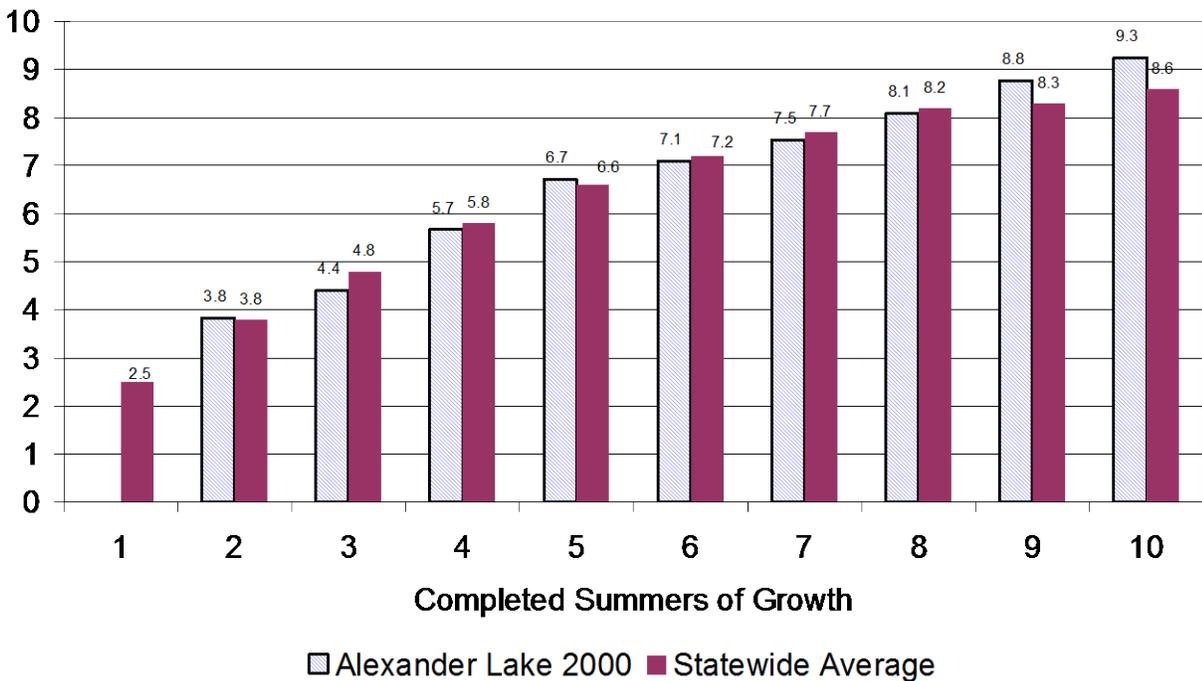
Bluegill were the most abundant species collected in our sampling representing 21.1% of the total catch. Of the 1,343 bluegill captured, 507 were measured (Figure 16). Bluegill ranged in size from 1.0 to 9.4 inches. A strong 2000 year-class was evident from our mini fyke net sampling done in September. Other peaks in the length frequency were at 3.5 – 4.5 inches and at 7 inches. PSD6 (stock size for bluegill is ≥ 3 inches) was 46% and RSD8 was only 3%. We only captured 10 bluegill 8 inches and larger. Growth rates of bluegill were at or slightly below statewide averages for ages 2 – 8 and above statewide averages for ages 9 and 10 (Figure 17).

**Figure 16. Bluegill Length Frequency
Alexander Lake - 2000**



**Figure 17. Bluegill Growth Rates
Alexander Lake - 2000**

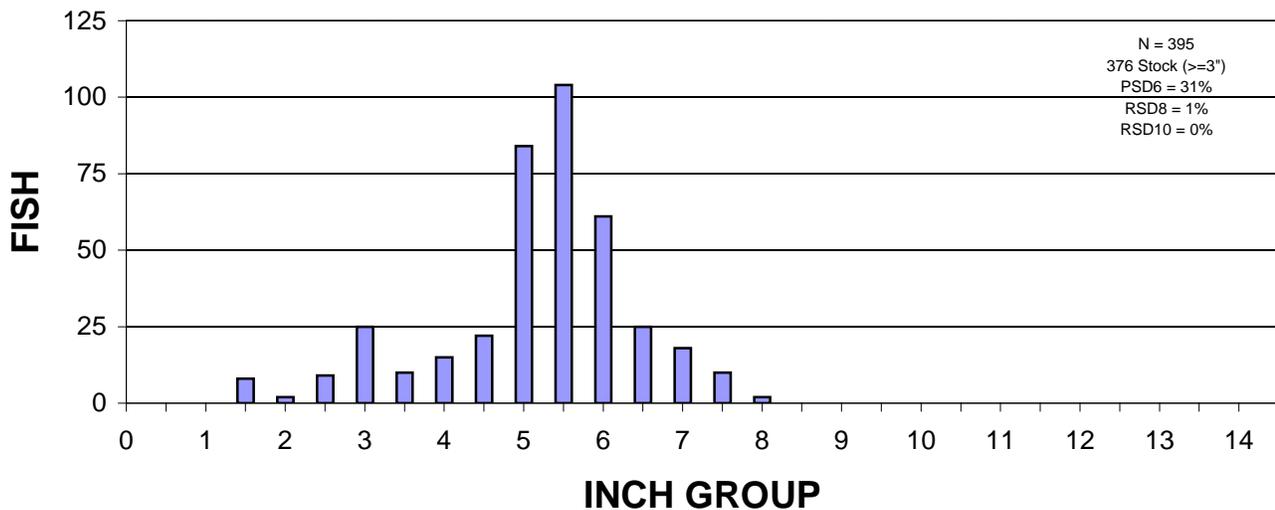
Mean Length (Inches)



Pumpkinseed

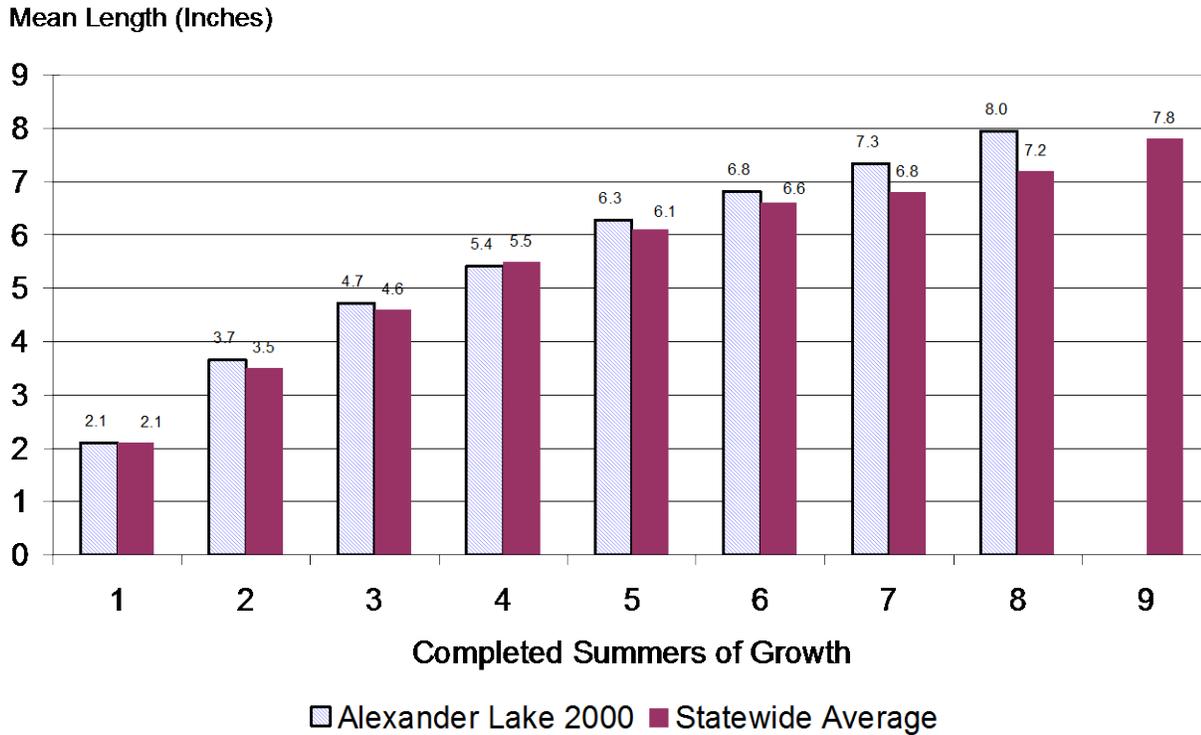
Pumpkinseed were the second most abundant panfish species collected in our sampling representing 7.2% of the total catch. Three hundred ninety five of 459 pumpkinseed were measured, ranging in size from 1.5 – 8.1 inches (Figure 18). The bulk of the pumpkinseed population was from 5 – 6 inches. PSD6 (stock size for pumpkinseed is ≥ 3 inches) was 31% and RSD8 was only 1%. We only captured 2 pumpkinseed 8 inches and larger.

**Figure 18. Pumpkinseed Length Frequency
Alexander Lake - 2000**



Pumpkinseed growth rates were at or above statewide averages for ages 1 – 8 (Figure 19). The oldest fish are growing at significantly faster rates than statewide averages; age 7 fish are 0.5 inches longer and age 8 fish are 0.8 inches longer than statewide averages.

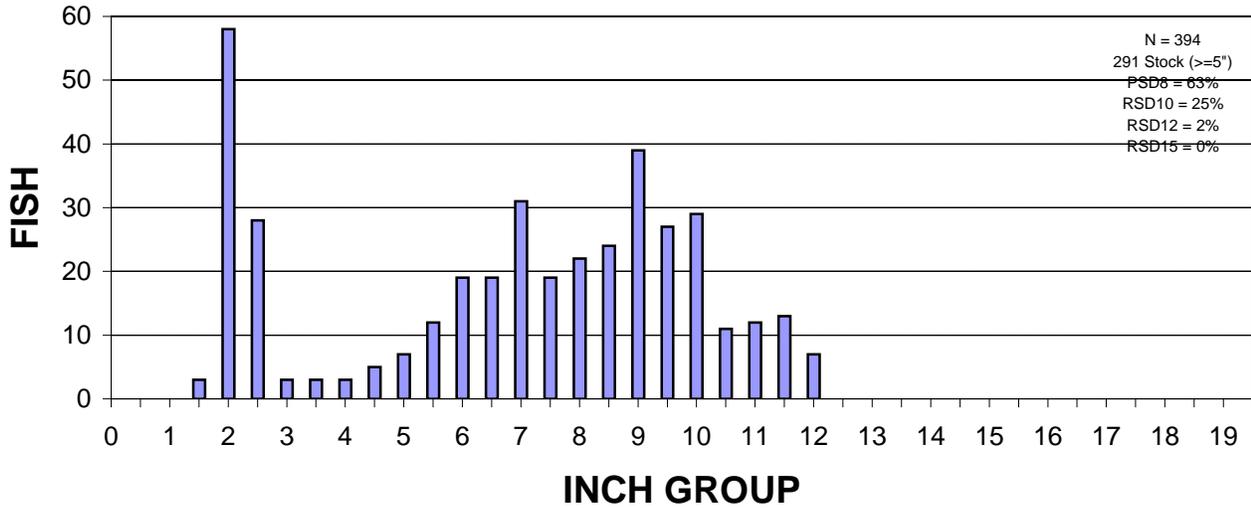
**Figure 19. Pumpkinseed Growth Rates
Alexander Lake - 2000**



Yellow Perch

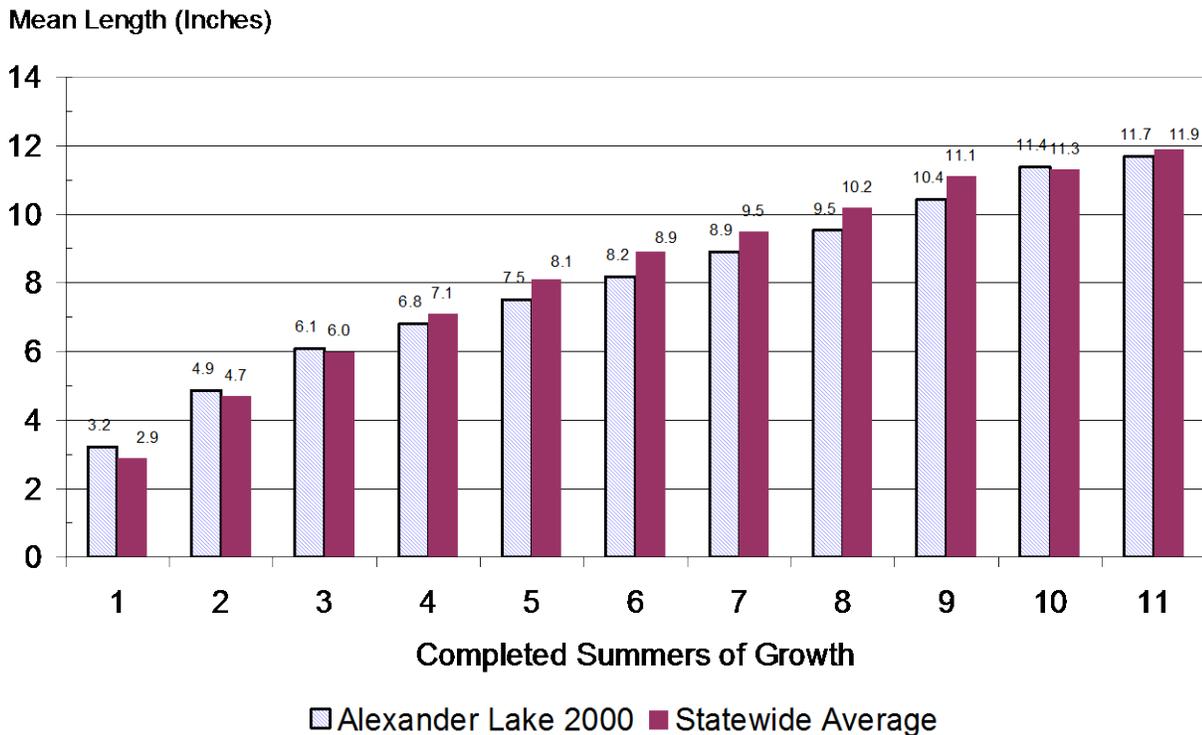
Yellow perch were the third most abundant panfish in our surveys and represented 7.2% of the total catch. A total of 394 perch were measured out of 457 that were captured (Figure 20). PSD8 (stock size for perch is ≥ 5 inches) was 63% and RSD10 was 25% indicating good size quality in the perch population. Seven perch 12 inches and larger were captured for a RSD12 = 2%. Yellow perch ranged in size from 1.8 – 12.2 inches. A very strong 2000 year-class of yellow perch was discovered in our late summer mini fyke netting. Peaks in the population occur at 7 and 9 inches and valleys between 3 – 6 inches and 7.5 – 8.5 inches.

**Figure 20. Yellow Perch Length Frequency
Alexander Lake - 2000**



Growth rates of yellow perch were slightly above statewide averages for ages 1 to 3 and age 10, and 0.2 – 0.7 inches below statewide averages for ages 4 – 9 and age 11 (Figure 21). The longevity of perch is good as fish up to 11 years old were sampled.

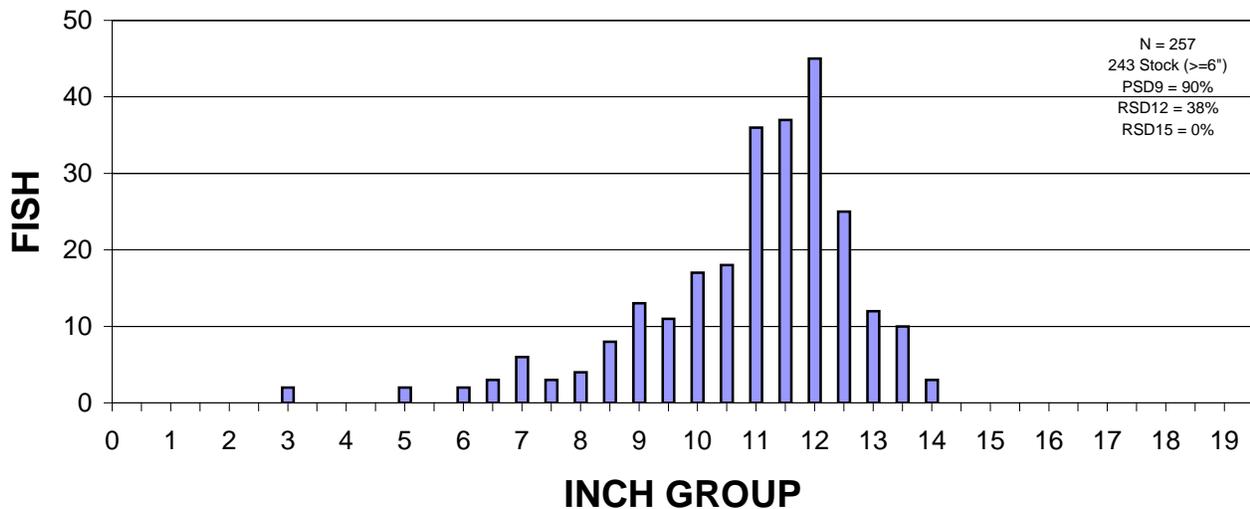
**Figure 21. Yellow Perch Growth Rates
Alexander Lake - 2000**



Yellow Bullhead

At 284 fish captured, yellow bullhead were the fourth most common panfish and made up 4.5% of our catch. Size ranged from 3.1 – 14.2 inches (Figure 22). PSD9 (stock size for bullhead is ≥ 6 inches) was 90% and RSD12 was 38% indicating a very good size quality in the population.

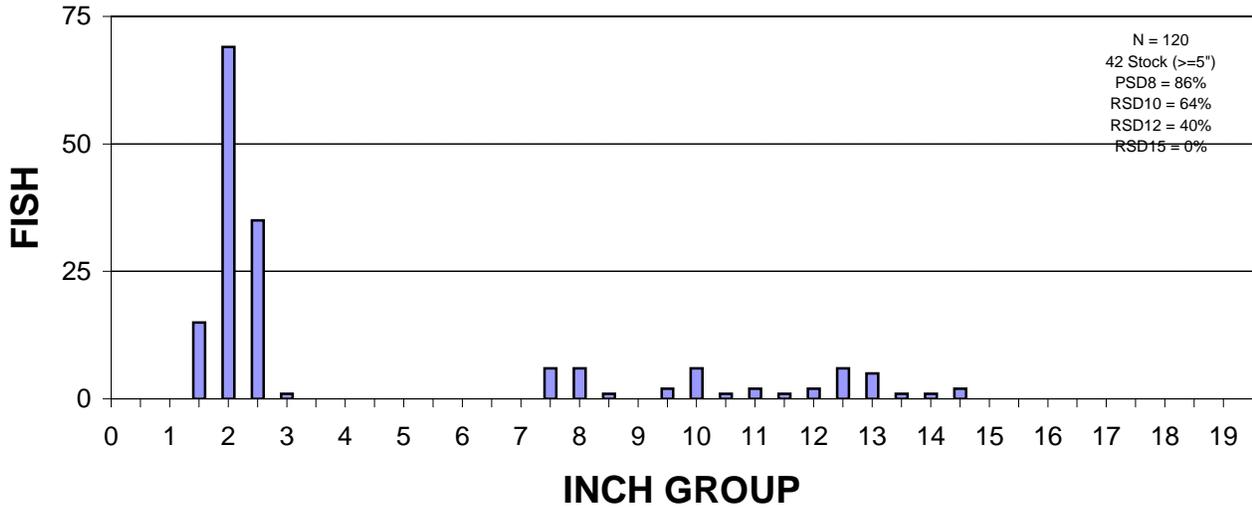
**Figure 22. Yellow Bullhead Length Frequency
Alexander Lake - 2000**



Black Crappie

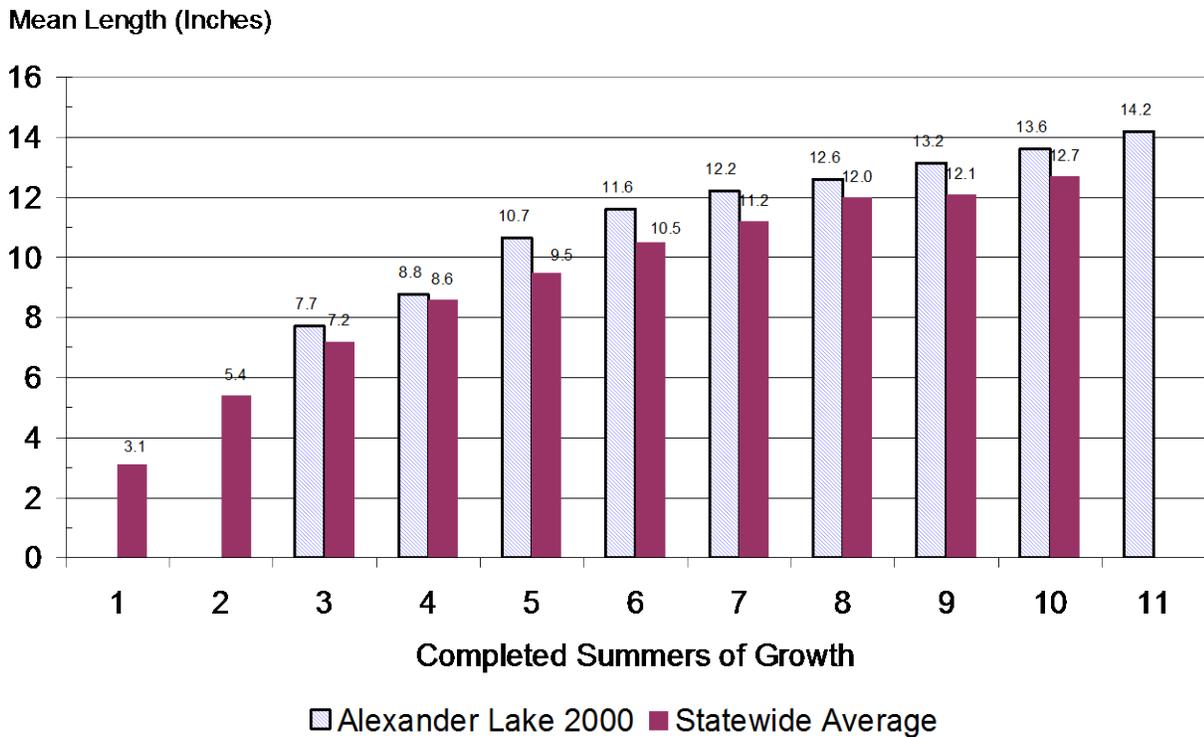
Black crappie were not abundant but they were the fifth most common panfish in our survey representing 2.7% of the total catch. One hundred seventy five crappie were captured, of which 162 were measured (Figure 23). Size ranged from 1.7 – 14.6 inches. Most of the crappie we sampled were in our mini fyke nets in late summer and were YOY from a strong 2000 year-class. Age 1 and 2 fish were completely absent from the population or were entirely missed in our sampling. There were just a few fish in each inch group from 7 – 14 inches. PSD8 (stock size for crappie is ≥ 5 inches) was 86%, RSD10 was 64%, and RSD12 was 40%. These data reveal a low-density, high-quality crappie population.

**Figure 23. Black Crappie Length Frequency
Alexander Lake - 2000**



As might be expected in a low-density population, crappie growth rates are significantly above statewide averages by 0.2 – 1.2 inches for ages 3 – 10 (Figure 24). We found crappie up to age 11 in the population.

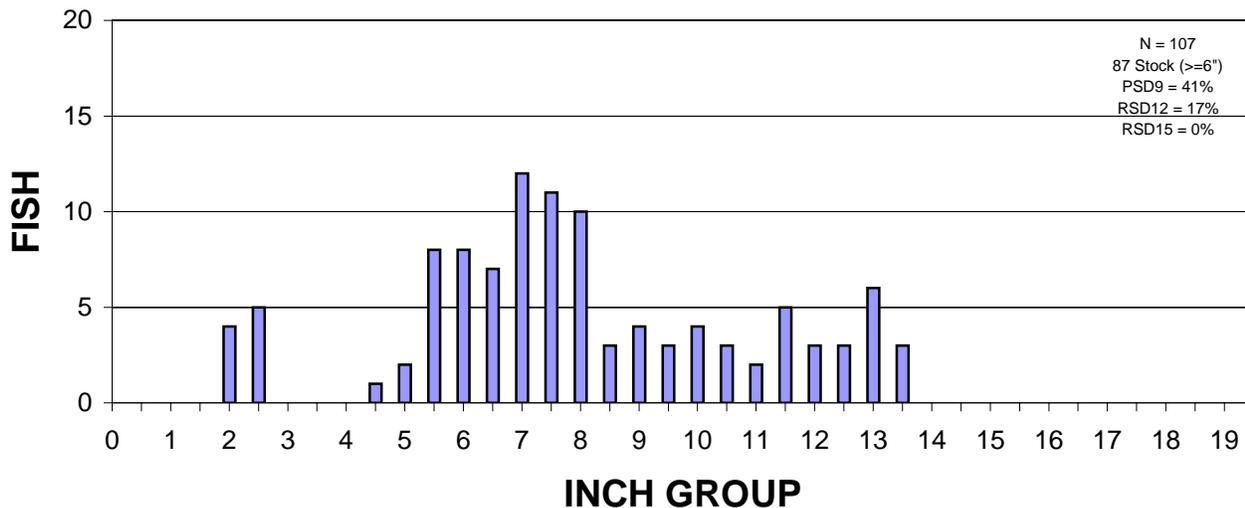
**Figure 24. Black Crappie Growth Rates
Alexander Lake - 2000**



Black Bullhead

Black bullhead were less than half as abundant as yellow bullhead accounting for 1.8% of the total catch. They were the sixth most abundant panfish as 116 were sampled and 107 measured (Figure 25). Size ranged from 2.0 – 13.8 inches with most of the fish < 8.5 inches. Unlike the yellow bullheads, we found several YOY in our late summer stream electrofishing surveys indicating a possible strong 2000 year-class. The size quality was not near as good as the yellow's as PSD9 was 41% and RSD12 was 17%.

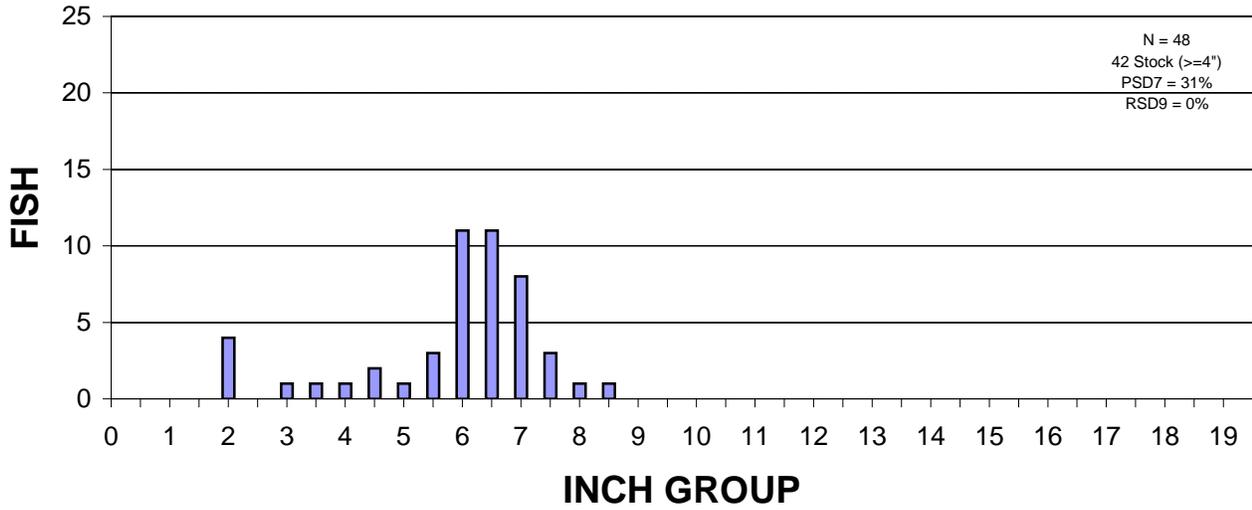
**Figure 25. Black Bullhead Length Frequency
Alexander Lake - 2000**



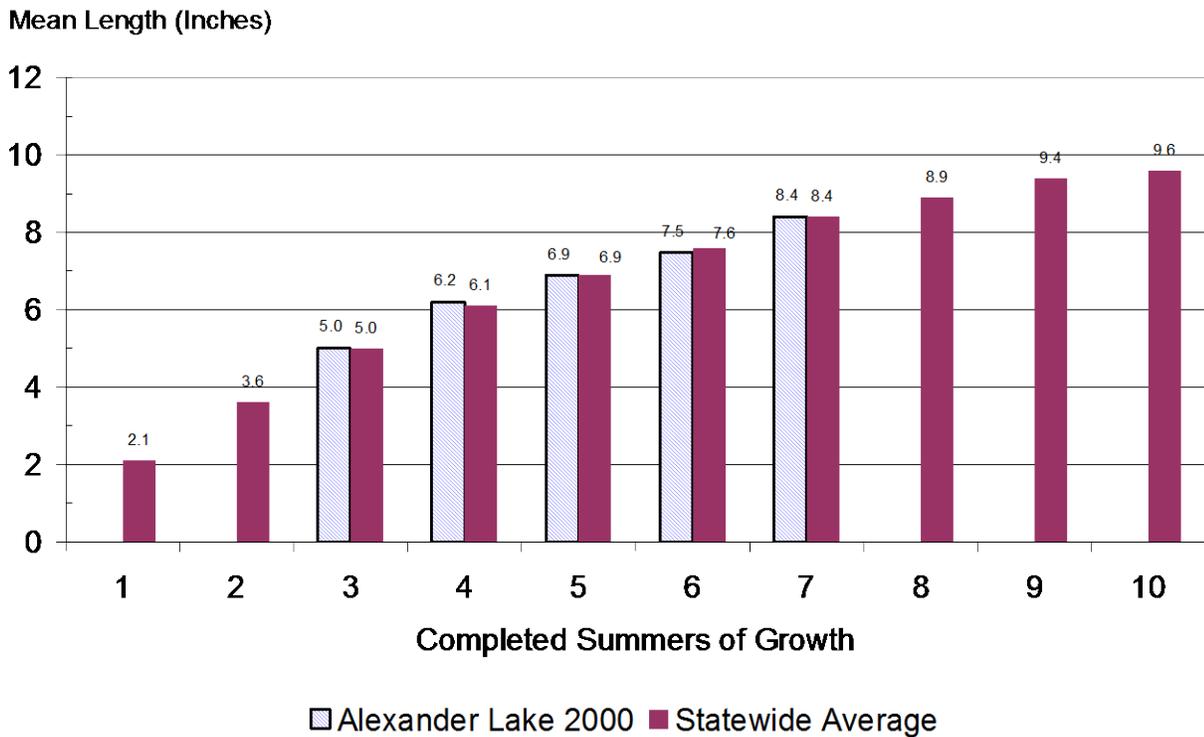
Rock Bass

Rock bass were the least abundant panfish captured in our surveys as only 50 fish were sampled and 48 measured accounting for less than 1% of our total catch. Size ranged from 2.0 – 8.8 inches with most fish from 6 – 7.5 inches (Figure 26). Size quality was fair as PSD7 (stock size for rock bass is ≥ 4 inches) was 31% but we only captured two fish that were 8 inches or larger. A few fish from the 2000 year-class showed up in our late summer mini fyke nets. Rock bass growth rates were almost identical to statewide averages as they only deviated by 0.1 inches for ages 4 and 6 and were right at average for ages 3, 5, and 7 (Figure 27).

**Figure 26. Rock Bass Length Frequency
Alexander Lake - 2000**



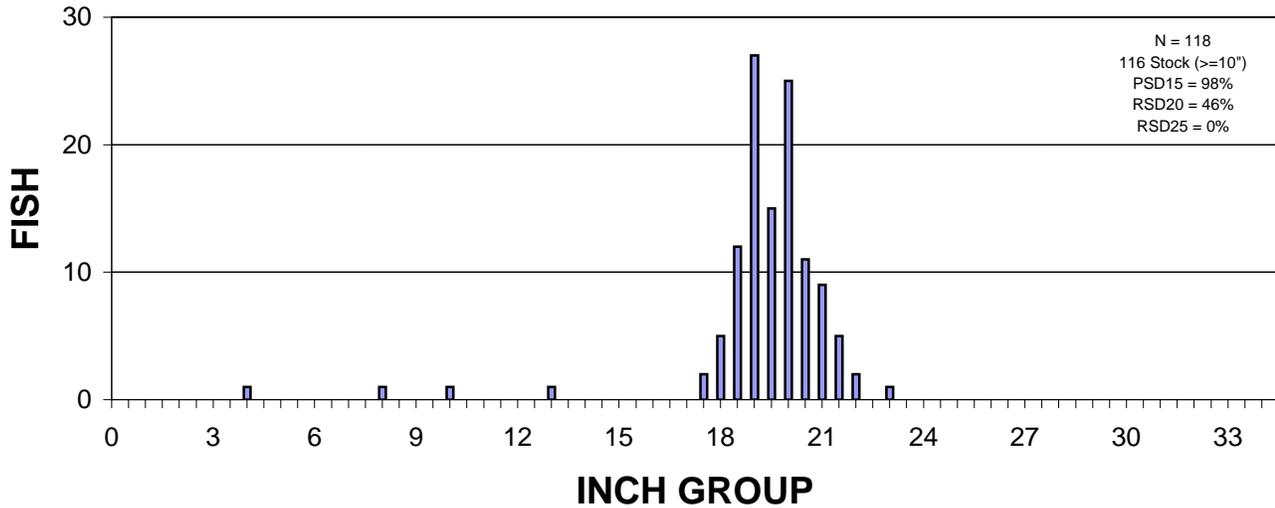
**Figure 27. Rock Bass Growth Rates
Alexander Lake - 2000**



Redhorse

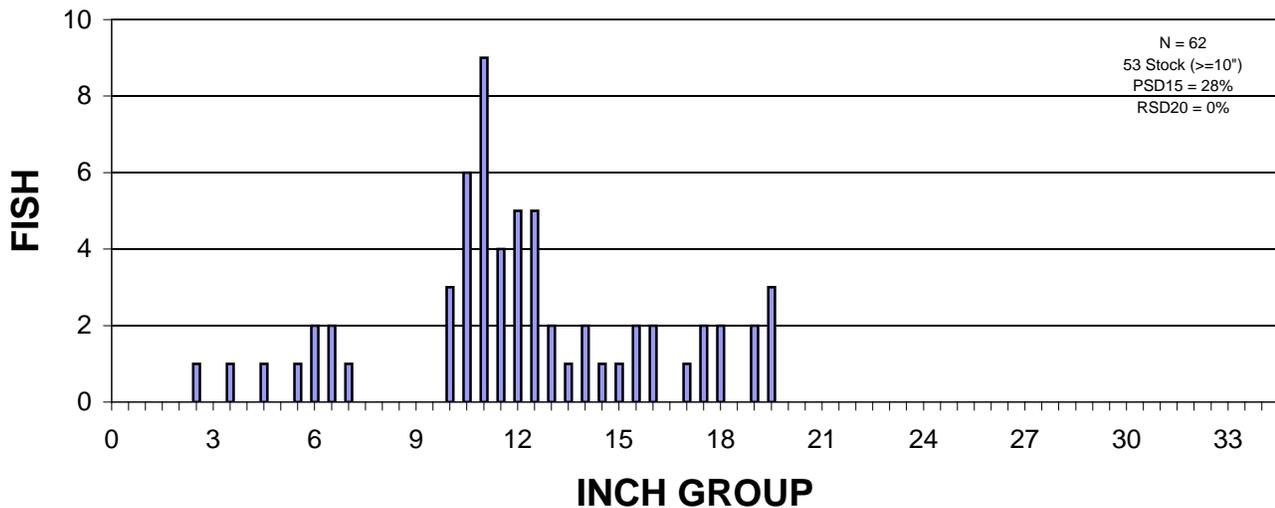
Redhorse were an abundant group of fish as 865 individuals in three species were captured (silver, shorthead, and golden) representing 13.6% of the total catch. Silver redhorse were the most abundant and 118 were measured ranging in size from 4.0 – 23.0 inches (Figure 28). Most fish were from 18 – 22 inches. Only 4 fish less than 17.5 inches were surveyed. PSD15 (stock size is ≥ 10 inches) was 98% and RSD20 was 46%.

**Figure 28. Silver Redhorse Length Frequency
Alexander Lake - 2000**



Shorthead redhorse were the next most abundant redhorse. Eighty-five were captured and 62 measured ranging in size from 2.9 – 19.8 inches (Figure 29). Most fish were 10 – 13 inches. PSD15 was 28%.

**Figure 29. Shorthead Redhorse Length Frequency
Alexander Lake - 2000**

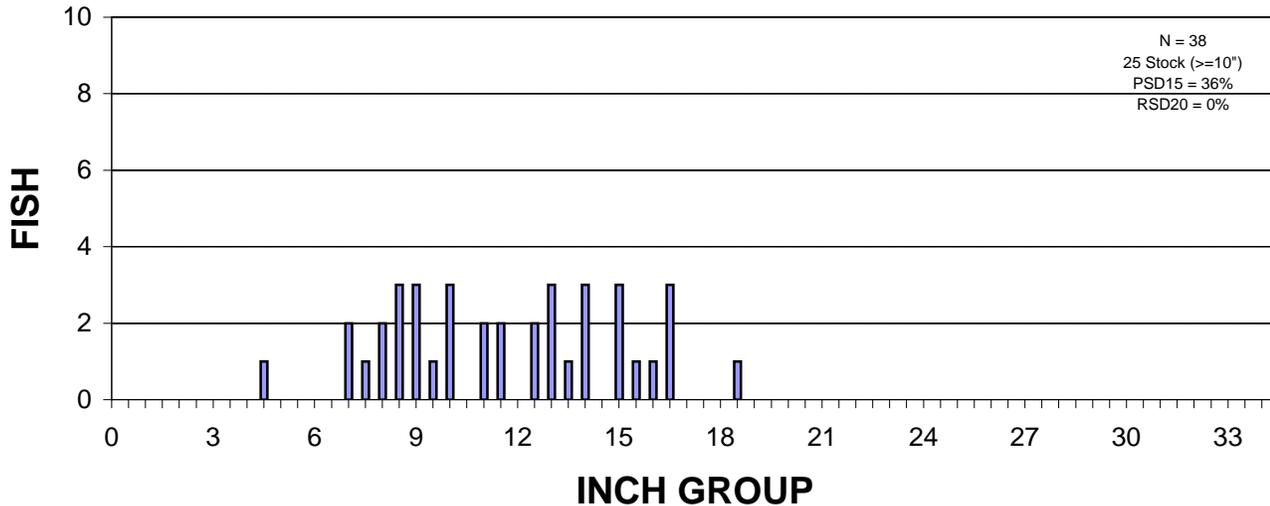


Seven golden redhorse were identified. Four were measured ranging in size from 15.0 – 19.6 inches.

White Sucker

Ninety-five white suckers were captured comprising 1.5% of the total catch. Size ranged from 4.5 – 18.8 inches in the 38 fish measured (Figure 30). Sizes from 7 – 16 inches all were represented. PSD15 (stock size is ≥ 10 inches) was 36%.

**Figure 30. White Sucker Length Frequency
Alexander Lake - 2000**



Northern Hog Sucker

Twenty one northern hog suckers were captured. Of the 12 measured, they ranged in size from 9.6 – 15.7 inches (Figure 31). PSD15 (stock size is ≥ 10 inches) was 18%.

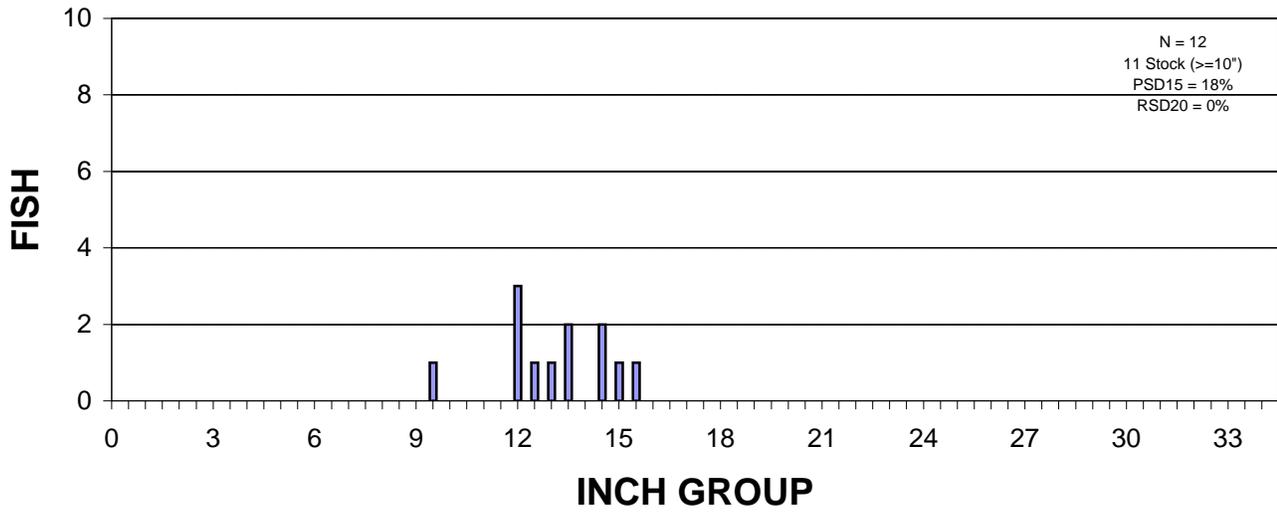
Bowfin

A total of 137 bowfin were surveyed representing 2.2% of the total capture. Thirty-six were measured ranging in size from 8.3 – 29.2 inches (Figure 32). Most of the fish captured were from 24.5 – 29 inches. With a stock size of ≥ 10 inches, PSD15 was 97%, RSD20 was 91%, and RSD25 was 62%.

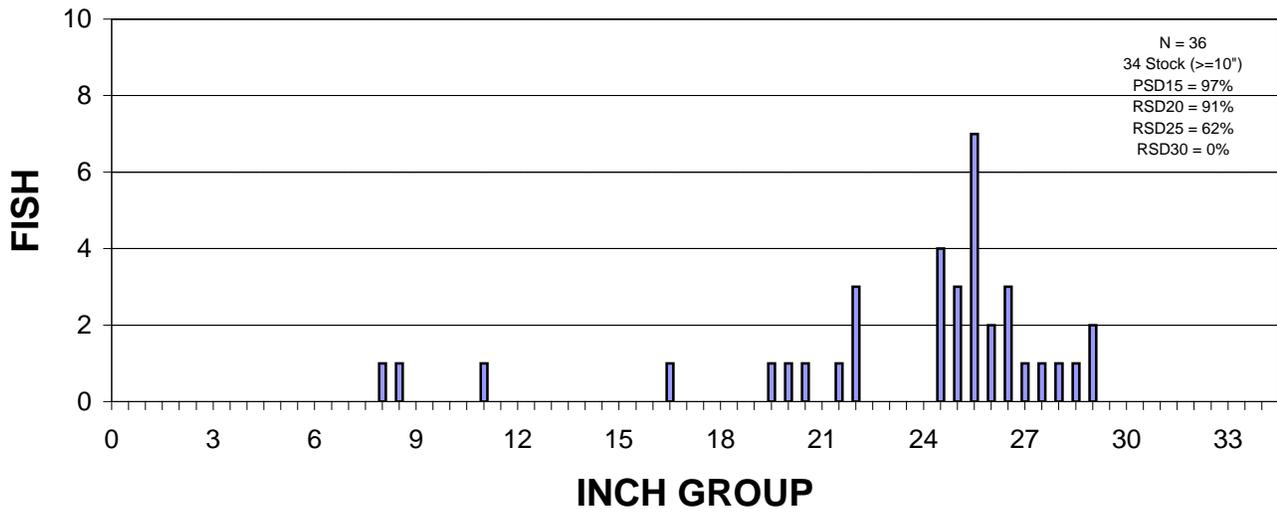
Other Species

The following other species and numbers were captured: golden shiner (63), logperch (12), trout-perch (7), creek chub (5), fantail darter (4), johnny darter (4), common shiner (2), rainbow darter (2), blackside darter (2), burbot (1), hornyhead chub (1), Iowa darter (1), brassy minnow (1), and finescale dace (1). Collectively, these 14 species comprised 1.7% of the total catch with minnows (Cyprinid family) and darters (Percid family) making up the bulk of these fish.

**Figure 31. Northern Hog Sucker Length Frequency
Alexander Lake - 2000**



**Figure 32. Bowfin Length Frequency
Alexander Lake - 2000**



Conclusions and Management Recommendations

Alexander Lake has high-density predator populations of walleye, smallmouth bass, northern pike, and muskellunge and relatively low-density and high-quality panfish populations of bluegill, pumpkinseed, yellow perch, black crappie, rock bass, and yellow and black bullhead. With the exception of muskellunge, all of the predatory gamefish are growing at rates below statewide averages for most of their lives. Conversely, the panfish, with the exception of yellow perch, are growing at rates at or above statewide averages for most of their lives. Maintaining the high predator densities and size structures will help sustain the quality panfish populations. All species are reproducing at acceptable rates and there is no need for stocking. Fisheries management emphasis should center on smallmouth bass, walleye, muskellunge, and panfish.

The smallmouth bass population is a real highlight of the fishery of Alexander Lake. The length frequency histogram reveals an excellent smallmouth bass size structure. Condition factors are at or above ideal for all ages except 7 and 8, which corresponds with the most abundant smallmouth bass in the system (15.5 – 16.4 inches). It appears that intraspecific competition due to the large standing stock of smallmouth bass in this size range contributes to the less than ideal condition factors and below average growth rates. Natural mortality and/or harvest of the bigger fish seems to limit the true trophy potential as we only sampled one fish over 20 inches.

The quality smallmouth bass fishery should be maintained at or above the current level either by maintaining existing regulations or through increased size and reduced daily bag limits. The current year-round open season for smallmouth bass is being looked at for possible change. It stands to reason that the same regulations that protect bass through the spawning season in most northern Wisconsin lakes and rivers should also apply to the Wisconsin River upstream from STH 64. During their spring and early summer movements, smallmouth bass concentrate below dams on the upper Wisconsin River and are very vulnerable to harvest. Just a few knowledgeable anglers could remove most of the quality-size fish in the population in a month or two of harvesting. We should be proactive and take the necessary steps now to protect the existing fishery rather than wait for the quality to go down and then try to bring it back. This excellent fishery should be protected.

The numbers of walleye drop off sharply from 14 – 17 inches, suggesting heavy harvest once they approach or reach the legal size limit of 15 inches. Without the aid of a creel survey we can't be sure, but it appears that this heavy harvest of walleye, is contributing to the lack of more quality-sized fish in the population. Only 18% of the walleye 10 inches and larger are over the legal size of 15 inches. A new walleye regulation went into effect April 1, 2002. Anglers are still able to harvest 5 walleye over 15 inches, but only one may be ≥ 28 inches and all walleye from 20 – 28 inches must be released. It is hoped that this regulation will provide for better quality catch-and-release fishing for walleye in the 20 – 28 inch-range. This regulation was adopted for the entire Wisconsin River system from the Prairie du Sac Dam upstream to the Grandfather Dam.

Our fall electrofishing catch rates of YOY walleye (1.2/mile in 2000, 1.0/mile in 1995, and 3.9/mile in 1994) are low when compared to natural lakes and probably don't reflect actual YOY walleye abundance. Reasons for this may include: the dark color of the water, the quick drop off along most of the shoreline, and possible behavioral differences in YOY walleye between lentic and lotic environments all of which may affect our sampling efficiency in this flowage. The total walleye population is estimated to be 11.5/acre and is completely supported through natural reproduction. The adult walleye PE is 2.4/acre; therefore the juvenile walleye density is about 9/acre. The walleye length frequency histogram also reveals a population with good and consistent reproduction as all sizes from 4 – 18 inches are well represented. The data supports the existence of a strong naturally reproducing population. Therefore, walleye should not be stocked.

A good, naturally reproducing population of muskellunge is present in Alexander Lake. The muskellunge length frequency structure reveals pretty consistent natural reproduction with most sizes from 11 – 44 inches represented. One peak at 19 inches and another at 23 inches indicate possible strong year-classes from 1996 – 1998 or possibly from the private stocking of 260, 8 – 14 inch fingerlings in the fall of 1997. Based on growth rates, these stocked fish should be in the range of 21.5 inches, which is in the valley of these two peaks. Regardless of whether these stocked fish are contributing to the peaks, there is still natural reproduction occurring and in the future no stocking should occur.

Muskellunge growth rates are very good and are above statewide averages for ages 1 to 3 and 6 to 11. We only have condition factor information for ages 2 – 6, and they are all below ideal. The larger fish appeared to be in better body condition and likely had weights closer to ideal. For the most part, condition factors for walleye and northern pike coincide well with their growth rates and this is likely the case too with muskellunge. The population density and good growth rates, especially for the larger fish, (likely due to the excellent sucker and redhorse forage) indicate potential to produce trophy muskellunge in this body of water. The quality muskellunge fishery should be maintained at or above the current level either by maintaining current regulations or by increasing the size limit.

The northern pike size structure and population estimate reveal a good population of small and mid sized fish up to 22 inches, with a few quality and trophy size pike present. Due to the trophy muskellunge potential, regulations to improve numbers of quality-size pike are not recommended. The present northern pike fishery provides for action on 15 – 22 inch fish with the chance to take a trophy up to 40 inches.

Largemouth bass, while present in very low numbers, are not a significant part of the overall fishery probably due to the lack of substantial backwater and bay habitat and aquatic vegetation. Only 14 largemouth bass were captured and the length frequency suggests limited and sporadic natural reproduction. Alexander Lake does not appear to have the right habitat to support a higher number and higher quality largemouth bass population than it currently has. Largemouth bass will likely remain an insignificant part of the Alexander Lake fisheries community.

The gamefish populations of walleye, northern pike, muskellunge, and smallmouth bass can generally be described as naturally reproducing high-density populations with quality size structures and slower than average growth rates. In general, walleye, northern pike, and smallmouth bass growth rates and condition factors are below average for the middle age ranges (2 – 7) and at or above average for age 1 fish and the older individuals in each population. It appears that the large standing stock of predatory gamefish (estimated at about 25 adults per acre for walleye, northern pike, muskellunge, and smallmouth bass combined) may be contributing to the slower than average growth of all but the very smallest and largest individuals of these species. The below average growth rates could be due to density dependent and interspecific competition factors in this predator-rich system with low-density panfish populations and good naturally reproducing populations of predators. Competition for food and space for yearling gamefish must not be limiting, as age 1 growth rates are good. Likewise, once gamefish numbers are thinned out as they reach old age, growth rates and condition factors improve to above average.

The panfish populations of bluegill, pumpkinseed, yellow perch, black crappie, rock bass, and yellow and black bullhead can generally be described as good naturally reproducing populations of low densities with faster than average growth rates. The size structures of these populations are very good.

The relative lack of bluegill in the 5 – 6 inch range and larger than 7.5 inches are likely the result of high harvest, predation, high natural mortality, or a combination of these factors. It appears that the mortality of mid-size bluegill by natural means, harvest, or predation (or a combination) allows for good growth rates in this northern Wisconsin flowage, especially for the very oldest fish.

Mortality of 7 inch and larger pumpkinseed (ages 6 – 8) appears to be high and is likely the result of high harvest, predation, high natural mortality, or a combination of these factors. Intraspecific competition doesn't appear to be limiting pumpkinseed growth or survival as they are growing at or above statewide averages for all of their lives.

Survival of age 1 and 2 yellow perch appears to be low, likely the result of high predation or natural mortality. The drop off in numbers of perch \geq 10 inches is likely due to a combination of harvest, predation, and natural mortality. Age 1 – 3 perch are growing at faster rates than statewide averages probably due to the high natural mortality and predation reducing intraspecific competition.

Lack of juvenile and adult habitat may be limiting black crappie from becoming more abundant in Alexander Lake. Either that or we hit the crappie cycle at its low point, just as it was beginning to rebuild. We caught many YOY crappie indicating a banner year-class. Time will tell if this year-class has enough escape cover to avoid predation and grow into a large cohort of harvestable size fish in 4-5 years. Alexander Lake does not have many backwater bays or sloughs with significant downed trees and brush that crappie prefer. Low survival (heavy predation and/or high natural mortality) of especially the young fish may also be contributing to the low abundance of crappie.

Rock bass are present in low numbers and probably don't contribute much to the fishery. Most of the fish are between 6 and 7.5 inches; too small to attract much attention from anglers. We did not capture a rock bass longer than 9 inches. The yellow and black bullhead populations provide for some quality angling with fish up to 14.2 inches present. The bulk of the yellow bullhead population is between 9 and 14 inches. Mortality through natural causes or high predation may account for the low numbers of yellow bullhead up to about 9 inches.

The non-sportfish community appears to be stable with the likely species present. Redhorse (silver, shorthead, and golden) and suckers (white and northern hog) are present in high numbers and likely contribute to the good growth rates of the larger walleye and northern pike and the trophy potential of muskellunge. Eleven new species were found in Alexander Lake for the first time: blackside darter, bowfin, brassy minnow, burbot, creek chub, fantail darter, finescale dace, hornyhead chub, Iowa darter, largemouth bass, and rainbow darter. Brown bullhead and emerald shiner were found in a 1978 survey but not this one.

Appendix 1. Catch rate (#/net night for fyke netting and #/hour for boom electrofishing) and size structure comparisons for fish surveys completed on Alexander Lake.

Species	Date	Year								
		1979	1979	1981	1984	1989	1994	1995	2000	2000
		April 13 – 28	Sept. 17	Sept. 10	Sept. 4	Aug. 30	Oct. 19	Oct. 4	March 22 – 29	Sept. 26
Gear	Fyke Nets	Boom EF	Boom EF	Boom EF	Boom EF	Boom EF	Boom EF	Fyke Nets	Boom EF	
Walleye	Number	23	26	77	33	10	23	47	47	202
	Catch Rate	0.4	8.7	N/A	33.0	5.0	32.9	39.2	0.7	24.0
	# ≥ 10"	20	2	17	14	8	17	24	45	129
	PSD15	45	0	18	14	63	12	8	31	10
	RSD20	15	0	0	0	25	0	0	13	0
	RSD25	5	0	0	0	0	0	0	0	0
	RSD30	0	0	0	0	0	0	0	0	0
Northern Pike	Number	443	6	1	7	1	3	7	248	37
	Catch Rate	7.4	2.0	N/A	7.0	0.5	4.3	5.8	3.5	4.4
	# ≥ 14"	364	5	1	3	1	2	6	243	35
	PSD21	28	40	100	67	100	0	17	29	23
	RSD28	4	0	100	0	0	0	17	1	0
	RSD34	2	0	0	0	0	0	0	<1	0
RSD44	0	0	0	0	0	0	0	0	0	
Muskellunge	Number	9	0	0	1	0	1	2	3	7
	Catch Rate	0.2	0	0	1.0	0	1.4	1.7	<0.1	0.8
	# ≥ 20"	1	-	-	0	-	1	1	2	6
	PSD30	100	-	-	0	-	100	0	100	17
	RSD34	100	-	-	0	-	100	0	50	0
	RSD38	0	-	-	0	-	0	0	50	0
RSD42	0	-	-	0	-	0	0	0	0	
Smallmouth Bass	Number	6	18	35	2	0	0	2	5	148
	Catch Rate	0.1	6.0	N/A	2.0	0	0	1.7	0.1	17.6
	# ≥ 7"	6	16	20	1	-	-	2	5	145
	PSD11	83	19	50	0	-	-	100	100	82
	RSD14	33	6	20	0	-	-	50	100	50
	RSD17	17	0	5	0	-	-	0	20	21
RSD20	0	0	0	0	-	-	0	0	<1	

		Year								
		1979	1979	1981	1984	1989	1994	1995	2000	2000
Date		April 13 – 28	Sept. 17	Sept. 10	Sept. 4	Aug. 30	Oct. 19	Oct. 4	March 22 – 29	Sept. 26
Species	Gear	Fyke Nets	Boom EF	Boom EF	Boom EF	Boom EF	Boom EF	Boom EF	Fyke Nets	Boom EF
Bluegill	Number	37	25	-	-	3	-	-	56	-
	Catch Rate	0.6	8.3	-	-	1.5	-	-	0.8	-
	# ≥ 3"	37	25	-	-	3	-	-	55	-
	PSD6	73	92	-	-	100	-	-	15	-
	RSD8	22	8	-	-	0	-	-	0	-
	RSD10	0	0	-	-	0	-	-	0	-
	RSD12	0	0	-	-	0	-	-	0	-
Pumpkinseed	Number	46	18	-	1	2	-	-	16	-
	Catch Rate	0.8	6.3	-	1.0	1.0	-	-	0.2	-
	# ≥ 3"	46	18	-	1	2	-	-	16	-
	PSD6	57	78	-	100	50	-	-	6	-
	RSD8	0	0	-	0	0	-	-	0	-
	RSD10	0	0	-	0	0	-	-	0	-
	RSD12	0	0	-	0	0	-	-	0	-
Yellow Perch	Number	59	22	-	6	3	-	-	82 <small>(81 measured)</small>	-
	Catch Rate	1.0	7.3	-	6.0	1.5	-	-	1.2	-
	# ≥ 5"	54	18	-	6	3	-	-	81	-
	PSD8	50	28	-	67	67	-	-	59	-
	RSD10	15	6	-	17	0	-	-	33	-
	RSD12	0	0	-	0	0	-	-	6	-
	RSD15	0	0	-	0	0	-	-	0	-
Black Crappie	Number	28	13	-	7	-	-	-	17	-
	Catch Rate	0.5	4.3	-	7.0	-	-	-	0.2	-
	# ≥ 5"	26	12	-	0	-	-	-	17	-
	PSD8	81	25	-	0	-	-	-	100	-
	RSD10	73	0	-	0	-	-	-	88	-
	RSD12	35	0	-	0	-	-	-	59	-
	RSD15	0	0	-	0	-	-	-	0	-

		Year								
		1979	1979	1981	1984	1989	1994	1995	2000	2000
Date		April 13 – 28	Sept. 17	Sept. 10	Sept. 4	Aug. 30	Oct. 19	Oct. 4	March 22 – 29	Sept. 26
Species	Gear	Fyke Nets	Boom EF	Boom EF	Boom EF	Boom EF	Boom EF	Boom EF	Fyke Nets	Boom EF
Black Bullhead	Number	715 (150 measured)	-	-	-	5	-	-	16 (7 measured)	-
	Catch Rate	11.9	-	-	-	2.5	-	-	0.2	-
	# ≥ 6"	138	-	-	-	5	-	-	5	-
	PSD9	88	-	-	-	80	-	-	60	-
	RSD12	4	-	-	-	0	-	-	0	-
	RSD15	0	-	-	-	0	-	-	0	-
	RSD18	0	-	-	-	0	-	-	0	-
Rock Bass	Number	30	16	-	-	-	-	-	11	-
	Catch Rate	0.5	5.3	-	-	-	-	-	0.2	-
	# ≥ 4"	29	16	-	-	-	-	-	11	-
	PSD7	17	19	-	-	-	-	-	18	-
	RSD9	0	0	-	-	-	-	-	0	-
	RSD11	0	0	-	-	-	-	-	0	-
	RSD13	0	0	-	-	-	-	-	0	-
Shorthead Redhorse	Number	60 (49 measured)	-	-	-	-	-	-	14 (5 measured)	-
	Catch Rate	1.0	-	-	-	-	-	-	0.2	-
	# ≥ 10"	49	-	-	-	-	-	-	5	-
	PSD15	88	-	-	-	-	-	-	60	-
	RSD20	2	-	-	-	-	-	-	0	-
	RSD25	0	-	-	-	-	-	-	0	-
	RSD30	0	-	-	-	-	-	-	0	-
White Sucker	Number	185 (123 measured)	-	-	-	-	-	-	50 (2 measured)	-
	Catch Rate	3.1	-	-	-	-	-	-	0.7	-
	# ≥ 10"	105	-	-	-	-	-	-	1	-
	PSD15	52	-	-	-	-	-	-	100	-
	RSD20	1	-	-	-	-	-	-	0	-
	RSD25	0	-	-	-	-	-	-	0	-
	RSD30	0	-	-	-	-	-	-	0	-

		Year								
		1979	1979	1981	1984	1989	1994	1995	2000	2000
Date		April 13 – 28	Sept. 17	Sept. 10	Sept. 4	Aug. 30	Oct. 19	Oct. 4	March 22 – 29	Sept. 26
Species	Gear	Fyke Nets	Boom EF	Boom EF	Boom EF	Boom EF	Boom EF	Boom EF	Fyke Nets	Boom EF
Northern Hog Sucker	Number	17	-	-	-	-	-	-	9	-
	Catch Rate	0.3	-	-	-	-	-	-	0.1	-
	# ≥ 10"	17	-	-	-	-	-	-	-	-
	PSD15	12	-	-	-	-	-	-	-	-
	RSD20	0	-	-	-	-	-	-	-	-
	RSD25	0	-	-	-	-	-	-	-	-
	RSD30	0	-	-	-	-	-	-	-	-
Bowfin	Number	5	-	-	-	-	-	-	83 <small>(6 measured)</small>	-
	Catch Rate	0.1	-	-	-	-	-	-	1.2	-
	# ≥ 10"	5	-	-	-	-	-	-	6	-
	PSD15	100	-	-	-	-	-	-	100	-
	RSD20	80	-	-	-	-	-	-	100	-
	RSD25	20	-	-	-	-	-	-	100	-
	RSD30	0	-	-	-	-	-	-	0	-

For comparison purposes, the 2000 fyke netting data only includes the ice-out survey.

For comparison purposes, the 2000 boom electrofishing data only includes the fall survey.

Appendix 3. Ice-out fyke netting daily catch.

	Water: Alexander Lake		Gear: Fyke Nets																	
	Date: March 22-29, 2000		Effort (Net Nights): 70																	
Species	March 22		March 23		March 24		March 25		March 26		March 27		March 28		March 29		Total	Total	Totals	Catch
	Measured	Counted	Measured	Counted	Measured	Counted	Measured	Counted	Measured	Counted	Measured	Counted	Measured	Counted	Measured	Counted	Measured	Counted		Rate
Walleye	1		7		12		5		8		10		1		3		47	0	47	0.7
Northern Pike	5		3		27		45		62		43		28		35		248	0	248	3.5
Muskellunge							2		1								3	0	3	0.0
Largemouth Bass							1								1		2	0	2	0.0
Smallmouth Bass							1		3				1				5	0	5	0.1
Yellow Perch			1	1	8		13		7		25		12		16		81	1	82	1.2
Bluegill			1				5		21		13		8		8		56	0	56	0.8
Black Crappie					1		6		1		8				1		17	0	17	0.2
Pumkinseed					1		7		3		2		2		1		16	0	16	0.2
Rock Bass					2				5		2		1		1		11	0	11	0.2
Yellow Bullhead					1		9			11		8		5		3	10	27	37	0.5
Black Bullhead						1	7		2		2		2		2		7	9	16	0.2
Shorthead Redhorse	5			2		6		1									5	9	14	0.2
Silver Redhorse	10			47		76		92									10	215	225	3.2
Golden Redhorse				1													0	1	1	0.0
Redhorse Spp.										99		67		35		9	0	210	210	3.0
White Sucker	2			4		12		9		2		9		9		3	2	48	50	0.7
Northern Hog Sucker				5				2		2		2					0	9	9	0.1
Bowfin	3		3			7		18		16		13		12		11	6	77	83	1.2
Trout-Perch																	0	0	0	0.0
Golden Shiner																	0	0	0	0.0
Common Shiner					1												1	0	1	0.0
Burbot																	0	0	0	0.0
Creek Chub																	0	0	0	0.0
Hornyhead Chub																	0	0	0	0.0
Rainbow Darter																	0	0	0	0.0
Fantail Darter																	0	0	0	0.0
Blackside Darter																	0	0	0	0.0
Johnny Darter																	0	0	0	0.0
Iowa Darter																	0	0	0	0.0
Logperch																	0	0	0	0.0
Brassy Minnow																	0	0	0	0.0
Finescale Dace																	0	0	0	0.0
Totals	26	0	14	60	53	102	101	122	111	132	103	99	53	63	66	28	527	606	1133	16.2

Appendix 7. Stream electrofishing catch.

	Water:	Alexander Lake			Gear:	Stream EF
	Date:	September 6, 2000		Effort (# of 90' Sites):	10	
	September 6					
			Total	Total		
Species	Measured	Counted	Measured	Counted	Totals	No./Site
Walleye	1		1	0	1	0.1
Northern Pike			0	0	0	0.0
Muskellunge			0	0	0	0.0
Largemouth Bass			0	0	0	0.0
Smallmouth Bass	7		7	0	7	0.7
Yellow Perch	2		2	0	2	0.2
Bluegill		71	0	71	71	7.1
Black Crappie	4	1	4	1	5	0.5
Pumkinseed		14	0	14	14	1.4
Rock Bass	1	2	1	2	3	0.3
Yellow Bullhead	1		1	0	1	0.1
Black Bullhead	8		8	0	8	0.8
Shorthead Redhorse	1		1	0	1	0.1
Silver Redhorse			0	0	0	0.0
Golden Redhorse		2	0	2	2	0.2
Redhorse Spp.			0	0	0	0.0
White Sucker			0	0	0	0.0
Northern Hog Sucker			0	0	0	0.0
Bowfin	1		1	0	1	0.1
Trout-Perch			0	0	0	0.0
Golden Shiner	10	25	10	25	35	3.5
Common Shiner			0	0	0	0.0
Burbot			0	0	0	0.0
Creek Chub	2		2	0	2	0.2
Hornyhead Chub	1		1	0	1	0.1
Rainbow Darter	2		2	0	2	0.2
Fantail Darter	4		4	0	4	0.4
Blackside Darter	2		2	0	2	0.2
Johnny Darter			0	0	0	0.0
Iowa Darter			0	0	0	0.0
Logperch	8	1	8	1	9	0.9
Brassy Minnow			0	0	0	0.0
Finescale Dace	1		1	0	1	0.1
Totals	56	116	56	116	172	17.2

