

CORRESPONDENCE/MEMORANDUM

DATE: November 16, 2005
TO: Mike Vogelsang, Woodruff
FROM: Bob Young, Woodruff
SUBJECT: Emily Lake, Florence County

Attached is the 2002 Comprehensive Fisheries Survey Report for Emily Lake in Florence County.

APPROVALS: _____
Mike Vogelsang, Headwaters Fishery Supervisor

Steve AveLallemant, NOR Fisheries Coordinator

NOTED: _____
Andy Fayram, FH/3

**Wisconsin Department of Natural Resources
Comprehensive Fisheries Survey Report**

Emily Lake, Florence County

2002



Lake and Location:

Emily Lake, Florence County, T39N-R19E-Sec 7 (WBIC 0651600)

Physical/Chemical Attributes:

Morphometry: 197 acres, maximum depth 43 feet

Lake Type: Drainage (one inlet, one outlet to Pine River Flowage)

Basic Water Chemistry: Medium hard - alkalinity 73 mg/l, conductance 145 umhos

Littoral substrate: 60% sand, 29% muck, 10% gravel

Aquatic vegetation: Common to abundant

Shoreline character: 90% upland, 10% wetland

Level of shoreline development: Moderate (avg. 1 structure < every 373 feet of shoreline)

Winterkill: Occasional partial kills reported

Other features: Clear water

Purpose of Survey: Assess status of gamefish, panfish and non-game species. Develop management recommendations.

Dates of Field Work: April 20, 2002 to October 2, 2002

Survey and Data Personnel: Matt Andre, Steve AveLallemant, Dave Brum, Ben Heimbach, Rick Jirsa, Marty Kiepke, Dave Sloan, Keith Worrall, Bob Young

Report Author: Bob Young, Fisheries Biologist, Woodruff

Final Report Date: August 11, 2004

I. SUMMARY

Emily Lake was surveyed in 2002 with a variety of sampling gear to assess the status of all major fish communities. Sampling began with early spring fyke netting and electroshocking, targeted at adult gamefish abundance, and concluded with fall electroshocking for gamefish young-of-year recruitment. Included between those periods was late spring electroshocking for adult bass, late spring fyke netting targeted at panfish, and summer mini-fyke netting for panfish and non-game species.

Three gamefish, 6 panfish and 4 non-game species were captured during the survey period. Walleye was the most commonly encountered gamefish, followed by largemouth bass (LMB) and northern pike (NP). Stocking supplements the walleye population, as there is evidence of some natural reproduction in past, non-stocked years. The estimated adult walleye density of 2.2 per acre is above average for stocked lakes, and average size of walleyes is good. Walleye growth is above average for younger fish and below average for older ages. There is a moderate density, naturally reproducing, fast growing population of LMB. Northern pike are also moderate in abundance, naturally reproducing, and growing at slightly above average rates. NP are capable of reaching quality size but the majority of fish captured were not large.

Among the panfish, bluegill were relatively much more abundant than black crappie, pumpkinseed, rock bass, warmouth, or yellow perch. Bluegill likely provide the vast majority of the panfish angling opportunity. Sampling indicated a decline in bluegill size structure and angling quality, as measured by lower modal size, and smaller proportion of quality size when compared to the last

similar survey in 1986. Growth rates for bluegill were somewhat slower than the average for comparable north central Wisconsin lakes, while other panfish were about average or above average. The relatively poor size structure and growth rates of bluegill are likely related to inherent lake characteristics, lower than preferred predator populations, and possibly high angling pressure on larger sizes.

Management recommendations are as follows:

Largemouth bass - No active management of largemouth bass is recommended at this time. More restrictive bass harvest regulations in the future could result in a reduction of bluegill numbers and corresponding improvement in sizes and growth.

Northern pike - No active management of northern pike is recommended at this time.

Walleye - Continue stocking walleye fingerlings every other year to maintain the population.

Bluegill - No direct, active management of bluegill is recommended at this time. Changing future bass regulations could positively impact bluegills in Emily Lake.

Other panfish - No active management of other panfish in Emily Lake is recommended at this time.

II. PAST MANAGEMENT AND SURVEYS

Known Stocking History

Bluegill – 400 adults, 1939

LM Bass – fingerlings, 1942, 1947, 1950, 1973

Muskellunge – fry&fingerlings, 1942, 1944-46, 1948, 1951-2

Walleye – fry&fingerlings, 1937-41, 1949-50, 9 of 19 years 1953 to 1971, 1987, 1989, 1990-92, 1994, 1998, 2000-01

Past Surveys and Findings

August 1953, seine – crappies, bluegills, perch abundant; pumpkinseed, N pike common; LM bass, muskellunge present

June 1956, seine – panfish abundant; LMB, N pike, walleye present

October 1967, electroshocking, N pike common; walleye, panfish present.

April/August 1968, various nets – bluegills, perch abundant; crappies, pumpkinseed, N pike, walleye, white sucker common; rock bass, green sunfish present.

August 1971, electroshocking – walleye, bluegill, pumpkinseed, crappie, perch common; N pike, rockbass present.

April/September 1986, fyke nets, electroshocking – walleye 2.9/acre, no walleye reproduction, N pike 0.9/acre, LM Bass present, bluegill and perch abundant

**Emily Lake – Florence Co.
2002 Sample Summary**

III. METHODS

<u>Dates</u>	<u>Gear Type</u>	<u>Sampling Effort</u>	<u>Primary Objective</u>	<u>Other Objectives</u>
April 20 – 27, 2002	Fyke Nets	5 – 4 Foot , 35 Lifts	Gamefish Population Estimates (Marking)	Collect Gamefish; Lengths, Mark and Aging Data. Gamefish and Nongamefish Catch per Unit Effort.
April 28, 2002	Electrofishing	All Shoreline 2.5 Mi. 2 Index Stations	Adult Walleye Recapture (1 st Run)	Collect Gamefish; Mark, Lengths and and Aging Data. Nongamefish CPE
May 21, 2002	Electrofishing	All Shoreline 2.5 Mi. 2 Index Stations	Bass PE Marking Run (2 nd Run)	Collect Gamefish: Mark, lengths and Aging Data. Nongamefish CPE
May 30, 2002	Electrofishing	All Shoreline 2.5 Mi.	Bass PE Marking Run (3 rd Run)	Collect Gamefish Aging Data, Mark And Lengths
June 5, 2002	Electrofishing	All Shoreline 2.5 Mi.	Bass Recapture Run (4 th Run)	Collect Gamefish Lengths and Mark
June 11 – 14, 2002	Fyke Nets	4 – 4 Foot, 16 Lifts	Panfish Survey, CPE	Collect Panfish Aging Data and Lengths.
August 8-9, 2002	Fyke Nets	5 - 3 Foot, 10 Lifts	Gamefish YOY and Nongamefish CPE	Identify species, Lengths, and CPE
October 02, 2002	Electrofishing	All Shoreline 2.5 Mi.	Gamefish Recruitment (5 th Run)	CPE All Gamefish



Fyke net



Running a fyke net

Collecting data, Emily Lake



Electroshocking boat

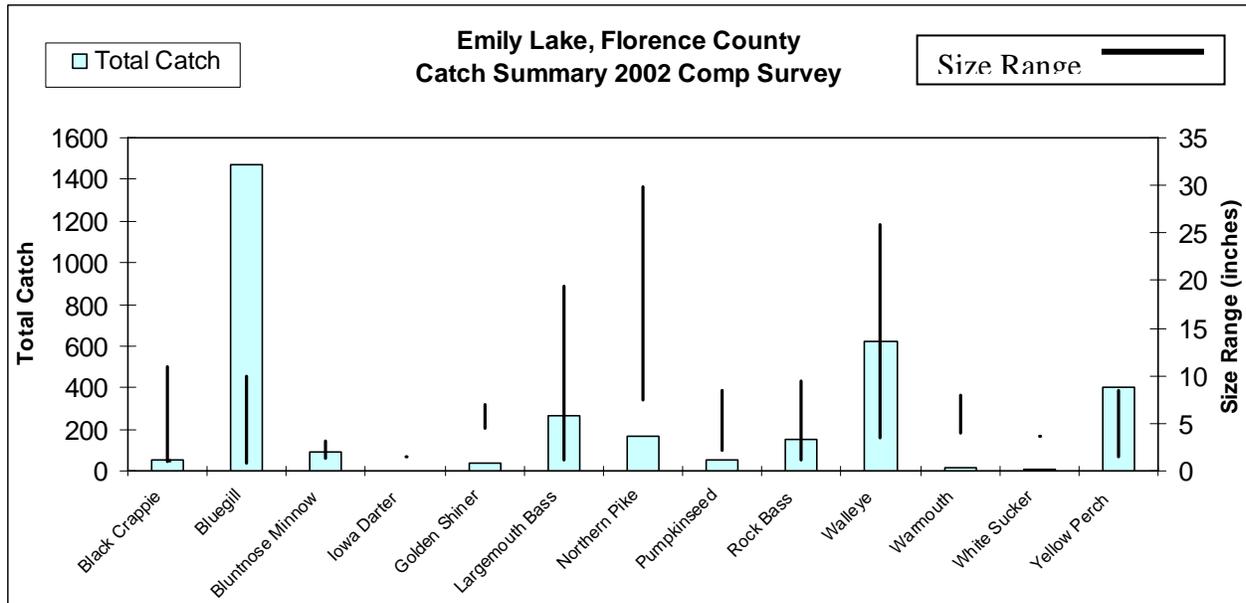


IV. SURVEY RESULTS

Results are summarized in the following figures. Corresponding data tables are in the Appendix.

CATCH SUMMARY

Figure 1.



GAMEFISH RELATIVE ABUNDANCE

Figure 2.

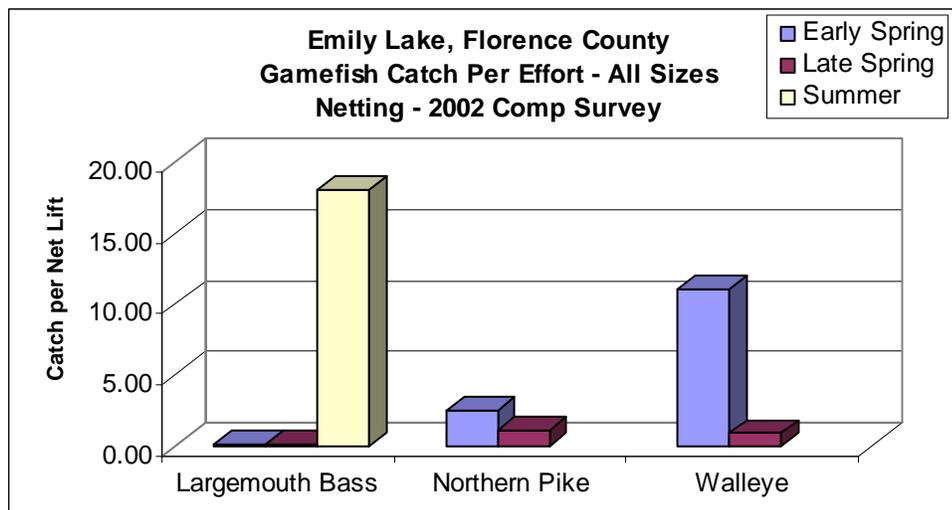
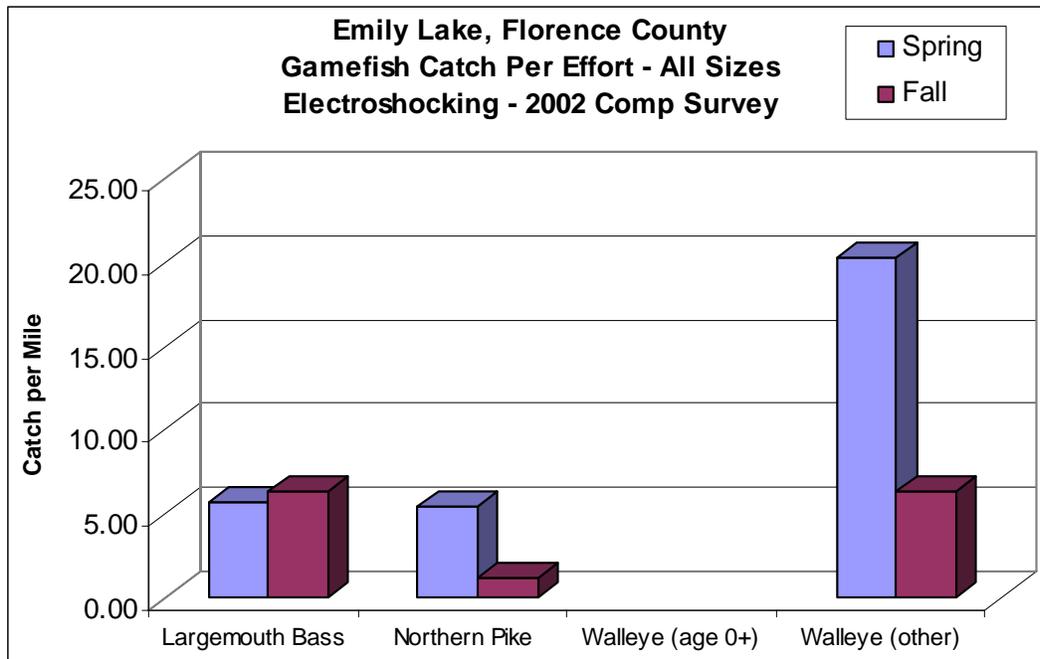


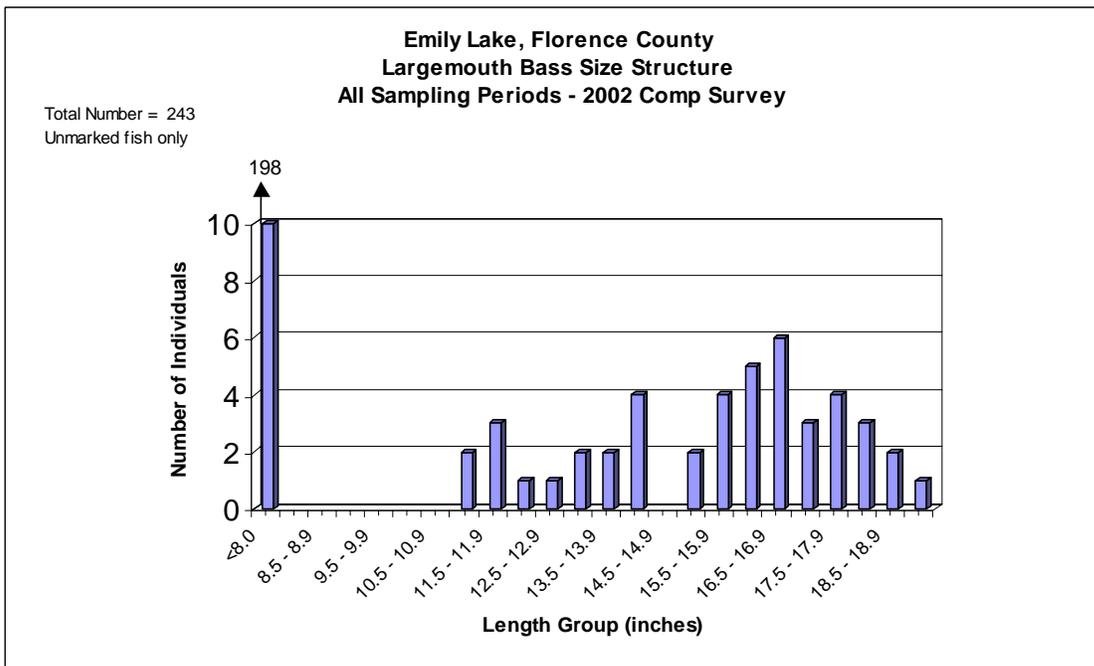
Figure 3.



LARGEMOUTH BASS

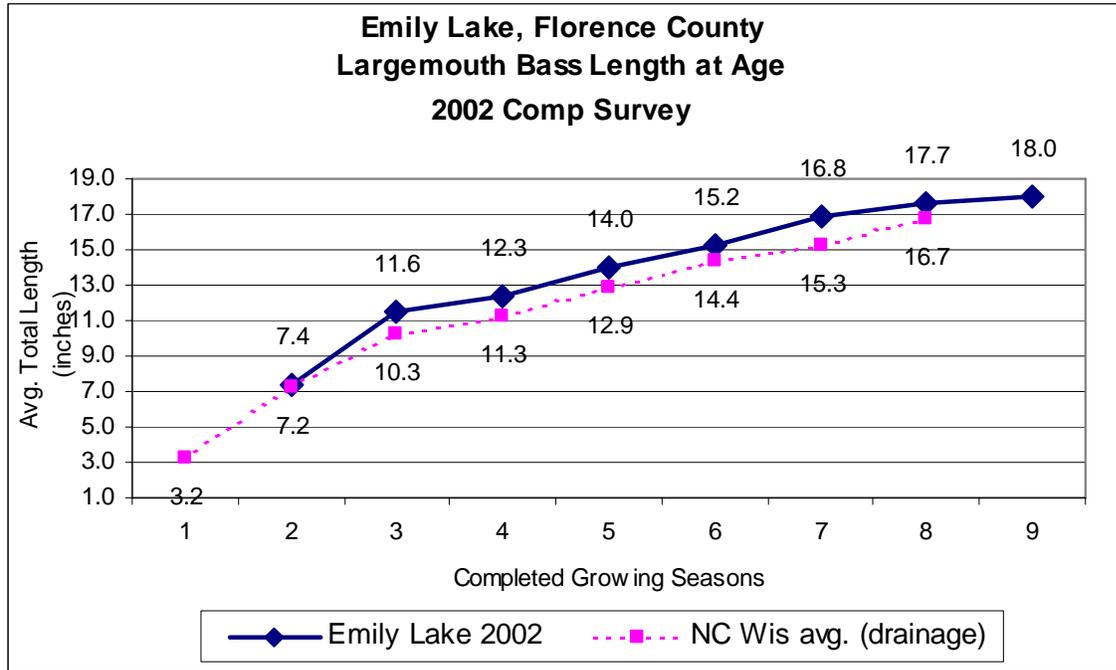
Size Structure

Figure 4.



Growth

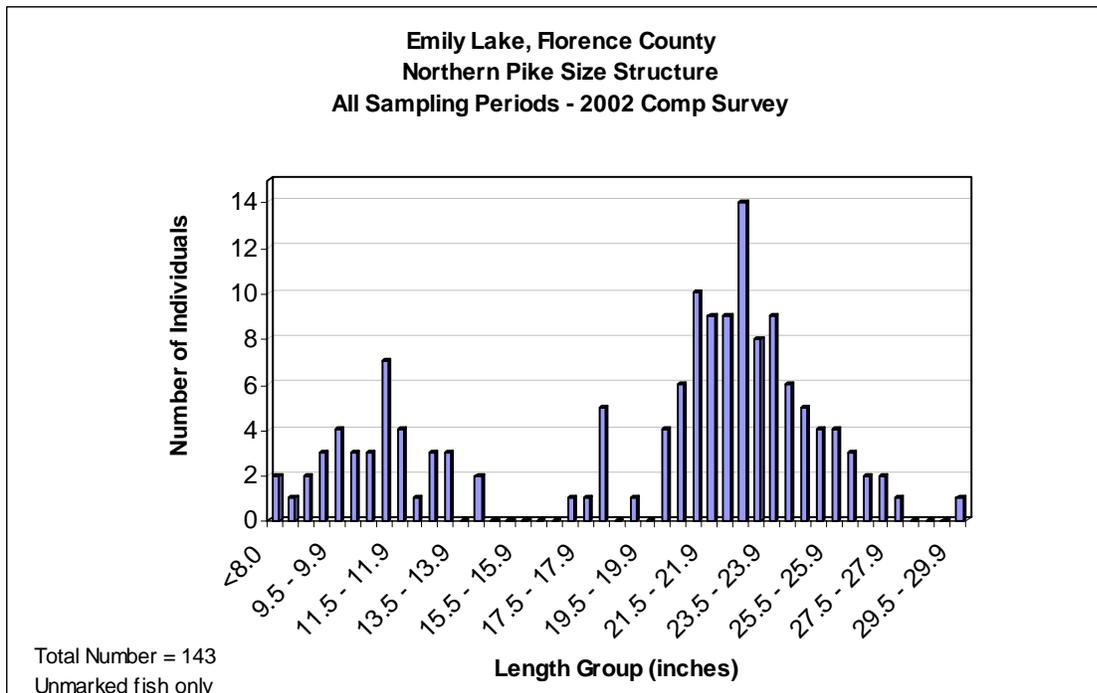
Figure 5.



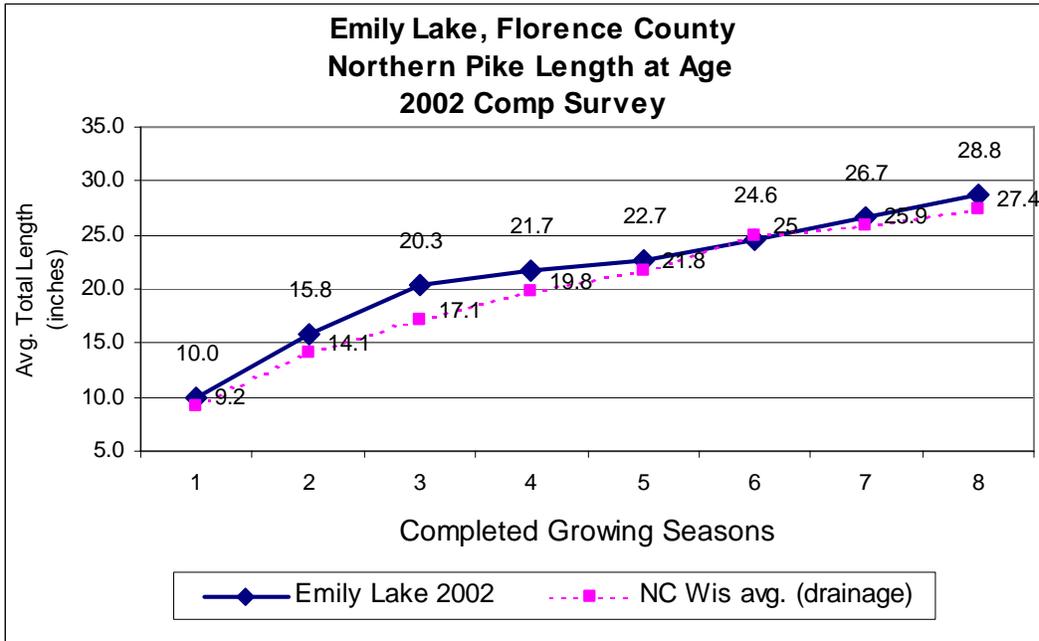
NORTHERN PIKE

Size Structure

Figure 6.



Growth
Figure 7.

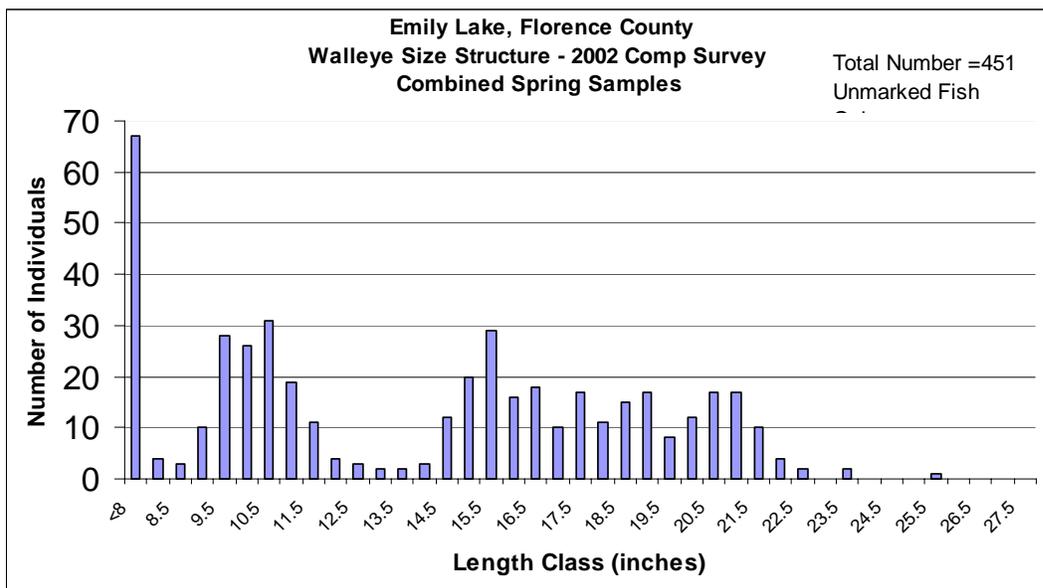


Abundance

A Chapman-modified Schnabel method used to calculate abundance estimated the adult northern pike population to be 320 fish, or 1.7 per acre. Based on 95% confidence intervals, the estimate could range from 174 to 679 fish. The coefficient of variation for the estimate was 31.5%.

WALLEYE

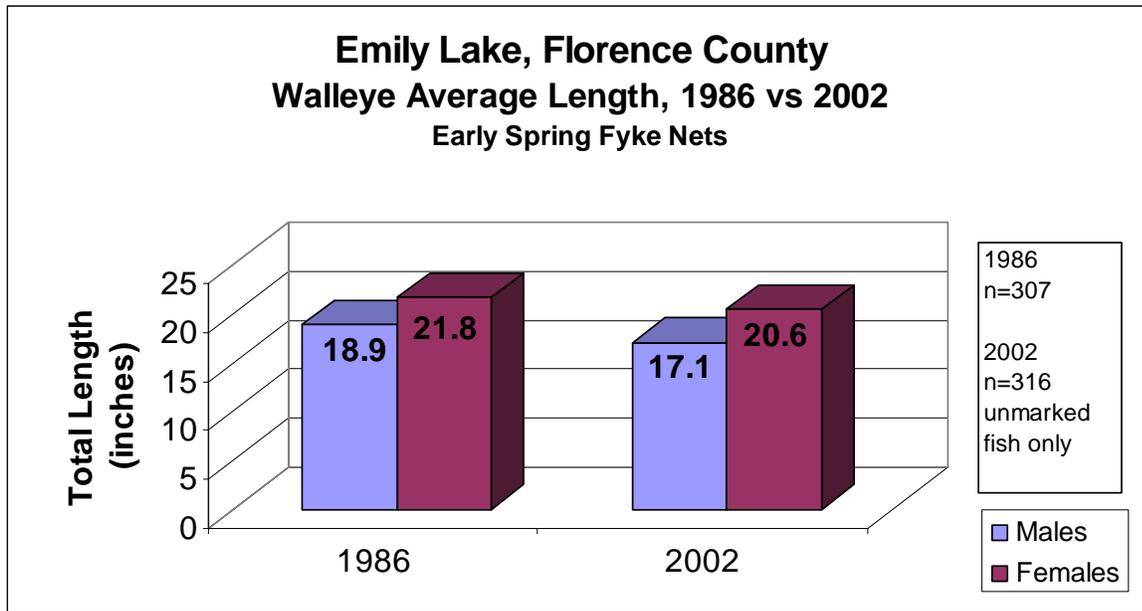
Size Structure
Figure 8.



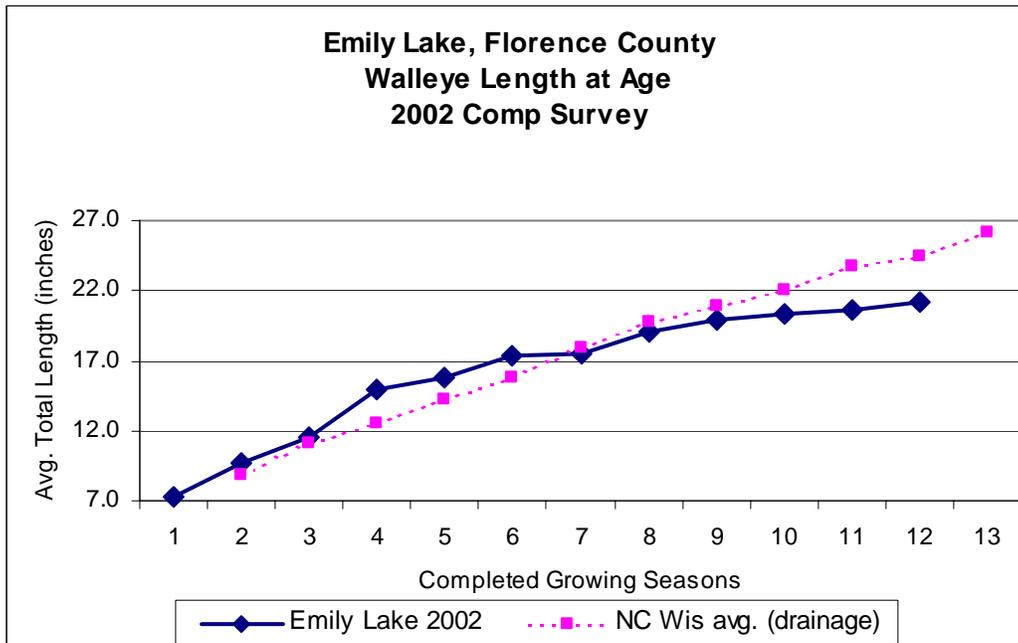


Emily Lake walleye

Figure 9.

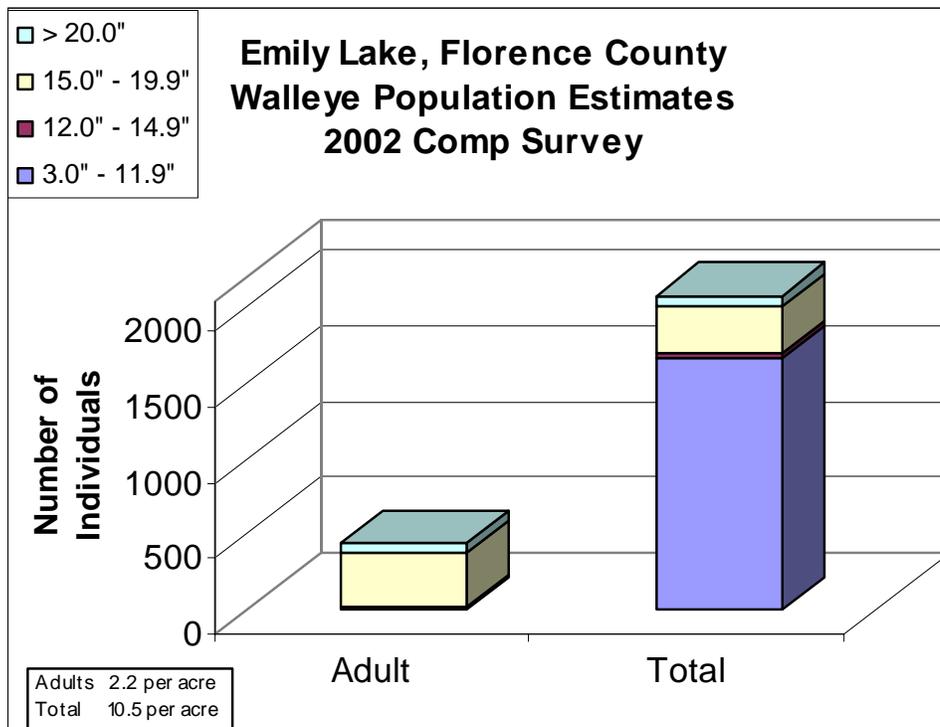


Growth
Figure 10.



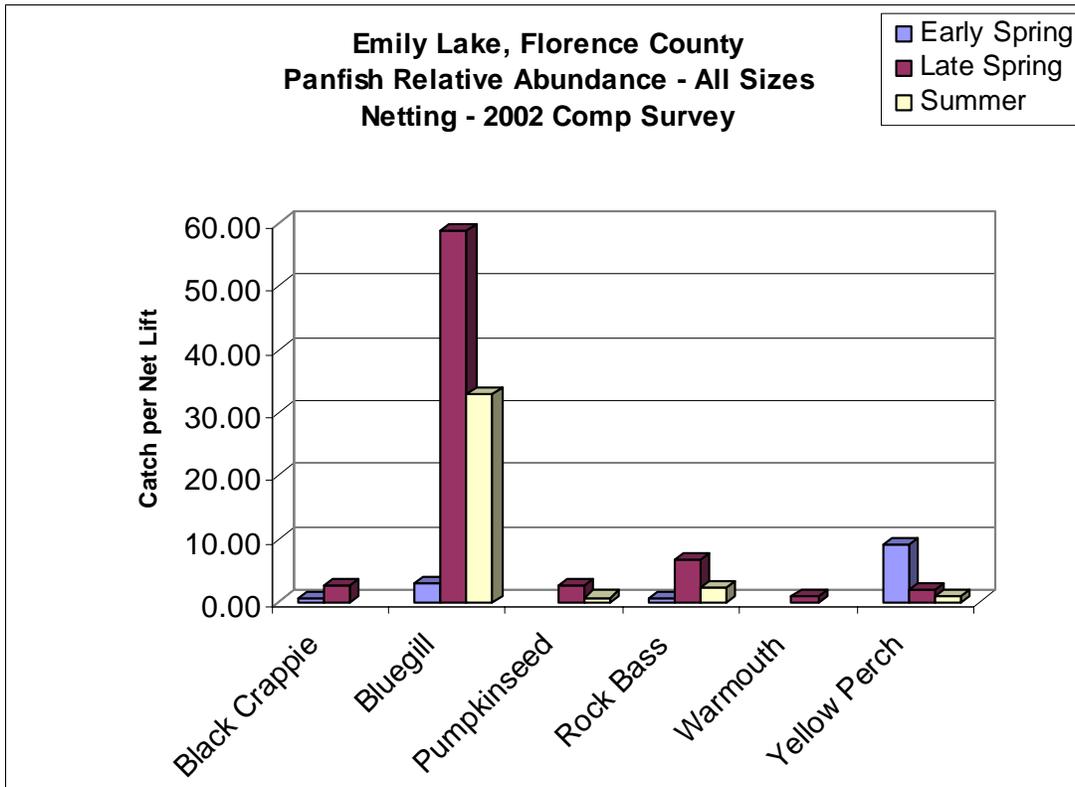
Abundance

Figure 11.



PANFISH RELATIVE ABUNDANCE

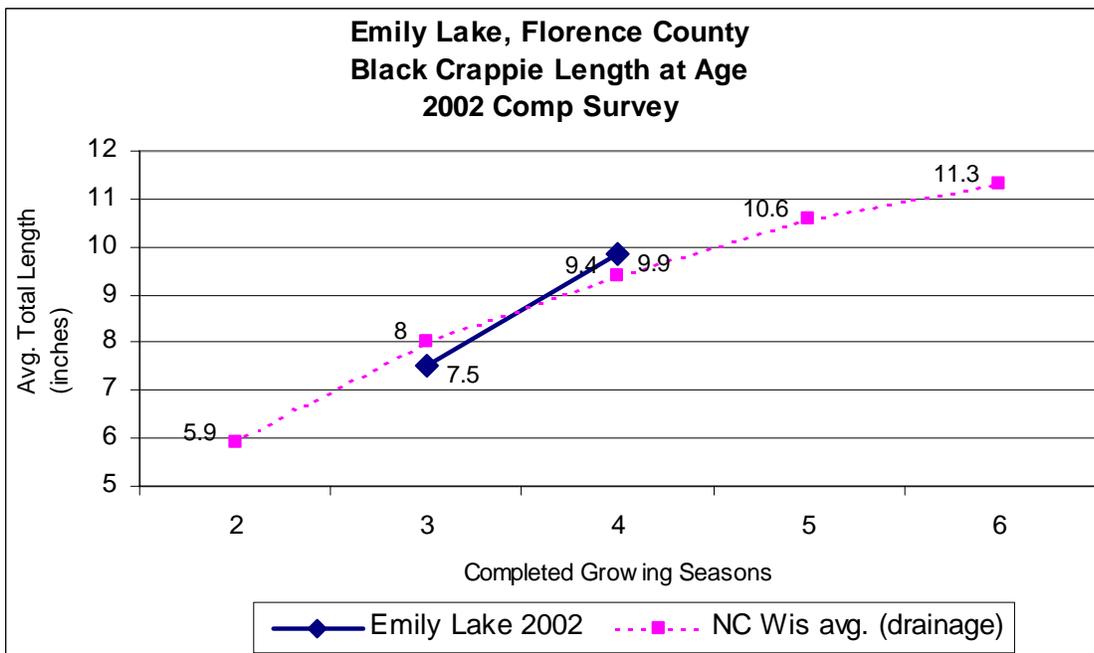
Figure 12.



BLACK CRAPPIE

Growth

Figure 13.



BLUEGILL

Size Structure

Figure 14.

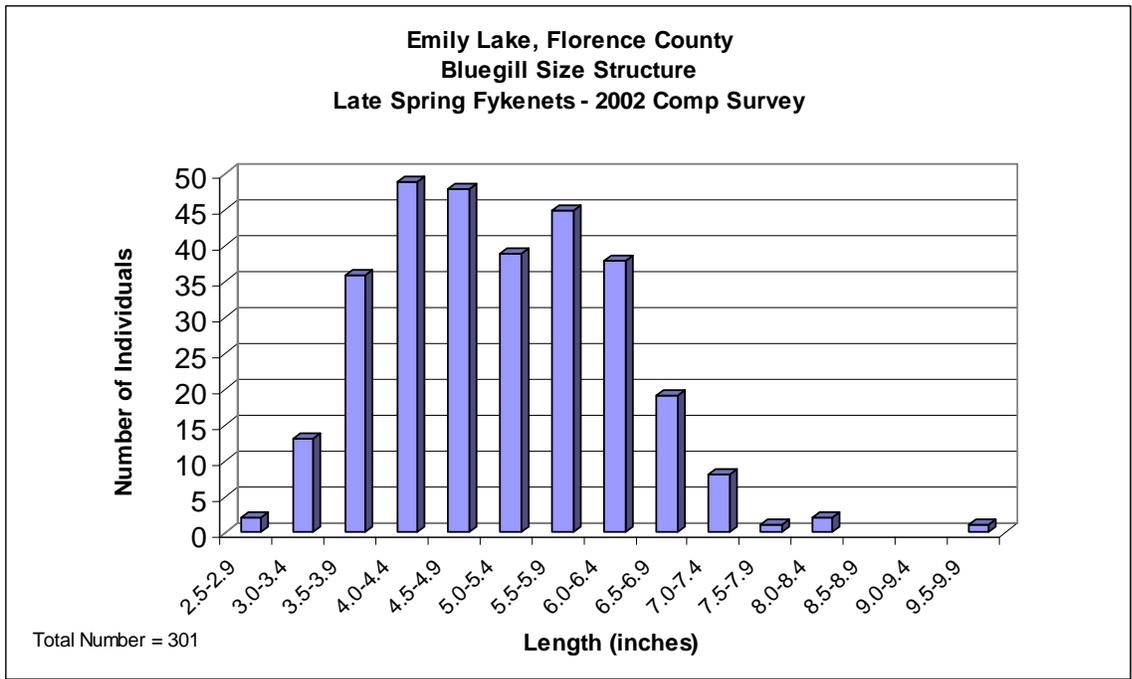
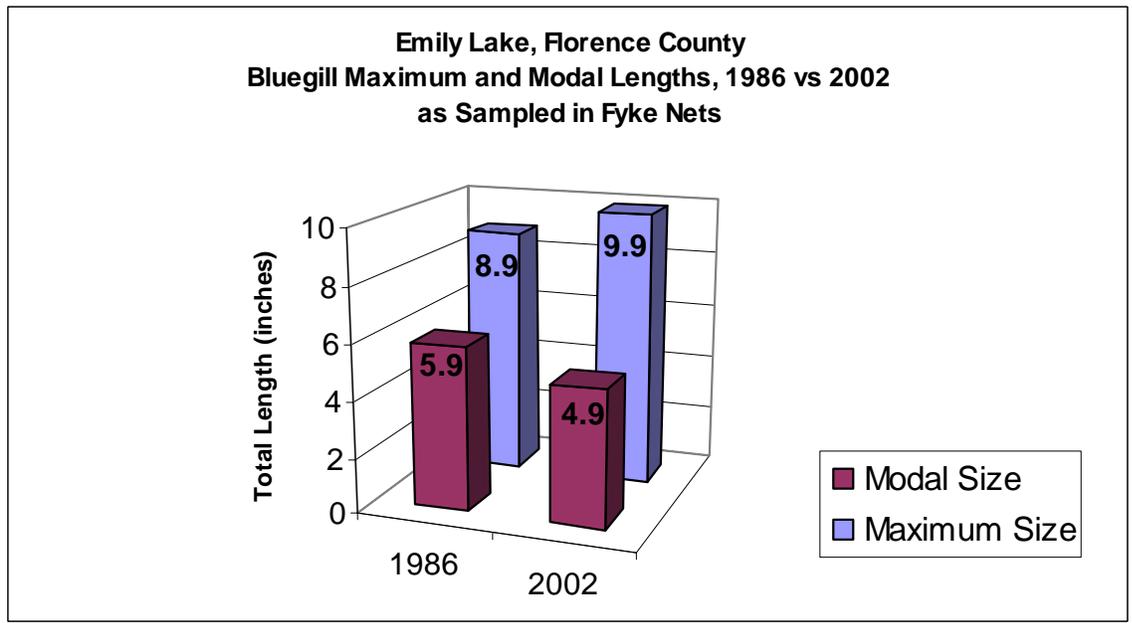
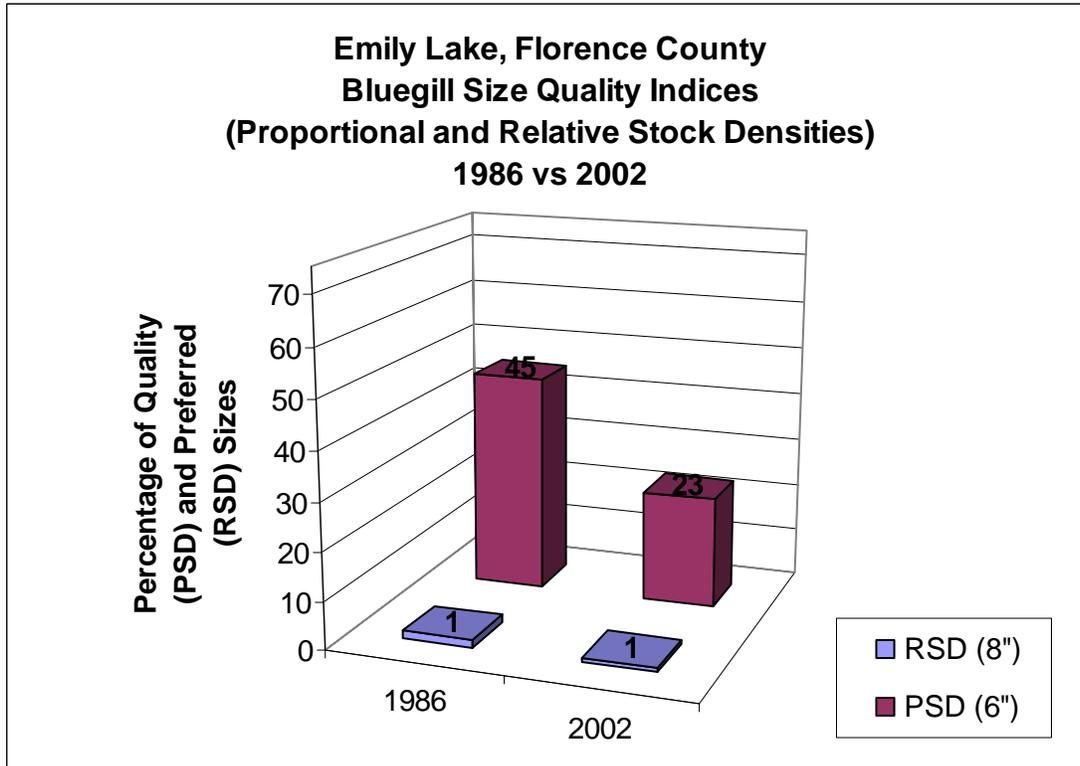


Figure 15.



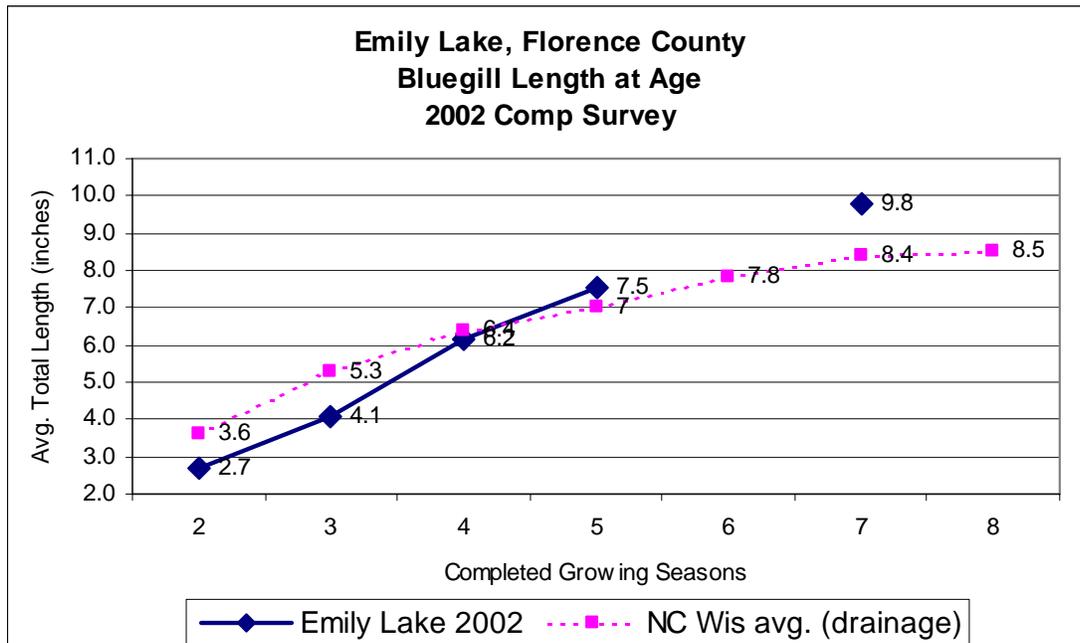
Bluegill size quality was expressed with the indices Proportional Stock Density (PSD) and Relative Stock Density (RSD) (Figure 14). PSD is the proportion of “minimum quality” size fish (6 inches or greater TL) while RSD is the proportion of “preferred” size fish (8 inches or greater). PSD (6) and RSD (8) were based on their proportion relative to a “stock” size of 3 inches total length.

Figure 16.



Growth

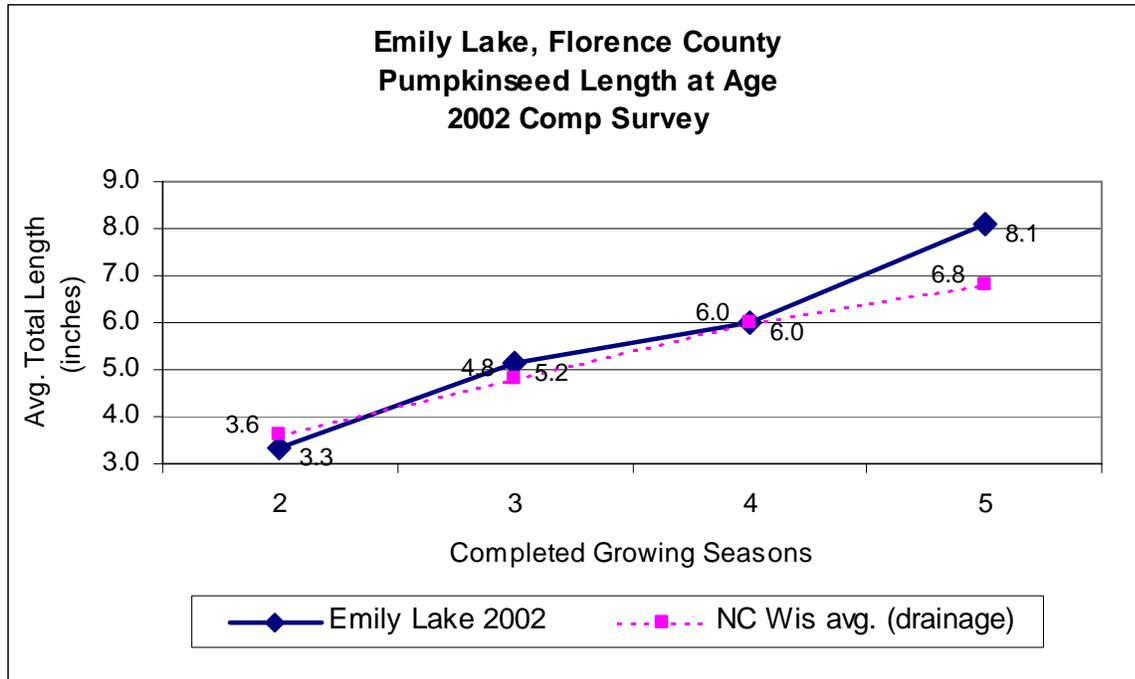
Figure 17.



PUMPKINSEED

Growth

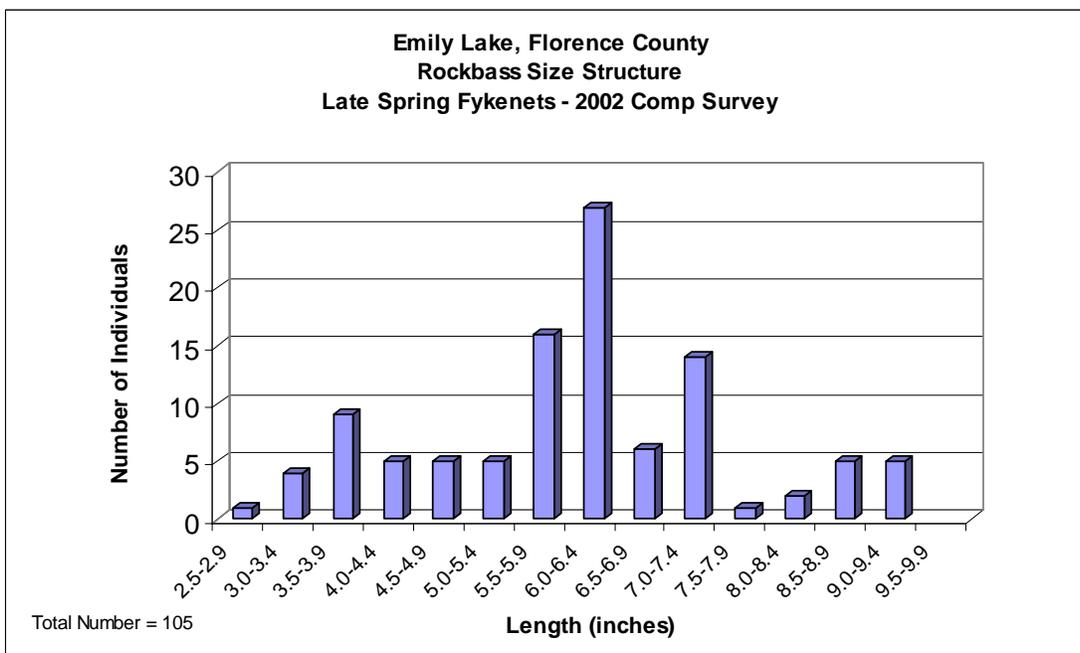
Figure 18.



ROCKBASS

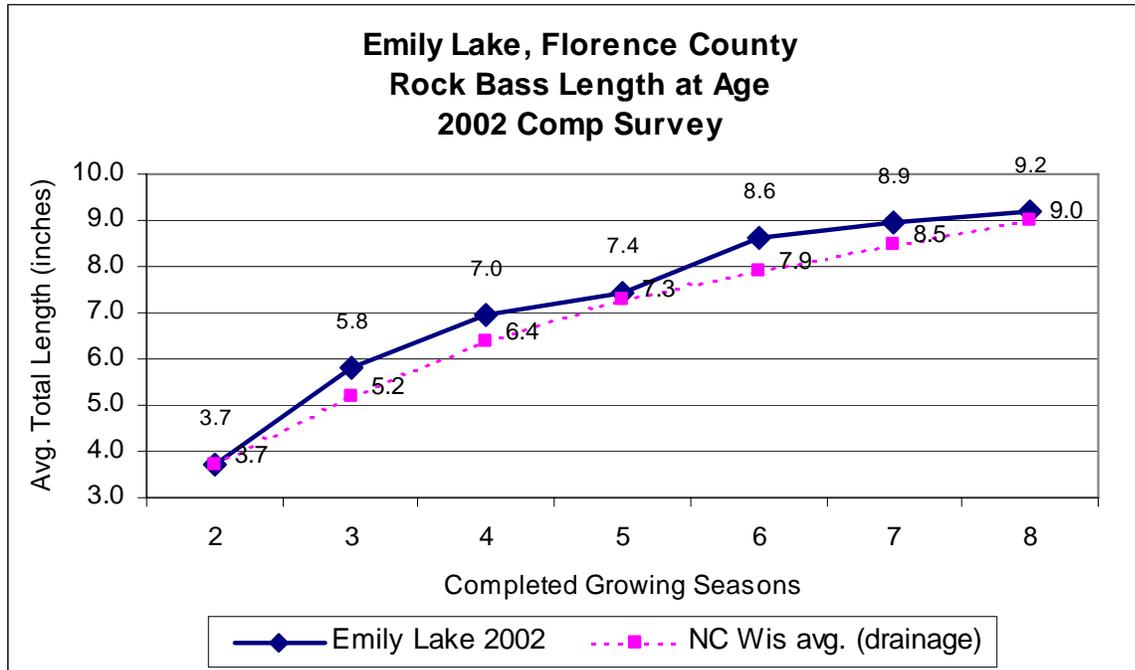
Size Structure

Figure 19.



Growth

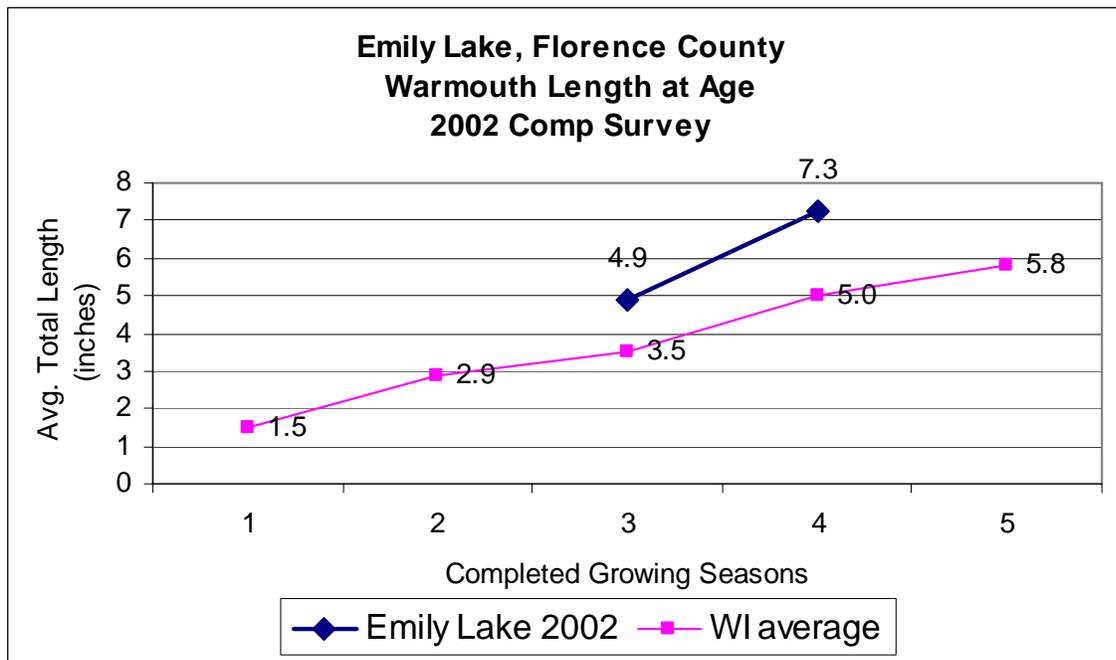
Figure 20.



WARMOUTH

Growth

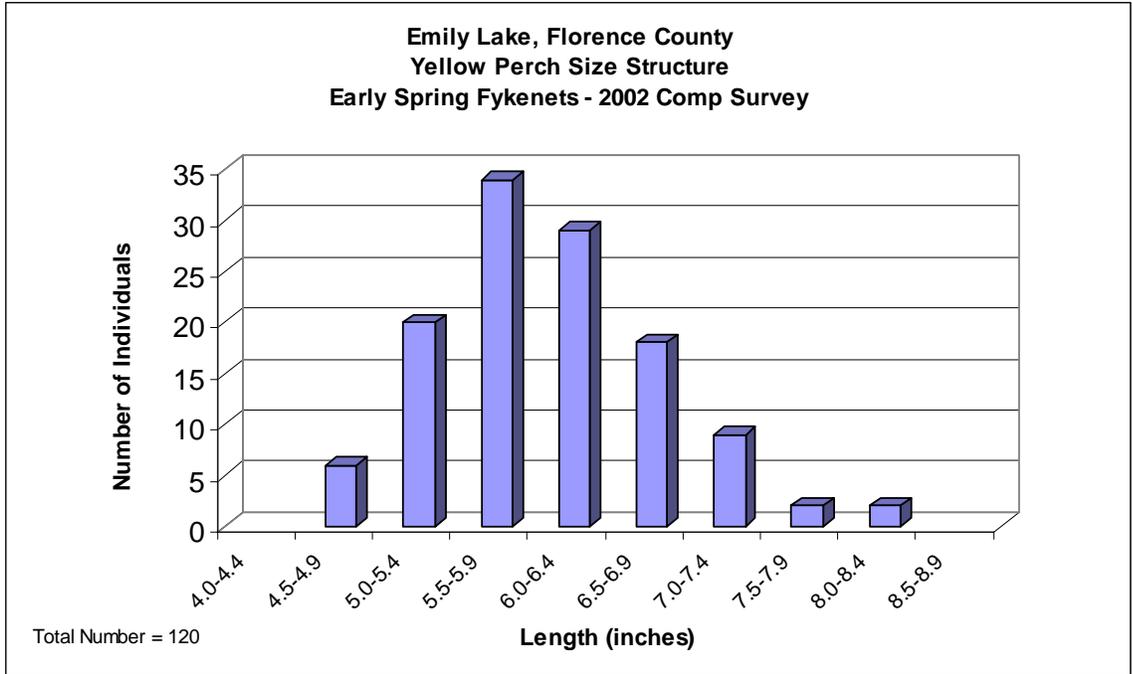
Figure 21.



YELLOW PERCH

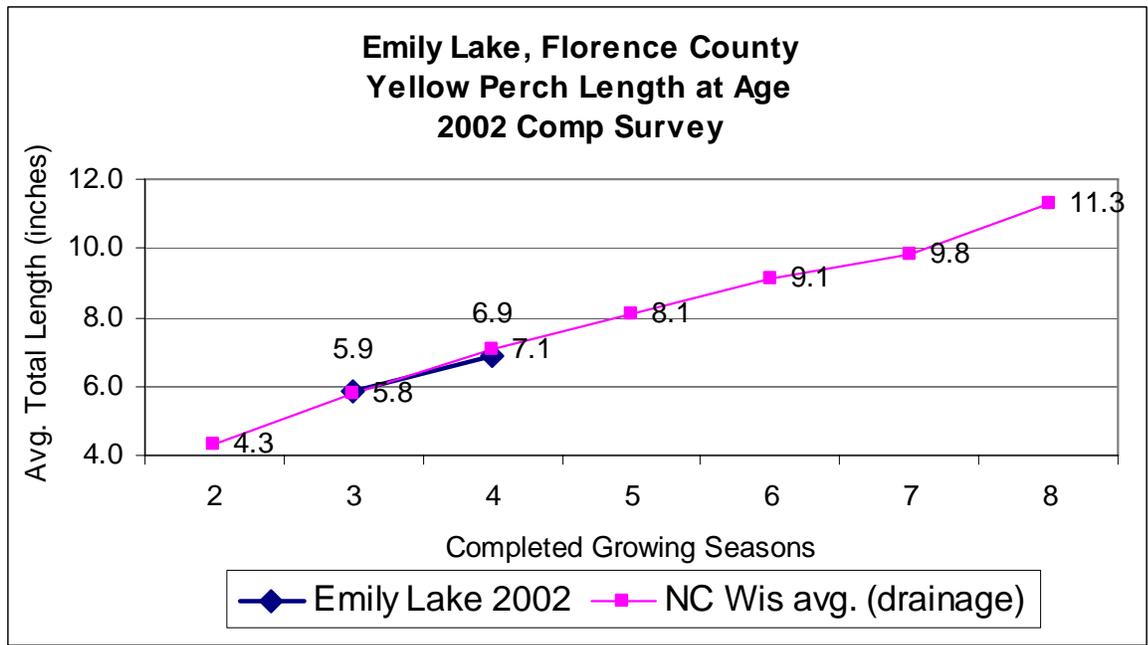
Size Structure

Figure 22.



Growth

Figure 23.



V. DISCUSSION AND RECOMMENDATIONS

GAMEFISH

Largemouth Bass (LMB) – Natural reproduction of LMB was evident in Emily Lake, with good size representation of smaller fish (Figure 4). Relatively few adult largemouth bass were captured during the survey, but of the adults captured the majority were from 15 to 19 inches total length (TL) (Table 4).

A Chapman-modified Schnabel method used to calculate abundance estimated the adult largemouth bass population to be 294 fish, or a modest 1.5 per acre. However, due to the small number of recaptures and resulting wide 95% confidence intervals, the actual number could range from 116 to 1173 fish. The coefficient of variation for the estimate was 49.8%, outside of the normally acceptable range. The few number of recaptures suggests the population may be larger than the estimate of 1.5 per acre.

Growth as inferred from scale aging appears slightly faster than the average for comparable north central Wisconsin lakes (Figure 5).

Recommendation: No active management of largemouth bass in Emily Lake is recommended at this time. The lake association may want to develop local support for a more restrictive bass harvest regulation in the future. A one bag, 18" minimum size limit on bass would encourage a greater bass population size and could result in better predatory control of small bluegill. A reduction of bluegill numbers and corresponding increase in bluegill growth rates would be desirable for Emily Lake panfish anglers.

Northern Pike – A moderate sized pike population (est. 1.7/acre) supported by natural reproduction is present in Emily Lake. Natural reproduction and/or recruitment may have been poor in the recent past, based on the apparent gap in the size structure from about 15" to about 18" total length (Figure 6).

Larger adult sizes are well represented, with the modal size being 22.5-22.9 inches TL. Pike are capable of reaching at least a quality size of nearly 30 inches in Emily Lake.

Growth as inferred from scale aging appears somewhat faster than the average for comparable north central Wisconsin lakes (Figure 7).

Recommendation: No active management of northern pike in Emily Lake is recommended at this time.

Walleye – A decent population of walleye supplemented by stocking exists in Emily Lake. The adult population estimate of 2.2 per acre is above the northern Wisconsin average, for stocked lakes, of 1.5 per acre. No young-of-year (YOY) walleye were captured in the fall electroshocking run, indicating no apparent natural reproduction in 2002, a non-stocked year. There is evidence of walleye year classes from some past years in which DNR did not stock. The 1986 survey found a similar adult walleye population with no DNR stocking for the previous 15 years. Also, of the walleyes collected in this 2002 survey, those aged at 3, 5-7, and 9 years (1999, 1995-1997, and 1993 year classes, respectively) were presumably from non-DNR stocked years. The 1999 year class is poorly represented in the population, while the other non-stocked year classes are quite well represented.

Good numbers of age 1+ walleyes, presumably from the 2001 stocking, were captured during the current survey, indicating good survival. Adult sizes were well represented, with a majority of adult walleyes over 15 inches TL (Figure 8). The average length of walleyes captured in early spring fyke nets is quite good and comparable to the last similar survey conducted in 1986 (Figure 9). It appears the 15-inch minimum size limit is appropriate for walleyes in Emily Lake. Growth as inferred from scale aging appears somewhat faster than the average for walleyes up to age 7, and slower than the average for walleyes above age 7 when compared to similar north central Wisconsin lakes (Figure 10).

Recommendation: Walleyes should continue to be stocked in Emily Lake every other year at a rate of 50 small fingerlings per acre.

PANFISH

Bluegill – Bluegill are by far the dominant panfish in Emily Lake, based on relative abundance (Figure 12).

Bluegill size structure appears to be marginal, with sizes up to 6.4 inches total length (TL) well represented, very few larger than 7.0 inches TL, but a maximum size recorded of almost 10 inches TL (Figure 14). Modal size (the size range with the most individuals) appears to have decreased when compared to the most recent similar survey (1986), while maximum size appears to be greater (Figure 15). The bluegill size quality index PSD6 also appears to have declined when compared to 1986 (Figure 16).

Bluegill growth as inferred from scale aging appears generally slower than the average up to 7 years old, and above average for ages greater than 7, when compared to similar north central Wisconsin lakes (Figure 17).

The current bluegill population may be somewhat out of balance in Emily Lake, in light of the relatively poor size structure and below-average growth rates for smaller fish. This overabundance of smaller fish could be partially due to the shallow nature of the lake basin and resulting abundant aquatic vegetation, which provides an excess of habitat and hiding cover for bluegills. Contributing factors could be high harvest rates of larger sized bluegills, and relatively low densities of bluegill predators like bass and northern pike.

Encouraging a higher density of bluegill predators, especially largemouth bass, could eventually improve bluegill size structure by thinning out smaller sizes and increasing growth rates.

Recommendation: No direct, active management of bluegill in Emily Lake is recommended at this time. See related recommendations for largemouth bass above.

Yellow Perch – Yellow perch was the second most abundant panfish captured, but were relatively far fewer in abundance than bluegill. Size structure was relatively poor, with a modal size of 5.5 to 5.9 inches TL, and a maximum size captured of 8.4 inches TL.

Growth as inferred from scale aging appears similar to the average for comparable north central Wisconsin lakes (Figure 23).

Recommendation: No active management of yellow perch in Emily Lake is recommended at this time.

Other Panfish - Black crappie, pumpkinseed, rockbass and warmouth were all relatively very low in abundance compared to bluegill (Figure 12). It is interesting to note a continuing population of warmouth in Emily Lake. Warmouth are found in very few northern Wisconsin waters.

Recommendation: No active management of other panfish in Emily Lake is recommended at this time.

GENERAL LAKE CONDITION and HABITAT

Emily Lake appears to have less than adequate amounts of near-shore large woody debris (LWD). LWD is primarily in the form of trees and branches that fall naturally into the water, and provides critical near-shore spawning habitat and cover for a variety of fish species. Submerged aquatic plants are abundant in Emily Lake due to its shallow nature and extensive littoral zone.

The lake association may want to encourage property owners to leave future deadfalls in the lake to provide more LWD.



LWD beneath boomshocker electrodes

The recent discovery of Eurasian water milfoil (EWM), a non-native aquatic plant, in nearby Elwood Lake calls for caution by local residents. While it is too early to know what the impact will be in Elwood Lake, it could also be spread from Elwood to other Florence County waters, including Emily Lake. EWM has had adverse impacts on fish populations and recreation in other Wisconsin lakes. The lake association may want to pursue educational activities to help prevent the spread of EWM throughout the area.

PUBLIC ACCESS

The one public access located at the county park on the east side of the lake is very adequate for the amount of public use. No significant erosion or other problems were evident at the landing.

APPENDIX

Appendix Table numbering corresponds with Figures in the SURVEY RESULTS section.

Table 1. Emily Lake, Florence County 2002 Comprehensive Fisheries Survey Catch Summary

Fish Species		Catch (and Size Range in Inches) by Sampling Period																Total Catch	
		Early Spring Netting			Spring Electrofishing			Late Spring Netting			Summer Netting			Fall Electrofishing					
Common Name	Scientific Name	Catch	MinSize	MaxSize	Catch	MinSize	MaxSize	Catch	MinSize	MaxSize	Catch	MinSize	MaxSize	Catch	MinSize	MaxSize	Catch	MinSize	
Black Crappie	<i>Pomoxis nigromaculatus</i>	14	ND	ND				41	7.0	10.9							55	7.0	
Bluegill	<i>Lepomis macrochirus</i>	98	ND	ND	101	3.1	7.3	940	2.5	9.9	330	0.9	4.3				1469	0.9	
Bluntnose Minnow	<i>Pimephales notatus</i>				1	2.9	2.9				93	1.4	3.1				94	1.4	
Iowa Darter	<i>Etheostoma exile</i>				1	ND	ND				1	1.5	1.5				2	1.5	
Golden Shiner	<i>Notemigonus crysoleucas</i>				5	5.0	6.5	31	4.5	6.9							36	4.5	
Largemouth Bass	<i>Micropterus salmoides</i>	7	ND	ND	57	6.5	19.4	3	7.0	7.9	180	1.2	3.4	16	4.5	10.0	263	1.2	
Northern Pike	<i>Esox lucius</i>	90	9.5	29.9	54	9.5	26.9	18	7.5	21.9				3	9.0	14.4	165	7.5	
Pumpkinseed	<i>Lepomis gibbosus</i>							43	2.5	8.4	7	2.2	3.2				50	2.2	
Rock Bass	<i>Ambloplites rupestris</i>	19	ND	ND	3	3.2	8.6	105	2.5	9.4	23	1.1	3.0				150	1.1	
Walleye	<i>Stizostedion vitreum vitreum</i>	385	3.5	25.9	203	6.0	22.4	15	7.5	22.4				16	10.0	12.9	619	3.5	
Warmouth	<i>Lepomis gulosus</i>							12	4.0	7.9							12	4.0	
White Sucker	<i>Catostomus commersoni</i>	7	ND	ND	1	3.7	3.7										8	3.7	
Yellow Perch	<i>Perca flavescens</i>	315	4.0	8.4	51	2.2	8.2	30	3.5	7.9	9	1.5	2.1				405	1.5	

ND = No Data

	Early Spring	Late Spring	Summer
Largemouth Bass	0.20	0.19	18.00
Northern Pike	2.57	1.13	
Walleye	11.00	0.94	

	Spring	Fall
Largemouth Bass	22.80	6.40
Northern Pike	21.60	1.20
Walleye (age 0+)		
Walleye (other)	81.20	6.40

Table 4. LMB Emily Lake 2002 Length Frequencies								
unmarked fish only								
INCH								
GROUP	4/20-27/2002	04/28/2002	05/21/2002	05/30/2002	06/05/2002	6/11-14/200	8/6-7/2002	Totals
<8.0			1	8	6	3	180	198
8.0 - 8.4								
8.5 - 8.9								
9.0 - 9.4								
9.5 - 9.9								
10.0 - 10.4								
10.5 - 10.9								
11.0 - 11.4				2				2
11.5 - 11.9				3				3
12.0 - 12.4				1				1
12.5 - 12.9				1				1
13.0 - 13.4	1				1			2
13.5 - 13.9				2				2
14.0 - 14.4			1	2	1			4
14.5 - 14.9								
15.0 - 15.4				2				2
15.5 - 15.9				3	1			4
16.0 - 16.4	2			1	2			5
16.5 - 16.9	2		1	1	2			6
17.0 - 17.4				2	1			3
17.5 - 17.9	1		1		2			4
18.0 - 18.4			1	2				3
18.5 - 18.9			1	1				2
19.0 - 19.4				1				1
19.5 - 19.9								
20.0 - 20.4								
20.5 - 20.9								
21.0 - 21.4								
21.5 - 21.9								
22.0 - 22.4								
22.5 - 22.9								
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25.0 - 25.4								
25.5 - 25.9								
26.0 - 26.4								
26.5 - 26.9								
27.0 - 27.4								
27.5 - 27.9								
28.0 - 28.4								
28.5 - 28.9								
29.0 - 29.4								
29.5 - 29.5								
30.0+								
TOTALS	6	0	6	32	16	3	180	243

Table 5. Largemouth Bass length at age (inches)

	Emily Lake 2002	NC Wis avg. (drainage)
age	survey avg length	length
1		3.2
2	7.4	7.2
3	11.6	10.3
4	12.3	11.3
5	14.0	12.9
6	15.2	14.4
7	16.8	15.3
8	17.7	16.7
9	18.0	

Table 6. NP Emily Lake2002 Length Frequency									
unmarked fish only									
INCH									
GROUP	4/21-26/2002	04/28/2002	05/21/2002	05/30/2002	06/05/2002	6/11-14/2002	8/6-7/2002	10/02/2002	totals
<8.0							2		2
8.0 - 8.4							1		1
8.5 - 8.9							2		2
9.0 - 9.4	1						1	1	3
9.5 - 9.9	2			1			1		4
10.0 - 10.4	2				1				3
10.5 - 10.9	2						1		3
11.0 - 11.4	3						4		7
11.5 - 11.9	1			1			1	1	4
12.0 - 12.4							1		1
12.5 - 12.9				1	2				3
13.0 - 13.4				1			2		3
13.5 - 13.9									0
14.0 - 14.4						1		1	2
14.5 - 14.9									0
15.0 - 15.4									0
15.5 - 15.9									0
16.0 - 16.4									0
16.5 - 16.9									0
17.0 - 17.4						1			1
17.5 - 17.9	1								1
18.0 - 18.4	2			1	2				5
18.5 - 18.9									0
19.0 - 19.4	1								1
19.5 - 19.9									0
20.0 - 20.4	2	1					1		4
20.5 - 20.9	2				3	1			6
21.0 - 21.4	6	1	2		1				10
21.5 - 21.9	5		1	2			1		9
22.0 - 22.4	5	1			2	1			9
22.5 - 22.9	10	2				2			14
23.0 - 23.4	4		2	2					8
23.5 - 23.9	6	1	1			1			9
24.0 - 24.4	6								6
24.5 - 24.9	2	3							5
25.0 - 25.4	4								4
25.5 - 25.9	4								4
26.0 - 26.4	3								3
26.5 - 26.9	2								2
27.0 - 27.4	2								2
27.5 - 27.9	1								1
28.0 - 28.4									0
28.5 - 28.9									0
29.0 - 29.4									0
29.5 - 29.9	1								1
30.0 - 30.4									0
30.5 - 30.9									0
31.0 - 31.4									0
31.5 - 31.9									0
32.0 - 32.4									0
32.5 - 32.9									0
33.0 - 33.4									0
33.5 - 33.9									0
34.0 - 34.4									0
34.5 - 34.9									0
35.0 - 35.4									0
35.5 - 35.9									0
36.0 - 36.4									0
36.5 - 36.9									0
37.0 - 37.4									0
37.5 - 37.9									0
38.0-38.4									0
TOTALS	80	9	6	15	12	18	0	3	143

	Emily Lake 2002	NC Wis avg. (drainage)
age	survey avg length	length
1	10.0	9.2
2	15.8	14.1
3	20.3	17.1
4	21.7	19.8
5	22.7	21.8
6	24.6	25
7	26.7	25.9
8	28.8	27.4

Table 8. Walleye Length Frequencies Emily Lake, Florence County 2002 Comprehensive Survey

Fyke Net and Electrofishing, Spring 2002 Unmarked Fish Only

April 20-27 fykes					April 28electro					May21elec		May 30 ele		June 5 ele		GRAND	
Length (in.)	male WE	female WE	unk. WE	TOTALS	Length (in.)	male WE	female WE	unk. WE	TOTALS	unk. WE	unk. WE	unk. WE	TOTAL				
<	8.0		14	14	<8				0	10	30	13	67				
8.0	8.4	0	3	3	8				0			1	4				
8.5	8.9	0	0	0	8.5				0		3		3				
9.0	9.4	0	5	5	9				0	1	2	2	10				
9.5	9.9	0	12	12	9.5			1	1	1	6	8	28				
10.0	10.4	0	13	13	10				0	1	8	4	26				
10.5	10.9	0	23	23	10.5			1	1		6	1	31				
11.0	11.4	0	14	14	11				0		3	2	19				
11.5	11.9	0	4	4	11.5				0		4	3	11				
12.0	12.4	0	4	4	12				0				4				
12.5	12.9	0	3	3	12.5				0				3				
13.0	13.4	0	2	2	13				0				2				
13.5	13.9	1	0	1	13.5				0				2				
14.0	14.4	1	0	2	14				0				3				
14.5	14.9	9	0	10	14.5	1			1		1		12				
15.0	15.4	13	0	3	15	4			4				20				
15.5	15.9	20	0	7	27	15.5	1		1	1			29				
16.0	16.4	10	1	3	16	1			1			1	16				
16.5	16.9	12	2	3	17	16.5			0		1		18				
17.0	17.4	4	2	2	8	17			1	1			10				
17.5	17.9	9	4	2	15	17.5	1		1	2			17				
18.0	18.4	5	3	2	10	18	1		1				11				
18.5	18.9	5	5	0	10	18.5	2		1	3	1	1	15				
19.0	19.4	7	7	1	15	19	1		1			1	17				
19.5	19.9	5	3	0	8	19.5			0				8				
20.0	20.4	3	8	0	11	20			0		1		12				
20.5	20.9	3	14	0	17	20.5			0				17				
21.0	21.4	1	16	0	17	21			0				17				
21.5	21.9	1	9	0	10	21.5			0				10				
22.0	22.4		4	0	4	22			0				4				
22.5	22.9		2	0	2	22.5			0				2				
23.0	23.4		0	0	0	23			0				0				
23.5	23.9		2	0	2	23.5			0				2				
24.0	24.4		0	0	0	24			0				0				
24.5	24.9		0	0	0	24.5			0				0				
25.0	25.4		0	0	0	25			0				0				
25.5	25.9		1	0	1	25.5			0				1				
26.0	26.4			0	0	26			0				0				
26.5	26.9			0	0	26.5			0				0				
27.0	27.4			0	0	27			0				0				
27.5	27.9			0	0	27.5			0				0				
28.0	28.4			0	0	28			0				0				
28.5	28.9			0	0	28.5			0				0				
29.0	29.4			0	0	29			0				0				
29.5	29.9			0	0	29.5			0				0				
30.0	30.4			0	0	30			0				0				
30.5	30.9			0	0	30.5			0				0				
>	30.9			0	> 30.5				0				0				
Totals		109	83	124		12	0	5		14	67	37	451				

Table 9. Walleye Avg Length Emily Lake
Early spring fyke nets

Survey Year	Males	Females	Number Fish
1986	18.9	21.8	307
2002	17.1	20.6	316

Table 10. Walleye length at age (inches)

	Emily Lake 2002	NC Wis avg. (drainage)
age	survey avg length	length
1	7.3	
2	9.7	8.9
3	11.6	11.1
4	14.9	12.5
5	15.7	14.2
6	17.3	15.8
7	17.5	17.9
8	19.1	19.7
9	19.9	20.9
10	20.3	22.0
11	20.6	23.7
12	21.3	24.5
13		26.1

Table 13. Black Crappie length at age (inches)

	Emily Lake 2002	NC Wis avg. (drainage)
age	survey avg length	length
2		5.9
3	7.5	8
4	9.9	9.4
5		10.6
6		11.3

Table 15. BG max/modal sizes

Emily Lake		
	max (in)	modal (in)
1986	8.9	5.9
2002	9.9	4.9

Table 11. Emily Lake WE Population Estimates
2002 Comp Survey

Size Group	Number of fish		Number per Acre	
	Adult	Total	Adult	Total
3.0" - 11.9"	1	1663	0.0	8.4
12.0" - 14.9"	15	27	0.1	0.1
15.0" - 19.9"	360	318	1.8	1.6
> 20.0"	66	67	0.3	0.3
Totals		442	2.2	10.5

Table 12. Emily Lake Panfish Netting CPE -2002

	Early Spring	Late Spring	Summer
Black Crappie	0.40	2.56	
Bluegill	2.80	58.75	33.00
Pumpkinseed		2.69	0.70
Rock Bass	0.54	6.56	2.30
Warmouth		0.75	
Yellow Perch	9.00	1.88	0.90

Table 14. Bluegill LF Emily Lake 2002
fyke nets June 11-14

Size Range	number BG
<2	
2.0-2.4	
2.5-2.9	2
3.0-3.4	13
3.5-3.9	36
4.0-4.4	49
4.5-4.9	48
5.0-5.4	39
5.5-5.9	45
6.0-6.4	38
6.5-6.9	19
7.0-7.4	8
7.5-7.9	1
8.0-8.4	2
8.5-8.9	
9.0-9.4	
9.5-9.9	1
10.0-10.4	
10.5-10.9	
11.0-11.4	
11.5-11.9	
12.0-12.4	
Totals	301

Table 16. Bluegill LF Emily Lake 2002

fyke nets June 11-14				
Size Range	number BG	number >= min stock length (3")	number >= min quality length (6")	number >= min pref length (8")
<2				
2.0-2.4				
2.5-2.9	2			
3.0-3.4	13	13		
3.5-3.9	36	36		
4.0-4.4	49	49		
4.5-4.9	48	48		
5.0-5.4	39	39		
5.5-5.9	45	45		
6.0-6.4	38	38	38	
6.5-6.9	19	19	19	
7.0-7.4	8	8	8	
7.5-7.9	1	1	1	
8.0-8.4	2	2	2	2
8.5-8.9	0	0	0	0
9.0-9.4	0	0	0	0
9.5-9.9	1	1	1	1
Totals	301	299	69	3

Table 17. Bluegill length at age (inches)

age	Emily Lake 2002		NC Wis avg. (drainage)	
	survey avg length		length	
2	2.7		3.6	
3	4.1		5.3	
4	6.2		6.4	
5	7.5		7	
6			7.8	
7	9.8		8.4	
8			8.5	

Table 18. Pumpkinseed length at age (inches)

age	Emily Lake 2002		NC Wis avg. (drainage)	
	survey avg length		length	
2	3.3		3.6	
3	5.2		4.8	
4	6.0		6.0	
5	8.1		6.8	

Table 19. Emily Lake 2002

Rockbass LF
fyke nets June 11-14

Size Range	number RB
<2	
2.0-2.4	
2.5-2.9	1
3.0-3.4	4
3.5-3.9	9
4.0-4.4	5
4.5-4.9	5
5.0-5.4	5
5.5-5.9	16
6.0-6.4	27
6.5-6.9	6
7.0-7.4	14
7.5-7.9	1
8.0-8.4	2
8.5-8.9	5
9.0-9.4	5
9.5-9.9	
10.0-10.4	
10.5-10.9	
11.0-11.4	
11.5-11.9	
12.0-12.4	
Totals	105

Table 20. Rockbass length at age (inches)

	Emily Lake 2002	NC Wis avg. (drainage)
age	survey avg length	length
2	3.7	3.7
3	5.8	5.2
4	7.0	6.4
5	7.4	7.3
6	8.6	7.9
7	8.9	8.5
8	9.2	9.0

Table 21. Warmouth length at age (inches)

	Emily Lake 2002	WI average
age	survey avg length	length
1		1.5
2		2.9
3	4.9	3.5
4	7.3	5.0
5		5.8

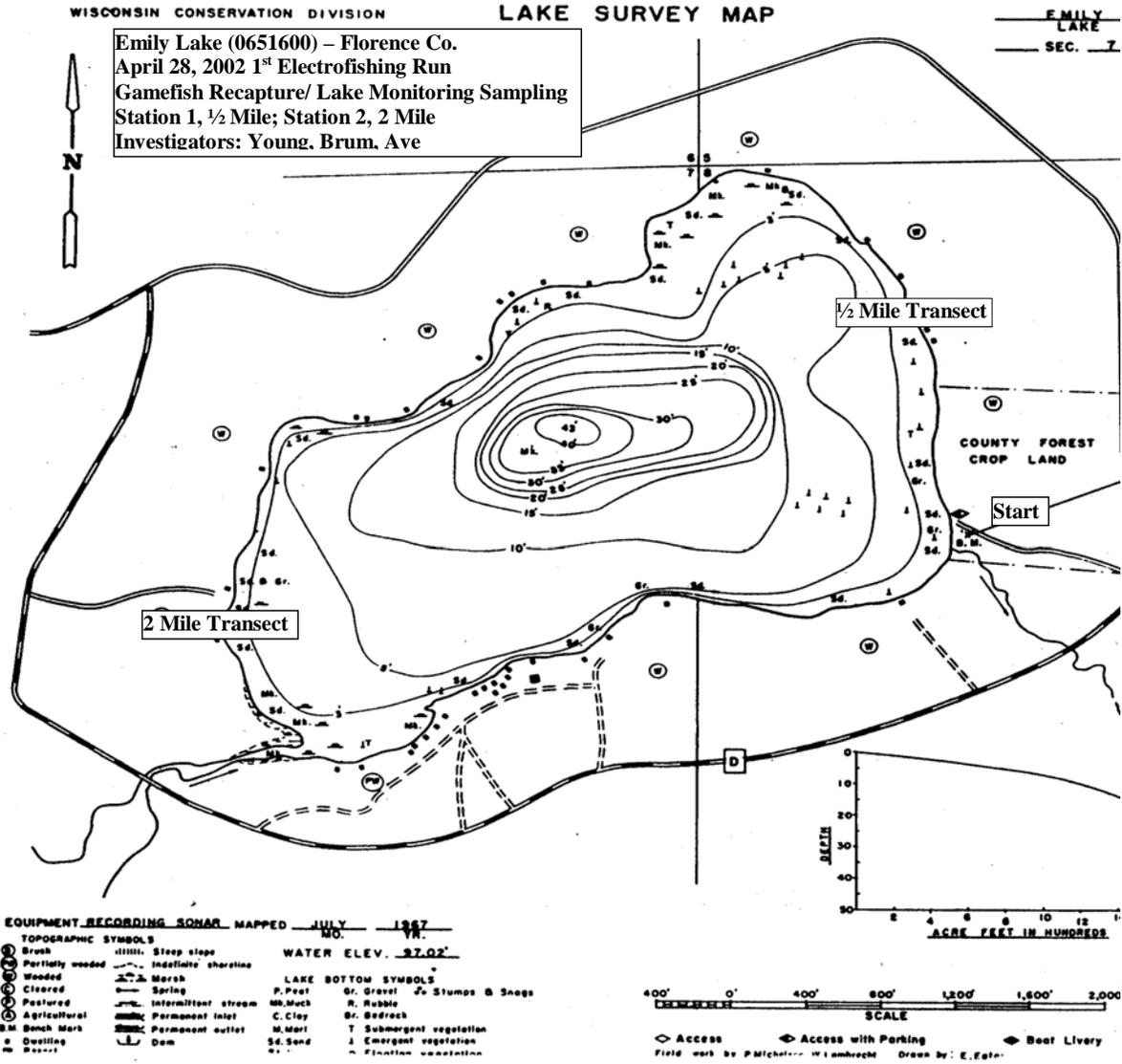
Table 22. Emily Lake 2002
Yellow Perch LF
fyke nets April 21-27
Size Range number YP

<2	
2.0-2.4	
2.5-2.9	
3.0-3.4	
3.5-3.9	
4.0-4.4	
4.5-4.9	6
5.0-5.4	20
5.5-5.9	34
6.0-6.4	29
6.5-6.9	18
7.0-7.4	9
7.5-7.9	2
8.0-8.4	2
8.5-8.9	
9.0-9.4	
9.5-9.9	
10.0-10.4	
10.5-10.9	
11.0-11.4	
11.5-11.9	
12.0-12.4	
Totals	120

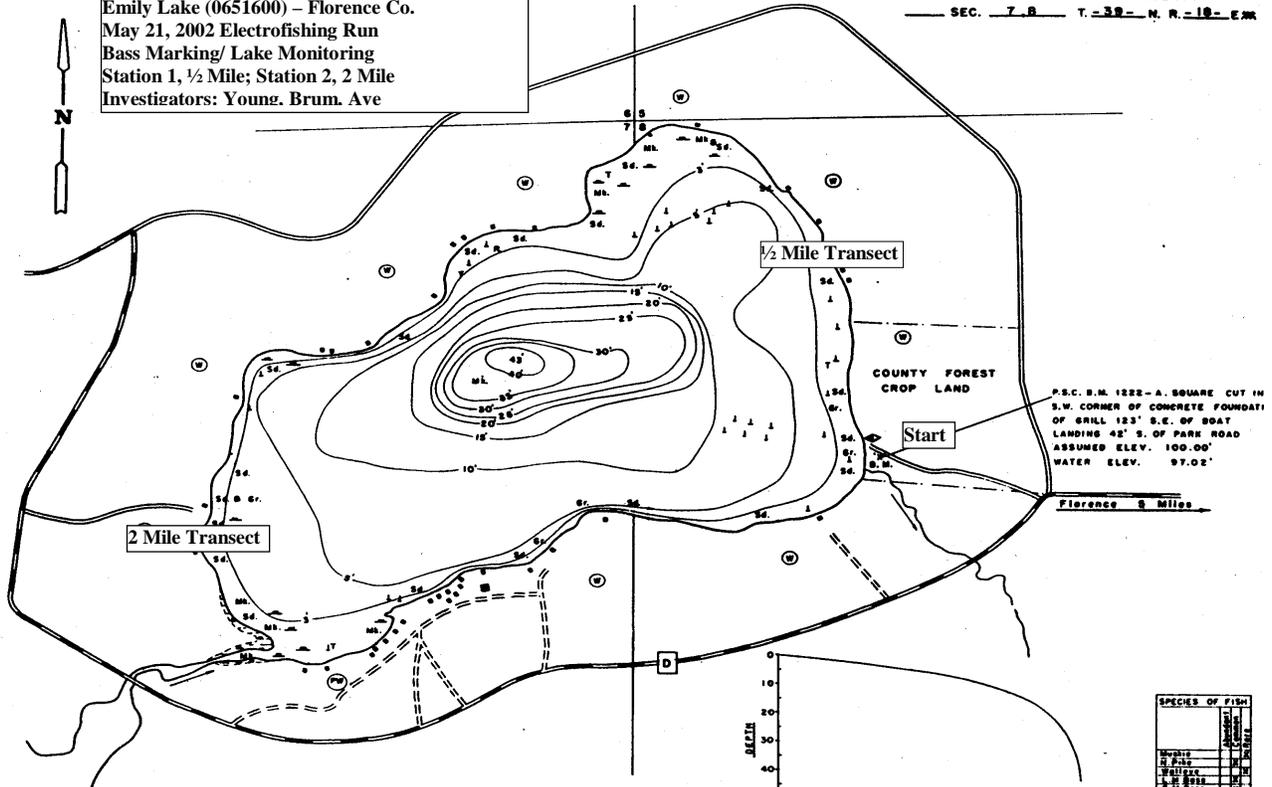
Table 23. Yellow perch length at age (inches)

	Emily Lake 2002	NC Wis avg. (drainage)
age	survey avg length	length
2		4.3
3	5.9	5.8
4	6.9	7.1
5		8.1
6		9.1
7		9.8
8		11.3

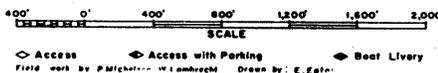
SAMPLE LOCATIONS



Emily Lake (0651600) - Florence Co.
 May 21, 2002 Electrofishing Run
 Bass Marking/ Lake Monitoring
 Station 1, 1/2 Mile; Station 2, 2 Mile
 Investigators: Young, Brum, Ave



- EQUIPMENT RECORDING SONAR MAPPED JULY 1987
 NO. 10
- TOPOGRAPHIC SYMBOLS
- Brush
 - Partially wooded
 - Wooded
 - Cleared
 - Pastured
 - Agricultural
 - B.M. Bench Mark
 - Quarry
 - Dam
- WATER ELEV. 27.02'
- LAKE BOTTOM SYMBOLS
- Gr. Gravel
 - Stumps & Snags
 - M. Mud
 - R. Rubble
 - C. Clay
 - Sr. Sand
 - S. Submergent vegetation
 - E. Emergent vegetation
 - F. Flotation vegetation

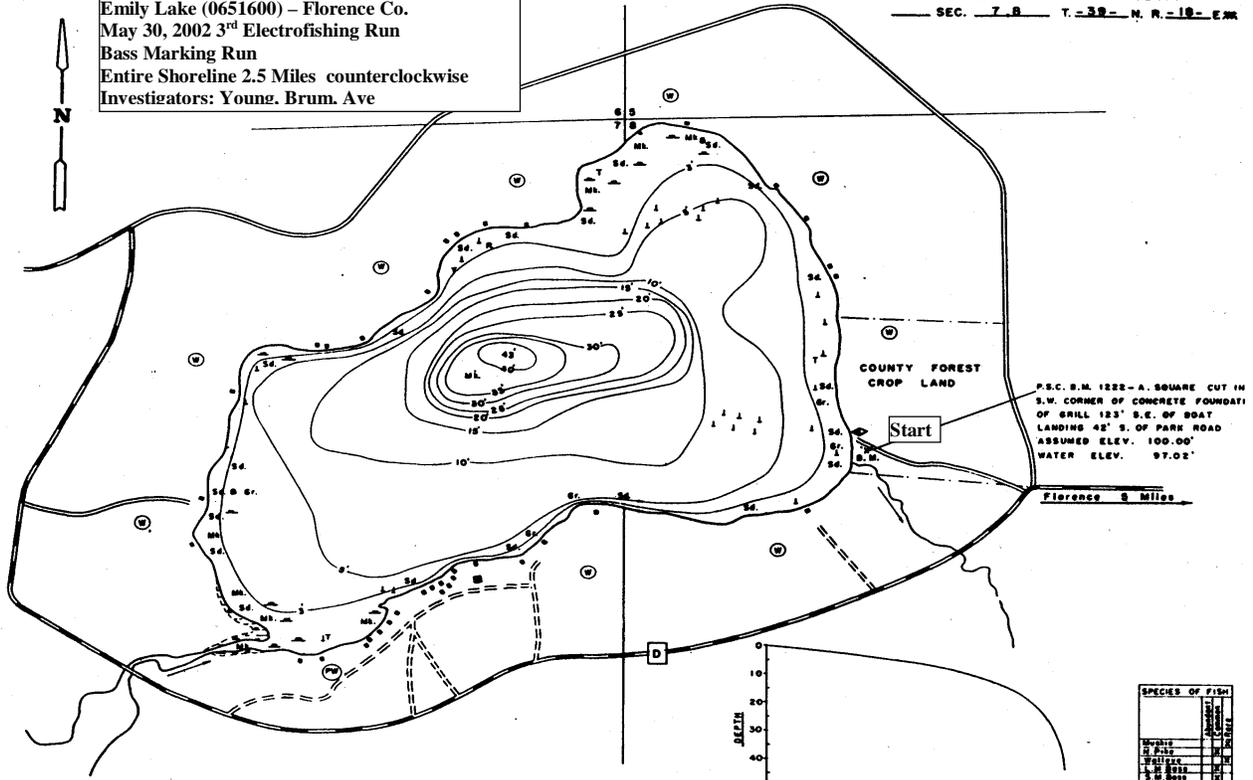


P.S.C. S.M. 1222-A. SQUARE CUT IN S.W. CORNER OF CONCRETE FOUNDATION OF GRILL 123' S.E. OF BOAT LANDING 42' S. OF PARK ROAD ASSUMED ELEV. 100.00' WATER ELEV. 97.02'

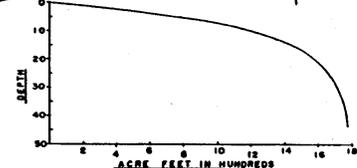
SPECIES OF FISH	
White Bass	12
Yellow Perch	10
Rock Bass	10
Smallmouth Bass	10
Crappie	10
Bluegill	10
Brook Silverside	10
Golden Shiner	10
Common Carp	10
Channel Catfish	10
White Crayfish	10

AREA 181.4 ACRES
 UNDER 3 FT. 1.8 %
 OVER 20 FT. 1.1 %
 VOLUME 1,786.3 ACRE FT.
 TOTAL ALK. 82 P.P.M.
 SHORELINE 2.5 MILES
 MAX. DEPTH 4.3 FEET

Emily Lake (0651600) - Florence Co.
 May 30, 2002 3rd Electrofishing Run
 Bass Marking Run
 Entire Shoreline 2.5 Miles counterclockwise
 Investigators: Young, Brum, Ave



P.S.C. S.M. 1222 - A. SQUARE CUT IN S.W. CORNER OF CONCRETE FOUNDATION OF BRILL 123' S.E. OF BOAT LANDING 42' S. OF PARK ROAD ASSUMED ELEV. 100.00' WATER ELEV. 97.02'



SPECIES OF FISH	
White Bass	10
Bluegill	10
Yellow Perch	10
Rock Bass	10
Smallmouth Bass	10
Chain Pickerel	10
Spottail Shiner	10
Common Carp	10
Golden Shiner	10
Brook Silverside	10
White Crayfish	10
Water Bug	10
Water Penny	10
Dragonfly	10
Beetle	10
Worm	10
Other	10

EQUIPMENT RECORDING SONAR MAPPED JULY 1987

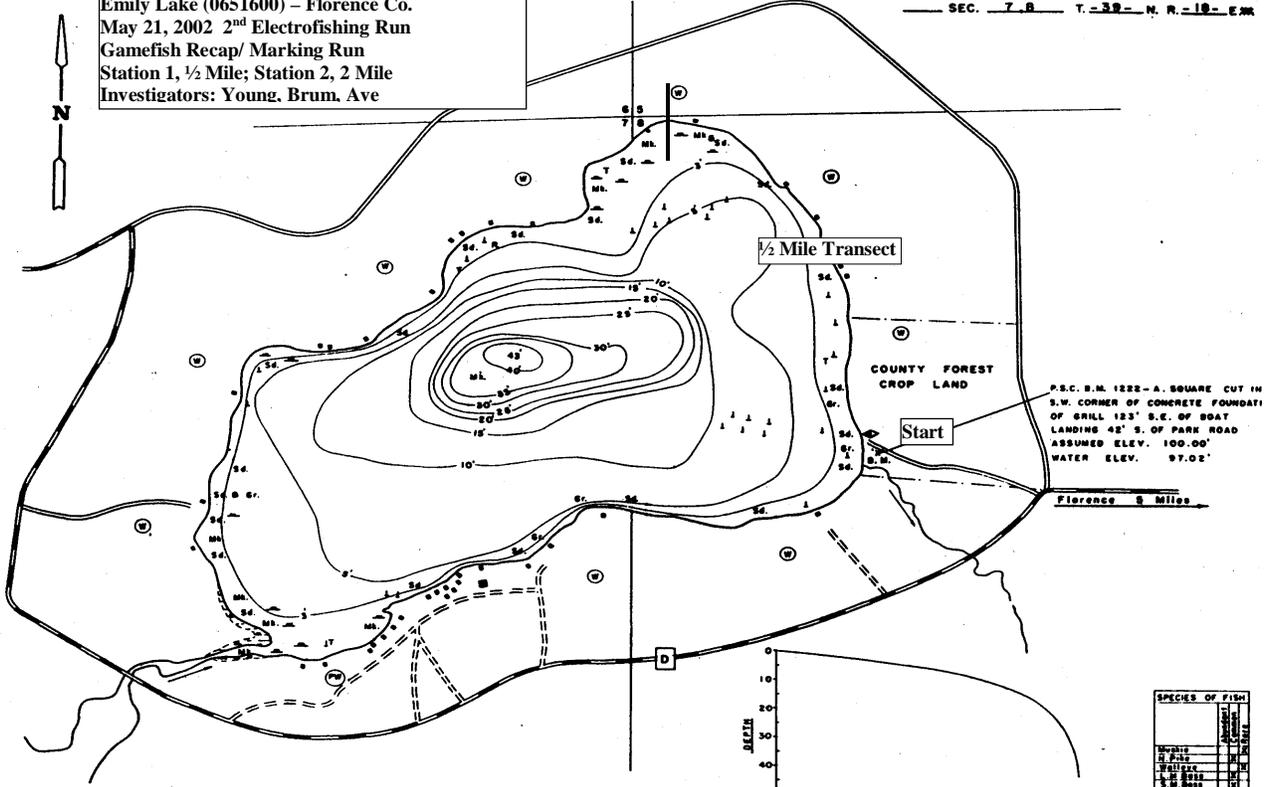
- TOPOGRAPHIC SYMBOLS
- Brash
 - Partially wooded
 - Wooded
 - Cleared
 - Pastured
 - Agricultural
 - B.M. Bench Mark
 - Quilling
 - Barrier
- WATER ELEV. 97.02'
- LAKE BOTTOM SYMBOLS
- Marsh
 - Spring
 - Intermittent stream
 - Permanent inlet
 - Permanent outlet
 - Dam
 - Gr. Gravel
 - Stumps & Snags
 - Rubble
 - Br. Bedrock
 - Submerged vegetation
 - Emergent vegetation
 - Sand
 - Finction vegetation



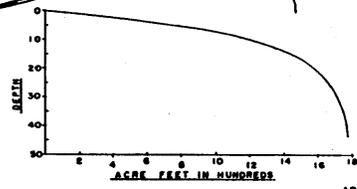
AREA 181.4 ACRES
 UNDER 3 FT. 1.8 %
 OVER 20 FT. 1.1 %
 VOLUME 1,788.3 ACRE FT.
 TOTAL ALK. 8.2 P.P.M.
 SHORELINE 2.5 MILES
 MAX. DEPTH 43 FEET

Access Access with Parking Boat Livery
 Field work by P. Mitchell - W. Lambeck Drawn by: E. Fahn

Emily Lake (0651600) - Florence Co.
 May 21, 2002 2nd Electrofishing Run
 Gamefish Recap/ Marking Run
 Station 1, 1/2 Mile; Station 2, 2 Mile
 Investigators: Young, Brum, Ave

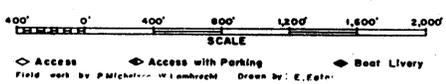


P.S.C. S.M. 1222-A SQUARE CUT IN S.W. CORNER OF CONCRETE FOUNDATION OF GRILL 123' S.E. OF BOAT LANDING 42' S. OF PARK ROAD ASSUMED ELEV. 100.00' WATER ELEV. 97.02'



SPECIES OF FISH	
Whitefish	1
Yellow Perch	1
Rock Bass	1
Smallmouth Bass	1
Crappie	1
Trout	1

- EQUIPMENT RECORDING SONAR MAPPED JULY 1967
 WATER ELEV. 97.02'
- TOPOGRAPHIC SYMBOLS: Brush, Partly wooded, Wooded, Cleared, Pastured, Agricultural, Bench Mark, Quailing, Barren
 - TOPOGRAPHIC SYMBOLS: Steep slope, Indistinct shoreline, Marsh, Spring, Intermittent stream, Permanent inlet, Permanent outlet, Dam
 - LAKE BOTTOM SYMBOLS: P. Peat, M. Muck, C. Clay, M. Marl, S.S. Sand, Gr. Gravel, R. Rubble, Br. Bedrock, T. Submergent vegetation, E. Emergent vegetation, F. Flotation vegetation
 - LAKE BOTTOM SYMBOLS: Stumps & Snags



AREA 181.4 ACRES
 UNDER 3FT. 1.8 %
 OVER 20FT. 1.1 %
 VOLUME 1,766.3 ACRE FT.
 TOTAL ALK. 82 P.P.M.
 SHORELINE 2.5 MILES
 MAX. DEPTH 43 FEET

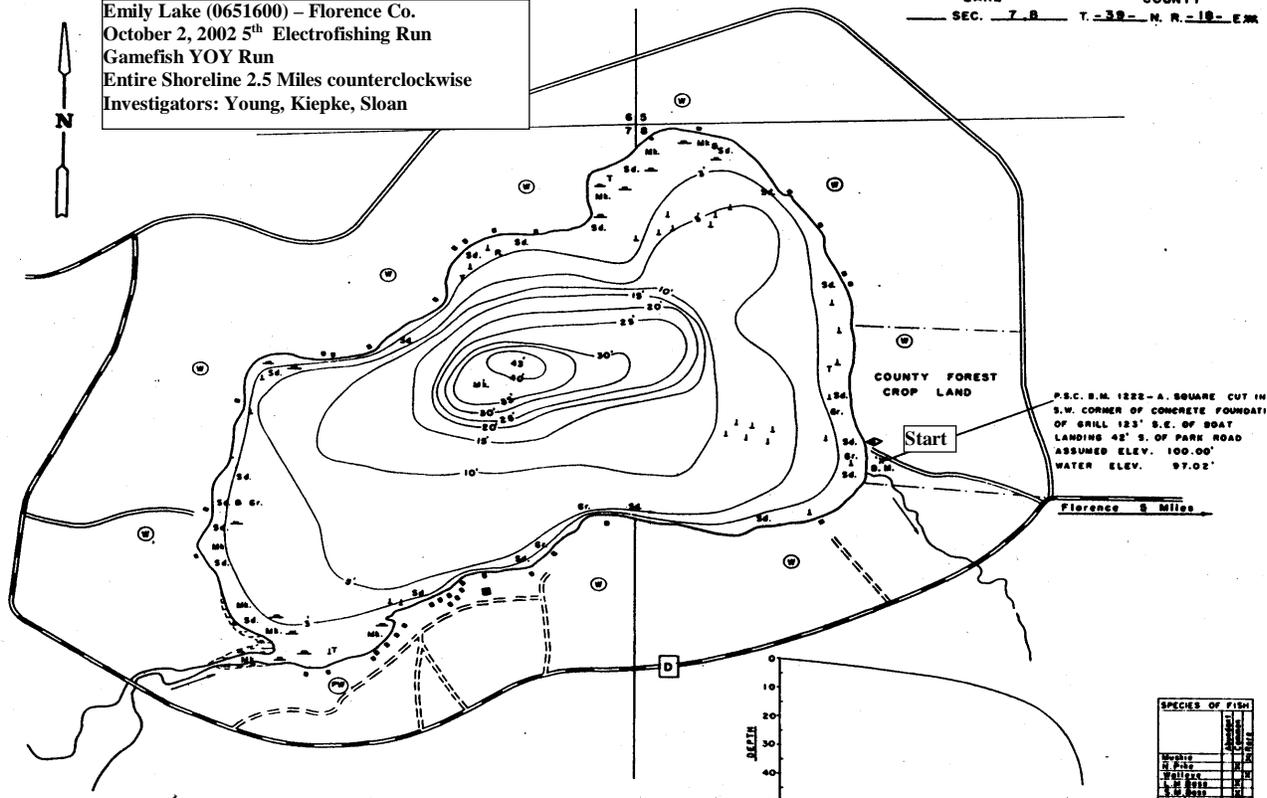
Access, Access with Parking, Boat Livery

WISCONSIN CONSERVATION DIVISION

LAKE SURVEY MAP

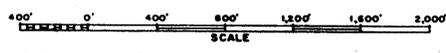
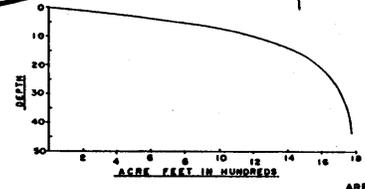
EMILY LAKE FLORENCE COUNTY
SEC. 7 B T. 32 N. R. 18 E.M.

Emily Lake (0651600) - Florence Co.
October 2, 2002 5th Electrofishing Run
Gamefish YOY Run
Entire Shoreline 2.5 Miles counterclockwise
Investigators: Young, Kiepkke, Sloan



EQUIPMENT RECORDING SONAR MAPPED JULY 1987
NO. 19

- TOPOGRAPHIC SYMBOLS**
- ① Brush
 - ② Partly wooded
 - ③ Cleared
 - ④ Pastured
 - ⑤ Agricultural
 - B.M. Bench Mark
 - Quailine
 - Power
 - ||||| Steep slope
 - - - Indistinct shoreline
 - ⊠ Marsh
 - ⊡ Spring
 - ⊢ Intermittent stream
 - ⊣ Permanent inlet
 - ⊤ Permanent outlet
 - ⊥ Dam
- LAKE BOTTOM SYMBOLS**
- P. Peat
 - M. Muck
 - C. Clay
 - Sd. Sand
 - Gr. Gravel
 - R. Rubble
 - Dr. Driftrock
 - Stumps & Snags
 - Submerged vegetation
 - Emergent vegetation
 - Flotation vegetation
- WATER ELEV. 97.02'

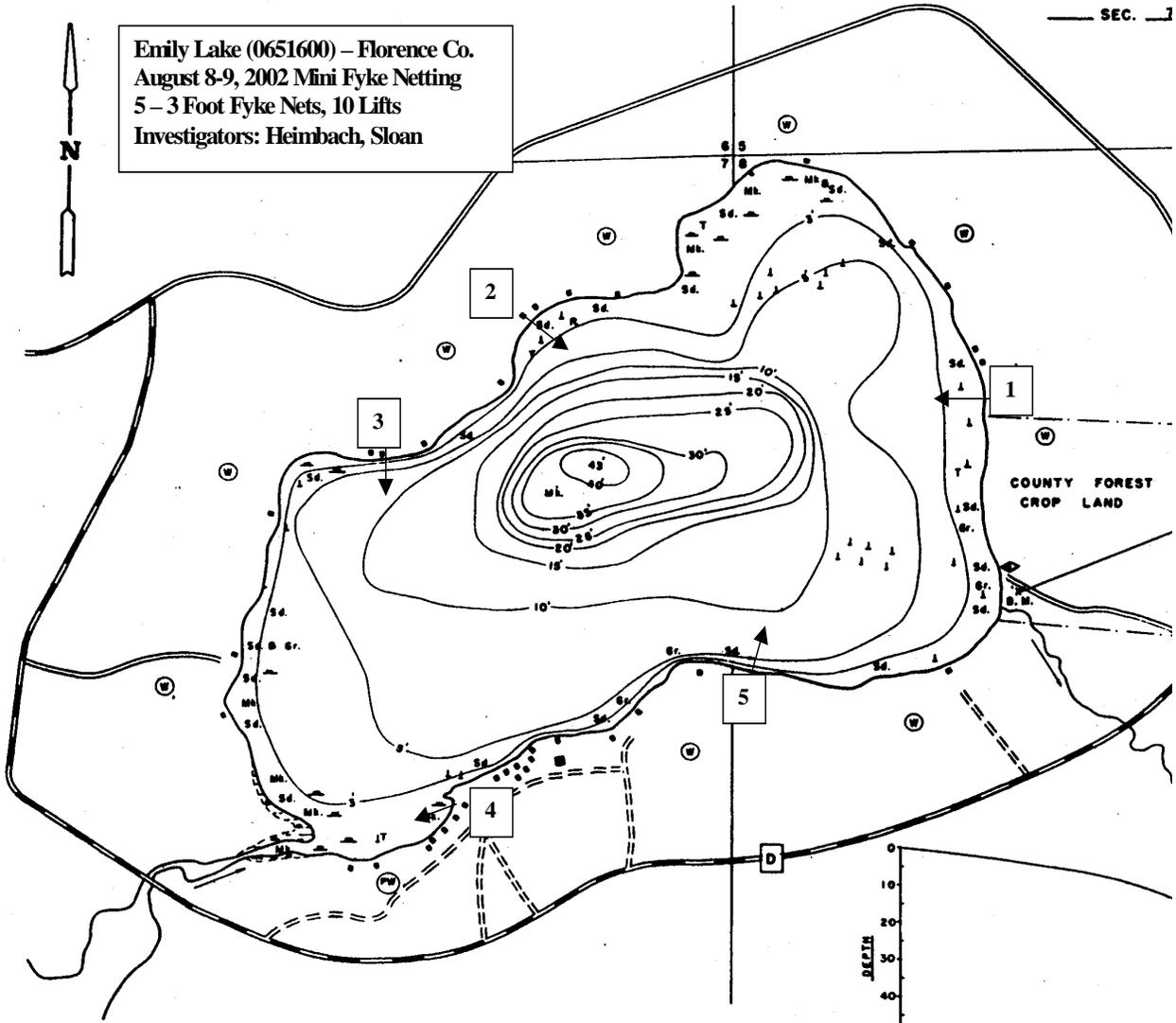


SPECIES OF FISH	
DATE	COUNT
Walleye	1
Rock Bass	1
White Sucker	1
Bluegill	1
Trout	1

AREA 1.915 ACRES
UNDER 5 FT. 18 %
OVER 20 FT. 11 %
VOLUME 1,286.3 ACRE FT.
TOTAL ALK. 82 PPM
SHORELINE 2.5 MILES
MAX. DEPTH 4.3 FEET

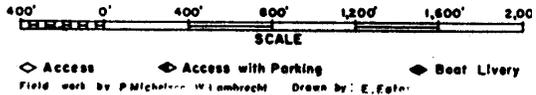
Access Access with Parking Boat Livery
Field work by Pulchra Wambrecht Drawn by E. Fagin

Emily Lake (0651600) - Florence Co.
August 8-9, 2002 Mini Fyke Netting
5 - 3 Foot Fyke Nets, 10 Lifts
Investigators: Heimbach, Sloan



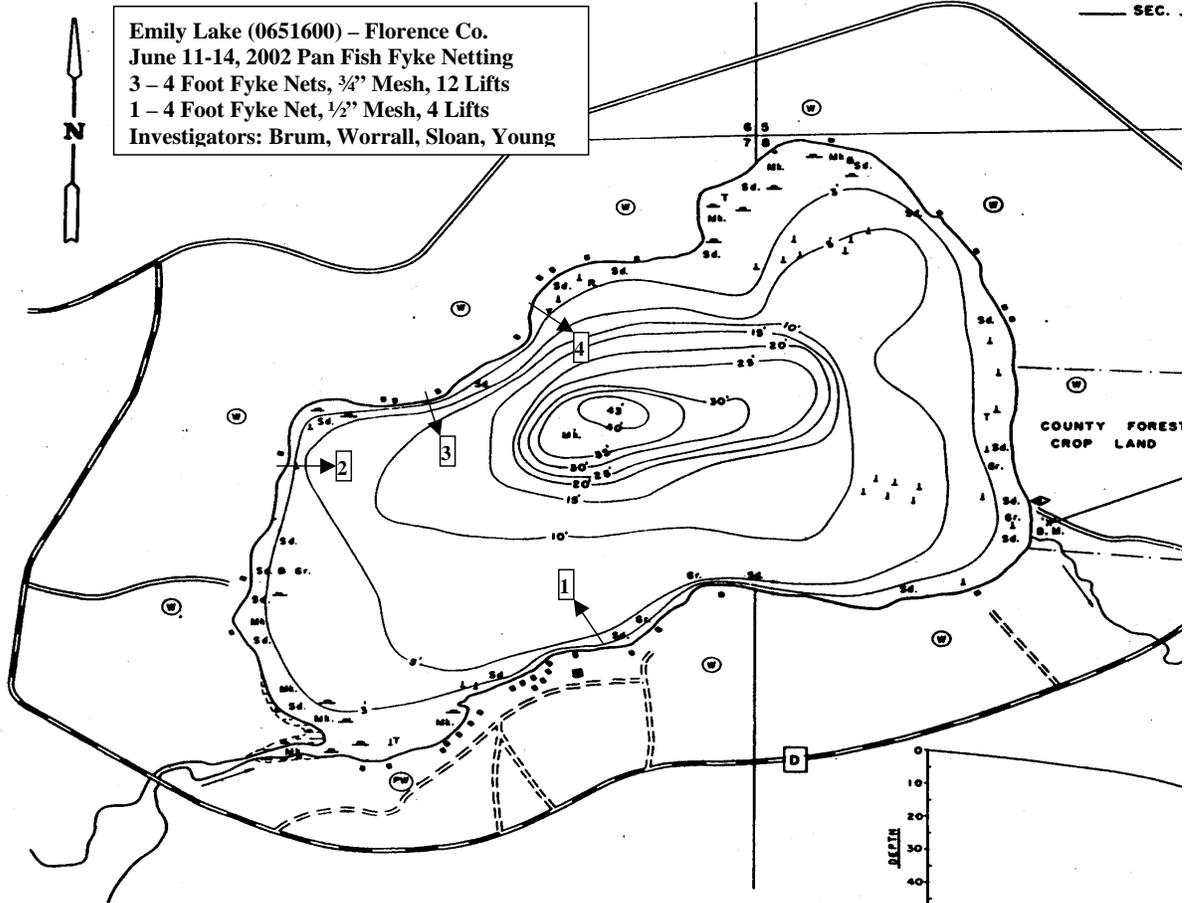
EQUIPMENT RECORDING SONAR MAPPED JULY 1987
MO. VA.

- | | | | |
|---------------------|------------------------|---------------------|--------------------------|
| TOPOGRAPHIC SYMBOLS | | WATER ELEV. 27.02' | |
| ① Brush | Steep slope | | |
| ② Partially wooded | ~ Indefinite shoreline | | |
| ③ Wooded | ~ Marsh | LAKE BOTTOM SYMBOLS | |
| ④ Cleared | ~ Spring | P. Peat | Gr. Gravel |
| ⑤ Pastured | ~ Intermittent stream | Mb. Muck | R. Rubble |
| ⑥ Agricultural | ~ Permanent inlet | C. Clay | Br. Bedrock |
| B.M. Bench Mark | ~ Permanent outlet | M. Marl | T. Submergent vegetation |
| o Doodling | ~ Dam | Sd. Sand | I. Emergent vegetation |
| m Beach | | St. Stumps & Snags | F. Floating vegetation |



◇ Access ◇ Access with Parking ◇ Boat Livery
Field work by P. Mitchell, W. Lambrecht Drawn by E. Egler

Emily Lake (0651600) – Florence Co.
 June 11-14, 2002 Pan Fish Fyke Netting
 3 – 4 Foot Fyke Nets, 3/4" Mesh, 12 Lifts
 1 – 4 Foot Fyke Net, 1/2" Mesh, 4 Lifts
 Investigators: Brum, Worrall, Sloan, Young



EQUIPMENT RECORDING SONAR MAPPED JULY 1967
 NO. 198

- TOPOGRAPHIC SYMBOLS**
- ⊙ Brush
 - ⊙ Partially wooded
 - ⊙ Wooded
 - ⊙ Cleared
 - ⊙ Pastured
 - ⊙ Agricultural
 - ⊙ B.M. Bench Mark
 - ⊙ Dwelling
 - ⊙ Barn

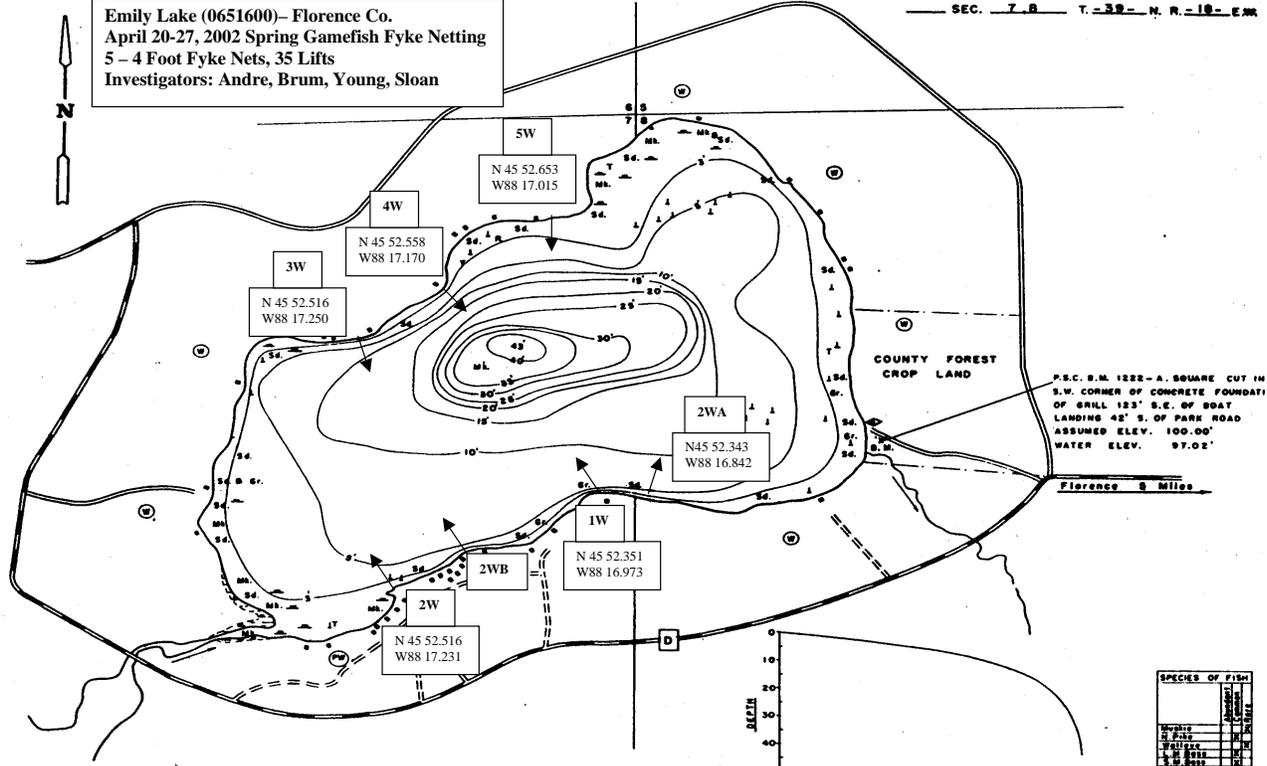
WATER ELEV. 97.02'

- LAKE BOTTOM SYMBOLS**
- P. Peat
 - Mb. Muck
 - C. Clay
 - M. Mud
 - Sd. Sand
 - Gr. Gravel
 - R. Rubble
 - Dr. Sandrock
 - T. Submerged vegetation
 - E. Emergent vegetation
 - F. Floating vegetation
 - Stumps & Snags



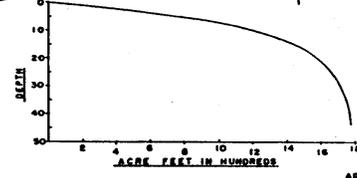
◊ Access ◊ Access with Parking ◊ Boat Live
 Field work by P. Nitchler, W. Lambrecht Drawn by: E. Egan

Emily Lake (0651600)- Florence Co.
 April 20-27, 2002 Spring Gamefish Fyke Netting
 5 - 4 Foot Fyke Nets, 35 Lifts
 Investigators: Andre, Brum, Young, Sloan



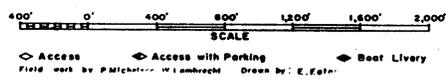
P.S. S.M. 1222 - A SQUARE CUT IN S.W. CORNER OF CONCRETE FOUNDATION OF GRILL 123' S.E. OF BOAT LANDING 42' S. OF PARK ROAD ASSUMED ELEV. 100.00' WATER ELEV. 97.02'

Florence 8 Miles



SPECIES OF FISH	
DATE	COUNT
4/20	1
4/21	1
4/22	1
4/23	1
4/24	1
4/25	1
4/26	1
4/27	1
TOTAL	7

- EQUIPMENT RECORDING SONAR MAPPED JULY 1987
- NO. WATER ELEV. 97.02'
- TOPOGRAPHIC SYMBOLS**
- Brush
 - Partially wooded
 - Wooded
 - Cleared
 - Pastured
 - Agricultural
 - B.M. Bench Mark
 - Dwelling
 - Barren
- LAKE BOTTOM SYMBOLS**
- P. Peat
 - M. Muck
 - C. Clay
 - M. Marl
 - Sd. Sand
 - Gr. Gravel
 - R. Rubble
 - Gr. Gravel
 - Stumps & Snags
 - Submerged vegetation
 - Emergent vegetation
 - Flotation vegetation



AREA 131.4 ACRES
 UNDER 20 FT. 11 %
 VOLUME 1,766.3 ACRE FT.
 TOTAL ALK. 82 P.P.M.
 SHORELINE 2.8 MILES
 MAX. DEPTH 4.3 FEET