Lake Emma

Presque Isle County
Ocqueoc River watershed, last surveyed 2003

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Environment

Lake Emma is located in southern Presque Isle County approximately 6 miles southwest of the town of Hawks (Figure 1). It has a natural lake basin of approximately 113 acres with a water control structure that floods an additional area of about 70 acres. The Ocqueoc River flows into the lake and departs through the control structure on the east end (Figure 2). The control structure was established in 1949 and is owned and maintained by Presque Isle County. The legal lake level was established at an elevation of 800.7 feet. The control structure has been renovated multiple times, including as recently as within the last decade. The lake is very shallow with a maximum depth of approximately 10 feet. Water clarity is low due to the tannin stain in the lake caused by decay of coniferous tree needles in the watershed. The shoreline is mostly undeveloped with wetlands and dominant coniferous forest. Submergent and emergent aquatic vegetation is prominent. A DNR boat launch exists along the south shore, providing for a hard-surfaced launch and ample trailer parking. Standard State of Michigan fishing regulations apply at Lake Emma with the exception of Northern Pike (no minimum size limit, 5 fish daily limit per person of which no more than 1 pike can be 24 inches or greater).

History

Stocking records indicate that Bluegill were stocked in Lake Emma from 1935-1945, while Largemouth Bass were stocked annually from 1943-1945, and Smallmouth Bass in 1940 and 1941. No recent fish stocking events have occurred since the World War II period.

The first analysis of Lake Emma and its fish community was made by the Michigan Department of Conservation (DOC) in June 1951. Biologists noted it as a dark stained lake with alkalinity ranging from 127-135ppm. Aquatic vegetation was abundant. Fish seining and gill-netting efforts found panfish such as Yellow Perch, Bluegill, and Pumpkinseed. Perch were considered common while other panfish were less abundant. Predators consisted of abundant but slow growing Northern Pike, as well as Largemouth Bass. Bullheads and White Suckers were considered common along with Bluntnose Minnow and Johnny Darter. Species diversity was not high.

A follow-up survey was conducted with five experimental gill-net lifts in July 1968, which documented a fish community similar to what was found in 1951, with the addition of Rock Bass. A temperature and dissolved oxygen profile were conducted in the deepest spot in Lake Emma (10 feet) which found very little thermal stratification with dissolved oxygen suitable to fish throughout the water column. Recommendations were made to remove the minimum size limit on Northern Pike in Lake Emma (and similar lakes nearby in the upper Ocqueoc River watershed) due to their abundance and slow growing nature. This was accomplished in 1973.

A more comprehensive survey of the Lake Emma fish community was made by the Michigan Department of Natural Resources (DNR) in late-June 1976. Sampling effort consisted of 12

experimental gill-net lifts and 7 large-mesh trap-net nights. Panfish were comprised primarily of Bluegill and Pumpkinseed, and to a lesser extent Rock Bass and Yellow Perch (Table 1). Panfish made up 48% of the catch by number (weight was not measured). Most Bluegill and Pumpkinseed were in the 6-9 inch size range, though good numbers of Bluegill were 10 inches or larger (Table 2). Very few small panfish were collected, though small panfish were likely not vulnerable to the sampling gear. Bluegill and Pumpkinseed exhibited age classes up to age 9 and 8, respectively (Table 3), and growth rates were slightly above the statewide average for both species. Growth rates were poor for young Bluegill and Pumpkinseed but increased significantly for older fish. Rock Bass and Yellow Perch were less abundant and slow growing.

The primary predators collected were Largemouth Bass and Northern Pike (Table 1). Predators comprised 7% of the total catch by number. Largemouth Bass ranged from 8-20 inches with most in the 12-14 inch size range (Table 2). Largemouth Bass demonstrated good growth when compared to the statewide growth index for the species and were represented by fish up through age 9. Largemouth Bass reached the minimum size limit (14 inches) approximately at age 4 or 5. Northern Pike were represented by only three age groups (Table 3) but were relatively common. Most pike were 14-18 inches and very few pike larger than 20 inches were captured. Northern Pike growth was very poor, nearly three inches slower than the average pike growth across Michigan.

Bullheads and White Sucker comprised 44% of the total catch by number. Large specimens of both species were collected.

In summary, managers suggested the overall fish population of Lake Emma was in good shape. Panfish were abundant, attained large sizes and older ages, and provided a quality fishery. Predators diversity was low, but numbers were suitable for the lake. Bass growth was excellent while pike growth was very slow. Liberal regulations for Northern Pike would remain in place for Lake Emma.

Current Status

The most recent general fish community survey was completed at Lake Emma in 2003. The survey was done by the DNR under the statewide Status and Trends survey protocol where sampling effort is a product of lake acreage. Sampling effort in early late-May consisted of 9 large-mesh fyke-net nights, 4 mini-fyke net nights, 6 trap-net nights, and 2 inland gill-net nights.

A total of 740 fish were collected during the 2003 survey (Table 4). Panfish, predator game fish, and rough fish comprised 56%, 16%, and 21% of the total catch by number, respectively. These percentages were more balanced compared to the percentages for panfish (48%), predators (7%), and rough fish (44%) from the 1976 survey.

The panfish catch was comprised of Bluegill, Pumpkinseed, Yellow Perch, Black Crappie, and Rock Bass (Table 4). Bluegill up to 9 inches were collected (Table 2). A healthy nine year-classes of Bluegill were represented in the catch, up to age 11 (Table 3). Bluegill growth was slightly below average compared to the statewide average, and generally slow for young fish and higher for adult fish. Despite this, we used the Schneider Index (Schneider 1990) for classifying the Bluegill size structure based on the trap and fyke net catches. Using indices of average length of captured Bluegill and percentages of larger fish in the population, the Bluegill population was classified as "good" and bordering on "excellent". Pumpkinseed were less abundant than Bluegill but still common, with most

specimens 6-8 inches in length and demonstrating slightly above average growth. Black Crappie were present but in lower abundance. This species was not collected in historical surveys of Lake Emma and likely was transplanted from other regional lakes by the public. It was apparent that crappie have fully established themselves in the Lake Emma fish community as they were represented by six age classes and some larger specimens were captured (Table 2 and 3). Yellow Perch and Rock Bass continued to be represented in the fish community although in lower numbers and generally smaller sizes.

Largemouth Bass and Northern Pike remained the only predator game fish in Lake Emma (Table 4). Most Largemouth Bass were 12-16 inches in length, though some large specimens were also collected (Table 2). Forty-four percent of the bass collected were legal size (14 inches) or larger. A healthy 10 age classes of bass were collected, and growth was still above the statewide average. The Northern Pike size structure from the 2003 survey was similar to that found in 1976 (Table 2). More year-classes of pike were collected in the 2003 survey compared to 1976, while growth remained extremely slow. Despite the lower minimum size limit (20 inches), only 18% of the surveyed pike were legal size.

Non-game fish including bullheads and White Sucker were still common in Lake Emma based on the 2003 survey catch. Also collected were Golden Shiners. Overall, species richness remained low for Lake Emma.

Analysis and Discussion

Lake Emma can be characterized as a shallow and fairly fertile natural lake system that is enhanced in size by a control structure. It is a warm water lake that produces good numbers and sizes of warm water species such as Bluegill, Pumpkinseed, and Largemouth Bass. These species tend to exhibit growth rates at or near average when compared to lakes across Michigan. The vegetated nature of the lake allows for Bluegill and Pumpkinseed to hide from predators, thus allowing acceptable numbers to live longer and attain sizes attractive to anglers. Species that survive and grow better in cool water systems are also present in Lake Emma (Yellow Perch and Northern Pike) but demonstrate reduced longevity and poor growth. Spawning habitat for all these species appears good. The balance of prey to predators to rough fish is currently acceptable and natural. No stocking of other species is warranted.

Management Direction

1. The standard State of Michigan fishing regulations are applicable for Lake Emma with the exception of Northern Pike. Regulations currently (and since 1973) in place for pike at Lake Emma and nearby watershed lakes encourage the harvest of small stunted pike. Lake Emma has ample spawning habitat for pike but lacks the summer cool water refuge necessary to grow large pike. Even with liberal regulations, pike densities remain high and growth remains extremely slow. Pike over 24 inches are rare in Lake Emma. Anglers should be encouraged to harvest more pike at Lake Emma, thus taking advantage of the liberal regulation.

2. Angler reports are scarce for Lake Emma, but the ones received in recent years suggest a satisfactory fishery, primarily for panfish. Anglers should be encouraged to report their catches to local DNR managers as it provides beneficial information to future management.

References

Schneider, J.C. 1990. Classifying Bluegill populations from lake survey data. Fisheries Division Technical Report 90-10. Lansing, MI.

Figure 1. Location of Lake Emma in the northern Lower Peninsula of Michigan.

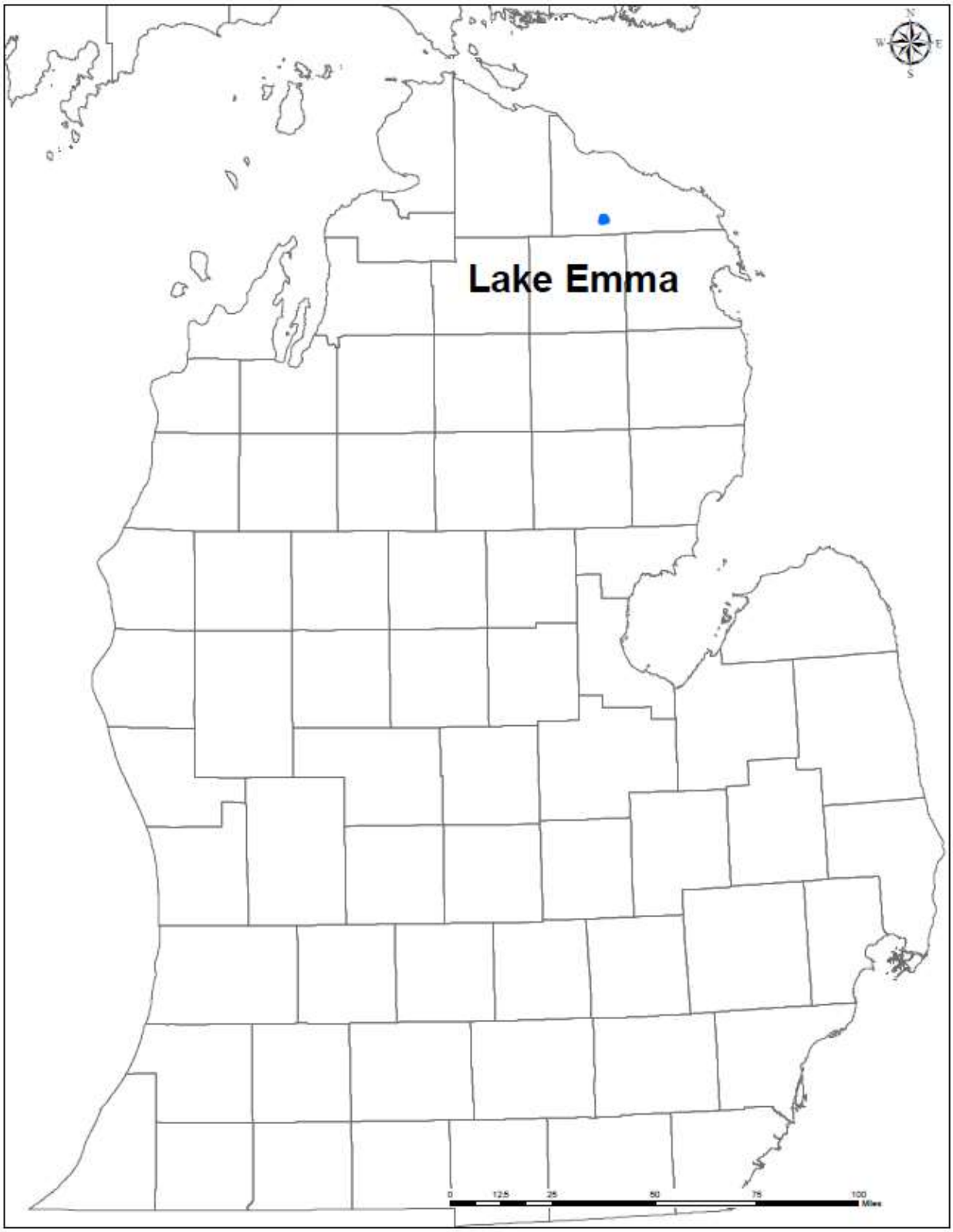

Figure 2. Depth map and boat launch location for Lake Emma in Presque Isle County.

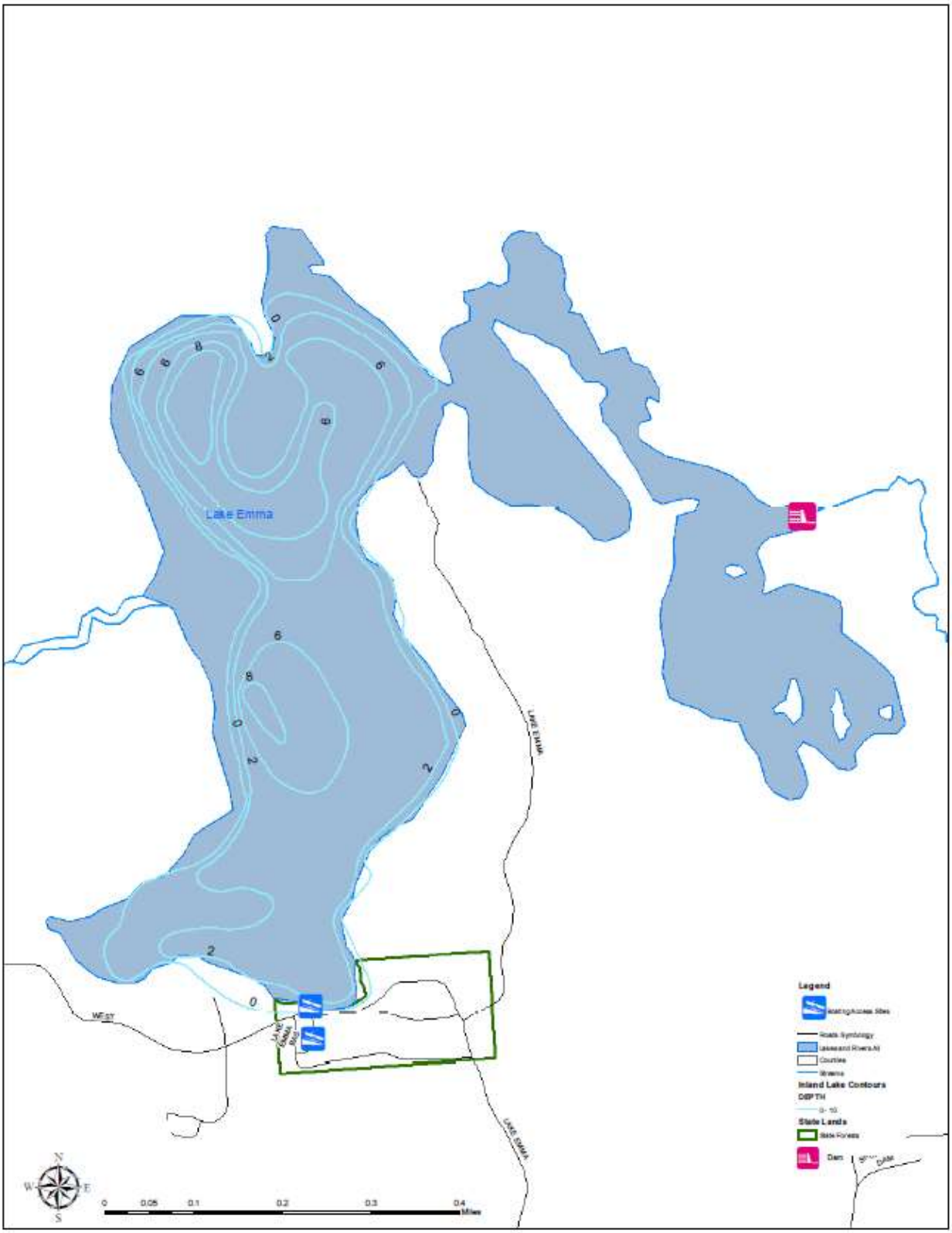

Table 1. Fish collected from Lake Emma June 22-24, 1976 by DNR with experimental gill nets and large-mesh trap nets.

Species	**Total Catch**	**Percent by number**
Bullhead sp.	353	35
Bluegill	299	29
Pumpkinseed	145	14
White Sucker	91	9
Largemouth Bass	40	4
Northern Pike	38	4
Rock Bass	27	2
Yellow Perch	13	1
Smallmouth Bass	1	<1
Total	**1,007**	

Table 2. Length frequency distributions of certain fishes collected in 1976 and 2003 surveys at Lake Emma.

Length (in)	**Black Crappie**		**Bluegill**		**L. Bass**		**N. Pike**		**Pumpkinseed**	
	1976	2003	1976	2003	1976	2003	1976	2003	1976	2003
<6			1	130					5	14
6-7.9		4	111	115					66	47
8-9.9		3	109	58	1	2		1	71	18
10-11.9		3	78		5	9		1	3	
12-13.9		2			23	35		2		
14-15.9					4	23	16	6		
16-17.9					3	6	10	13		
18-19.9					3	5	7	9		
20-21.9					1	2	4	5		
>=22							1	2		

Table 3. Comparison of mean length (inches) at age for prominent game fishes of Lake Emma in 1976 and 2003. Number in parentheses represents number aged. The growth index is the growth for each species at Lake Emma in 2003 compared to the statewide average for that species by age.

Species	Age group	June 1976	May 2003	Growth Index (in)
Bluegill	II	3.7 (1)	--	--
	III	6.0 (20)	3.7 (5)	-1.2
	IV	6.5 (8)	4.9 (12)	-0.9
	V	7.6 (12)	6.8 (16)	+0.1
	VI	8.1 (7)	7.7 (8)	+0.4
	VII	8.9 (7)	8.1 (4)	+0.3
	VIII	9.8 (10)	8.8 (1)	+0.6
	IX	10.2 (8)	8.4 (5)	+0.1
	X	--	9.0 (2)	--
	XI	--	8.4 (3)	--
Pumpkinseed	II	4.8 (1)	--	--
	III	5.1 (7)	3.4 (1)	-1.5
	IV	6.2 (16)	5.5 (7)	-0.1
	V	7.2 (12)	6.9 (9)	+0.7
	VI	8.2 (5)	7.0 (10)	+0.4
	VII	8.7 (3)	7.5 (4)	+0.4
	VIII	9.0 (2)	8.2 (4)	+0.7
	IX	--	8.4 (2)	--
	X	--	8.6 (3)	--

Table 3.-Continued.

Species	Age group	June 1976	May 2003	Growth Index (in)
Largemouth	II	9.9 (3)	8.2 (2)	-+1.1
Bass	III	11.7 (23)	10.3 (2)	+0.9
	IV	13.9 (4)	12.3 (19)	+0.7
	V	15.8 (3)	13.9 (16)	+0.7
	VI	16.4 (2)	15.2 (6)	+0.5
	VII	--	17.1 (3)	+0.8
	VIII	18.8 (2)	17.7 (1)	+0.3
	IX	--	18.0 (3)	-0.3
	X	--	18.7 (1)	-0.6
	XI	--	--	--
	XII	--	--	--
	XIII	--	20.3 (2)	--
Northern	I	13.7 (8)	10.6 (2)	-1.1
Pike	II	15.4 (25)	14.9 (9)	-2.7
	III	19.7 (5)	17.7 (16)	-3.0
	IV	--	19.5 (7)	-3.8
	V	--	22.6 (5)	-2.8
Yellow Perch	II	--	3.6 (3)	-1.6
	III	6.2 (7)	4.7 (1)	-1.8
	IV	7.0 (3)	5.9 (2)	-1.6
	V	8.0 (2)	7.7 (2)	-0.8
	VI	10.4 (1)	--	--

Table 3.-Continued.

Species	Age group	June 1976	May 2003	Growth Index (in)
Black Crappie	III	--	7.9 (6)	+0.4
	IV	--	9.5 (1)	+0.9
	V	--	10.6 (2)	+1.2
	VI	--	--	
	VII	--	11.2 (1)	+0.4
	VIII	--	12.9 (1)	+1.5
	IX	--	--	--
	X	--	13.0 (1)	--

Table 4. Fish collected from Lake Emma May 19-22, 2003 by DNR under the Status and Trends lake survey protocol.

Species	Total Catch	Percent by Number	Length Range (in)	Average Length (in)
Bluegill	303	41.5	2-9	6.7
Bullhead sp.	145	19.9	2-13	10.8
Largemouth Bass	82	11.2	8-20	14.0
Pumpkinseed	79	10.8	2-9	6.6
Golden Shiner	39	5.3	1-4	2.6
Northern Pike	39	5.3	9-26	17.6
White Sucker	13	1.8	15-21	18.6
Black Crappie	12	1.6	7-13	9.5
Yellow Perch	12	1.6	2-9	5.2
Rock Bass	6	0.8	5-9	8.3
Total	**730**			