Michigan Department of Natural Resources
Status of the Fishery Resource Report
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THE RANDALL CHAIN-OF-LAKES: MESSENGER, SOUTH, RANDALL, NORTH, CEMETERY, CRAIG, AND MORRISON LAKES

Branch County (T6S, R6W, Sections 5, 8, 17 and T5S, R6W Sections 29 and 32)
Surveyed May-August 2000

Scott K. Hanshue

Environment

The Randall Chain-of-Lakes is a series of seven lakes including Messenger, South, Cemetery, North, Randall, Morrison and Craig lakes located in central Branch County near the City of Coldwater. The lakes are located in the Battle Creek outwash plain of the Kalamazoo interlobate area (Albert 1995). Bedrock geology in this region is entirely Coldwater (Paleozoic) shale and the most common upland soil types are sand and sandy loams. Hydric soils such as Houghton muck, Adrian muck and Edwards muck are common in the shoreline areas (USDA 1986). Average annual precipitation and snowfall within the watershed are approximately 33 inches and 47 inches, respectively (USDA 1986). The landscape surrounding the lakes is described as a combination of gently rolling hills, wooded hills and swamps, cattail marshes and agricultural fields.

Formed during the Wisconsin glacial stage (10,000 – 75,000 years ago), the lakes were increased in size and depth by historical marl mining operations and the construction of a nine foot high dam on Coldwater River near the town of Hodunk in 1847. Collectively, the Chain-of-Lakes and connecting channels cover approximately 1100 acres. The watershed includes a drainage area of more than 170 square miles as measured at the outlet of Craig Lake.

The Randall Chain-of-Lakes can be described as four principal lake subsystems based on basin morphology. Messenger and South lakes represent the first subsystem in the series of lakes (Figure 1). These lakes cover approximately 172 acres, and have a combined mean depth of 3.0 feet and a flushing rate of 2.3 days. Due to the marshy nature of the shoreline, development on the lakes is limited.

The next subsystem includes Cemetery, North, and Randall lakes. These three lakes are essentially one large lake with three distinct basins (Figure 2). Collectively these lakes cover approximately 513 acres. Overall mean depth is 20 feet with a maximum depth of 35 feet. Hydraulic retention time in this system is approximately 35 days. The lake bottom consists mainly of marl which was historically dredged. The last marl mining operation in Cemetery, North, and Randall lakes ceased in 1937. As a result of these mining operations, steep drop-offs are common in this lake complex. Shoal areas were well vegetated with curly leaf pond weed and Eurasian milfoil rated as abundant. Approximately 30 percent of the shoreline is developed with both seasonal and permanent residences.

The next two basins are Morrison and Craig lakes (Figures 3 and 4). At 288 acres, Morrison is a relatively deep, open lake with a mean depth of 20 feet and a maximum depth of 46 feet. The substrates found in Morrison Lake are mainly sand and marl in shallow areas, below depths of 15 feet, fibrous peat and muck predominate. Aquatic vegetation found in Morrison Lake is considered to be moderately abundant and is predominantly Eurasian milfoil and coontail. Craig Lake covers approximately 122 acres and has average and maximum depths of 13 and 20 feet, respectively. In contrast to the open basin of Morrison Lake, Craig Lake contains

numerous islands and is mainly shallow shoal habitat. Aquatic vegetation in the lakes is abundant and primarily consists of coontail, Eurasian milfoil, and curly leaf pondweed. The substrates found in the lake include muck, sand, marl, and fibrous peat. The shoreline of Morrison Lake is heavily development with cottages and year-round residences nearly encompassing the lake. Craig Lake is less developed and has large expanses of marshy shoreline.

The lake chain receives inputs from the Coldwater River and the Sauk River (East Branch Coldwater River), which empty into South Lake; Cold Creek which enters North Lake from the east; and Miller Lake outlet which empties into the southern end of Morrison Lake. The majority of surface water inputs to the chain are the Coldwater River and the Sauk River. A common man-made connecting channel in their upper watersheds influences the flows of these tributaries. This channel was constructed to provide access to Coldwater Lake for the purpose of mining marl used in the manufacture of cement by a plant located at the north end of Marble Lake (MDNR 1981).

Due to the impacts of several historical point source discharges to the Chain-of-Lakes system, several water quality investigations were conducted during 1970-1980 by the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources (MDNR), United States Geological Survey, and others (MDNR 1981). These investigations reported highly enriched (eutrophic) conditions in the Cemetery, North, and Randall lakes complex. In general, lakes are considered eutrophic when total phosphorus and chlorophyll a concentrations exceed 20 μg/L and 12μg/L, respectively. Secchi depth readings provide an indirect measurement of productivity by measuring the depth sunlight penetrates the water column. Enriched waters are generally more turbid and commonly have Secchi depth readings of less than six feet. Available water quality information collected in Cemetery, North and Randall lakes during the above studies (USEPA STORET) reported limited Secchi depths (3 to 4 feet) and elevated concentrations of both total phosphorus (277 μg/L) and chlorophyll a (33 μg/L). Water quality conditions in the in downstream Morrison and Craig lakes were somewhat better, but still considered to be enriched with total phosphorus concentrations of 27 μg/L to 45 μg/L, maximum chlorophyll a concentrations 24 μg/L and Secchi depths ranging 5 to 7 feet. Total alkalinity readings throughout the lakes during these investigations ranged from 139 to 220 mg/l $CaCO_3$.

As a result of these water quality evaluations, point source inputs of nutrients and biological oxygen demanding pollutants from the Village of Quincy, Coldwater State Home, and Coldwater Rendering were eliminated in the early 1970s. All remaining discharges to the watershed are currently regulated by federal and state water quality standards. Water quality indicators such as increased Secchi depth and lower concentrations of total phosphorus, soluble reactive phosphorus and chlorophyll a were recently documented in a water quality study contracted by the City of Coldwater (LTI 1999). The investigators reported early spring and late summer total phosphorus and chlorophyll a concentrations in Randall Lake ranging from 17-20 μg/L and 11-21 μg/L, respectively. Secchi depth readings during the sampling period ranged from 6.3 to 7 feet. These data indicated past and current point source pollution control efforts have improved water quality throughout the Chain-of-Lakes. The sample data reported by LTI (1999) also suggested that the major source of nutrients to the system is now due to urban nonpoint sources. LTI (1999) also reported that agricultural lands (on which best management practices have been implemented through programs administered by the United State Department of Agriculture) contributed less phosphorus on an areal basis than lands where best management practices have not been employed.

The Randall Chain-of-Lakes are a very popular angling destination. Angling pressure is reported to be heavy during the summer and moderate during the winter fishing season. Public access to the lakes is provided by two state-owned launches. The Randall Lake access site is located three miles northwest of the City

of Coldwater on the northwest shore of the lake. The Craig Lake access site is located on the west shore 2 miles southeast of the town of Hodunk. Both sites offer parking for 20 vehicles and restroom facilities are available. In addition, lands administered by Branch County provide public access to Messenger Lake and South Lake.

Fishery Resource

The Michigan Department of Conservation conducted initial fishery surveys of South, Cemetery, North, Randall, and Morrison Lakes in 1927. However it was not until 1941 that complete fishery and mapping surveys of the entire lake chain were completed. Among the species of fish reported during the early surveys were longnose gar, spotted gar, bowfin, grass pickerel, northern pike, rock bass, green sunfish, pumpkinseed sunfish, warmouth, bluegill, largemouth bass, black crappie, hybrid sunfish, yellow perch, and several shiner and darter species. These surveys documented abundant populations of panfish and northern pike, and reported the fish to be in excellent condition. During 1934-1939 several species of warmwater fish including; bluegill, yellow perch, largemouth bass, and smallmouth bass; were stocked throughout the lake chain by the Department of Conservation. These stocking practices were discontinued in 1942 when research indicated the stocking of warmwater fish in lakes where they naturally occur was an ineffective management option (Cooper 1948).

Limited fisheries surveys of the chain were next conducted during 1960 and 1964-65. A 1960 seine survey of Cemetery, North and Randall lakes resulted in the catch of fast growing pumpkinseed sunfish, bluegill, black crappie, and yellow perch. Many young largemouth bass were also caught during this survey, indicating good recruitment of this species. In 1964-65 electrofishing equipment was used for the first time on Morrison, Craig, and South lakes. These surveys produced good numbers of bluegill and other panfish. Several other fish species previously reported in other surveys were also collected but in limited numbers. These electrofishing surveys also documented the first observations of common carp in Craig and Morrison lakes. Overall, the fishery in the Chain-of-Lakes was reported to be good to excellent with most fish species exhibiting growth rates equal to or greater than state averages.

The next major fishery survey of the Chain-of-Lakes occurred during May-June 1980. During this intensive survey 78 trap net lifts were made throughout the entire Chain-of-Lakes. Numerically the catch was dominated by bluegill with 5190 individuals (1190 pounds collected). The survey catch also included 1788 (630 pounds) black crappie and 39 (256 pounds) northern pike. Bullhead species also contributed a large proportion of the catch with 790 individuals (609 pounds) collected. Although largemouth bass and yellow perch were also represented in the catch, their numbers were limited by gear efficiency. For all the lakes, 76 percent of the bluegills and 74 percent of the black crappie were larger than the minimum size generally considered acceptable to anglers. A summary of this survey effort concluded that despite high angling pressure, the Randall Chain-of-Lakes continued to support healthy sport fish-panfish populations.

In June 1990, North, Cemetery, Randall, Morrison, and Craig lakes were surveyed using standard trap nets and experimental gill nets. Game species collected included northern pike, pumpkinseed sunfish, bluegill, black crappie, largemouth bass, and yellow perch. The catch also included one channel catfish, a species which had not previously been collected from this waterbody and may have been the result of an unpermitted private stocking. Consistent with the 1980 trap net survey, bluegills were numerically dominant and accounted for 64 percent of the total catch. Based on scale analysis, bluegill growth rates were equal to or slightly above the state average. Over 75 percent of the 861 bluegills collected were of acceptable size (6 inches). Black crappies were also well represented, with 199 individuals collected. Growth rates for most age classes were above state average and over 90 percent were acceptable size. Largemouth bass, yellow perch, and northern pike were also represented in the catch. Although limited in numbers,

growth rates for these species were reported to be equal to or above state averages.

The most recent fishery surveys of the Randall Chain-of-Lakes were conducted on North, Cemetery, Randall, Morrison, and Craig lakes during June-August 2000. Survey efforts included: six standard trap nets (6 foot x 3 foot with 1.5 inch mesh) and two 125-foot experimental gill nets on North, Cemetery and Randall lakes, four trap nets and one gill net on Morrison Lake and five trap nets and one gill net on Craig Lake. In addition, one hour of nighttime 250 volt DC electrofishing was conducted on each lake.

North, Cemetery, and Randall lakes

The fish community sample from North, Cemetery, and Randall lakes was similar to that reported in the 1980 and 1990 surveys. Sportfish collected included northern pike, pumpkinseed sunfish bluegill, largemouth bass, black crappie, and yellow perch. Because North, Cemetery and Randall lakes are essentially three distinct basins of one large lake, the catch data were pooled and the three lakes analyzed as a single waterbody (Table 1).

The bluegill was the most abundant species collected during this survey and accounted for 58 percent of the overall catch. Twenty two percent of the 1029 individuals collected were considered to be acceptable to anglers (6 inches). The addition of electrofishing gear accounted for the increased in the proportion of smaller individuals in the catch as compared with the 1980 surveys which employed trap nets only. Bluegill growth rates were at the state average (Table 2). Seven year classes (ages 0-6) were collected during the survey. The lack of older fish may be an indication of heavy fishing mortality (Table 3). Based on the Schneider (1990) Index for rating bluegill populations, this population received a score of 4.4 and an overall qualitative rating of good on a scale of 1 (poor) to 7 (excellent).

Black crappies were the second most abundant species in terms of number collected and comprised 10 percent of the catch by weight. Slightly over 60 percent were considered acceptable size. Growth rates of black crappie were slightly above the state average.

A total of 172 largemouth bass ranging from 2-14 inches representing seven age classes were collected (Table 1). These fish accounted for approximately 10 percent of the total catch by number and by weight. Legal sized bass accounted for less than 3 percent of the total collected. Scale analysis indicates poor growth rates in ages 1-4 and average growth rates for age 5 fish (Table 2). However, recruitment of these age classes appears to be consistent. The lack of legal-sized fish suggests larger bass are cropped as they are recruited into the fishery.

Yellow perch accounted for slightly less than six percent of the total catch. A total of 96 individuals ranging from 2 to10 inches were collected. Approximately 12 percent of the yellow perch collected were of acceptable size (7 inches). Age groups 2 and 3 were the most abundant indicating good recruitment (Table 3). All age groups exhibited slow growth with a mean growth index one full inch below the State average.

A total of five northern pike were collected during the survey. All individuals were legal size ranging in length from 29 to 39 inches and had a combined weight of 53 pounds. Recruitment appears limited based on the small number of fish collected and several missing age classes.

Other fish species collected included spotted gar, longnose gar, bowfin, common carp, golden shiner, redhorse sucker, brown bullhead, yellow bullhead, rock bass, green sunfish, pumpkinseed sunfish, warmouth, hybrid sunfish, and logperch, all of which have been reported in previous surveys. Collectively these species accounted for 18 percent of the catch by number and 68 percent by weight.

Morrison Lake

A total of eighteen species were collected in Morrison Lake during the 2000 survey (Table 4). Bluegills composed 71 percent of the total

catch, and were the most abundant species collected both by number and weight. Approximately 26 percent of the 1278 bluegills collected were of acceptable size. Six ages classes were represented in the sample and were considered to be growing at the state average rate (Table 5). Due to the relatively few individuals larger than 6 inches, the bluegill population in Morrison Lake received a Schneider Index rating of acceptable to average with an overall score of 3.4.

Largemouth bass were the second most abundant species in the catch. The majority of the largemouth bass collected were small. Few legal size individuals were collected and accounted for less than 3 percent of the catch. Scale analysis indicates the largemouth bass population as a whole is growing at the state average rate. However, the growth rate of age six individuals was nearly an inch below the state average.

Black crappie accounted for approximately 8 percent of the total catch with 140 individuals from 9 year classes collected. Fish growth analysis indicates black crappies in Morrison Lake were growing at the state average rate (Table 5).

Yellow perch accounted for less than 4 percent of the total catch. Although seven age classes were collected, ages 6 and 7 fish were absent from the sample. Of the 60 individuals collected, 20 percent were considered to be of acceptable size. Overall, yellow perch were growing at the state average rate and recruitment appeared to be stable (Table 6).

The six northern pike collected during the survey were all legal sized fish and ranged in length from 27 to 40 inches. Although only age 4 and 7 fish were collected, the survey was limited to one night of netting and therefore may not accurately reflect the age structure of the northern pike population.

Other species of fish collected during the Morrison Lake survey included: spotted gar, bowfin, common carp, common shiner, lake chubsucker, yellow bullhead, brown bullhead, green sunfish, pumpkinseed sunfish, warmouth, and logperch. These species are typically found in warmwater fish communities and have been reported in previous surveys.

Craig Lake

Similar to the findings in Morrison Lake, bluegill accounted for 70 percent of the catch by number and 30 percent of the total weight (Table 7). Although 1170 bluegills were collected, only 10 percent of the catch was considered to be of an acceptable length to anglers. Bluegill growth was determined to be slow, with ages 1 through 4 fish displaying less than average growth (Table 8). Using the Schneider Index, this bluegill population ranked between poor and acceptable with a score of 2.8.

A total of 128 largemouth bass ranging from 1-16 inches were collected and were the second most abundant species in the catch. While these fish accounted for approximately 8 percent of the Craig Lake fish sample, only 6 percent of the largemouth bass collected were legal fish. With the exception of age 4 individuals all year classes were growing slightly below the state average rates.

Black crappies were well represented in the survey with 93 individuals ranging from 4 to 11 inches collected. With the exception of 1996 year class recruitment appears to be stable (Table 9). Growth of black crappie was at, or slightly above, the state average rate.

The yellow perch collected from Craig Lake were similar to that of Morrison Lake. Yellow perch ranged from 3 to 11 inches in length and accounted for approximately 6 percent of the total catch. Of the 99 individuals collected, 20 percent were considered to be an acceptable size to anglers. Age 2 fish (average length 5.3 inches) accounted for 40 percent of the catch. Growth rates of yellow perch were less than state average for most age classes and considerably lower for age 7 individuals.

Four redear sunfish were collected in trap nets during the survey. This species was not historically stocked and was not reported in the 1990 Craig Lake fish collections. Redear

sunfish have been stocked in nearby Coldwater Lake since the 1950s. It is likely the Coldwater Lake population of redear sunfish spread to Craig Lake through the Coldwater River or Sauk River channels.

Northern pike in the Craig Lake collection was limited to two fish representing two age classes; age 4 (26 inched) and age 7 (37 inches). Again, due to the limit netting effort these data may not accurately reflect the age structure and abundance of the Craig Lake northern pike population.

Other fish species reported in the Craig Lake collection were similar to those reported for Randall and Morrison lakes and included: spotted gar, bowfin, common carp, golden shiner, yellow bullhead, green sunfish, pumpkinseed sunfish, warmouth, hybrid sunfishes, and logperch.

Overall, the fish community in the Randall Chain-of-Lakes is diverse and appears to provide a good recreational fishery. With the exception of predatory sport fishes, most sought-after species displayed good recruitment and fair growth rates. Historically these lakes have had a reputation for supporting good bluegill, black crappie, yellow perch, and northern pike populations. Angler reports and recent fisheries survey data indicated bluegills are heavily targeted while black crappies appear to receive less angling pressure. Throughout the Randall Chain-of-Lakes largemouth bass displayed slow growth rates and northern pike recruitment was low. In addition to the Randall Chain-of Lakes, the nearby Coldwater-Marble Chain-of-Lakes offers a wide variety of excellent recreational fishing opportunities making the Coldwater area a popular angling destination.

Management Direction

The results of the 2000 fishery surveys documented that the Randall Chain-of-Lakes continue to support relatively diverse fish communities. Recommended management of the lake chain should focus on maintaining self-sustaining populations of naturally occurring fish species. Management efforts should include protection of the remaining natural shoreline, adjacent riparian wetlands, and shallow water habitats unaltered by the historical marl mining operations. Due to the limited number of northern pike collected during the 2000 surveys, future fisheries surveys should be conducted in the early spring to provide better information on the status of this historically important species. Finally, continued efforts to improve and protect water quality through reductions in nonpoint source pollutant loadings in the Sauk River and Coldwater River watersheds should be fully supported.

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Table 1.–Number, weight, and length of fish collected from North, Cemetery, and Randall lakes with trap nets, gill nets, and DC boomshocker, May and August, 2000.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (in)[1]	Average length (in)	Percent legal size[2]
Black crappie	216	12.3	72.0	10.0	1-12	7.9	60(7")
Bluegill	1029	58.6	84.1	11.7	0-8	4.3	22(6")
Bowfin	7	0.4	31.5	4.4	18-27	22.9	100
Brown bullhead	20	1.1	18.6	2.6	3-14	12.3	95
Common carp	36	2.1	323.9	45.1	20-30	26.9	100
Golden shiner	33	1.9	3.4	0.5	6-8	6.9	100
Green sunfish	1	0.1	0.1	0.0	4-4	4.5	0
Hybrid sunfish	28	1.6	6.2	0.9	4-8	6.5	68(6")
Largemouth bass	172	9.8	68.0	9.5	1-14	8.9	3(14")
Logperch	29	1.7	0.4	0.1	1-4	3.2	100
Longnose gar	1	0.1	1.4	0.2	25-25	25.5	100
Northern pike	6	0.3	52.9	7.4	29-39	22.6	100(24")
Pumpkinseed	17	1.0	3.0	0.4	4-7	5.9	53(6")
Redhorse sucker spp.	11	0.6	6.7	0.9	8-14	11.7	100
Rock bass	1	0.10	0.5	0.1	8-8	8.5	100(6")
Spotted gar	5	0.3	8.4	1.2	20-25	23.5	100
Warmouth	8	0.5	2.9	0.4	6-8	7.6	100
Yellow bullhead	39	2.2	28.0	3.9	2-13	11.1	100
Yellow perch	96	5.5	6.9	1.0	1-10	5.7	13(7")
Total	1755	100	718.6	100.0			

[1] Note some fish were measured to 0.1 inch, others to inch group: e.g., "5"=5.0 to 5.9 inch, "12"=12.0 to 12.9 inches: etc.

[2] Percent legal size or acceptable size for angling. Legal size or acceptable size for angling is given in parentheses.

Table 2.–Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from North, Cemetery, and Randall lakes with trap nets, gill nets, and DC boomshocker, May and August, 2000. Number of fish aged is given in parentheses.

Species	Age 1	2	3	4	5	6	7	8	9	10	Mean Growth Index[1]
Black crappie	1.3 (1)	5.8 (23)	7.9 (19)	9.4 (4)	10.2 (9)	10.8 (13)	11.1 (4)	11.9 (5)	---	12.0 (1)	+0.4
Bluegill	0.9 (11)	2.2 (18)	4.8 (35)	7.0 (12)	7.4 (4)	8.2 (4)	---	---	---	---	-0.4
Largemouth bass	2.0 (13)	5.5 (27)	8.7 (25)	10.7 (13)	13.2 (11)	14.5 (3)	14.6 (1)	---	---	---	-1.1
Northern pike	---	---	29.5 (1)	---	---	29.3 (2)	37.9 (2)	---	34.1 (1)	---	---
Pumpkinseed	---	---	4.7 (5)	5.7 (1)	---	---	---	---	---	---	-0.2
Yellow perch	2.1 (6)	3.8 (14)	5.5 (22)	7.3 (9)	8.0 (3)	7.1 (1)	---	---	---	---	-1

[1] Mean growth index is the average deviation from the state average length at age.

Table 3.–Estimated age frequency (percent) of fish caught from North, Cemetery, and Randall lakes with trap nets, gill nets, and DC boomshocker, May and August 2000.

Species	Age 1	2	3	4	5	6	7	8	9	10	Number aged
Black crappie	1	29	24	5	11	16	5	6	---	1	79
Bluegill	13	21	42	14	5	5	---	---	---	---	84
Largemouth bass	14	29	27	14	12	3	1	---	---	---	93
Northern pike	---	---	17	---	---	33	33	---	17	---	6
Pumpkinseed	---	---	5	1	---	---	---	---	---	---	6
Yellow perch	11	25	40	16	5	2	---	---	---	---	55

Table 4.–Number, weight, and length of fish collected from Morrison Lake with trap nets, gill nets, and DC boomshocker, June and July, 2000.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (in)[1]	Average length (in)	Percent legal size[2]
Black crappie	140	7.8	32.5	9.0	5-13	7.0	33 (7”)
Bluegill	1278	71.1	123.6	34.2	1-8	4.8	26 (6”)
Bowfin	4	0.2	18.6	5.1	20-27	23.3	100
Brown bullhead	4	0.2	18.6	0.9	9-13	11.8	100
Common carp	1	0.1	9.4	2.6	27-27	27.5	100
Golden shiner	8	0.4	0.8	0.2	1-7	6.4	100
Grass pickerel	1	0.1	0.3	0.1	11-11	11.5	100
Green sunfish	2	0.1	0.5	0.1	6-7	7	100
Hybrid sunfish	20	1.1	4.8	1.3	5-8	6.8	85 (6”)
Lake chubsucker	5	0.3	1.1	0.3	6-7	7.3	100
Largemouth bass	149	8.3	74.0	20.5	1-14	9.2	3 (14”)
Logperch	30	1.7	0.4	0.1	2-4	3.4	100
Northern pike	6	0.3	50.1	13.8	27-40	32.5	100 (24”)
Pumpkinseed	45	2.5	7.8	2.1	4-7	5.9	44 (6”)
Spotted gar	2	0.1	1.7	0.5	13-22	18.0	100
Warmouth	7	0.4	2.0	0.5	5-8	6.9	86
Yellow bullhead	36	2.0	24.7	6.8	6-14	11.1	97
Yellow perch	60	3.3	6.4	1.8	1-10	5.6	20 (7”)
Total	1798	100.0	361.6	100.0			

[1] Note some fish were measured to 0.1 inch, others to inch group: e.g., “5”=5.0 to 5.9 inch, “12”=12.0 to 12.9 inches: etc.

[2] Percent legal size or acceptable size for angling. Legal size or acceptable size for angling is given in parentheses.

Table 5.–Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Morrison Lake with trap nets, gill nets, and DC boomshocker, June and July 8-31, 1995. Number of fish aged is given in parentheses.

Species	Age 1	2	3	4	5	6	7	8	9	10	Mean Growth Index[1]
Black crappie	---	6.1 (23)	8.0 (16)	9.7 (5)	10.2 (5)	11.1 (4)	11.1 (3)	11.7 (1)	---	---	+0.3
Bluegill	2.2 (9)	3.7 (9)	5.2 (23)	6.4 (16)	7.5 (7)	8.3 (4)	---	---	---	---	0.0
Largemouth bass	5.8 (23)	8.6 (25)	10.6 (23)	12.7 (5)	13.3 (9)	14.6 (6)	---	---	---	---	0.0
Northern pike	---	---	---	28.4 (2)	---	---	34.4 (4)	---	---	---	---
Pumpkinseed	---	5.1 (3)	6.0 (16)	5.6 (5)	7.3 (1)	---	---	---	---	---	+0.3
Yellow perch	3.6 (14)	5.3 (22)	6.8 (4)	8.7 (8)	8.7 (3)	---	---	10.4 (1)	---	---	0.0

[1] Mean growth index is the average deviation from the state average length at age.

Table 6.–Estimated age frequency (percent) of fish caught from Morrison Lake with trap nets, gill nets, and DC boomshocker, June and July 2000.

Species	Age 0	1	2	3	4	5	6	7	8	9	10	Number aged
Black crappie	---	---	39	27	8	8	7	5	2	2	1	59
Bluegill	---	13	13	34	24	10	6	---	---	---	---	68
Largemouth bass	7	23	26	23	5	9	6	---	---	---	---	98
Northern pike	---	---	---	---	33	---	---	67	---	---	---	6
Pumpkinseed	---	---	12	64	20	4	---	---	---	---	---	25
Yellow perch	9	25	39	7	14	5	2	---	---	---	---	57

Table 7.–Number, weight, and length of fish collected from Craig Lake with trap nets, gill nets, and DC boomshocker, June and August, 2000.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (in)[1]	Average length (in)	Percent legal size[2]
Black crappie	93	5.6	31.2	12.5	4-11	7.9	52 (7”)
Bluegill	1170	70.0	69.3	27.7	0-7	4.0	10 (6”)
Bowfin	3	0.2	10.6	4.2	20-22	21.5	100
Common carp	2	0.1	18.8	7.5	27-27	27.5	100
Golden shiner	20	1.2	2.5	1.0	5-8	7.3	100
Green sunfish	1	0.1	0.1	0.0	4-4	4.5	100
Hybrid sunfish	30	1.8	5.1	2.0	4-7	6.0	50 (6”)
Largemouth bass	128	7.7	53.9	21.6	1-16	8.3	5 (14”)
Logperch	14	0.8	0.2	0.1	1-4	3.5	100
Northern pike	2	0.1	16.5	6.6	26-37	32.0	100 (24”)
Pumpkinseed	59	3.5	8.2	3.3	3-7	5.4	25 (6”)
Redear sunfish	4	0.2	3.1	1.2	7-10	9.8	100 (6”)
Spotted gar	3	0.2	1.6	0.7	12-18	16.5	100
Warmouth	5	0.3	1.3	0.5	4-8	6.7	80
Yellow bullhead	38	2.3	16.3	6.5	1-12	9.0	84
Yellow perch	99	5.9	11.3	4.5	3-11	6.0	20 (7”)
Total	1671	100.0	250	100.0			

[1] Note some fish were measured to 0.1 inch, others to inch group: e.g., “5”=5.0 to 5.9 inch, “12”=12.0 to 12.9 inches: etc.

[2] Percent legal size or acceptable size for angling. Legal size or acceptable size for angling is given in parentheses.

Table 8.–Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Craig Lake with trap nets, gill nets, and DC boomshocker, June and August, 2000. Number of fish aged is given in parentheses.

Species	Age 1	2	3	4	5	6	7	8	9	10	Mean Growth Index[1]
Black crappie	---	5.9 (24)	8.1 (13)	9.1 (6)	10.3 (9)	11.2 (10)	11.2 (3)	11.4 (1)	---	---	+0.2
Bluegill	2.0 (14)	3.3 (13)	4.5 (16)	6.1 (20)	7.3 (6)	---	---	---	---	---	-0.4
Largemouth bass	5.0 (23)	8.0 (29)	10.5 (20)	12.1 (9)	13.1 (6)	14.4 (3)	15.5 (1)	16.1 (1)	---	---	-0.3
Northern pike	---	---	---	26.3 (1)	---	---	37.0 (1)	---	---	---	---
Pumpkinseed	---	4.2 (12)	5.5 (16)	6.3 (4)	6.9 (2)	7.1 (3)	7.0 (1)	---	---	---	+0.2
Yellow perch	3.5 (5)	5.3 (22)	7.0 (8)	7.7 (8)	8.8 (4)	8.5 (7)	9.7 (1)	---	---	---	-0.4

[1] Mean growth index is the average deviation from the state average length at age.

Table 9.–Estimated age frequency (percent) of fish caught from Craig Lake with trap nets, gill nets, and DC boomshocker, June and August 2000.

Species	Age 0	1	2	3	4	5	6	7	8	9	10	Number aged
Black crappie	---	---	36	20	9	14	15	5	2	---	---	66
Bluegill	9	18	17	21	26	8	---	---	---	---	---	76
Largemouth bass	4	24	30	21	9	6	3	1	1	---	---	96
Northern pike	---	---	---	---	50	---	---	50	---	---	---	2
Pumpkinseed	---	---	32	42	11	5	8	3	---	---	---	38
Yellow perch	---	9	40	15	15	7	13	2	---	---	---	55