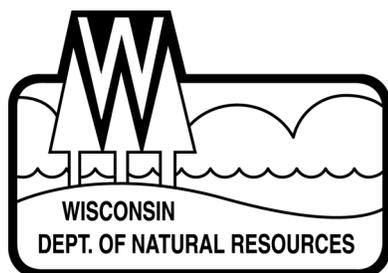


Comprehensive Fisheries Survey of Emma Lake, Oneida County Wisconsin during 2012.

Waterbody Identification Code 983500



John Kubisiak
Senior Fisheries Biologist
Rhinelanders
April, 2013



Your purchase of fishing equipment
and motor boat fuel supports boating
access and Sport Fish Restoration.

Comprehensive Fisheries Survey of Emma Lake, Oneida County Wisconsin during 2012.

John Kubisiak
Senior Fisheries Biologist
April, 2013

EXECUTIVE SUMMARY

A comprehensive fisheries survey was conducted in Emma Lake during spring and fall, 2012. We found good numbers of northern pike and largemouth bass and lower numbers of muskellunge and smallmouth bass. There was a remnant walleye population from stocking in 1999 and 2001 (population estimate, PE = 0.4 adults per acre). Panfish species were abundant, with low to moderate size structure. We found high catches of bluegill, moderate catches of black crappie pumpkinseed and yellow perch and lower catches of bluegill x pumpkinseed hybrids and yellow bullhead. Non-game species in the catch include golden shiner, johnny darter and white sucker. We did not capture any rock bass, although they were second only to bluegill in a June, 1962 survey. I recommend continuing to manage Emma Lake for a diverse fishery including stocked muskellunge, northern pike, largemouth bass and panfish.

Lake and location:

Emma Lake, south-central Oneida County, T36N R08E Section 21. Emma Lake is in the town of Crescent, about 2/3 mile south of Rhinelander city limits. Emma is part of the Upper Wisconsin River watershed. It is listed as a seepage lake, but an unnamed, intermittent stream (not marked on the topographic map) drains west to Crescent Creek.

Physical/Chemical attributes (Andrews and Threinen 1966):

Morphometry: 223 acres with maximum depth of 17 feet.

Watershed: 1.5 square miles, including 148 acres of adjoining wetlands.

Lake type: Listed as a seepage lake, but stream outflow suggests spring lake.

Basic water chemistry: Very soft – alkalinity 7 mg/l, conductance 20 μ mhos.

Water clarity: Light brown water of low transparency.

Littoral substrate: 65% sand, 25% muck and some gravel and rubble.

Aquatic vegetation: dense in some areas. Watershield rings most of the lake.

Winterkill: none.

Boat landing: gravel ramp with parking for two vehicles with trailers and one additional vehicle.

Other features: Shoreline 70% upland with a coniferous bog wetland adjoining part of the lake.

Purpose of Survey: Assess status of game and panfish species and develop management recommendations.

Dates of fieldwork: Walleye netting, March 21 – 26 2012. Panfish netting, May 29 – June 1 2012. Electrofishing March 28, April 20, May 16, May 23, May 30 and September 13, 2012.

BACKGROUND

Six fyke nets were fished for 4 nights around June 29, 1962 (likely Monday, June 24 through Friday, June 29, 1962) for a total of 24 net-nights. Catch per net-night included 0.54 walleye and 0.0625 smallmouth bass. Bluegill were the most abundant panfish (1.0 per net-night), followed by rock bass (0.83). There were low catches of “sunfish,” perch and crappie, while shiners, bullheads, suckers and crayfish were listed as present and snapping turtles were listed as common. (Morehouse 1962).

Fall electrofishing surveys were conducted in 1995, 99, 2000, 01 and 02. The 1995 survey captured 3 adult walleye (18.0 to 24.9 inches), 18 largemouth bass (2.5 to 17.9 inches), 4 smallmouth bass (10.4 to 16.9 inches) and 8 northern pike (16.0 to 25.9 inches). After 11,150 1.3-inch walleye were stocked on June 18, 1999, no gamefish were captured in fall of 1999 or 2000. However, northern pike and largemouth bass were listed as “common” and walleye were listed as “present” in 2000, so it is likely that only juvenile walleye were targeted in those surveys. Following 11,150 1.6-inch walleye stocked in 2001, 5.1 yoy walleye per mile were captured in 2001 and 0.98 age-1 walleye per mile were captured in 2002. Walleye stocking was discontinued after 2001 due to the low fall catches.

METHODS

The ice went out on March 20, 2012, and 6 standard fyke nets (¾-inch mesh, bar measure) were set on March 21. These nets targeted walleye and northern pike. The nets were pulled on March 26, and effort totaled 30 net-nights. Four standard ¾-inch nets (except one 3/8-inch mesh was set to target smaller fish) targeting panfish were set May 29 and pulled June 1 for a total of 12 net-nights.

An electrofishing boat using alternating current was used to collect gamefish along the entire shoreline on March 28, April 20, and May 16, 23 and 30, 2012. The shoreline was also electrofished on September 13, 2012, targeting juvenile gamefish (reported separately).

Length or length category (nearest half-inch) was recorded for all gamefish and for panfish in May. Adult gamefish captured in spring were given a left-ventral fin clip and juveniles were given a top-tail clip for use in mark-recapture population estimates. Age structures (scales or spines) were removed from ten fish per species, per half-inch group.

RESULTS AND DISCUSSION

Walleye

During walleye netting, 65 walleye were captured in 5 nights, including 12 recaptures, at a rate of 2.1 walleye per net night (Table 1). The electrofishing sample on March 28 yielded 42 walleye (11.3 fish per mile), including 12 recaptures. Adult walleye showed large size centered on about 23 inches (Figure 1).

The mark-recapture population estimate of 81 adult walleye (± 12 SD), or 0.4 per acre, is undoubtedly low, given that a cumulative 73 walleye were handled by the end of the survey. The second electrofishing run on April 20 generates an estimate of 132 adult walleye (± 30 SD), or 0.6 per acre. It is likely the true number is somewhere between these two values. The most common ages we assigned are 9 and 10 (Appendix A), likely representing under-aging of 11-year-old fish stocked in 2001. Under-aging of older fish is a common problem with walleye scale ages (Erickson 1983). The low population estimates and the absence of walleye less than 20 inches in length reflect a remnant population from stocking over a decade ago (Table 2).

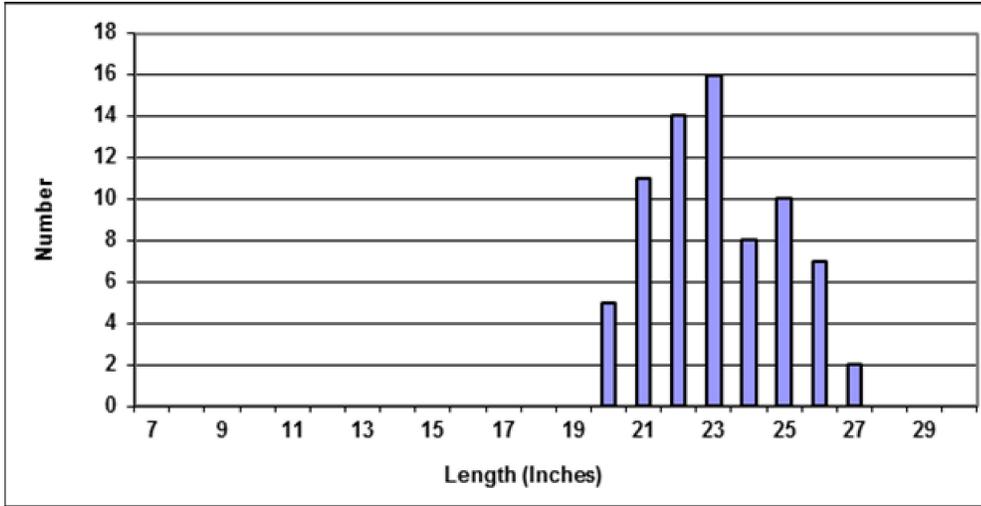
Table 1. Catch per unit effort during a 2012 survey of Emma Lake, Oneida County WI. Netting catch rates are reported as number of fish per net night, while electrofishing catch rates are number of fish per mile of shoreline. Blank cells during shocking runs indicate a species was not targeted.

species	walleye netting	March 28 shocking	April 20 shocking	May 16 shocking	May 23 shocking	May 30 shocking	panfish netting
walleye	2.1	4.6	4.6	0	0.24	0.24	0.25
largemouth bass	0.23	2.2	5.9	10.5	4.4	6.6	0.42
smallmouth bass	0.37	0	1.9	2.7	0.73	0.73	0
muskellunge	0.43	1.5	1.7	0.49	0.24	0.49	0
northern pike	1.7	1.9	4.9	4.4	2.7	2.9	0.17
black crappie	16.7						13.3
bluegill	74.5						75.3
hybrid bluegill x pumpkinseed	1.5						0.42
golden shiner	0.53						1.6
johnny darter	0	present					0
pumpkinseed	15.6						12.1
white sucker	0.57						0
yellow bullhead	0.17						0.83
yellow perch	10.1						0.83

Table 2. Fish stocking record during 1975 through 2012 in Emma Lake, Oneida County Wisconsin.

Year	Species	Size	Number	Comments
1975	walleye	sm fingerling	6,000	
1976	muskellunge	lg fingerling (12 inch)	400	
1977	walleye	lg fingerling (3 inch)	35,000	
1983	walleye	lg fingerling (3 inch)	11,000	
1990	walleye	sm fingerling (2 inch)	11,160	
1999	walleye	sm fingerling (1.3 inch)	11,150	
2001	walleye	sm fingerling (1.6 inch)	11,150	
2003	muskellunge	lg fingerling (12.5 inch)	223	Musky Clubs Alliance
2005	muskellunge	lg fingerling (11.5 inch)	223	Musky Clubs Alliance
2007	muskellunge	lg fingerling (12 inch)	223	Musky Clubs Alliance
2010	muskellunge	lg fingerling (12 inch)	223	Musky Clubs Alliance
2011	muskellunge	lg fingerling (10 inch)	220	Musky Clubs Alliance

Figure 1. Length-frequency of adult walleye during 2012 in Emma Lake, Oneida County WI.



Largemouth and Smallmouth Bass

We captured 124 largemouth bass during spring sampling, including only 9 recaptures of previously-marked fish and 21 fish less than 8 inches in length. The largemouth population (including all fish over 8 inches) is unable to be estimated with precision, but estimates range from 1.0 to 2.3 adults per acre, depending on which recapture sample is used. Largemouth showed a broad range of sizes with average adult length (including fish 8 inches and larger) of 14.1 inches (Figure 2). The longest largemouth was 20.1 inches; 37% of adults were 14 inches and larger, while 5.8% were 18 inches and larger. Both species of bass were growing close to average, with largemouth length-at-age slightly ahead and smallmouth about ½ year behind average (Appendix A).

Thirty-six smallmouth bass were captured during the survey (including 3 recaptures). Average adult length was 13.3 inches. The largest smallmouth was 19.3 inches; 43% were 14 inches and larger, while 3.6% were at least 18 inches (Figure 3).

Figure 2. Length-frequency of adult largemouth bass during 2012 in Emma Lake, Oneida County Wisconsin.

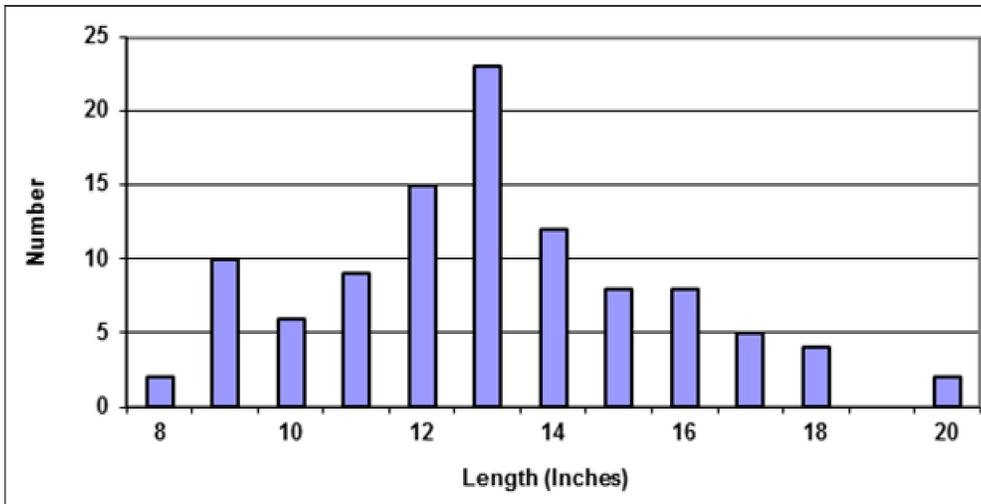
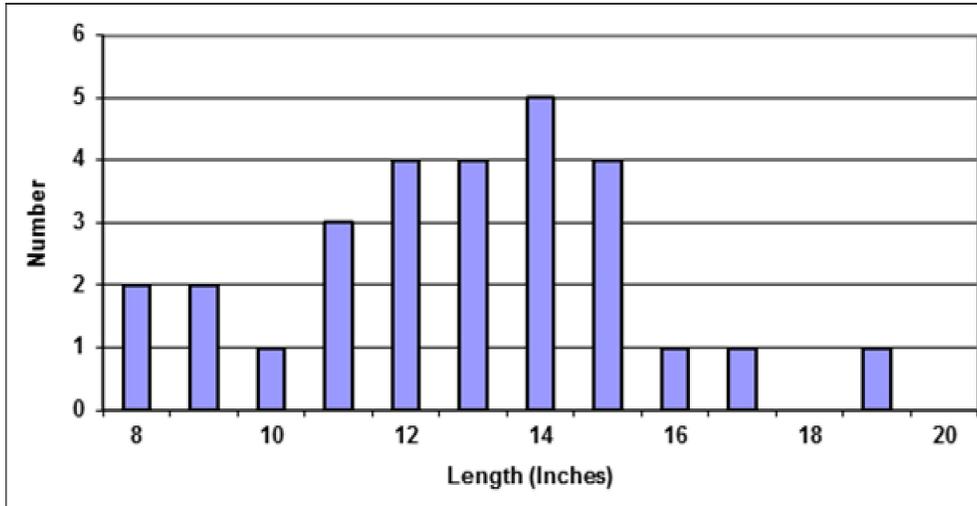


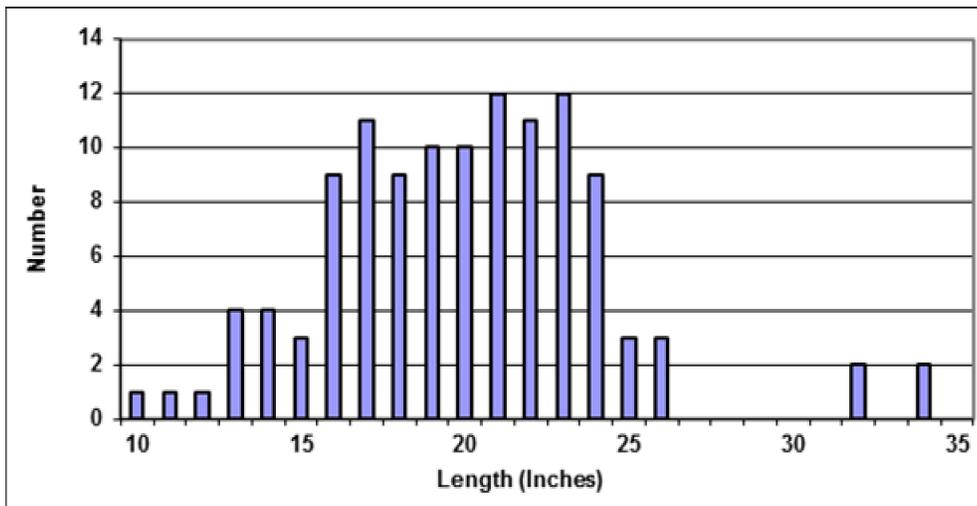
Figure 3. Length-frequency of adult smallmouth bass during 2012 in Emma Lake, Oneida County Wisconsin.



Northern Pike

We captured 123 northern pike (including 5 recaptures of previously-marked fish and 1 immature fish less than 12 inches in length). Most northern pike ranged broadly in size from 16 to 25 inches, with an average length of 20.5 inches; 5.9% of pike were 26 inches or larger and 3.4% exceeded 30 inches (Figure 4). The largest northern pike was a 34.4 inch female. Growth of male pike was about average for the region, while females were a little ahead of average (Appendix A).

Figure 4. Length-frequency of northern pike during 2012 in Emma Lake, Oneida County Wisconsin.

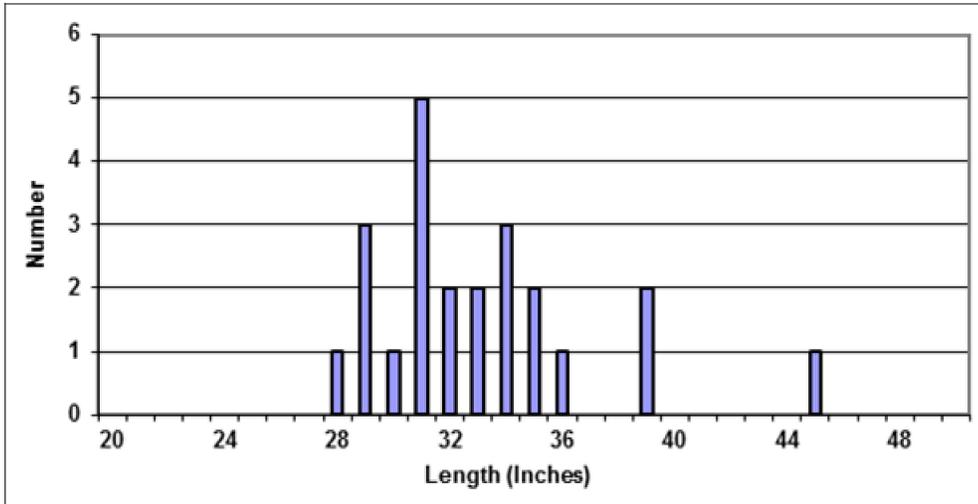


Muskellunge

Muskellunge come in to spawn later than the pike and walleye, and targeted muskellunge netting was not performed on Emma. We captured 31 muskellunge during the survey, including 5 recaptures of previously-marked fish and 3 immature fish. Adult muskellunge ranged from 28.4 to 45.7 inches in length (Figure 5). Muskellunge have been stocked in Emma Lake by Musky Clubs Alliance of Wisconsin in odd-numbered years since 2003 (except 2009 was missed and the quota

was stocked in 2010, Table 2). In Northern Wisconsin, average length of a 9-year-old male muskellunge is about 35.8 inches in length, while age-9 females average 39.5 inches, so it is not surprising after 9 years of stocking that all the muskellunge except one were less than 40 inches in length.

Figure 5. Length-frequency of adult muskellunge during 2012 in Emma Lake, Oneida County WI.



Panfish

Emma has moderate depth and low fertility with extensive beds of aquatic vegetation. These conditions result in fairly high panfish abundance. Crappie and yellow perch catch is normally highest during early netting periods, while bluegill and pumpkinseed catch is high later. However, on Emma the catch of panfish other than perch was remarkably consistent during both netting periods. We found high net catches of bluegill, moderate catches of black crappie, pumpkinseed and yellow perch, and lower numbers of bluegill x pumpkinseed hybrids and yellow bullhead (Table 1). No rock bass were encountered during the survey, although 0.8 per net night were captured in 1962 (Morehouse, 1962).

Bluegill size showed a broad peak from 4.5 to 7 inches, with few fish over 7 (Figure 6). Bluegill growth was about 1-2 years behind average, while pumpkinseed length-at-age was about a year behind (Appendix A). Black crappie growth was right about average, with a yearclass of age-2 fish coming up at 5 inches, along with good numbers of 7 to 10-inch fish that were mostly ages 3 to 5 (Figure 8). Yellow perch were growing slowly, with a strong peak of 4- and 5-year-old fish at about 5.5 inches (Figure 9). Abundant smaller yellow perch, small enough to swim through the ¾ inch mesh fyke nets, were noted during electrofishing surveys.

Figure 6. Length-frequency of bluegill during 2012 in Emma Lake, Oneida County Wisconsin.

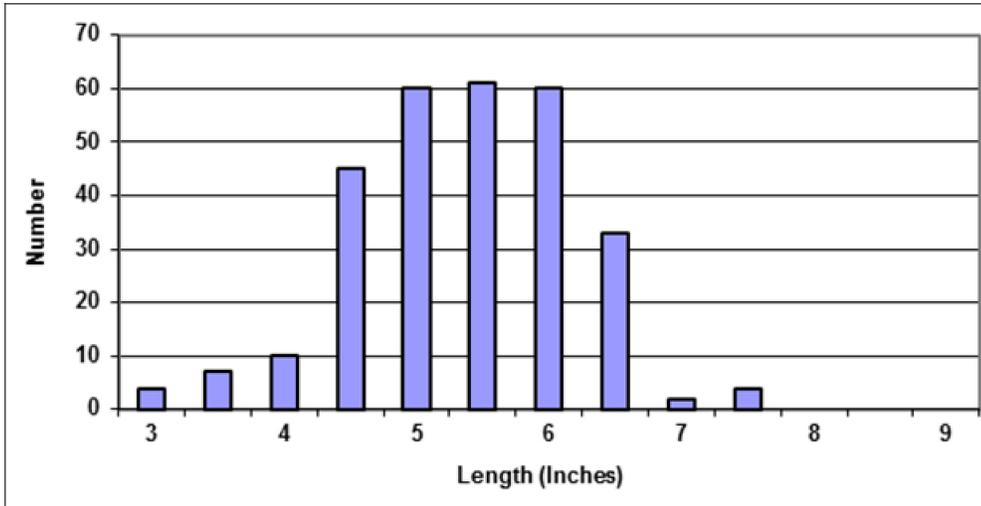


Figure 7. Length-frequency of pumpkinseed during 2012 in Emma Lake, Oneida County WI.

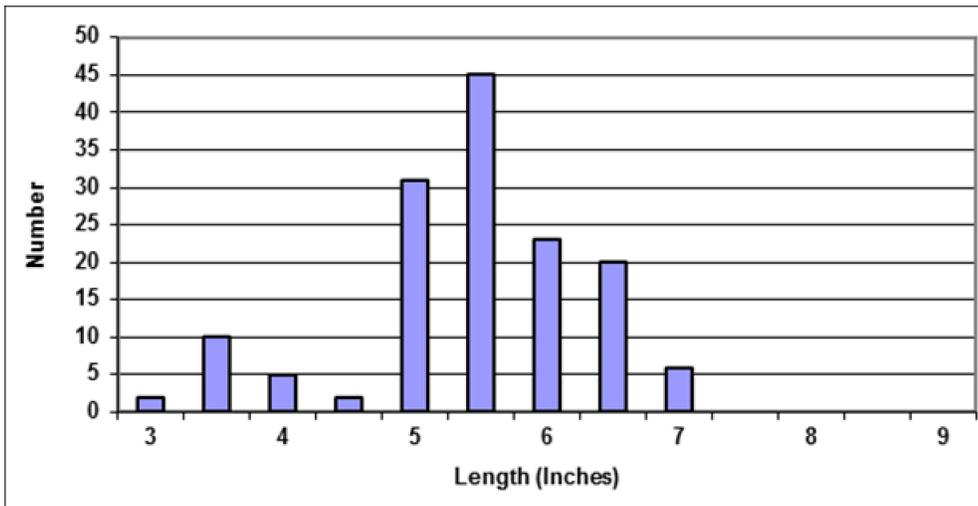


Figure 8. Length-frequency of black crappie during 2012 in Emma Lake, Oneida County WI.

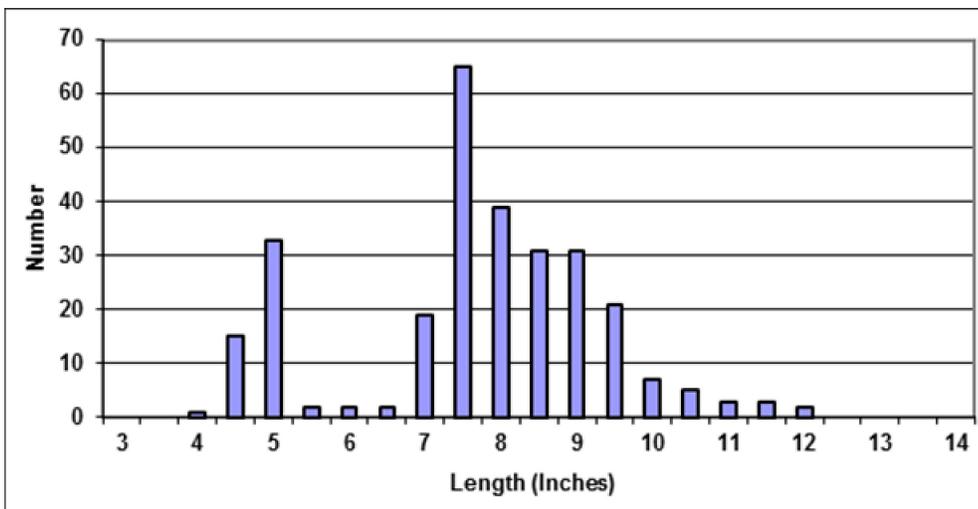
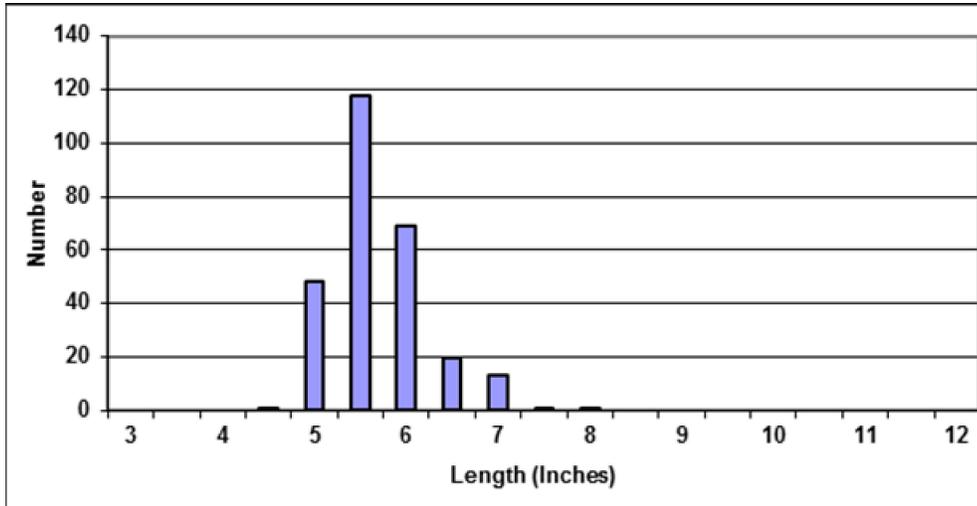


Figure 9. Length-frequency of yellow perch during 2012 in Emma Lake, Oneida County WI.



MANAGEMENT RECOMMENDATIONS

Emma Lake supports a diverse fishery. Northern pike and largemouth bass are the dominant gamefish, with lower numbers of smallmouth bass and stocked muskellunge. A remnant walleye population is a product of stocking just over a decade ago. Gamefish growth rates were around average for the region, and size structure was excellent. Bluegill dominated the panfish catch, followed by black crappie, pumpkinseed and yellow perch. Hybrid bluegill x pumpkinseed and yellow bullhead were also present, with non-game species including golden shiner, johnny darter and white sucker. Growth rates and size were relatively poor on most panfish, but multiple yearclasses of black crappie were growing well and 27% of crappie were over 9 inches in length. Emma should continue to be managed with largemouth bass and northern pike as the dominant game species. Given the soft water and dense vegetation, it may not be possible to improve panfish growth rates, but strong predator populations are a step in the right direction.

ACKNOWLEDGEMENTS

Steve Timler and I supervised the field work for this survey. Jeff Blonski, Aaron Nelson and Mike Vogelsang assisted on the water. Mike Coshun calculated the walleye and largemouth bass population estimates.

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Cover image courtesy of Oneida County website. www.co.oneida.wi.gov

APPENDIX A FISH AGE RESULTS

An age-length key was created from the aged subsample and applied against the full length-frequency to estimate averages.

Table A.1. Male walleye length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
8	1	20.7	17.6
9	8	22.3	18.7
10	10	21.9	19.2
11	5	23.1	19.4
12	3	22.2	20.0
13	1	22.3	

Table A.2. Female walleye length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
8	8	24.1	21.0
9	13	25.0	22.5
10	5	26.7	23.5
11	1	24.0	24.7
12	2	25.5	25.4
13			26.5

Table A.3. Largemouth bass length at age in Julia Lake, Oneida County Wisconsin during 2012 and 2009.

Age	Number of fish	avg. length	Northern WI avg.
1	4	4.0	3.5
2	7	7.0	6.6
3	9	8.8	8.9
4	14	10.9	10.5
5	19	13.2	12.1
6	15	14.1	13.6
7	4	16.5	14.9
8	1	16.2	15.8
9	5	16.9	16.2
10	6	18.8	17.1
11	1	15.7	17.8
12	1	15.9	18.2

Table A.4. Smallmouth bass length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
1			3.5
2	4	6.2	6.9
3	3	8.9	9.3
4	4	10.8	11.8
5	8	12.6	13.5
6	6	14.7	15.2
7	4	15.8	16.1
8	1	19.3	17.1
9			17.7
10			18.3
11			18.5
12			19.8

Table A.5. Male northern pike length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
2	1	9.9	13.4
3	2	17.3	16.2
4	11	19.7	18.9
5	4	20.2	20.6
6			22.3
7	2	23.2	23.4
8	2	24.1	24.8
9	3	22.0	23.9

Table A.6. Female northern pike length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
2			
3	2	22.6	16.9
4	11	22.1	20.4
5	12	21.4	23.1
6	3	19.7	24.4
7	1	32.1	27.3
8	1	34.4	28.8
9	1	34.4	32.1

Table A.7. Male muskellunge length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
5	1	28.4	29.2
6	6	31.0	31.5
7	5	32.8	33.3
8	2	34.2	34.4
9	1	34.5	35.8
10	3	35.3	37.3
11			37.9

Table A.8. Female muskellunge length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
5			31.9
6	2	42.6	33.7
7			35.8
8			38.1
9			39.5
10			41.0
11			43.2

Table A.9. Bluegill length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
2	5	3.3	3.9
3	7	3.7	5.0
4	14	4.7	6.2
5	27	5.5	6.8
6	17	6.2	7.8
7	5	6.6	8.2
8			8.7
9	2	7.7	8.7

Table A.10. Pumpkinseed length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
2			3.6
3	15	3.7	4.8
4	4	5.1	5.7
5	35	5.8	6.5
6	10	6.4	6.8
7	1	7.3	7.3

Table A.11. Black crappie length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
2	23	5.1	5.3
3	14	7.5	7.1
4	26	8.1	9.0
5	32	9.4	10.0
6	6	11.1	10.7
7	5	11.6	11.6

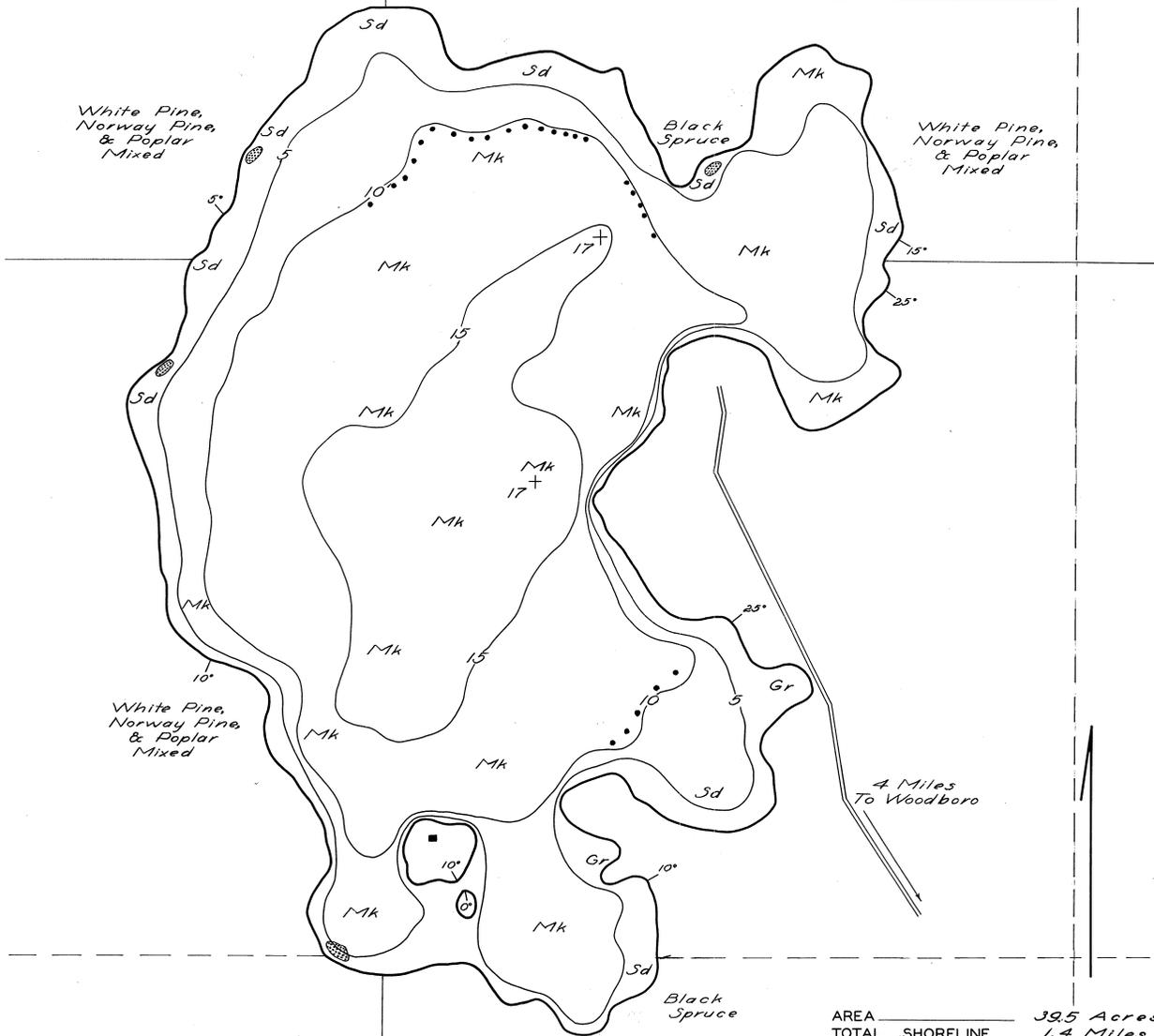
Table A.12. Yellow perch length at age in Julia Lake, Oneida County Wisconsin during 2012.

Age	Number of fish	avg. length	Northern WI avg.
2			4.6
3	5	5.6	6.0
4	26	5.9	6.9
5	25	6.3	7.9
6			9.0
7			9.9

WISCONSIN CONSERVATION DEPARTMENT
 BIOLOGY DIVISION
 LAKE AND STREAM IMPROVEMENT SECTION

LAKE SURVEY MAP

LAKE EMMA
 SECTION 21
 TOWNSHIP 36 N
 RANGE 8 E
 TOWN OF WOODBORO
 COUNTY ONEIDA



AREA 395 Acres
 TOTAL SHORELINE 1.4 Miles
 MAX. DEPTH 17 Feet

SCALE 1" = 165'
 0 200 400 500 Ft

DATE January 31, 1940
 COMPILED BY E.M.B. C.C.C.
 TRACED BY T.L.B. C.C.C.
 SOURCE OF INFORMATION Lake Survey Project
C.C.C. Camp Tomahawk
WPA Lake Improvement project
 SOUNDINGS 200' Intervals

 DATES OF MAP REVISION _____
 WORK AGENCY C.C.C. & WPA

LAKE IMPROVEMENT RECORD

TYPE	DATE	1940	1959	
• BRUSH REFUGES		37	26	
w SAPLING TANGLES		91		
□ SPAWNING BOXES		14		
* MINNOW SPAWNERS		73		
TOTAL		215	26	

W.P.A.

LEGEND
 ● WEED BEDS
 ○ ROCKY SHOALS
 Sd SAND
 Cl CLAY
 Gr GRAVEL
 Mk MUCK
 ■ DWELLING
 □ ABANDONED DWELLING
 ■ RESORT