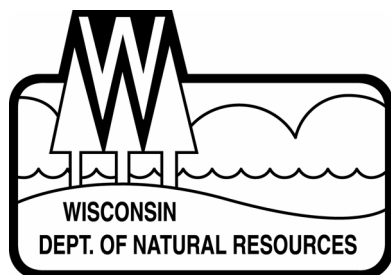


Comprehensive Fisheries Survey of Indian Lake, Oneida County Wisconsin during 2004.

Waterbody Identification Code 1598900



John Kubisiak
Senior Fisheries Biologist
Rhinelanders
June, 2007



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

Comprehensive Fisheries Survey of Indian Lake, Oneida County Wisconsin during 2004.

John Kubisiak
Senior Fisheries Biologist
June, 2007

EXECUTIVE SUMMARY

A comprehensive fisheries survey of Indian Lake was conducted during spring, 2004. Indian Lake has a diverse, high-quality fishery. Northern pike (population estimate, PE = 4.3 per acre) were the dominant gamefish, with good populations of walleye (PE = 1.4 adults and 1.6 total walleyes per acre), largemouth bass (PE = 1.2 per acre), and smallmouth bass (PE = 1.0 per acre). A few muskellunge were also present. Panfish species include black crappie, bluegill, pumpkinseed, bluegillxumpkinseed hybrids, yellow perch, rock bass and bullheads. Panfish were abundant, with good size structure. Bass growth rates were average or above, while growth was slow for northern pike and older walleye. Growth rates were below regional averages for yellow perch and for bluegill and pumpkinseed younger than age 6, but average or above for rock bass, black crappie and age 6 and older bluegill and pumpkinseed.

Indian Lake supports good fisheries for panfish, northern pike, and lower density, quality-size walleye and bass. Fish populations show adequate natural reproduction, and no stocking is currently needed, but walleye recruitment should be periodically monitored.

Lake and location:

Indian Lake, Oneida County, T39N R9E Sec36

Located in north-east Oneida County in the town of Sugar Camp, about 9 miles south of Eagle River. It is part of the Upper Wisconsin River watershed and is drained by Indian Chain Creek.

Physical/Chemical attributes (Andrews and Threinen 1966):

Morphometry: 397 acres, maximum depth 26 feet.

Watershed: 2 square miles, including 464 acres of adjoining wetlands.

Lake type: Spring (No inlet; outlet is Indian Chain Creek).

Basic water chemistry: Soft – alkalinity 28 mg/l, conductance 62 µmhos.

Water clarity: Clear water of moderate transparency.

Littoral substrate: 55% sand, 20% muck, 15% gravel and some rock.

Aquatic vegetation: Submerged vegetation dense in the east bay and the northeast portion of the lake, moderate elsewhere. Floating and emergent plants adjoin the bog wetland in the east bay.

Winterkill: None.

Boat landing: Asphalt and gravel ramp with parking for four vehicles with trailers.

Other features: Shoreline 70% upland with significant areas of shrub-conifer bog wetland.

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

Dates of fieldwork: Walleye netting, April 20-25 2004.

Panfish netting June 14-18 2004.

Mini-fyke netting August 31 - September 1 2004.

Hook & line bass marking May 26 2004.

Electroshocking (entire shoreline) April 26, May 7, May 20, June 9, June 15 and September 9 2004.

BACKGROUND

After a single electroshocking run on July 22, 1963, Morehouse (1963) indicated “Panfish are quite abundant ... and will result in a greater problem in the near future.” Muskellunge stocking was recommended to increase predation on panfish. “Ideal walleye spawning areas” were described and the walleye population was termed “good”. No bass were found, but it was noted that local residents had reported good bass fishing in the past. In a summary paragraph from the Oneida County annual report, it was noted “Bullheads are numerous and are of good size which should make removal by commercial means economical.” Commercial fisherman’s reports indicate that 1,395 pounds of 10-12 inch bullheads were removed during October 1963.

A spring survey was conducted in 1972 (Berndt 1973). Gamefish were netted (24 net lifts from May 15-19), an electroshocking survey was performed on the night of May 19 and 8 seine hauls were collected on June 22. Gamefish populations were characterized as “a good population of walleyes... natural reproduction is occurring. Other predator game fish captured were muskellunge, northern pike, smallmouth bass, and largemouth bass.” Yellow perch and bluegills were the most abundant panfish. Under Fish Stocking, the report recommended “No additional walleye stocking is recommended for a five-year period. Walleye year classes are represented from years when the lake wasn’t stocked.” Walleye reproduction was to be evaluated after five years (no evaluation is recorded). “Periodic support stocking of muskellunge is recommended on the assumption natural reproduction is limited.”

Great Lakes Indian Fish and Wildlife Commission (GLIFWC) conducted a mark-recapture adult walleye population estimate in 1991 and 1992. They estimated 2.23 (± 0.73 SD) adult and 3.43 (± 1.0 SD) total walleyes per acre in 1991 and 1.47 (± 0.10 SD) adults per acre in 1992.

Fall young-of-year surveys were conducted in 1990, 91, 92, 93, 94 (GLIFWC) and 2004 (DNR).

METHODS

The ice went off Indian Lake the night of April 18, 2004. Eight standard fyke nets (3/4” bar mesh) were set April 20. These nets targeted walleye and were fished through April 25. Eight standard fyke nets were fished June 14-18 (targeting panfish). Six mini-fyke nets (3/16” bar mesh with 1” bar mesh exclusion netting across the mouth) were fished one night on August 31-September 1 (targeting juvenile and non-game fish). A WDNR-standard alternating current electrofishing boat was used to collect fish on April 26, May 7, May 20, June 9, June 15 and September 9, 2004 (the June 15 collection was an extra sample to better estimate largemouth and smallmouth bass populations). Hook and line marking of bass was attempted on May 26, after numerous beds were noted during the May 20 shocking survey, but cold weather had pushed most of the fish offshore. Length or length category (nearest half-inch) was recorded for all gamefish and on panfish during June. Adult gamefish were given a right-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, 379 walleyes were captured in 5 nights (including 1 juvenile and 80 recaptures), at a rate of 7.9 walleyes per net day (Table 1). Another 18 walleyes (8 were recaptures)

were captured during panfish netting. The first electrofishing sample on April 26 yielded 65 walleyes (12.7 fish per mile), and subsequent electrofishing runs produced 23, 25, 20 and 0 walleyes. The mark-recapture population estimate of 566 adult walleyes (± 89.4 SD), or 1.4 per acre, is below the predicted population of 1,437 (from a regression model of naturally reproducing northern Wisconsin walleye populations), but is still above 476, the lower 95% prediction interval of the model. Indian Lake was true to its reputation for producing “a few, nice-size walleye,” and it appears that the population is maintaining itself at a moderate to low abundance.

The total walleye population (all fish 7 inches and larger) is estimated at 646 (± 153.0 SD). Fish less than 15 inches usually make up a large proportion of a naturally-reproducing walleye population. However, these sizes comprised only 15% of adult walleyes (Figure 1) and 28% of total walleyes estimated in Indian Lake, indicating weak to moderate yearclasses in recent years. Fall surveys show weak recruitment in early 1990s, while the September 2004 survey indicated a moderate yearclass (11.2 age 0 and 1.8 age 1 walleye per mile of shoreline).

Only males less than 17 inches are included in growth summaries. Slow growth of larger fish made scale ages suspect, and time constraints prevented additional ageing of spines. Growth of male walleye was about average out to age 6, but was very slow for older fish (Appendix A). Four larger male walleyes 20.2 to 21.1 inches in length were assigned ages of 11, 12, 16 and 17, indicating that growth rates of individual fish range from average to well below average.

Walleye were stocked sporadically from 1954 to 1991 (Table 2). In years past, it was common to stock on top of naturally reproducing populations. However, recent studies indicate that stocking to supplement natural reproduction is usually ineffective (Li et al. 1996). The walleye population in Indian Lake was below average in 2004, but still within the normal range in lakes supported by natural reproduction. The low population may simply be a result of weak recruitment in recent years, rather than a long-term decline. Fall surveys to monitor future recruitment are warranted.

Figure 1. Length-frequency of adult walleyes during 2004 in Indian Lake, Oneida County Wisconsin.

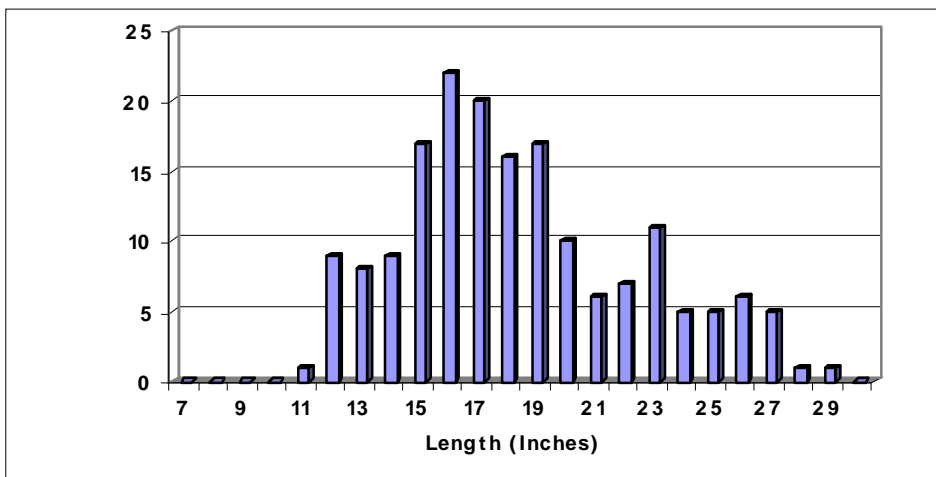


Table 1. Catch per unit effort of gamefish and panfish species during spring, 2004 comprehensive survey of Indian Lake, Oneida County Wisconsin. Netting catch rates are reported as number of fish per net night, while electrofishing catch rates are number of fish per mile of shoreline. Panfish data were not collected during all sampling events and were only collected on two 0.5-mile index stations on September 9.

species	walleye netting	April 26 shocking	May 7 shocking	May 20 shocking	June 9 shocking	June 15 shocking	panfish netting	Sept 9 shocking
walleye	7.9	12.7	4.5	4.9	3.9	0	0.6	14.1
largemouth bass	0.8	1.8	2.0	2.7	4.1	5.7	2.0	6.9
smallmouth bass	0.7	1.0	4.9	8.6	7.1	9.0	1.4	7.5
northern pike	2.5	6.3	4.9	5.1	3.7	2.3	1.0	5.1
black bullhead	0.02						0.2	0
black crappie	1.8						4.1	9
bluegill	3.7						83.3	408
hybrid bluegill								
xpumpkinseed	0						0.3	2
pumpkinseed	0.7						31.0	6
rock bass	0.6						5.8	23
yellow bullhead	3.2						57.8	14
yellow perch	3.9						0.4	51

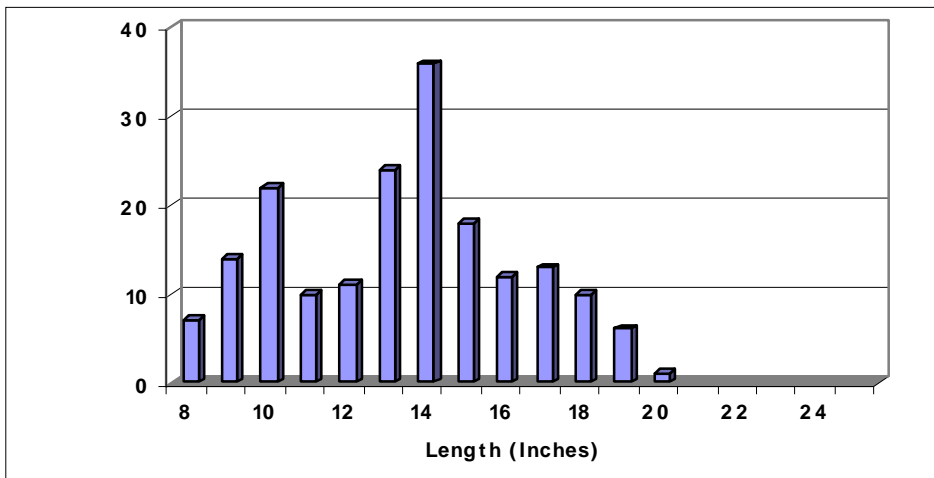
Smallmouth Bass

The current Wisconsin state hook and line record smallmouth is a 9 pound, 1 ounce fish caught in Indian Lake in 1950, and the lake continues to show some quality-size bass. Two hundred thirty-seven smallmouth bass were captured (including recaptures and juvenile fish) during spring sampling. The adult (greater than 8 inches) smallmouth bass population was estimated at 379 (\pm 82 SD), or 0.95 per acre. Smallmouth bass length-frequency (Figure 2) indicates adult size centered on 14 inches, with good numbers of fish out to 20 inches. Growth rates of smallmouth were average or above, with very good potential for producing quality-size fish (Appendix A). The largest smallmouth handled was 20.9 inches.

Table 2. Fish stocking record through 2006 in Indian Lake, Oneida County Wisconsin.

Year	Species	Size	Number
1954	walleye	fingerling	800
1955	muskellunge	fingerling	397
1957	muskellunge	fingerling	1,300
1958	muskellunge	fingerling	214
1964	muskellunge	fingerling	4,000
1965	muskellunge	fingerling	4,250
1966	walleye	fingerling	15,000
1968	walleye	fingerling	27,000
1969	muskellunge	fingerling	752
1970	walleye	fingerling	5,000
1971	muskellunge	fingerling	1,711
1973	muskellunge	fingerling	800
1976	walleye	fingerling	12,000
1977	muskellunge	fingerling (7inch)	800
1979	muskellunge	fingerling (9 inch)	411
1982	muskellunge	fingerling (12 inch)	800
1983	walleye	fingerling (2 inch)	20,000
1984	muskellunge	fingerling	300
1985	walleye	fingerling	20,000
1986	muskellunge	fingerling	800
1989	walleye	fingerling (2 inch)	20,000
1991	walleye	fingerling (2.8 inch)	10,100

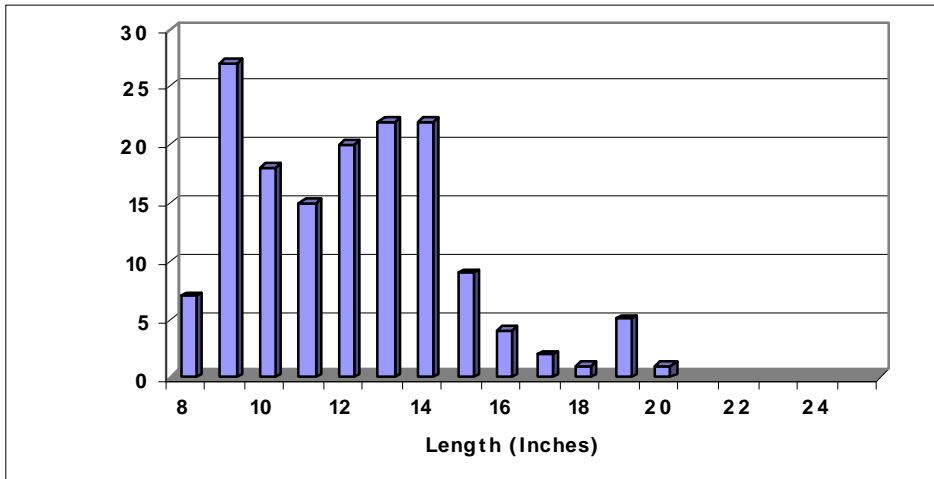
Figure 2. Length-frequency of smallmouth bass during 2004 in Indian Lake, Oneida County Wisconsin.



Largemouth Bass

The adult largemouth bass population was estimated at 461 (± 181 SD), or 1.2 per acre. The largest largemouth was 20.8 inches, but most of the 187 handled were less than 15 inches (Figure 3). A length-frequency that is truncated just after the legal length limit suggests that angler harvest may be impacting the number of larger fish. Similar to smallmouth, growth rates of largemouth bass were somewhat above regional averages.

Figure 3. Length-frequency of largemouth bass during 2004 in Indian Lake, Oneida County Wisconsin.

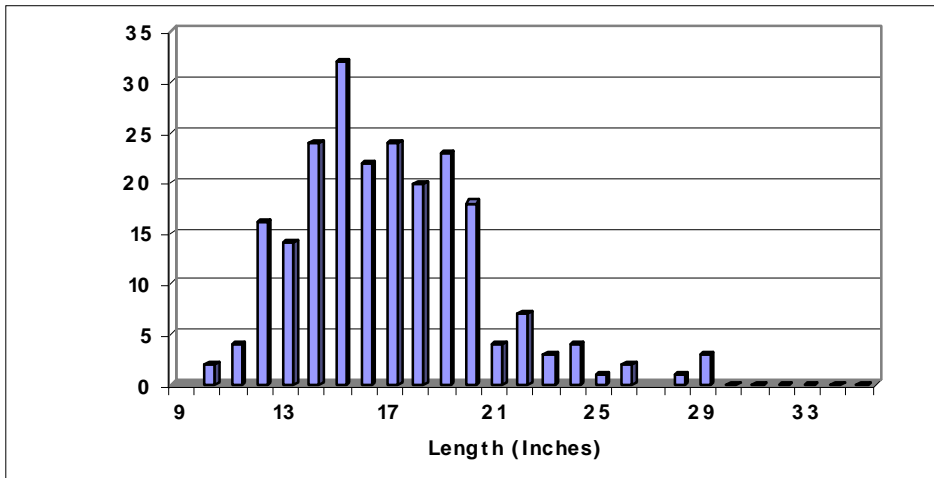


Northern Pike and Muskellunge

Two hundred sixty-four northern pike were captured (including 11 juveniles and 15 recaptures), all gears combined. The northern pike population (including sexually mature fish and all fish over 12 inches) was estimated at 1,718 (± 443 SD), or 4.3 per acre using the Schnabel multiple-capture method (Ricker 1975). Average size of adult northern pike was 17.2 inches, and low numbers of fish greater than 21 inches in length were observed (Figure 4). The largest northern pike was 29.9 inches. The relatively small average size can be attributed to slow growth. Female northern pike lengths-at-age were about a year behind average until age 6, and they were even further behind at older ages (Appendix A). Male pike were also growing at average to below average rates.

No muskellunge were captured during the survey, but several large ones were observed during the May 20 electroshocking survey. Muskellunge spawning habitat is available, but recruitment is likely suppressed by the abundant northern pike. Muskellunge were last stocked in Indian Lake in 1986 (Table 2). Fingerling muskellunge are vulnerable to predation by northern pike, making it difficult to establish muskies by stocking on top of an abundant northern pike population (Margenau 1999).

Figure 4. Length-frequency of adult northern pike during 2004 in Indian Lake, Oneida County Wisconsin.



Panfish

April netting produced good catches of yellow perch, bluegill, and yellow bullhead. Bluegill, yellow bullhead and pumpkinseed dominated June panfish netting (Table 1). Size structure of all panfish species was quite good, indicating adequate populations of predator fish (Figures 5 – 10). June bluegill catch rates of 83 per net night are high, but are below the ‘high density’ threshold of 100 fish per net night. The strong peak in bullhead size (Figure 10) suggests that most of the population is from one or two large yearclasses.

Bluegill and pumpkinseed were growing about a year behind regional averages at the smaller sizes, with lots of variation between individual fish lengths-at-age (Appendix A). Fish larger than about 7 inches were generally growing well. One possible explanation is panfish that remain in the shallow, vegetated areas of the lake are limited by food, but have good survival. Faster-growing fish may be living in areas with more food and more vulnerability to predators. One exception to the fast-growing larger fish was a 9.1-inch bluegill. Growth increments on this fish’s scales were very small, but at 14 years of age, it had survived long enough to achieve a large size. Yellow perch were growing slowly, with length-at-age averaging over a year behind regional values. In contrast to other panfish, black crappie and rock bass were growing about average throughout their size range.

Figure 5. Length-frequency of bluegill during 2004 in Indian Lake, Oneida County Wisconsin.

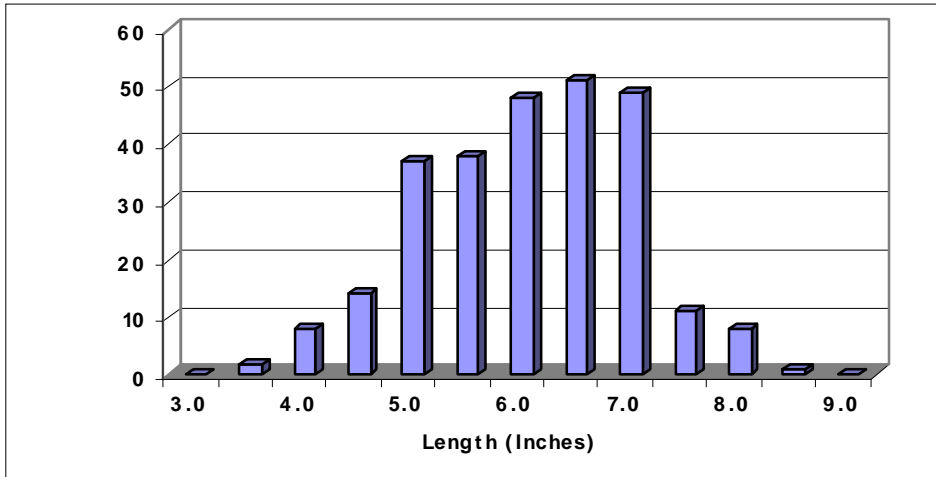


Figure 6. Length-frequency of pumpkinseed during 2004 in Indian Lake, Oneida County WI.

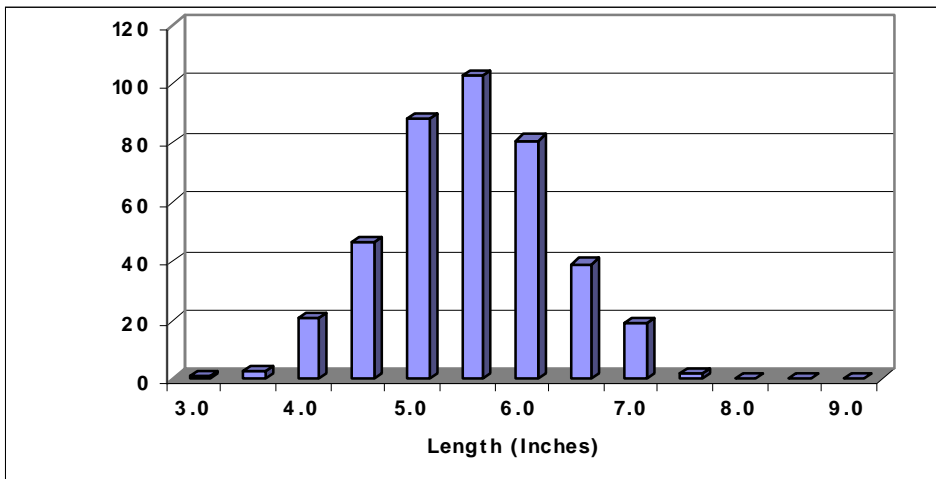


Figure 7. Length-frequency of black crappie during 2004 in Indian Lake, Oneida County WI.

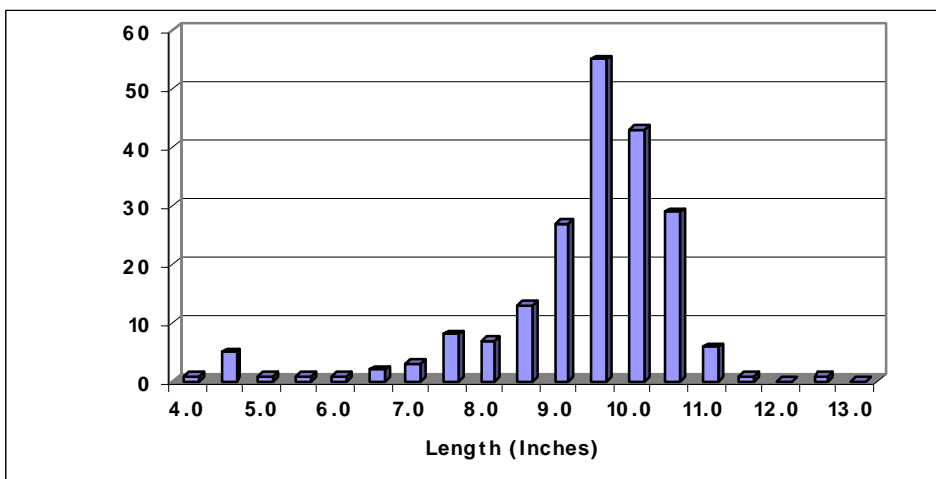


Figure 8. Length-frequency of yellow perch during 2004 in Indian Lake, Oneida County WI.

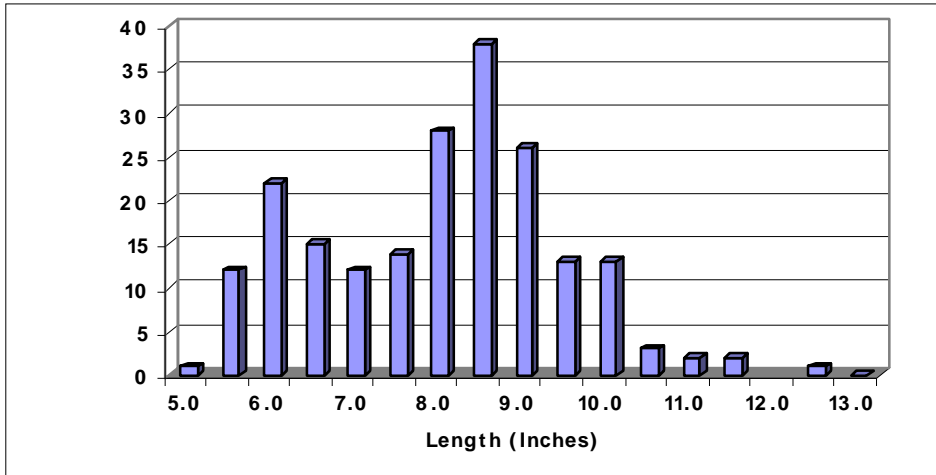


Figure 9. Length-frequency of rock bass during 2004 in Indian Lake, Oneida County Wisconsin.

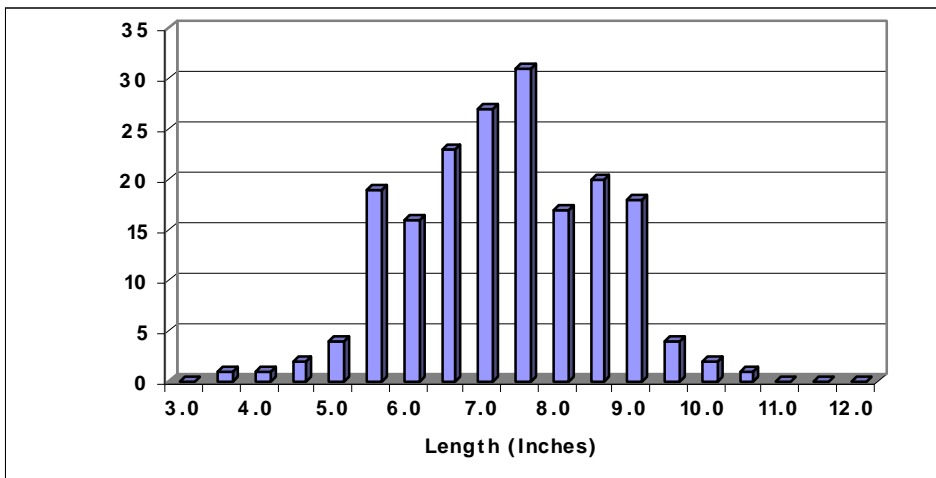
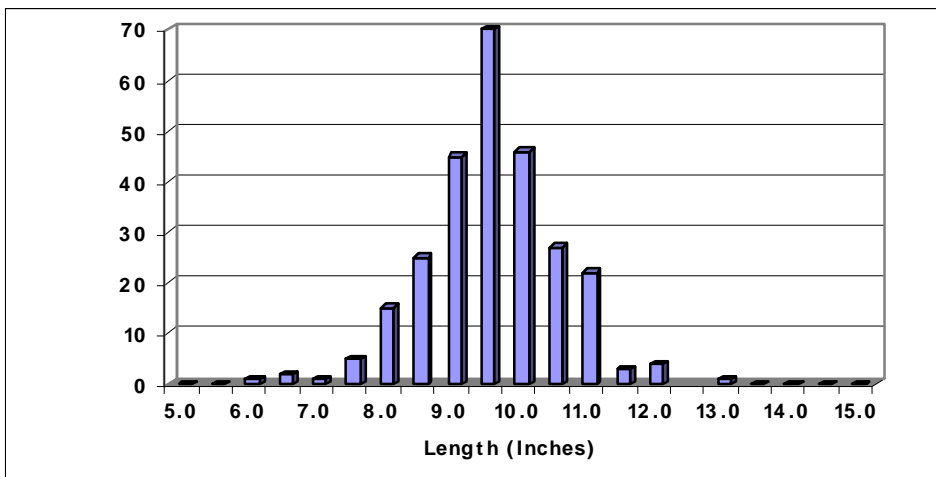


Figure 10. Length-frequency of yellow bullhead during 2004 in Indian Lake, Oneida County Wisconsin.



MANAGEMENT RECOMMENDATIONS

Indian Lake supports a diverse gamefish community. Northern pike are the dominant gamefish and likely control recruitment of other species. Northern pike are abundant with poor size structure and slow growth at older ages. The walleye population is moderate in density, with good numbers of fish larger than 15 inches. Walleye recruitment appears to be low to moderate. They may be affected by predation from the abundant northern pike. Smallmouth bass show moderate numbers and good size structure. Largemouth bass are slightly more abundant than smallmouth, but most fish were less than 14 inches. This could reflect angler harvest of legal-sized bass, especially largemouth. Both bass species are growing at average or above. Muskellunge are present in the lake, but survival of naturally reproduced or stocked muskies is probably very poor due to the abundant northern pike. Despite high panfish abundance, growth rates and size structure were generally good, with the exception of the slow-growing yellow perch. This indicates that the gamefish populations are in balance and are providing adequate predation on most panfish species. I recommend continuing to manage Indian Lake for panfish, northern pike, and moderate density, quality-size walleye and bass. No stocking is currently needed, but walleye recruitment should be periodically monitored.

ACKNOWLEDGEMENTS

Matt Andre, Tom Bashaw, Kevin Gauthier, Steve Gilbert, Dennis Goulee, Nate Guldan, Ben Heimbach, Steve Timler, Joelle Underwood, Brian Uttech and Keith Worrall assisted in the field. Steve Timler and I assigned ages from scales and spines. Matt Andre entered and summarized data. Mike Coshun calculated walleye and bass population estimates.

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Cover image courtesy of TerraServer-USA website and the United States Geological Survey.
<http://terraserver-usa.com>

APPENDIX A FISH AGE RESULTS

When 50 or more fish were measured, the aged sub-samples were applied against the full length-frequency to eliminate bias from a non-random subsample. Too few female walleye were aged to accurately represent age and growth.

Table A.1. Male walleye length-at-age in Indian Lake, Oneida County Wisconsin during 2000 and 2004.

Age of fish	Number	Indian avg length	Northern WI avg
2			10.6
3	16	12.1	11.6
4	12	13.9	13.0
5	3	15.0	14.5
6	8	15.4	15.8
7	6	16.0	16.9
8	2	16.7	18.1
9	2	16.5	18.9
10	1	16.3	19.7
11			20.4
12			20.6
13			21.3
14			22.0

Table A.2. Smallmouth bass length-at-age in Indian Lake, Oneida County Wisconsin during 2004.

Age of fish	Number	Indian avg length	Northern WI avg
2	16	6.6	6.9
3	21	8.8	9.3
4	16	11.5	11.8
5	18	13.3	13.5
6	13	15.4	15.2
7	14	17.0	16.1
8	5	17.3	17.1
9	6	18.1	17.7
10	3	18.6	18.3
11	2	18.9	18.5
12	3	20.7	19.8

Table A.3. Largemouth bass length-at-age in Indian Lake, Oneida County Wisconsin during 2004.

Age of fish	Number	Indian avg length	Northern WI avg
2	13	6.6	6.6
3	23	8.7	8.9
4	12	11.3	10.5
5	11	12.4	12.1
6	14	13.9	13.6
7	9	14.5	14.9
8	9	16.4	15.8
9	2	17.5	16.2
10	3	20.6	17.1
11	1	18.2	17.8
12	3	19.2	18.2

Table A.4. Female northern pike length-at-age in Indian Lake, Oneida County Wisconsin during 2004.

Age	Number of fish	Indian avg length	Northern WI avg
1	1	10.3	13.1
2	5	13.6	14.4
3	5	15.4	16.9
4	6	17.7	20.4
5	3	19.4	23.1
6	2	22.2	24.4
7	4	20.0	27.3
8	3	22.5	28.8
9	2	19.3	32.1
10	0		33.8
11	1	26.7	

Table A.5. Male northern pike length-at-age in Indian Lake, Oneida County Wisconsin during 2004.

Age	Number of fish	Indian avg length	Northern WI avg
1			10.7
2	17	11.8	13.4
3	13	15.2	16.2
4	7	15.9	18.9
5	16	17.5	20.6
6	11	22.3	22.3
7	4	23.1	23.4
8	2	21.2	24.8
9	1	22.0	23.9
10	0		21.5
11	1	20.2	

Table A.6. Bluegill length-at-age in Indian Lake, Oneida County Wisconsin during 2004.

Age	Number of fish	Indian avg length	Northern WI avg
1			2.5
2	2	3.2	3.9
3	9	3.8	5.0
4	20	4.6	6.2
5	36	5.9	6.8
6	17	7.5	7.8
7	6	8.7	8.2
8	4	8.2	8.7
9	1	7.5	8.7
10	1	8.0	9.2
14	1	9.1	

Table A.7. Pumpkinseed length-at-age in Indian Lake, Oneida County Wisconsin during 2004.

Age	Number of fish	Indian avg length	Northern WI avg
1			2.2
2	2	3.3	3.6
3	10	3.8	4.8
4	10	4.5	5.7
5	34	6.0	6.5
6	20	6.9	6.8
7	1	7.4	7.3
8	1	7.5	7.3
9	1	7.3	

Table A.8. Rock bass length-at-age in Indian Lake, Oneida County Wisconsin during 2004.

Age	Number of fish	Indian avg length	Northern WI avg
1			1.5
2	2	4.0	3.6
3	4	4.9	5.1
4	16	5.7	6.4
5	26	6.8	7.2
6	16	7.9	7.9
7	10	9.3	8.4
8	13	9.1	9.0
9	2	9.7	9.4
10	2	10.7	
11	1	10.0	

Table A.9. Black crappie length-at-age in Indian Lake, Oneida County Wisconsin during 2004.

Age	Number of fish	Indian avg length	Northern WI avg
1			3.4
2	6	5.8	5.3
3	8	7.6	7.1
4	23	7.5	9.0
5	9	9.9	10.0
6	10	11.1	10.7
7	4	11.2	11.6
8	1	11.9	11.7
9	1	12.7	10.4
10	1	13.8	11.6

Table A.10. Yellow perch length-at-age in Indian Lake, Oneida County Wisconsin during 2000 and 2004.

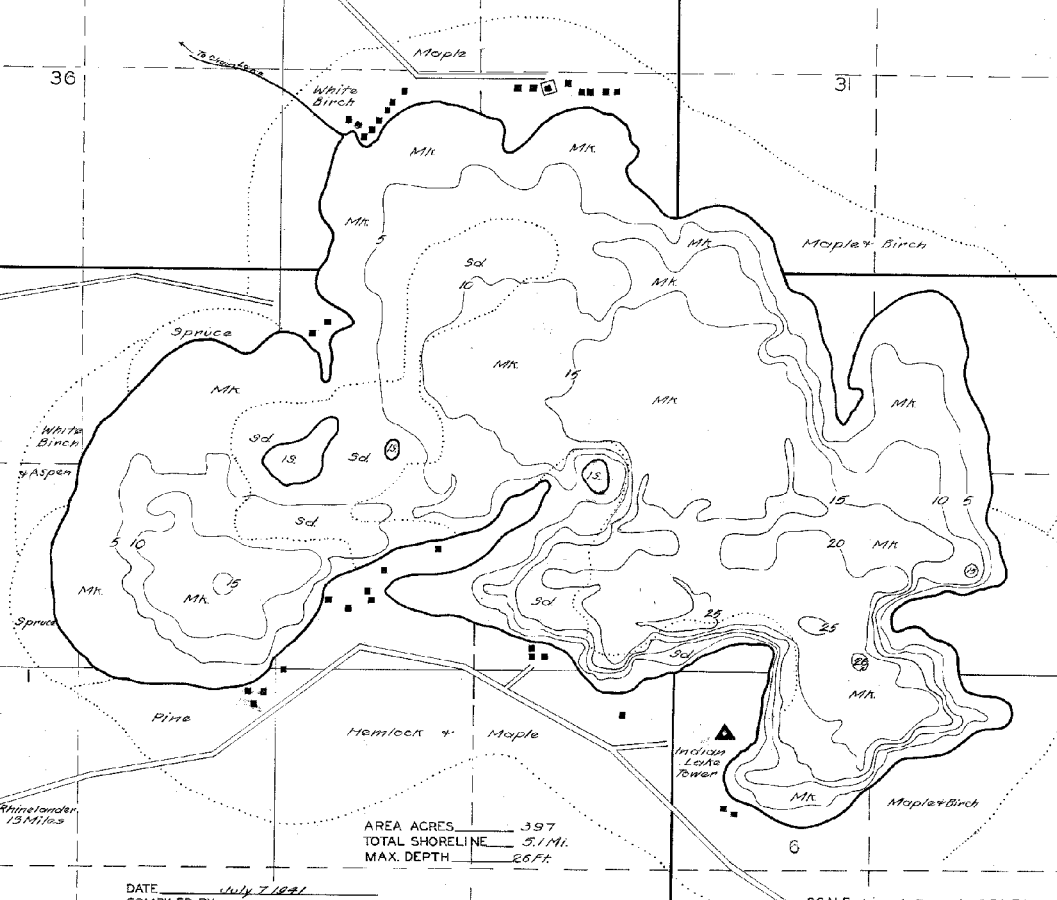
Age	Number of fish	Indian avg length	Northern WI avg
1			3.4
2			5.3
3	12	5.9	7.1
4	12	5.3	9.0
5	18	7.4	10.0
6	23	7.9	10.7
7	16	9.1	11.6
8	11	11.1	11.7
9	136	11.0	10.4
10	5	12.5	11.6
11	1	11.9	

LAKE SURVEY MAP

LAKE INDIAN
 SECTION 36-31-1-6
 TOWNSHIP 38-39 N
 RANGE 9-10 E
 TOWN OF SUGAR CAMP
 COUNTY ONIEDA

FORM F-17

WISCONSIN CONSERVATION DEPARTMENT
 BIOLOGY DIVISION
 LAKE AND STREAM IMPROVEMENT SECTION



AREA ACRES 397
 TOTAL SHORELINE 5.1 Mi.
 MAX. DEPTH 26 Ft.

DATE July 7, 1941
 COMPILED BY _____
 TRACED BY W. P. A. (W.P.A.)
 SOURCE OF INFORMATION
W.P.A. Lake Survey Project
 SOUNDINGS DRAFT Interviews
 DATES OF MAP REVISION _____
 WORK AGENCY W. P. A.

LAKE IMPROVEMENT RECORD	
TYPE	DATE
— BRUSH REFUGES	_____
— SAPLING TANGLES	_____
□ SPAWNING BOXES	_____
* MINNOW SPAWNERS	_____
TOTAL	_____

SCALE 1 inch Equals 500 Ft.

LEGEND	
⊙	WEED BEDS
⊙	ROCKY SHOALS
Sd	SAND
CA	CLAY
Gr	GRAVEL
Mk	MUCK
■	DWELLING
□	ABANDONED DWELLING
□	RESORT