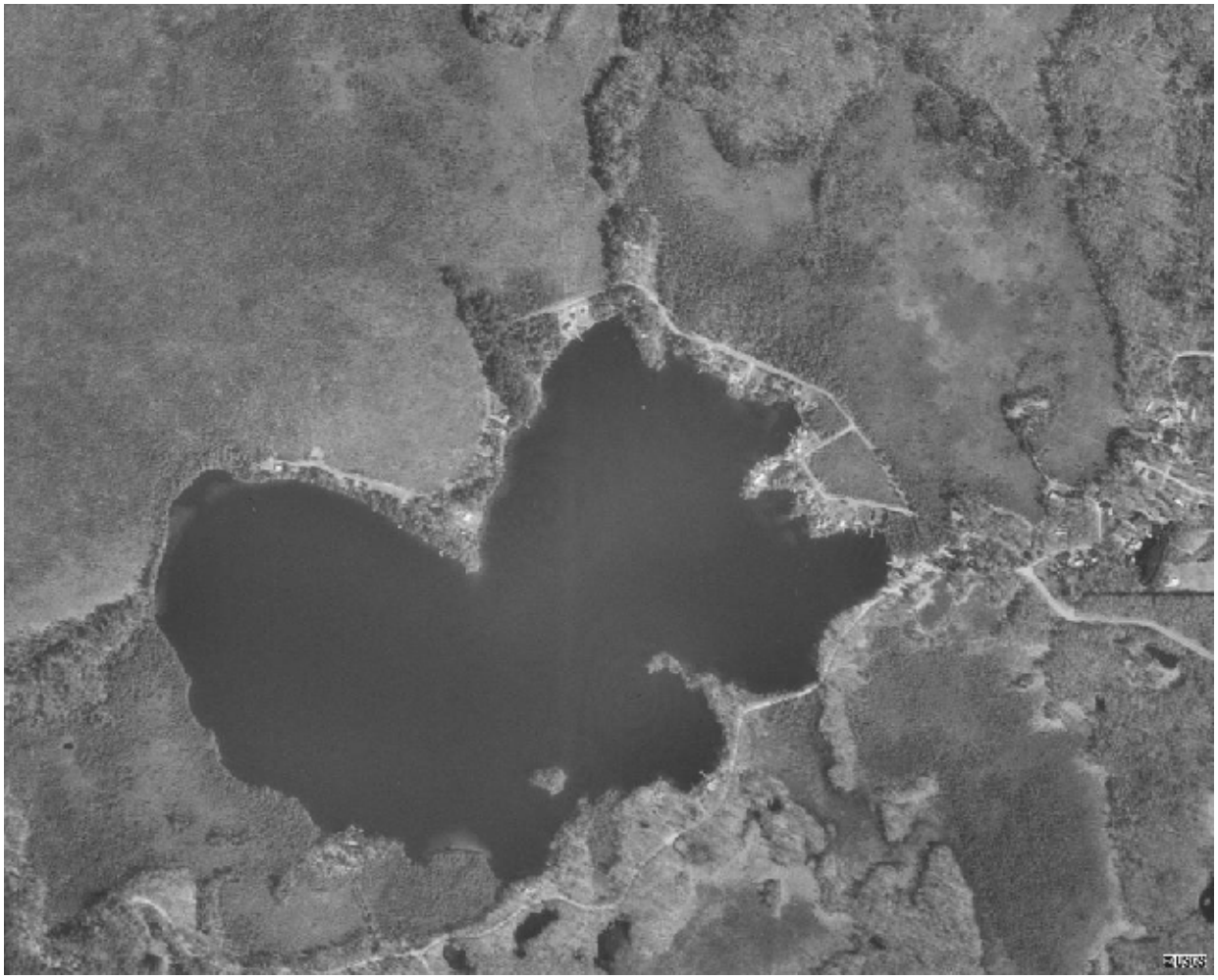
Fisheries Survey of Burrows Lake, Oneida County Wisconsin during 2004.

Waterbody Identification Code 975000



John Kubisiak
Senior Fisheries Biologist
Rhinelander
November, 2005

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EXECUTIVE SUMMARY

A baseline fisheries survey of Burrows Lake was conducted during summer and fall, 2004. Bluegill growth rates and back-calculated length-at-age were used to evaluate the success of panfish removals during 2001 and 2002. Gamefish were moderate to low in density and included largemouth bass, walleye and northern pike. Muskellunge are also present but were not captured during the survey. Other species included bluegill, pumpkinseed, black crappie, yellow bullhead and white sucker. Bluegill abundance was high, with poor size structure and growth below the regional average. Growth increments were identical between pre- and post-removal time periods, indicating no growth benefit from the panfish removals.

Abundant gamefish forage is present in the form of 3 to 6-inch bluegill. I recommend continuing to manage Burrows Lake for largemouth bass and panfish. Muskellunge and walleye are maintained by stocking and may provide additional angling opportunities.

Lake and location:
Burrows Lake, Oneida County, T36N R5E Sec3
Located in southwest Oneida County in the town of Little Rice, about 20 miles northwest of Tomahawk. It is part of the Upper Wisconsin River watershed.

Physical/Chemical attributes (Andrews and Threinen 1966):
Morphometry: 156 acres, maximum depth 26 feet.
Watershed: 3 square miles, including 158 acres of adjoining wetlands.
Lake type: Seepage (no inlet or outlet).
Basic water chemistry: Slightly acid, very soft – pH 6.6, alkalinity 2 mg/l, conductance 15 μmhos.
Water clarity: Clear water of moderate transparency.
Littoral substrate: 45% muck, 35% sand, 15% gravel and some rubble.
Aquatic vegetation: Submerged vegetation dense on much of the lake, along with significant areas of floating and emergent plants. Meadow, bog and coniferous wetlands along 75% of the shoreline.
Winterkill: None.
Boat landing: Concrete plank ramp with parking for 1 vehicle with trailer and 2 other vehicles.
Other features: Shoreline 75% wetland with significant area of upland adjoining the lake basin.

Purpose of Survey: Baseline monitoring, assess panfish growth rates and develop management recommendations.

Dates of fieldwork:
Electroshocking (entire shoreline) September 2 2004.
Mini-fyke netting September 7-8 2004.

BACKGROUND

Burrows was surveyed with fyke nets in 1949, 1955 (reported by Berndt 1972), 1963 (Morehouse, 1963), 1971 (Berndt 1972) and 2000 (Vogelsang and Timler 2001). Electroshocking was conducted in 1997 (fall) and 2000 (spring and fall). Results of the surveys were similar, with large catches of panfish but low abundance of other game and panfish species. Bluegill and perch were characterized as slow-growing and panfish removals (mostly bluegill) were conducted in 1949, 1950, 1956, 1971, 2001 and 2002. The 2001 and 2002 efforts removed 14.25 and 9.5 pounds of bluegill per acre, respectively, for a total of over 3,700 pounds of bluegill. The goal of panfish removals is to reduce the number of mouths to feed so that the available invertebrate forage is allocated among fewer competing individuals. In some cases, improvements in bluegill growth rates and/or proportional stock density (PSD, the proportion of bluegill measuring 6 inches total length or greater) have been demonstrated by removing (e.g., AveLallemant 1992) or killing (e.g., Schneider and Lockwood 2002) a substantial proportion of the bluegill population.

METHODS

A WDNR-standard alternating current electrofishing boat was used to collect fish on September 2, 2004. Six mini-fyke nets (3/16" bar mesh with 1" bar mesh exclusion netting across the mouth) were fished one night on September 7-8, 2004 (targeting juvenile and non-game fishes). Age structures (scales) were collected during the electrofishing survey.

Fish length-at-age was back-calculated by measuring the radius of each annulus or growth ring (S_n) to the total radius of the scale (S). This ratio was multiplied by the length of the fish at capture (L) to estimate its length when the annulus was laid down (L_n) using the equation $L_n = S_n/S(L-a) + a$ (Schneider et al. 2000). The intercept (a) was calculated from the data as 0.78 for bluegill, which is similar to the generalized literature value of 0.8 (Carlander 1982). This method was used to estimate the growth of each fish over time, to test whether growth rates changed after the removals.

RESULTS AND DISCUSSION

Gamefish

Catch of gamefish was low in Burrows Lake (Table 1). Largemouth bass are the dominant predator, and a total of 15 were captured during fall shocking, ranging from 4.5 to 18.9 inches in length. Only one northern pike and two walleye were captured. Northern pike were likely introduced: they were first reported from Burrows Lake during the 2000 survey when 26 were captured (Vogelsang and Timler 2001). Walleye and muskellunge have been sporadically stocked. Past walleye stocking has had limited success: the total population was estimated at 47 walleyes in 2000 ($\pm$ 5.0 SD), or 0.3 per acre. Muskellunge are not likely to reach high enough density to have an effect on the super-abundant panfish, but they may provide some additional angling opportunity.

In contrast to the panfish (see below), gamefish were generally growing at or above average. Largemouth bass grew behind average through age 3, then caught up and exceeded average length-at-age by age 4 (10.5 inches) and beyond (Appendix A). The two walleyes collected were nearly a year ahead of average, reaching 14.7 inches at age 4. The single northern pike was 1.5 inches below average, reaching 24.3 inches at age 8. It appears that smaller gamefish are competing for invertebrate food with the abundant panfish, but grow well once they are large enough to feed on bluegill. The results suggest that the low fertility of Burrows Lake does not limit predator growth and contradict the second part of Vogelsang and Timler's (2001) management recommendation 3:

"Walleye stocking should be discontinued since the dollar-to-benefit ratio appears to be poor. *Also, adding an additional predator to an already infertile system will confound any positive management benefits.*" In contrast, Schneider and Lockwood (2002) found increased bluegill growth rates after stocking predators in lakes with stunted panfish; in bluegill-dominated systems, they recommend stocking walleye larger than 6 inches total length due to poor survival of smaller sizes.

Table 1. Catch per unit effort of gamefish and panfish species during the 2004 survey of Burrows 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. During fall shocking, all gamefish were collected along the entire shoreline, while panfish data were collected on two 0.5-mile index stations.

species	Mini-fyke netting	Fall shocking
walleye	0	0.7
largemouth bass	0.3	5.5
northern pike	0	0.4
black crappie	0	0.7
bluegill	1.0	93.0
pumpkinseed	0	1.5
yellow bullhead	0.3	0

Panfish

Panfish numbers were dominated by an abundant bluegill population, with pumpkinseed, black crappie and yellow bullhead also present (Table 1). Similar to other lakes in the region, the summer mini-fyke nets produced a low catch of age-0 bluegill. The poor 2004 yearclass was likely due to cool temperatures which caused poor spawning conditions. During fall shocking, bluegill from 3 to 6 inches were abundant with little representation by other sizes and PSD was only 5.6 (Figure 1). The average of 4.4 inches is slightly below the average daily sizes of 4.8 to 5.0 inches observed on bluegills removed during June 12-15 2001 (Timler 2001). In many lakes few large bluegill are captured during fall shocking, so the observed poor size structure may be partially due to the gear and time of collection. Nevertheless, bluegill in Burrows Lake were stunted, with growth rates about 2 years behind the regional average (Figure 2). The slow growth was remarkably similar to results from surveys in 1949 and 1950 (Appendix A, Table A.1). These results demonstrate no benefit from the removals: bluegill collected in 2004 showed identical back-calculated length-at-age before and after panfish removals were initiated in 2001. Average back-calculated length was 1.9 inches at age 1, 3.0 inches at age 2 and 4.0 inches at age 3. The extremely low productivity of Burrows Lake (characterized by an alkalinity of 2 ppm) makes panfish removal ineffective.

Stocking of fathead minnows was one measure that the Burrows Lake Association attempted in the past to address low forage abundance. However, it is unlikely that past stocking of fathead minnows for forage had an impact on either gamefish or panfish growth because the fatheads are similar in

size to young-of-year bluegill: the fatheads were probably not consumed by the bluegill, and they would simply replace bluegill in the diet of predator fish. The volume stocked (over 2,000 pounds in 2002, Table 2) would amount to only a few days forage in a 156-acre lake. By comparison, Art Oehmcke State Fish Hatchery fed about 42,000 pounds of baitfish to raise approximately 37,000 muskies weighing 9,250 pounds during summer, 2005 (Bruce Underwood, Art Oehmcke State Fish Hatchery, personal communication).

Table 2. Fish stocking record through 2004 in Burrows Lake, Oneida County Wisconsin. Not all private stockings are recorded in the file.

Year	Species	Size	Number	
1963	hybrid muskellunge	fingerling	800	
1964	hybrid muskellunge	fingerling	1,759	
1965	hybrid muskellunge	fingerling	2,000	
1968	muskellunge	fingerling	182	
1969	muskellunge	fingerling	300	
1970	muskellunge	fingerling	800	
1972	muskellunge	fingerling	800	
1973	hybrid muskellunge	fry	55,590	
1974	muskellunge	fingerling (11 inch)	357	
1976	muskellunge	fingerling (12 inch)	300	
1977	muskellunge	fingerling (12 inch)	292	
1980	muskellunge	fingerling (10 inch)	280	
1980	largemouth bass	fingerling	1,000	private
1980	walleye	fingerling	1,000	private
1983	muskellunge	fingerling (11 inch)	150	
1984	muskellunge	fingerling	200	
1985	muskellunge	fingerling (8 inch)	318	
1987	muskellunge	fingerling (11 inch)	300	
1988	black crappie	lg fingerling (3-5 inch)	400	private
2000	walleye	fingerling (6-8 inch)	2,000	private
2001	black crappie	lg. fingerling	6,000	private
2002	fathead minnow	adult (2 inch)	557,000	private
2003	muskellunge	fingerling (12.5 inch)	156	private

Figure 1. Length-frequency of bluegill during 2004 in Burrows Lake, Oneida County Wisconsin.

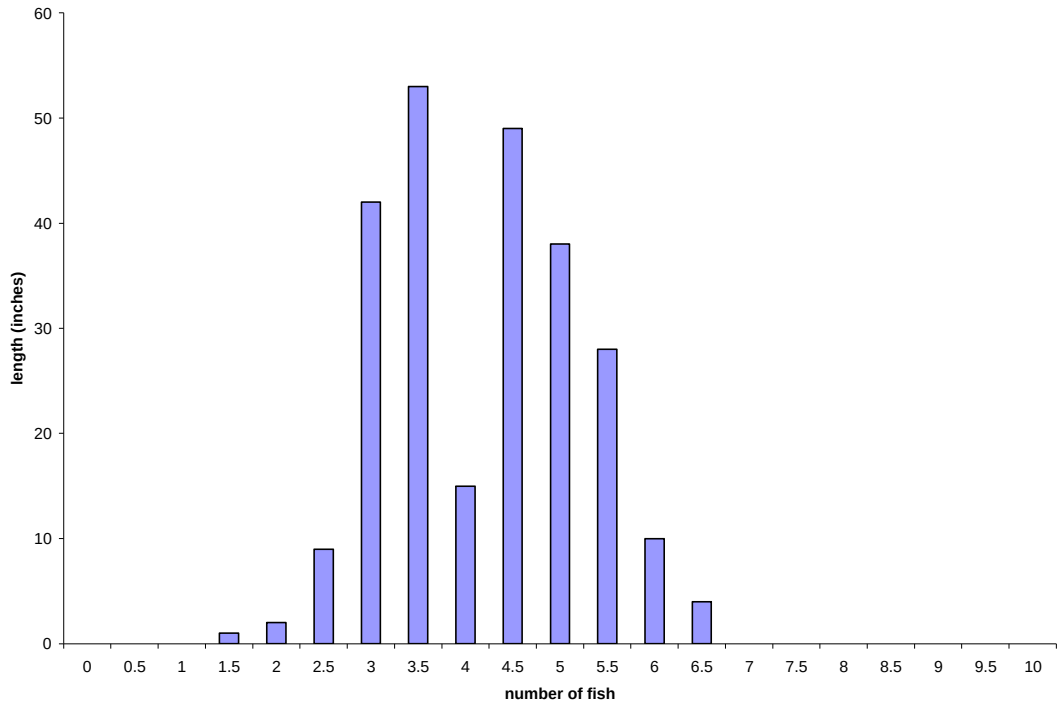
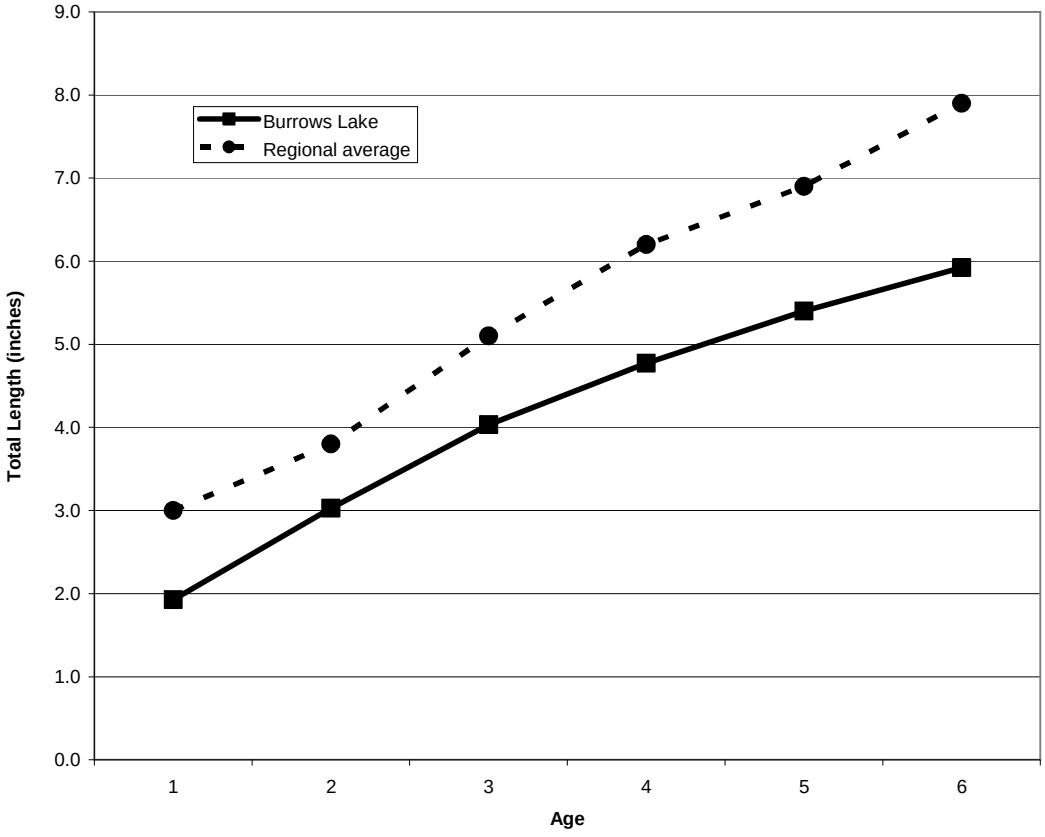


Figure 2. Bluegill length-at-age during 2004 in Burrows Lake, Oneida County Wisconsin compared to the regional average.



MANAGEMENT RECOMMENDATIONS

Burrows Lake supports a gamefish community dominated by largemouth bass and northern pike. Stocked populations of walleye and muskellunge are present in the lake at low abundance. Due to their large gape, largemouth bass are the most efficient predator on bluegill. Largemouth showed slow growth for their first few years, but caught up and passed regional averages once they were large enough to eat bluegill. The extremely low productivity of Burrows (as shown by an alkalinity of 2 ppm) makes continued problems with panfish stunting very likely. As demonstrated by the results of this survey, efforts to correct stunting may be ineffective in lakes like Burrows with abundant cover, extremely low productivity and area in excess of 100 acres. I recommend continuing to manage Burrows Lake for largemouth bass and panfish. Bass recruitment and early growth rates are likely suppressed by the over-abundant bluegill; a high minimum length limit on bass is appropriate in this situation. Stocked walleye and muskellunge may provide additional fishing opportunities if they can survive to a large enough size to feed on bluegill.

ACKNOWLEDGEMENTS

Matt Andre and Steve Timler assisted in the field. Steve Timler and I assigned ages from fish scales. Matt Andre entered and summarized data.

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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

Table A.1. Bluegill length-at-age in Burrows Lake, Oneida County Wisconsin on September 2, 2004, June 8, 1950 and August 18, 1949. One year was added to the 2004 and 1949 ages to account for an additional summer of growth; slightly larger sizes in 1950 could be a benefit of the 1949 removals, or they may simply reflect summer growth prior to the June sample.

Age	2004 Number of fish	2004 Burrows avg length	1950 Number of fish	1950 Burrows avg length	1949 Number of fish	1949 Burrows avg length	Regional average
2	10	2.5			2	2.6	3.8
3	29	3.6	29	4.7	32	4.4	5.1
4	17	4.6	2	5.6	4	5.3	6.2
5	17	5.4	1	5.8	1	5.4	6.9
6	17	6.0	33	6.5	37	6.0	7.9
7	2	6.6	30	7.2	31	7.2	8.5
8			4	7.9			8.8
9			1	8.2			

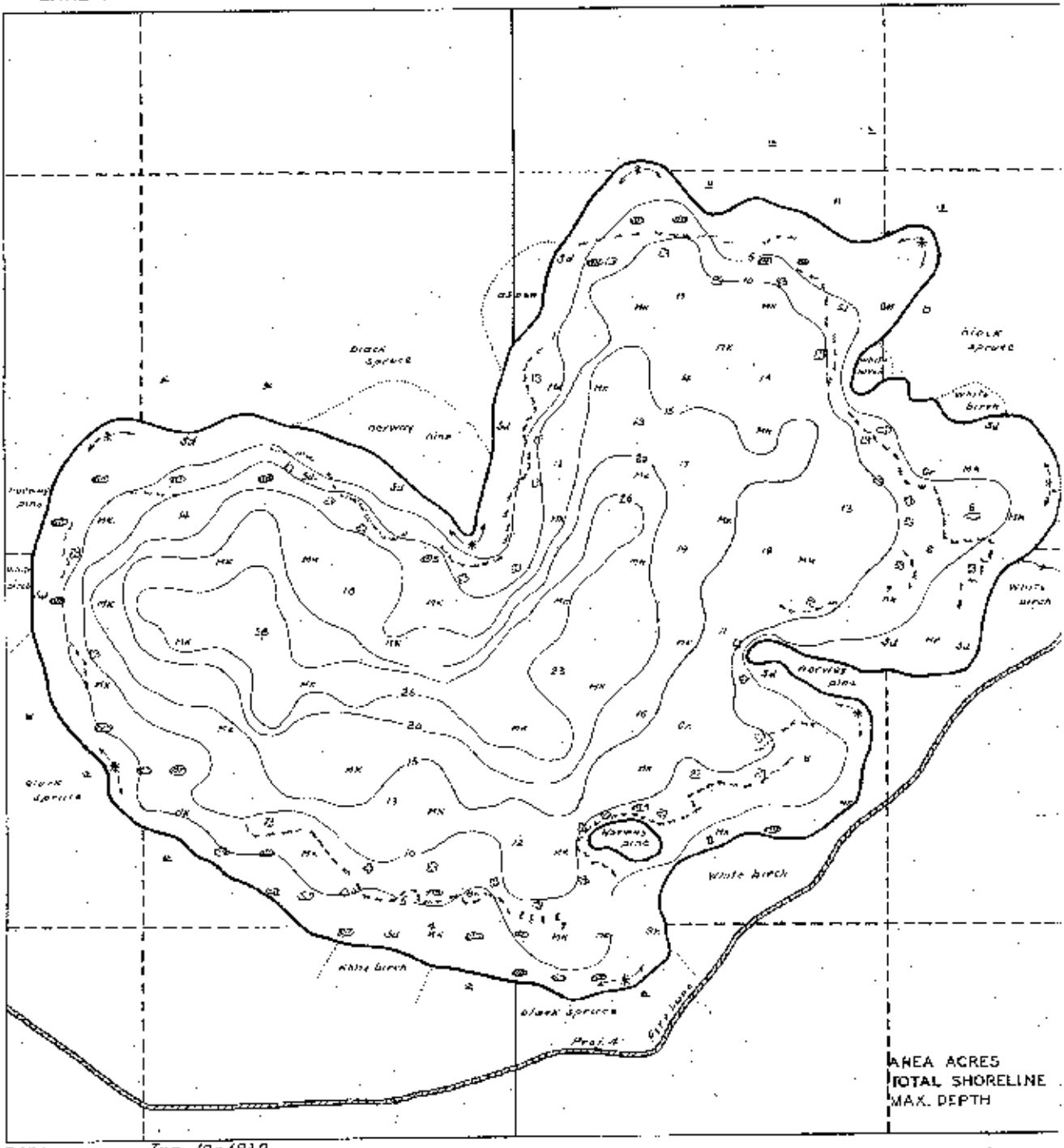
Table A.2. Largemouth bass length-at-age in Burrows Lake, Oneida County Wisconsin during 2004. One year was added to ages to account for an additional summer of growth.

Age	Number of fish	Burrows avg length	Regional average
2			6.6
3	7	5.5	8.9
4	2	7.9	10.5
5	2	12.6	12.1
6	0		13.6
7	2	15.1	14.9
8	0		15.8
9	1	18.6	16.3
10			17.4
11			17.7
12			18.4
13			18.3

LAKE SURVEY MAP

LAKE BURROWS
SECTION 3-4
TOWNSHIP 36
RANGE 5
TOWN OF LITTLE RI
COUNTY ONEIDA

WISCONSIN CONSERVATION DEPARTMENT
BIOLOGY DIVISION
LAKE AND STREAM IMPROVEMENT SECTION



AREA ACRES
TOTAL SHORELINE
MAX. DEPTH

SCALE: 1" = 330'

DATE Jan. 10-1939
COMPILED BY E.M.B.
TRACED BY P.A.B. Camp 84-S
SOURCE OF INFORMATION
C.C.C. Camp Ironwork 84 S
Lake Improvement Project

SOUNDINGS
C.C.C. Camp Ironwork 84 S

DATES OF MAP REVISION

WORK AGENCY CCC

LAKE IMPROVEMENT RECORD

TYPE	DATE			
BRUSH REFUGES				
SAPLING TANGLES				
SPAWNING BOXES				
MINNOW SPAWNERS				
TOTAL				

LEGEND

- WEED BEDS
- ROCKY SHOALS
- Sd. SAND
- Cl. CLAY
- Gr. GRAVEL
- Mk MUCK
- ■ DWELLING
- ▫ ABANDONED DWE
- ▣ RESORT