Silver Lake, Washington County
(WBIC 36200)
Comprehensive Fish Community Survey
2007
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ABSTRACT

We conducted a fish population survey of 118 acre Silver Lake in Washington County during the spring of 2007. We used fyke nets and electrofishing to sample the fish population, capturing 12 species of fish. Bluegill were the most abundant species. The bluegill were generally small, had a poor size structure and grew slowly. Largemouth bass were the most abundant predator species. The bass had a fairly good size structure but grew below the state average. We caught only 38 northern pike. Anecdotal information indicated that the pike are abundant and generally small. We caught 27 walleye ranging in size from 10.7" to 22.7". The walleye were likely from past private stocking by the lake protection district. Black crappie were caught in fairly low numbers yet, they are commonly sought by anglers. Only 9 yellow perch were caught during the survey. The fish population and fish growth generally reflected what was expected for a relatively infertile spring-fed lake in southeastern Wisconsin. The greatest management challenge is to improve bluegill growth. Management recommendations include the alternate year stocking of 35 small walleye fingerling/acre and the possible reduction or elimination of the northern pike size limit.

INTRODUCTION

Silver Lake is a 118 acre spring fed lake in central Washington County. It is the headwaters of Silver Creek which flows from the north end of the lake in a northeasterly direction to the Milwaukee River. The lake has a maximum depth of 47 feet with an average depth of 20 feet (Figure 1). The water is generally clear and vegetation is well developed. Two small "kettle" areas exist on the north end of the lake. The main portion of the lake has vast shallow areas at the south and southeastern portions of the lake.

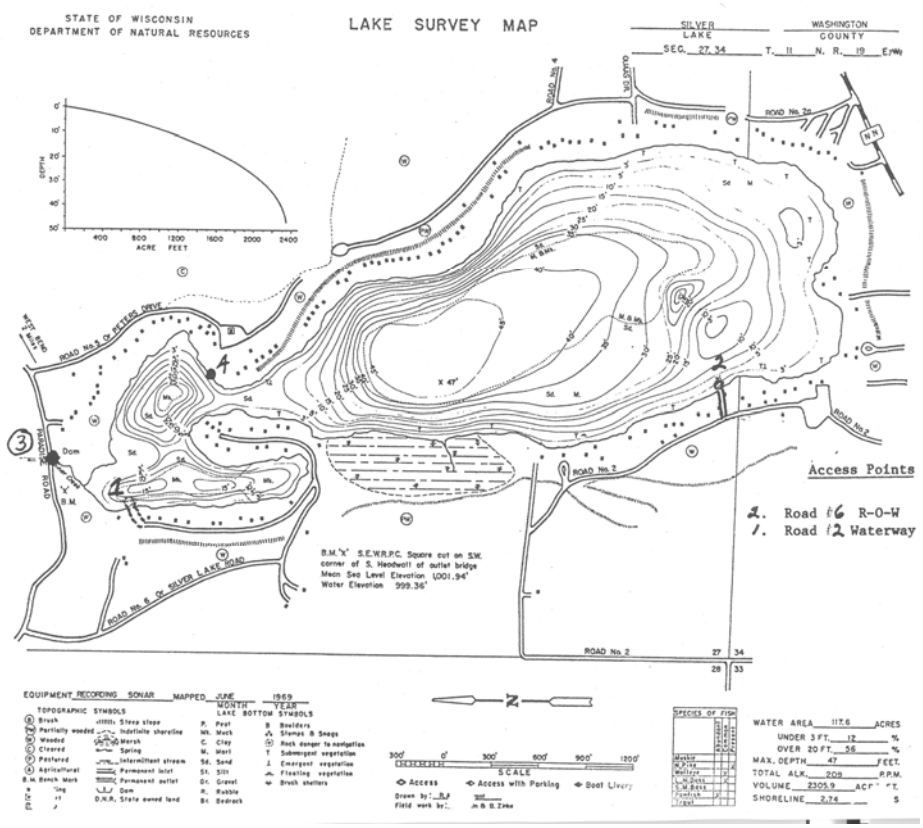

Figure 1. Silver Lake, Washington County.

A public access was developed on the lake in 2005 by Washington County. The access is located on Peters Drive at the northeast corner of the lake. Walleye fingerlings have occasionally been stocked in the lake by private groups over the past 10 years.

A single night electrofishing survey on October 11, 2005 found an over-abundance of bluegill with a poor size structure and slow growth rate. Largemouth bass were the predominant predator species in the sample and had a normal length distribution. Twelve walleye and 20 northern pike were also captured. Black crappie exhibited a wide range in length up to 12.8" long, indicating that a fair crappie population existed in the lake. Subsequently, we have observed anglers that were successful at catching "decent" size crappie in spring.

METHODS

We used fyke nets and electrofishing to capture fish samples in the lake in spring 2007. Five 3' white fyke nets were set on March 26th and were used until April 3rd. A total of 40 net nights(NN) of effort were expended. They were first set in areas where we anticipated spawning northern pike would be present and eventually moved the nets to locations where walleye would be attempting to spawn. We electrofished on the evening of April 19th to get a recapture sample of gamefish and on May 22nd to focus on the capture of more largemouth bass even though all species were netted and measured. A large boom shocker unit with 13 amps of pulsed DC current was used for electrofishing.

RESULTS AND DISCUSSION

We captured 12 species of fish during the survey plus bluegill/pumpkinseed hybrids. Those fish that were caught in low numbers (< 10 individuals) during the survey were not included in Table 1. They include yellow perch, white sucker, green sunfish, brown bullhead, yellow bullhead and the bluegill/pumpkinseed hybrid.

Table 1. Catch statistics for fish captured in Silver Lake during spring 2007 fyke netting and electrofishing.

	Bluegill	L.M. Bass	N. Pike	Walleye	Pumpkinseed	Bl. Crappie	Rock Bass
	Fyke Net Samples						
# Caught	779	9	24	13	25	15	19
Catch/NN	19.5	0.2	0.6	0.34	0.6	0.4	0.5
Size Range	2.1 – 7.7	4.4 – 12.4	13.5 – 29.2	14.5 – 22.7	3.2 – 7.4	3.1 – 10.4	2.5 – 10.1
Mean Length	3.9	8.8	19.9	17.5	5.0	5.9	3.9
PSD	3.9%	16.7%	34.8%	84.6%	24.0%	8.3%	14.3%
RSD	0	0	4.3%	15.4%	0	8.3%	14.3%
	Electrofishing Samples						
# Caught	240	164	14	14	9	9	17
Catch/hr.	96.0	65.6	5.6	5.6	3.6	3.6	6.8
Catch/mile	50.0	34.2	2.9	2.9	1.9	1.9	3.5
Size Range	2.4 – 8.5	5.3 – 18.3	17.2 – 25.8	10.7 – 22.2	4.2 – 9.3	5.8 – 10.9	6.5 – 10.1
Mean Length	4.6	12.4	21.1	16.1	6.1	7.8	8.2
PSD	12.1%	68.9%	57.1%	61.5%	55.6%	33.3%	94.1%
RSD	0.5%	6.1%	0	7.7%	11.1%	11.1%	29.4%

Bluegill

Bluegill are the most common fish species in Silver Lake and they present the greatest management problem for the lake. They are overabundant, slow growing and exhibit a poor size structure. We caught 779 bluegill in fyke nets at a rate of 19.5/NN (Table 1). The electrofishing catch of 240 fish at 96.0/hr was lower than expected for the two electrofishing trips. The first electrofishing trip yielded only 11 fish while the second yielded 229 fish. The low catch during the first trip was likely due to low temperatures. Previous single run electrofishing surveys on the lake on May 22, 2000 and October 11, 2005 yielded bluegill catch rates of 234/hr and 306/hr, respectively.

The size range of bluegills in the 2007 samples ranged from 2.1" – 7.7" in fyke nets and 2.4" – 8.5" while electrofishing (Table 1). There was a strong length mode at 3.5" in fyke net samples (Figure 2) and 4.0" in

electrofishing samples (Figure 3). The PSD values were 4.6% for fyke net samples and 11.7% for electrofishing samples. The RSD8 values were 0.0% for fyke net samples and 0.5% for electrofishing samples. Both the PSD and RSD8 values were very low and indicate that the size structure of the bluegill population is poor in the lake.

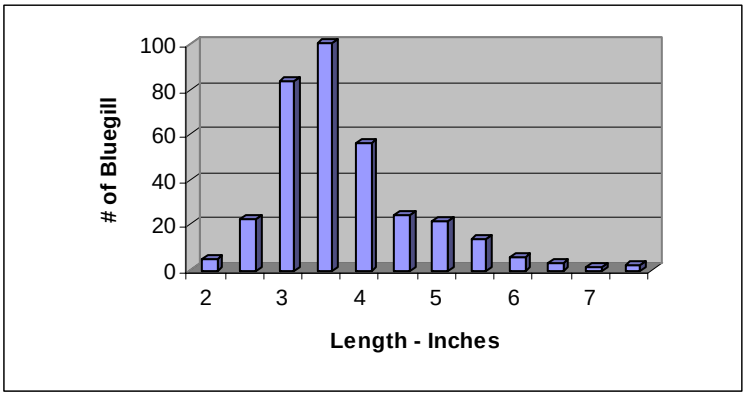

Figure 2. Length frequency distribution of bluegill in fyke net samples - 2007.

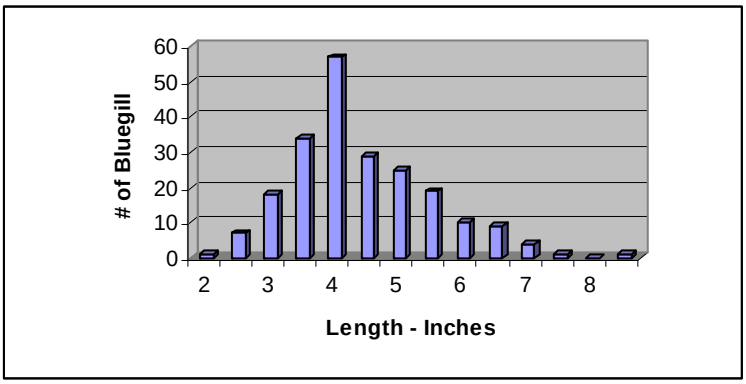

Figure 3. Length frequency distribution of bluegill in electrofishing samples - 2007.

The growth of Silver Lake bluegill was well below the state average at age (Table 2). The slow growth rate had been previously documented in a survey that was conducted in 2005. Two factors are thought to contribute to the slow growth of Silver Lake bluegill. The first is the generally low fertility of the lake since it is a spring fed resource with a small watershed. Secondly, there is abundant spawning habitat in the lake that probably contributes to an overabundance of reproduction by the species. With a combination of high reproduction and low fertility, slow growth of bluegill is expected and difficult to improve. An increase in the number of walleye in the lake may help reduce bluegill numbers. However, it would be difficult to establish enough adult walleye in the lake to significantly reduce bluegill numbers.

Table 2. Length at age of Silver Lake fishes (number aged in parenthesis) back-calculated lengths.

Species/Age	1	2	3	4	5	6	7	8
Bluegill State Ave.	1.8”(94) 3.3”	2.5” (94) 4.0”	3.3” (94) 4.8”	4.2” (84) 5.8”	5.5” (53) 6.4”	6.2” (31) 7.0”	6.8” (9) 7.6”	7.1” (2) 8.0”
Largemouth Bass State Ave.	3.6” (75) 4.9”	6.3” (75) 7.0”	8.6” (68) 9.3”	10.8” (53) 11.2”	12.4” (41) 12.9”	13.6” (24) 14.7”	14.5” (9) 16.2”	15.1” (2) 17.5”
Northern Pike State Ave	---	15.4” (41) 14.7”	17.9” (36) 17.8”	19.9” (26) 20.5”	21.2” (16) 23.2”	24.1” (4) 25.5”	---	---
Walleye State Ave	7.1” (5) 7.0”	11.4” (5) 9.9”	13.7” (2) 12.2”	---	---	---	---	---
Black Crappie State Ave.	3.2” (30) 4.7”	5.4” (30) 5.8”	7.3” (15) 7.4”	9.1” (5) 8.5”	10.7” (2) 9.4”	---	---	---
Yellow Perch State Ave.	3.2” (8) 4.1”	4.6” (8) 5.0”	6.1” (5) 6.1”	7.7” (2) 6.9”				

Largemouth Bass

Largemouth bass were the most common predator in Silver Lake. We caught 9 bass in fyke nets and 164 bass during the two electrofishing runs (65.6/hr) (Table 1). A strong length mode was found at the 12" – 13" size range (Figure 4). The electrofishing sample PSD value was 68.9% which is relatively high. The RSD15 was 6.1% which was relatively low. The length frequency distribution indicated that harvest of legal size fish over 14" long may be high. Largemouth bass are probably the most significant predators on the abundant bluegill in the lake.

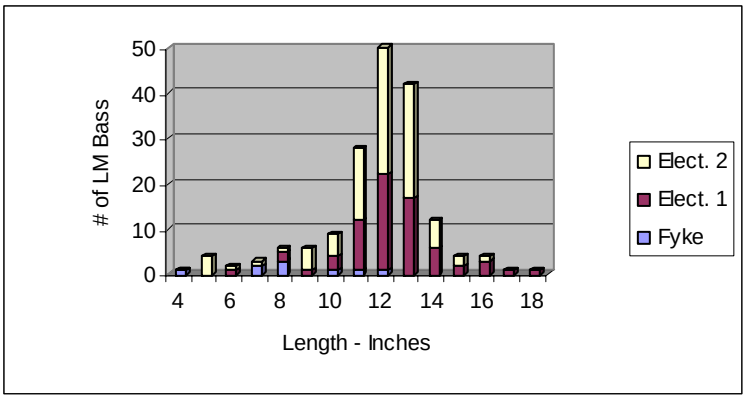

Figure 4. Length frequency distribution of largemouth bass in fyke net and electrofishing samples - 2007.

The growth rate of largemouth bass in Silver Lake is low in comparison to state averages (Table 2). The likely reason for the poor comparison to state averages is that the bass start out growing slowly as they compete with the abundant bluegill for a limited food base (invertebrates). They are then unable to overcome the initial slow growth despite an abundance of forage (bluegills) in the lake. Such slow growth of largemouth bass is common in low fertility spring fed lakes.

Northern Pike

Anecdotal information from lake shore residents and anglers indicates that northern pike are fairly abundant in Silver Lake. Our survey information did not substantiate their claims. Quite possibly, we did not accurately characterize the population in our fyke net or electrofishing samples. Northern pike are sometimes difficult to sample as spawning often begins before ice is completely off the lake. We may have missed the bulk of the spawning run with our nets despite having put the nets in on the day the ice left the lake.

We caught 24 northern pike in fyke nets at a catch rate of 0.6/NN (Table 1). We caught 14 pike while electrofishing at a rate of 5.6/hr. We attempted to catch enough pike to do a population estimate but, were unable to do so with the low catch.

The northern pike ranged in size from 13.5" – 29.2" (Table 1). Length modes were obvious at 17" and 20" – 22" (Figure 5). Those modes represented mostly age 2 and age 4/5 northern pike. Only one fish of the 38 captured measured greater than the 26" minimum size limit.

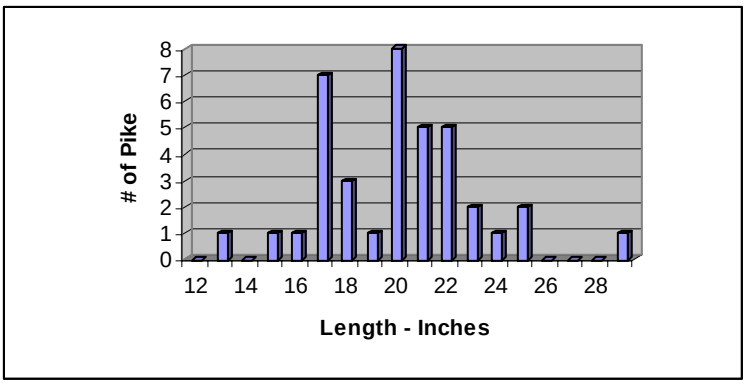

Figure 5. Length frequency distribution of northern pike in 2007.

Northern pike growth was similar to the state averages (Table 2). Growth seemed to slow at ages 5 and 6 but, the low number of fish in the sample was low and the differences may not be significant. A larger forage base in the form of white sucker in the lake would lead to faster growth. The apparent abundance of northern pike in Silver Lake probably contributes to the slow growth.

Walleye

Walleye were stocked periodically into Silver Lake by the Silver Lake Protection District. There was no evidence of any natural reproduction of walleye in Silver Lake from the survey results. We caught 13 walleye in nets (0.34/NN) and 14 while electrofishing (5.6/hr) (Table 1). Due to the small number of fish in the sample, no population estimate was possible. Anglers do report an occasional catch of walleye.

The walleye in the samples ranged from 10.7" to 22.7" (Table 1). Five of the walleye were in the 19" size group. Adult walleye were most vulnerable to capture due to there presence in shallow water seeking spawning habitat.

A small number of walleye were aged from Silver Lake samples. The growth rate of those aged fish indicated that walleye growth in Silver Lake is above the state average (Table 2). Forage for walleye is almost unlimited in Silver Lake and there is potential for fast growth of walleye.

Pumpkinseed, Black Crappie, Yellow Perch and Rock Bass

We caught 25 pumpkinseed in fyke nets and 9 while electrofishing (Table 1). They ranged in size from 3.2" to 9.3". Pumpkinseed probably provide an occasional catch to anglers and are able to grow to a fairly large size.

Black crappies are regularly sought by anglers fishing Silver Lake and probably provide good action at times on the lake. Good crappie spawning habitat was observed in the "kettle" near the bulrush stands. We caught 15 crappies in fyke nets that ranged in size from 3.1" to 10.4" (Table 1). We caught only 9 crappies while electrofishing that ranged in size from 5.8" to 10.9". Heavy angling pressure probably keeps the population from being able to produce larger crappie. Two anglers were observed catching several crappies one day while we were returning to the boat ramp. The growth of black crappie was similar to the state averages in general (Table 2).

We only caught 1 yellow perch in fyke nets and 7 during the second electrofishing sample. The low catch may not be an accurate reflection on the population though, it is likely that they contribute little to the sport fishery of the lake. Growth of the perch was similar to the statewide averages (Table 2).

Rock bass were fairly common in the catch. We caught 19 rock bass in fyke nets and 17 while electrofishing (Table 1). They ranged in size from 2.5" to 10.1". While not generally sought by anglers, they do provide fairly good action when caught.

General Observations

The fish community we observed in Silver Lake is typical of clear, spring fed lakes in Southeastern Wisconsin. Such lakes are relatively infertile. Zooplankton production is likely more limited than in drainage lakes that are fed by streams that introduce more fertility to the lake. The small watershed of Silver Lake is a related factor.

Bluegill production is typically high on lakes with large areas of shallow, sand bottoms. Spawning habitat is not limited and larger spawning bluegills are vulnerable to anglers. The high bluegill production is rarely controlled by largemouth bass in such lakes.

Natural reproduction of walleye may never occur in Silver Lake despite attempts to stock the species. Low fertility appears to be the common factor. Walleye are typically associated with drainage lakes as well. They were not native to Silver Lake. While spawning occurs and eggs likely hatch, the fry are apparently unable to survive due to the absence of suitable zooplankton resources. Stocking is needed to sustain the fishery.

Silver Lake has good to excellent habitat quality for largemouth bass. We observed a healthy population of largemouth bass as expected. The 14" minimum size limit adequately protects the population and many bass anglers practice catch and release.

Northern pike populations are highly variable on spring fed lakes and Silver Lake is no exception. The lake is likely to sustain a relatively high density on northern pike that provide good angling in winter. It is likely to produce an occasional large pike but, is not likely to produce many trophies.

We did not evaluate the forage minnow populations of the lake. Rock bass may be significant predators on minnows as are small bass, northern pike and walleyes. However, the large shallow flats of Silver Lake should be good habitat for minnows.

The vegetation present, especially in the "kettle", is high quality habitat and should be preserved. The native species are especially important to the overall health of the lake. Invasive species should be managed to limit their impact on native species as warranted.

Overall, the greatest management challenge for Silver Lake is to reduce the number of bluegill present so that growth rates may improve. Walleye stocking may help to reduce bluegill numbers though, it would be difficult to develop an adult population in excess of 2 adult walleye per acre.

MANAGEMENT RECOMMENDATIONS

I recommend that walleye fingerling be stocked on alternate years in Silver Lake at a rate of 35 fingerling/acre. Walleye should be stocked by boat over deep water when possible to reduce the initial predation that occurs in shallow water. Walleye stocking is needed to produce a sustainable fishery and to provide added predation on bluegills.

Local anglers have commented that they feel the 26" minimum size limit on northern pike is not appropriate for Silver Lake. Our fyke net catch of pike was relatively low which would lead to an assumption that pike are common but not abundant in the lake. However, fyke net samples do not always reflect true population levels for the species as spawning commonly begins before ice-out and the pike are not easily sampled. Only 1 of the 38 pike captured exceeded 26" long and most of the fish were in the 20" to 21" size range. Elimination of the minimum size limit or reduction to a smaller size may be warranted.

NOTED AND APPROVED

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Sue Beyler, Inland Fisheries Team Supervisor Date