Silver Lake
Washtenaw County, T1S R4E Sec 3-4
Huron River Watershed, Last Surveyed May 2013

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Environment

Silver Lake is a natural lake of glacial origin that is approximately 204 acres in size with a 7-acre island in the northwest corner (Figure 1). It is located almost on the county line in northwest Washtenaw County (northern tip of lake crosses into Livingston County) in the Pinckney Recreation Area. There is one small inlet on the lake's south end and an outlet at its southeast side that is tributary to Little Portage Lake in the Portage Creek watershed which eventually flows into the Huron River.

The Portage Creek watershed lies within the Washtenaw district of the Southern Lower Michigan Regional Landscape Ecosystem and is described by features identified in the Jackson Interlobate sub-district (Albert 1995). The Jackson Interlobate sub-district is characterized by steep, end-moraine ridges surrounded by pitted outwash deposits with kettle lakes and wetlands dispersed within the outwash. Extensive wetlands are common around many of the lakes. Soils are well to excessively-well drained and textures range from sand to clay with a common occurrence of sandy loam on the moraine ridges and sand on the outwash plains.

There is no water level control structure or legally established lake level so the water level fluctuates naturally based on rainfall and water table movements. This lake is characterized as having steep drop-offs and has a maximum depth of 45 feet. The bottom types are mainly sand, marl, and peat. Aquatic vegetation is moderately abundant and includes Chara, bladderwort, coontail, Eurasian milfoil, water lilies, and bulrush as well as several varieties of pondweed.

Relatively few homes exist on this lake and approximately one-half of the lake's shoreline (the southwest portion) is state-owned. Public access is available through the Pinckney Recreation Area located at the southwest end of the lake and public watercraft access is presently restricted to carry-in boats only (there is a private launch for larger boats for the few private residences on the lake). There is a state-operated public beach in the recreation area as well as restrooms and playground and picnic facilities adjacent to the lake. A fishing pier also exists on park property and provides anglers access to the small southeast basin (Figure 2). From the paved parking lot, anglers must cross approximately 300 feet of an open, grassy area to reach the pier and carry-in boat launch area. There are restictions on high speed boating or watersking from 6:30pm to 10:00am.

In order to help concentrate fish, in 1990, twenty fish cover structures (used Christmas trees) were placed within casting distance of the fishing pier in water approximately 15 feet deep. These trees were installed vertically in groups of 10 using a cement block to weight them. These structures have proven to be the most effective panfish attractors when compared with other fish cover types. Parks personnel reported that pier anglers consistently experience fair to good fishing success.

A limnological profile of the lake was taken on August 5, 2013 (Figure 3) that showed a thermocline established at about 20-25 feet. Water temperature was fairly constant at 74 F from the surface down

to about 18 feet. There it began to drop sharply and was below 60 F by 25 feet. The temperature decline continued more slowly and eventually reached 40 F at 40 feet (maximum depth was just under 41 feet). Dissolved oxygen levels were rather low at the surface (4 ppm), but then increased steadily to 6-7 ppm at 20-25 feet. Beyond 25 feet the dissolved oxygen dropped sharply and was below the level prefered by most fish (3 ppm) by 28 feet and continued to drop reaching less than 0.5 ppm by 37 feet. The pH ranged from 8.7 at the surface to 8.5 at 20 feet; below the thermocline it gradually dropped reaching 7.8 at 40 feet.

History

Silver Lake was stocked with bluegills, sunfish, largemouth bass, and yellow perch on an intermittent basis from the mid-1930s to the mid-1940s. This practice was discontinued after research showed that stocking these species was both unnecessary and uneconomical. Tiger muskellunge were stocked from the early 1970s through 1985. Few muskies were reported caught by anglers and these plants were discontinued. More recently, redear sunfish were stocked in 1991, 1993, and 1995 with the hope of creating a trophy panfish fishery.

This lake was surveyed in 1994 and 1998 with trap and gill nets to evaluate the success of the redear sunfish stocking program. During the 1994 survey, 29 redears were captured with trap nets and they averaged nearly 8 inches. The 1998 survey collected 193 redear in the trap nets with an average length of over 9 inches and growth rates an inch or more above the state average. Several year classes of redears were found from post-stocking years indicating they were reproducing successfully in the lake and had become a major component of the panfish community.

Current Status

A fish community survey was conducted on Silver Lake from May 14-17, 2013, by MDNR Fisheries Division. Gear included 3 inland trap nets set for 3 nights, 2 small-mesh fyke nets set for 2 nights, and 1 experimental gill net set for 1 night (Figure 1b). Fish were removed from all the gears daily for a total of 9 trapnet, 4 small-mesh fyke, and 1 gill net nights of sampling. The goal of this survey included developing an overall picture of the fish community and to further evaluate the redear sunfish fishery previously established.

A total of 653 fish weighing about 231 pounds and comprised of 20 different species were collected (Table 1). Panfish such as bluegill, redear sunfish, rock bass, and black crappie made up 73% of the total catch by number and 47% by weight. Large predator species such as largemouth bass and northern pike were only 5% of the catch by number, but 27% of the biomass caught. Brown and black bullhead were 5.5% of the catch by number and 10% by weight. Forage fish species included bluntnose minnow, blackchin and blacknose shiner, lake chubsucker, and least darter. A few bowfin and a single carp and grass pickerel were also caught.

Bluegill and redear sunfish made up roughly equal parts of the panfish catch. Bluegill were 31% of the total catch by number, 7.5 % by weight, and ranged from 1 to over 9 inches long (Table 1). The average length in the trap net catch (86 fish) was 5.9 inches with about 50% of the bluegill exceeding the minimum size acceptable to anglers of 6 inches and 14 fish were over 8 inches (Table 2). Catch per effort (CPE) in the trap nets was low at just under 10 fish per net lift. Growth rates were relatively slow with the average length-at-age 0.8 inches below the state average (Table 3). The bluegill

population was also evaluated using Schneider's Index (Schneider 1990). This index provides a relative measure of the quality of the bluegill fishery in a lake based on a scale of 1-7, with 7 being the best. The bluegill in Silver Lake received an index of 3.8 which equates to an "acceptable-average" rating.

Redear sunfish made up 30% of the total catch by number and 33% by weight with a size range of 1 to almost 11 inches (Table 1). The trap net catch (179 fish) averaged 7.9 inches with 79% exceeding the 6-inch minimum size acceptable to anglers (Table 2). A total of 103 fish were over 8 inches with 13 longer than the master angler catch and release minimum length of 10 inches. Growth for this species was also slow with an average growth index 1.8 inches below the state average (Table 3).

Other panfish species collected in significant numbers included 23 rock bass ranging from 1-8 inches, 10 black crappie from 6 to 10 inches, and 30 hybrid sunfish from 2 to 9 inches (Table 1). The hybrid sunfish appeared to be a cross between redear sunfish and pumpkinseed based on coloration and physical characteristics. Additional panfish species collected in small numbers were 2 pumpkinseed, 2 warmouth, and 2 yellow perch.

The only large sport fish species caught in the survey were largemouth bass and northern pike. The 19 largemouth bass averaged 13.6 inches with 7 fish exceeding the minimum legal-size limit of 14 inches. Growth rates were generally above average through age six then tended to drop below the state average at older ages. A total of 14 northern pike were collected with an average length of 22.2 inches and 1 fish over the minimum legal-size limit of 24 inches. Growth rates for pike were generally well below the state average.

Three species comprised the bulk of the small, forage fish species found in the survey. Bluntnose minnow (38 fish), blackchin shiner (34 fish), and blacknose shiner (27 fish) are typical minnow-like species found in smaller, isolated lakes in this part of the state. The other two forage species, lake chubsucker (2 fish) and least darter (3 fish), are less common, but indicative of good water quality and a higher proportion of natural shoreline and nearshore habitats than are found on more developed lakes in the area.

The brown and black bullheads caught in this survey made up 5.5% of the total catch by number and 10% by weight (Table 1). Brown bullhead (31 fish) averaged 10.4 inches with 21 fish over the 10-inch mark. Black bullhead (5 fish) ranged from 13 to over 15 inches. Other miscellaneous fish species collected in small numbers included 3 bowfin and a single carp.

In addition to the fish, turtles were found to be very abundant in Silver Lake. Five native species of turtles were collected: 38 map turtle (3-8 inch carapace length), 13 painted turtle (3-5 inches), 10 snapping turtle (8-16 inches), 6 musk turtle (3-4 inches), and 3 spiny softshell (6-14 inches).

Analysis and Discussion

Similar to the 1998 survey, redear sunfish and bluegill comprised the majority of the trap net catch. While the numbers of these two species caught with all gear combined were roughly equal, the redear sunfish were about twice as abundant as the bluegill in the trap net catch (179 redear vs. 86 bluegill). These numbers are very similar to the previous survey where 193 redear were caught compared to 72 bluegill, but the catch rates were not similar between the two surveys. The roughly equal numbers

caught was achieved with 3 nights of sampling using 3 nets in 2013 (9 net nights) compared to just a single night of sampling with 4 nets (4 net nights) in 1998. This difference is not quite so drastic when you consider the first net lift usually has much higher catch rates than subsequent net lifts (and only the first net lift was used in 1998), but it is still significant and indicates a somewhat lower abundance of both species compared to the previous survey.

The average size of both species in the trap net catch also declined since the last survey. Redear sunfish averaged 9.3 inches in 1998 compared to 7.9 inches in 2013 while bluegill averaged 6.8 inches in 1998 versus 5.9 inches in 2013. Mean growth indices for both species dropped as well. Bluegill growth rates in 2013 were 0.8 inches below state average compared to 0.2 inches below average in 1998. The decline in redear sunfish growth was even more drastic dropping from 1.2 inches above the state average in 1998 to 1.8 inches below the state average in 2013.

A positive change from 1998 was the presence of every age class of both redear sunfish and bluegill up through age eleven in this most recent survey. This indicates both species are consistently successful in spawning each year with subsequent good survival of the young fish. This consistent reproduction and recruitment success is probably one factor in the decline of both the redear and bluegill growth rates. Consistently successful spawning means more small fish competing for food every year. They never recover from the extremely poor growth in their early years which results in the smaller adults. Insufficient predation to reduce the numbers of smaller fish may also be a factor.

The generally smaller adult bluegills also resulted in a decline in the Schneider's Index (Schneider 1990) calculated for this survey. It dropped from a rating of 4.75 (average-good) in 1998 down to a 3.8 (acceptable-average) rating in 2013.

The increasing abundance of redear sunfish corresponds with decreased numbers of pumpkinseeds in Silver Lake. A 1994 survey caught 112 pumpkinseeds (CPE of 16), 42 pumpkinseeds were caught by trap nets in 1998 (CPE of 10.5), and only 2 (CPE of 0.2) were captured in 2013.

Overall, the introduction of redear sunfish to Silver Lake has increased the abundance of good-sized panfish (over 8 inches) with the potential to catch a "trophy" panfish (redear sunfish over 10 inches are present). However, the establishment of this self-sustaining population of redear sunfish has occurred at the price of reduced numbers of larger bluegills and almost total loss of the pumpkinseed population.

Another concern is the appearance of signficant numbers of hybrid sunfish. A total of 30 hybrid sunfish ranging from 2 to 9 inches were collected in 2013. None were reported from the prior two surveys in 1994 and 1998. Several other lakes where self-sustaining redear populations have been established have also developed significant numbers of hybrid sunfish. It may be that when large numbers of redear sunfish reach maturity, they tend to overwhelm available spawning grounds and mix with native species - resulting in an atypical number of hybrids. These hybrids attain large sizes and are readily caught by anglers, so the overall panfish fishery remains good, but the effect of this mixing of genetic material in the native panfish community needs further study.

Both the largemouth bass and northern pike are present in satisfactory numbers and sizes. The many year classes caught in the 2013 survey provide evidence of adequate natural reproduction. This is

similar to the results of previous surveys and shows the populations of these large sport fish are stable in Silver Lake.

Management Direction

A self-sustaining population of redear sunfish has developed from the stocking program conducted in the early 1990s. While it has had negative effects on other panfish species in the lake, the overall fishery is still in good condition and there is the added possibility of catching some larger-than-average panfish. With no public boat ramp on the lake, angling pressure is probably lower than similar lakes in the area with public boat access. Whether it is due to this lower fishing pressure or other factors, the panfish populations are maintaining a satisfactory size structure. No further management actions targeting panfish species are necessary at this time

The populations of largemouth bass and northern pike appear to be stable and self-sustaining with adequate numbers present to maintain predation pressure on the panfish species. There are also reasonable numbers of legal-size fish for anglers. Growth is relatively slow, but the limited fishing pressure, consistent reproductive success, and angler tendency to release legal-size bass should all function to provide continued good predator populations. No additional management for large predator species is recommended.

Public shorefishing opportunities on Silver Lake are limited to a single fishing pier in the Pinckney State Recreation Area and wading along portions of the state-owned shoreline. Possibilities for enhancing shorefishing opportunities along the state property could include installation of submerged, fish-attracting structures near the existing fishing pier (similar to what was done in 1990) to draw more fish within reach of anglers. The structures that were installed in 1990 were successful in increasing angling success from the pier, but the materials used only have a life span of a few years before they decompose and no longer provide any benefit. There could also be some modifications to enhance accessibility to the existing pier (such as a maintained path from the parking lot to the pier). Installation of another fishing pier to the west of the beach area could also be considered. In addition, provisions to drop a small boat, canoe, or kayak from a vehicle at the edge of the water would enable less able-bodied individuals to take advantage of the relatively quiet atmosphere on this lake.

References

Albert, D.A. 1994. Regional lansdscape ecosystems of Michigan, Minnesota, and Wisconsin: a working map and classification, fourth edition. Michigan Natural Features Inventory, Lansing, MI.

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Technical Report 90-10, Ann Arbor, MI.

Figure 1. Silver Lake contour map with 2013 sampling sites.

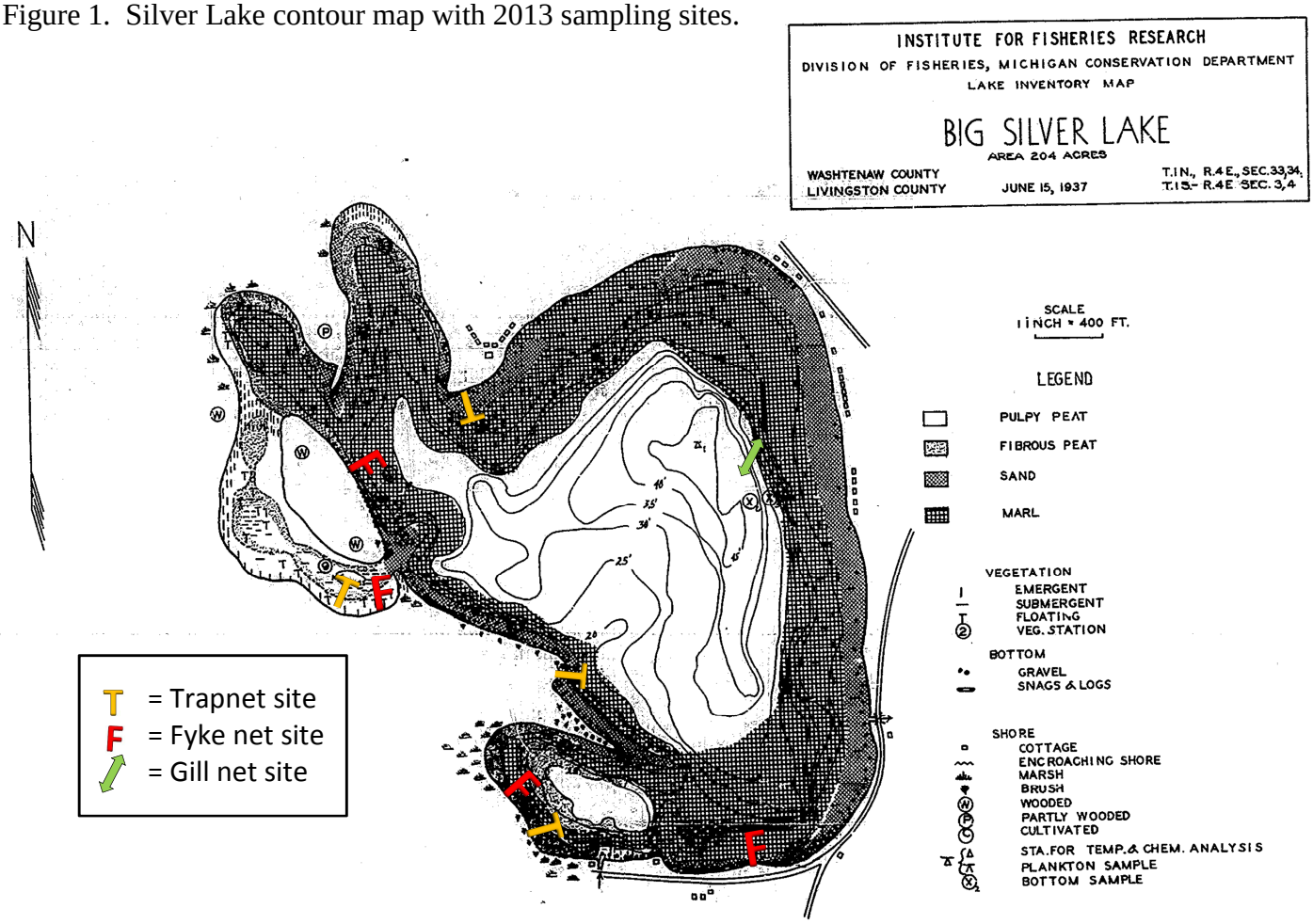

Figure 2. Aerial photo of Silver Lake, Washtenaw County.

Figure 3. Limnological Profile of Silver Lake (August 5, 2013).

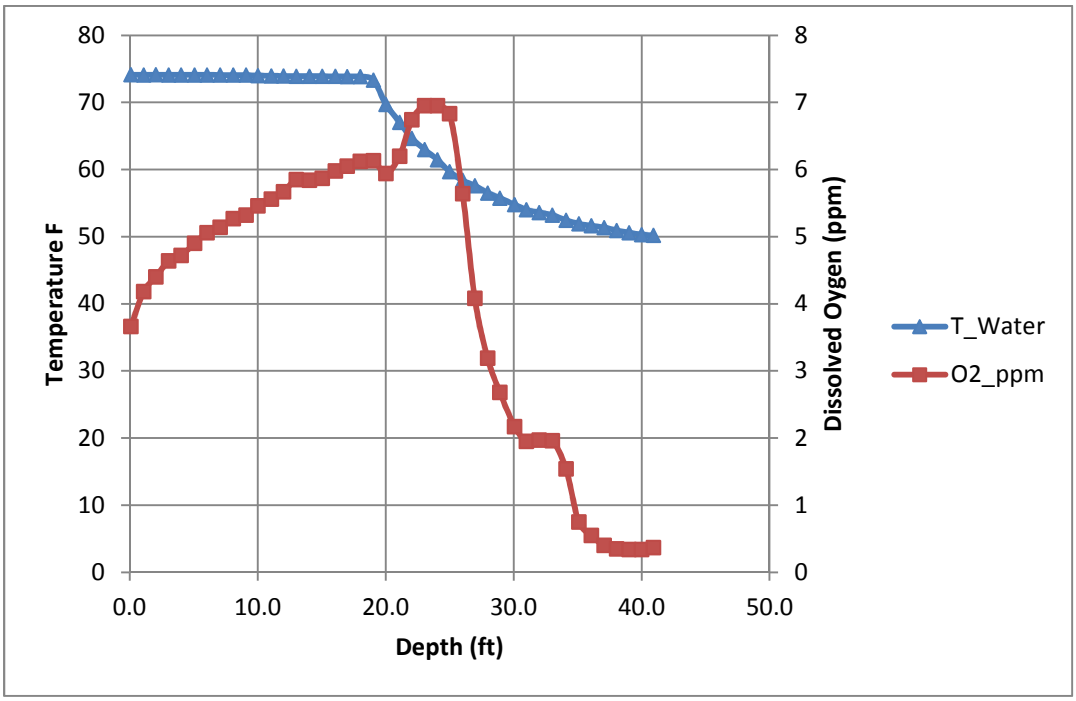

Table 1. Species catch and relative abundance of fishes collected with all gear types combined during the Silver Lake fisheries survey, May 14 - May 17, 2013.

Species	Number	Percent by number	Weight (lb.)	Percent by weight	Length Range (in.)	Average Length (in.)	Percent legal size*
Black crappie	10	1.5	3.3	1.4	6-10	7.8	70
Blackchin shiner	34	5.2	0.1	0	1-2	2.1	100
Black bullhead	5	0.8	6.7	2.9	13-15	13.9	100
Bluegill	205	31.4	17.3	7.5	1-9	5.1	19
Bluntnose minnow	38	5.8	0.2	0.1	1-3	2.3	100
Blacknose shiner	27	4.1	0.1	0	1-2	2	100
Bowfin	3	0.5	12.4	5.4	19-24	22.5	100
Brown bullhead	31	4.7	17.4	7.5	6-12	10	97
Common carp	1	0.2	24.4	10.6	38	38.5	100
Green sunfish	5	0.8	0.1	0	2-3	2.9	0
Hybrid Sunfish	30	4.6	5.3	2.3	2-9	5.6	37
Lake chubsucker	2	0.3	0.2	0.1	3-6	5	100
Least darter	3	0.5	0.0	0	1	1.5	100
Largemouth bass	19	2.9	27.4	11.9	9-17	13.3	37
Northern pike	14	2.1	34.2	14.8	19-26	22.2	7
Pumpkinseed	2	0.3	0.8	0.3	6-8	7.5	100
Rock bass	23	3.5	5.5	2.4	1-8	5.9	70
Redear sunfish	197	30.2	75.5	32.7	1-10	6.8	72
Warmouth	2	0.3	0.1	0	3-3	3.5	0
Yellow Perch	2	0.3	0.0	0	2-3	3	0
All species totals:	653		230.9				

* Percent legal or acceptable size for angling

Table 2. Catch summary of important sport fish collected with trap nets during the 2013 Silver Lake fish survey.

Length (in)		Bluegill	Redear Sunfish	Black Crappie	Largemouth Bass	Northern Pike
	Avg L	5.9	7.9	8.2	13.6	22.3
	CPE	9.6	19.9	1.1	2.1	0.4
0						
1						
2						
3		11	1			
4		25	17			
5		11	19			
6		12	17	3		
7		13	22	2		
8		10	44	2		
9		4	46	1	1	
10			13	2	3	
11					3	
12					2	
13					3	
14						
15					1	
16					4	
17					2	
18						
19						
20						1
21						
22						2
23						1
24						
Total		86	179	10	19	4

Table 3. Weighted mean length and age composition of selected fish species collected in Silver Lake, May 14-17, 2013.

Species	Age	No. Aged	Length Range (in)	Weighted Mean Length (in)	State Avg. Length (in)	Mean Growth Index
Bluegill	I	13	1.5-2.0	1.69	1.8	-0.8
	II	10	2.2-3.0	2.49	3.8	
	III	3	3.2-3.8	3.53	5	
	IV	18	3.7-6.5	4.38	5.9	
	V	11	4.5-8.1	5.94	6.7	
	VI	18	4.8-9.1	6.6	7.3	
	VII	9	5.7-9.3	7.56	7.8	
	VIII	3	7.1-9.5	8.17	8.2	
	X	2	8.8-9.7	9.25	8.9	
	XI	1	8.9	8.9		
Redear Sunfish	I	1	1.7	1.7	1.9	-1.8
	II	8	2.3-2.9	2.64	4.4	
	III	2	3.4-3.8	3.6	6.2	
	IV	13	3.5-8.6	5.39	7.6	
	V	23	4.3-8.9	6.99	8.7	
	VI	14	5.6-10.0	7.79	9.6	
	VII	5	5.8-10.0	8.66	10.3	
	VIII	6	7.8-10.1	8.99	10.8	
	IX	4	9.4-10.7	9.83		
	X	5	7.6-9.9	9.21		
	XI	1	10.2	10.2		
Largemouth Bass	III	5	9.5-11.6	10.38	9.4	+1.0
	IV	4	11.3-13.1	12.18	11.6	
	V	2	11.3-13.4	12.35	13.2	
	VI	1	16.1	16.1	14.7	
	VII	1	13.6	13.6	16.3	
	VIII	1	15.8	15.8	17.4	
	IX	1	16.3	16.3	18.3	
	X	3	16.8-17.6	17.1	19.3	
	XI	1	17.2	17.2		
Northern Pike	IV	1	20.5	20.5	23.4	-3.5
	V	8	19.4-26.7	22.04	25.5	
	VI	2	22.7-23.7	23.2	27.3	
	VII	1	20	20.2	29.3	
	VIII	2	23.1-23.2	23.15	31.2	