Starvation Lake
Kalkaska County
Manistee River Watershed, last surveyed in 2018

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Environment

Starvation Lake is a 134-acre lake located in Blue Lake Township, northeastern Kalkaska County, Michigan. The lake lies within the Manistee River watershed, is self-contained with no inlets or outlets, and is relatively shallow, reaching a maximum depth of 47 feet. Starvation Lake is considered a two-story lake with available shallow water habitat to support warm-water gamefish including bass and panfish, and deep colder-water habitats available to support cold water species like trout. The bottom substrate of Starvation Lake is primarily sand, with some of the deeper areas containing layered organic substrate.

Much of the area around the lake is State-owned forest land, comprised of northern hardwoods and conifers, rolling hills and sandy soils. The property directly surrounding the lake is nearly all privately owned parcels and one small parcel is owned by the Michigan Department of Natural Resources (MDNR). Public access to Starvation Lake is gained via the MDNR property on the northeastern shore where there is a hard surface boat launch with one skid pier, a pit toilet, and parking for 7 vehicles and trailers. There is a local ordinance related to the operation of watercraft on Starvation Lake. It includes a moratorium on high speed boating (including waterskiing and tubing) between the hours of 6:30 pm and 10:00 am the next day.

The fisheries of Starvation Lake are regulated by the Michigan Department of Natural Resources (MDNR) as a Type C trout lake. Type C regulations include a year-round fishing season, a minimum size limit of 8 inches for both rainbow and brown trout, and a daily bag limit of five trout where no more than three can exceed 15 inches in length.

History

Fish stocking has occurred in Starvation Lake since 1936. Warmwater species including Bluegill, Smallmouth Bass and Largemouth Bass were stocked into the lake by the Michigan Department of Conservation from 1936-1943 (Table 1; MDOC, precursor to the MDNR). The first fisheries survey was conducted by the MDOC in the summer of 1943. Survey efforts included experimental gill nets and hook and line fishing. Species captured in the 1943 survey included Bluegill, Bluntnose Minnows, Rock Bass, Smallmouth Bass, White Sucker, and Yellow Perch (Table 2). In the survey writeup, MDOC Fisheries Biologist Leonard Allison recommended halting the stocking of warm-water species, asserting that native species could sustain themselves through natural reproduction. At the time, Allison recommended stocking Rainbow Trout, if public access to the lake could be assured. Rainbow Trout were stocked in the spring of 1944, and either Rainbow Trout, Brown Trout, or both have been stocked in most years since (Table 1).

Additional fisheries surveys were conducted in Starvation Lake during 1947, 1965, 1968, 1970-1971, 1973, 1979, 1984, 1991, 1997, 2008, 2012-2013 and 2018. Surveys incorporated a variety of gear

types and seventeen fish species were observed in the lake (Table 2). Surveys indicate that Starvation Lake supports populations of both Largemouth and Smallmouth Bass, populations of panfish including Bluegill, Rock Bass, and Yellow Perch. Brown Trout and Rainbow Trout were also consistently recovered in surveys.

Survey efforts conducted post 2008 were aimed at evaluating the success of trout stocking efforts and obtaining general information on the status of fish populations in the lake. Both Brown Trout and Rainbow Trout were captured in the May 2008 MDNR netting survey of Starvation Lake and populations of warm/coolwater gamefish were observed (Table 3). Largemouth and Smallmouth Bass and Yellow Perch were numerous. Bluegill were less numerous but exhibited exemplary growth. White Sucker were prominent in the 2008 catch and over 100 individuals were captured comprising more than half of the biomass of fish surveyed (Table 3). Banded Killifish and Mimic Shiners were captured, neither of which had been previously documented in Starvation Lake (Table 2). The 2008 survey captured 14 Rainbow Trout (7-26 inches in length), representing four different year classes.

The growth of Bluegill and Largemouth Bass in Starvation Lake has typically been better than the State of Michigan average, while Smallmouth Bass and Yellow Perch have tended to grow more slowly (Tonello 2000; MDNR files, Cadillac). In the 2008 survey, Bluegill were not numerous but several individuals over 10 inches in length were observed, indicating growth that was two inches better than the state average (Table 4). Both Largemouth and Smallmouth Bass were observed at sizes reaching 17 inches. Largemouth Bass were growing above the state average, while Smallmouth Bass grew slightly below the state average (Tables 3 and 4). Most Yellow Perch were less than six inches in length and growth rates were near the state average. Rainbow Trout grew well and averaged 20.7 inches in length by their third year in the lake. One exceptional Brown Trout was 29.1 inches in length at eight years old (Table 4).

Electrofishing surveys were conducted by researchers in 2012 and 2013 to evaluate returns of two separate Brown Trout strains, the Wild Rose and the Sturgeon River strains which were marked with unique fin clips and stocked into the lake (Wills 2016). In the 2012 effort, only 6 Brown Trout were captured, five of them were Wild Rose and one was the Sturgeon River strain. In 2013, a total of 24 Brown Trout were captured, 19 were Wild Rose and five were the Sturgeon River strain.

Issues reported on Starvation Lake over the years have included on and off reports of poor trout fishing, likely due to heavy fishing pressure. Correspondence from MDNR Fisheries Biologist Gary Schnicke in 1971 referred to reports of 30-40 boats fishing at once for stocked trout (MDNR files, Cadillac). Yellow Perch die-offs from unknown causes were reported in 1955 and 1978. One lone Northern Pike was caught in a 1973 fisheries survey; the only Northern Pike to have ever been recorded in Starvation Lake. In 1985, a petition was submitted to MDNR requesting the stocking of Rainbow Trout in addition to Brown Trout. The petitioners cited poor survival and fishing for the Brown Trout. In response, both Brown and Rainbow Trout have been stocked by MDNR each year since (Table 1). In 1963 and in 2004 riparian landowners reported extremely low water levels, in each case, the water levels rebounded in subsequent years. In 2006 anglers reported catching Rainbow Smelt in Starvation Lake. The only previous record of Rainbow Smelt in Starvation Lake was one individual caught in a 1991 MDNR fisheries survey (MDNR files, Cadillac).

Current Status

The most recent survey of Starvation Lake was conducted during May 14-17, 2018 and included trap nets, large-mesh fyke nets, small-mesh fyke nets, and inland gill nets. A total of 563 fish, representing 9 different species were captured in the 2018 survey (Table 5). Bluegill and Yellow Perch were the most frequently collected species. Captured Bluegills were mostly large adults, averaging 8.6 inches in length. The Yellow Perch were small, averaging less than 7 inches in length. Largemouth Bass and Smallmouth Bass were well-represented in the survey, with multiple year classes of both species present. Largemouth Bass ranged from 9 to 20 inches in length, and 81% were larger than 14 inches. Smallmouth Bass ranged from 2 to 19 inches in length, and 59% were larger than 14 inches (Table 5). Rock Bass were numerous with 91 individuals captured, and White Sucker were less abundant with 27 captured (Table 5). Iowa Darters (N=52) were observed in the 2018 survey which had not been previously documented in Starvation Lake.

In the 2018 survey, Bluegill growth rates averaged two inches above the state average (Table 6). Whereas, Yellow Perch growth rates were 1.3 inches below the state average. Both species of bass exhibited growth rates that were greater than the state average (Table 6).

Brown Trout and Rainbow trout were well-represented in the 2018 survey. A total of 54 Brown Trout were captured which ranged from 4 to 23 inches in length (Table 5). Brown Trout 9 inches or less in size (N=45) likely represented recently stocked fish and were therefore not aged. Larger brown trout (N=9) represented four different age classes (Table 6). Rainbow Trout (N=13) were captured that ranged from 7 to 19 inches in length. Three were recently stocked fish, and the remaining 10 fish represented three age groups (Table 6).

Analysis and Discussion

Starvation Lake continues to be an excellent destination for anglers in pursuit of panfish, bass, and stocked trout. The 2018 MDNR fisheries survey of Starvation Lake found healthy populations of Bluegill, Rock Bass, Largemouth Bass, and Smallmouth Bass, all of which were growing above the state average. Yellow Perch are less successful in Starvation Lake and are lower in abundance and growing below the state average. Stocked Brown Trout and Rainbow Trout continue to grow well and hold over for multiple years, attaining trophy sizes over 20 inches. Angler reports for the stocked trout remain extremely positive.

Large populations of White Sucker can compete with other species like Yellow Perch, Walleye and possibly Bluegill for food (Hayes 1990). In other area lakes, manual removals of White Sucker have been conducted, with the goal of reducing the White Sucker biomass and alleviating potential competition with more desirable species (Tonello 2015). However, the 2018 Starvation Lake survey documented smaller numbers of White Sucker than previous surveys, so it is unlikely that interspecific competition is a factor at this time.

Northern Pike have only been documented once (one individual fish) in Starvation Lake, in the 1971 MDNR fisheries survey (MDNR files, Cadillac). Northern Pike represent the biggest threat to smaller inland lake trout fisheries. Once introduced to a lake, pike are difficult to eradicate, and are known to be effective predators on stocked trout. It is imperative that Northern Pike never become established in Starvation Lake if the trout fishery is to continue into the future.

Management Direction

Starvation Lake continues to be one of the premier inland trout fishing lakes in northern Michigan. This is entirely due to the MDNR stocking program. Unfortunately, Starvation Lake does not have the appropriate habitat to support natural reproduction of either Rainbow Trout or Brown Trout. Therefore, stocking should continue at rates of 25/acre (3,350 fish) on an annual basis for both species.

According to Wills (2015), the Wild Rose Brown Trout strain outperformed the Sturgeon River strain in inland lakes of northern Michigan. The Wild Rose strain of Brown Trout should continue to be stocked into Starvation Lake. Little Manistee strain Steelhead outperformed Eagle Lake strain Rainbow Trout in seven different Michigan inland lakes (Caroffino and Nuhfer 2014). Currently, MDNR's hatchery system is at capacity for Little Manistee strain Steelhead, and all are allocated to Great Lakes stocking locations. Therefore, Eagle Lake strain Rainbow Trout should continue to be stocked into Starvation Lake. If additional hatchery rearing space for Steelhead becomes available in the future, the stocking Little Manistee strain should be considered for Starvation Lake.

The shoreline of Starvation Lake should be protected and considered critical to the continued health of the lake's aquatic community. Human development in the form of seawalls, artificial beaches, and riprap do not provide healthy environments for aquatic life. Watershed management practices should be geared toward sustaining healthy biological communities which include considerations for fish, invertebrates, amphibians, reptiles, birds and aquatic mammals. Guidelines for protecting fisheries habitat in inland lakes can be found in Fisheries Division Special Report 38 (O'Neal and Soulliere 2006). Consideration should be given to maintenance of water quality, nutrient inputs; preservation of natural shorelines (including shore contours and vegetation), preservation of bottom contours, vegetation, and structures within the lake. The Michigan Natural Shoreline Partnership, an organization dedicated to promoting natural shoreline landscaping to protect Michigan's inland lakes (http://www.mishorelinepartnership.org/), can provide guidance and training on how best to manage the land/water interface for the benefit of Starvation Lake and its residents.

References

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Table 1. Fish stocked in Starvation Lake, Kalkaska County, 1905-2019.

Year	Species	Number	Size	Strain
1936	Bluegill	8,000	4 months	
	Largemouth Bass	400	5 months	
1937	Largemouth Bass	200	3 months	
1938	Bluegill	10,000	4 months	
	Largemouth Bass	2,000	4 months	
1939	Bluegill	10,000	5 months	
	Smallmouth Bass	400	4 months	
1940	Bluegill	100	yearlings	
	Smallmouth Bass	400	4 months	
1941	Bluegill	15,000	3 months	
	Largemouth Bass	400	4 months	
1942	Bluegill	15,000	3 months	
	Largemouth Bass	200	4 months	
1943	Bluegill	750	yearlings	
	Largemouth Bass	450	4 months	
	Smallmouth Bass	500	4 months	
1944	Rainbow Trout	2,000	adults	
1945	Rainbow Trout	2,000	20 months	
1946	Rainbow Trout	15,000	7 months	
1947	Rainbow Trout	15,000	7 months	
1948	Rainbow Trout	15,000	fall fingerlings	
1949	Rainbow Trout	15,000	fall fingerlings	
1950	Rainbow Trout	15,000	fall fingerlings	
1951	Rainbow Trout	30,000	fall fingerlings	
1952	Rainbow Trout	15,000	fall fingerlings	
1953	Rainbow Trout	15,000	fall fingerlings	
1954	Rainbow Trout	15,000	fall fingerlings	
1955	Rainbow Trout	15,000	fall fingerlings	
1956	Rainbow Trout	15,000	sub legal	
1957	Rainbow Trout	15,000	legal	
1958	Rainbow Trout	6,000	legal	
1959	Rainbow Trout	5,000	legal	
1960	Rainbow Trout	5,000	legal	
1961	Rainbow Trout	5,000	legal	
1962	Rainbow Trout	3,000	legal	
1963	Rainbow Trout	3,000	legal	
1964	Rainbow Trout	3,000	legal	
1965	Rainbow Trout	5,000	sub legal	
1966	Rainbow Trout	13,400	fall fingerlings	
1968	Rainbow Trout	3,300	yearlings	
1969	Rainbow Trout	3,300	yearlings	
1970	Brown Trout	3,300	yearlings	
1971	Brown Trout	3,300	yearlings	
1973	Brown Trout	3,300	yearlings	
1974	Brown Trout	2,000	yearlings	
1975	Brown Trout	2,000	yearlings	
1976	Brown Trout	2,000	yearlings	

1977	Brown Trout	2,000	yearlings	
1978	Brown Trout	2,000	yearlings	
1979	Brown Trout	1,000	yearlings	
1980	Brown Trout	2,000	yearlings	
1981	Brown Trout	2,000	yearlings	Harrietta
1982	Brown Trout	2,000	yearlings	Harrietta
1983	Brown Trout	2,000	yearlings	Harrietta
1984	Brown Trout	2,000	yearlings	Harrietta
1985	Brown Trout	1,530	yearlings	Harrietta
1986	Brown Trout	1,820	yearlings	Plymouth Rock
	Rainbow Trout	1,000	yearlings	Shasta
	Rainbow Trout	750	adults	Shasta
1987	Brown Trout	1,000	yearlings	Harrietta
	Rainbow Trout	1,100	yearlings	Shasta
1988	Brown Trout	1,000	yearlings	Plymouth Rock
	Rainbow Trout	900	yearlings	Shasta
1989	Brown Trout	1,000	yearlings	Plymouth Rock
	Rainbow Trout	900	yearlings	Shasta
1990	Brown Trout	900	yearlings	Plymouth Rock
	Rainbow Trout	1,000	yearlings	Shasta
1991	Brown Trout	1,000	yearlings	Plymouth Rock
	Rainbow Trout	920	yearlings	Arlee
1992	Brown Trout	980	yearlings	Wild Rose
	Rainbow Trout	1,000	yearlings	Shasta
1993	Brown Trout	990	yearlings	Wild Rose
	Rainbow Trout	870	yearlings	Shasta
1994	Brown Trout	1,000	yearlings	Wild Rose
	Rainbow Trout	1,000	yearlings	Harrison Lake
1995	Brown Trout	930	yearlings	Wild Rose
	Rainbow Trout	1,000	yearlings	Shasta
1996	Brown Trout	934	yearlings	Wild Rose
	Rainbow Trout	999	yearlings	Eagle Lake
1997	Brown Trout	999	yearlings	Wild Rose
	Rainbow Trout	999	yearlings	Eagle Lake
1998	Brown Trout	980	yearlings	Wild Rose
	Rainbow Trout	1,000	yearlings	Eagle Lake
1999	Brown Trout	1,000	yearlings	Wild Rose
	Rainbow Trout	970	yearlings	Eagle Lake
2000	Brown Trout	1,200	yearlings	Wild Rose
	Rainbow Trout	1,070	yearlings	Eagle Lake
2001	Brown Trout	1,030	yearlings	Wild Rose
	Rainbow Trout	1,000	yearlings	Eagle Lake
2002	Brown Trout	1,200	yearlings	Wild Rose
	Rainbow Trout	1,200	yearlings	Eagle Lake
	Rainbow Trout	31	adults	
2003	Brown Trout	1,020	yearlings	Wild Rose
	Rainbow Trout	1,150	yearlings	Eagle Lake
2004	Brown Trout	2,000	yearlings	Wild Rose
	Rainbow Trout	2,100	yearlings	Eagle Lake
2005	Brown Trout	2,000	yearlings	Wild Rose

	Rainbow Trout	2,200	yearlings	Eagle Lake
2006	Brown Trout	2,000	yearlings	Wild Rose
	Rainbow Trout	3,000	yearlings	Eagle Lake
2007	Brown Trout	1,800	yearlings	Wild Rose
	Rainbow Trout	2,100	yearlings	Eagle Lake
2008	Brown Trout	2,000	yearlings	Wild Rose
	Rainbow Trout	2,200	yearlings	Eagle Lake
2009	Brown Trout	2,040	yearlings	Wild Rose
	Rainbow Trout	2,100	yearlings	Eagle Lake
2010	Brown Trout	3,125	yearlings	Wild Rose
	Brown Trout	3,125	yearlings	Sturgeon River
	Rainbow Trout	2,800	yearlings	Eagle Lake
2011	Brown Trout	3,125	yearlings	Wild Rose
	Brown Trout	3,125	yearlings	Sturgeon River
	Rainbow Trout	2,800	yearlings	Eagle Lake
2012	Brown Trout	3,125	yearlings	Wild Rose
	Brown Trout	3,125	yearlings	Sturgeon River
	Rainbow Trout	2,700	yearlings	Eagle Lake
	Rainbow Trout	2,500	fall fingerlings	Eagle Lake
2013	Brown Trout	3,125	yearlings	Wild Rose
	Brown Trout	3,125	yearlings	Sturgeon River
	Rainbow Trout	2,800	yearlings	Eagle Lake
2014	Brown Trout	3,350	yearlings	Wild Rose
	Rainbow Trout	3,325	yearlings	Eagle Lake
2015	Brown Trout	3,685	yearlings	Wild Rose
	Rainbow Trout	3,500	yearlings	Eagle Lake
2016	Brown Trout	3,350	yearlings	Wild Rose
	Rainbow Trout	3,350	yearlings	Eagle Lake
2017	Brown Trout	3,500	yearlings	Wild Rose
	Rainbow Trout	3,685	yearlings	Eagle Lake
2018	Brown Trout	3,350	yearlings	Wild Rose
	Rainbow Trout	3,600	yearlings	Eagle Lake
	Rainbow Trout	5,000	fall fingerlings	Eagle Lake
2019	Brown Trout	3,339	yearlings	Wild Rose
	Rainbow Trout	3,685	yearlings	Eagle Lake

Table 2. Presence/absence of fish species in historical fisheries surveys of Starvation Lake, Kalkaska County (1943-2018).

Species	1943	1947	1965	1968	1970	1971	1973	1979	1984	1991	1997	2008	2018
Banded Killifish												x	
Bluegill	x		x			x	x	x	x	x	x	x	x
Bluntnose Minnow	x											x	
Brown Trout						x	x	x	x	x	x	x	x
Common Shiner											x		
Fathead Minnow											x		
Iowa Darter													x
Largemouth Bass			x			x	x	x		x	x	x	x
Mimic Shiner												x	
Northern Pike							x						
Pumpkinseed Sunfish			x			x	x	x	x	x			
Rainbow Smelt										x			
Rainbow Trout		x	x	x	x	x				x	x	x	x
Rock Bass	x		x	x		x	x	x	x	x	x	x	x
Smallmouth Bass	x		x			x	x	x	x	x	x	x	x
White Sucker	x	x	x			x	x	x	x	x	x	x	x
Yellow Perch	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 3. Number, weight, and length of fish collected from Starvation Lake, Kalkaska County, with trap nets, large mesh fyke nets, small mesh fyke nets, and inland gillnets, May 13-16, 2008.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches)[1]	Average length	Percent legal size[2]
Banded Killifish	32	2.6	0.5	0.1	2-3	3.3	
Bluegill	22	1.8	9.2	1.7	4-10	7.8	73 (6")
Bluntnose Minnow	49	4.0	0.8	0.1	2-3	3.4	
Brown Trout	10	0.8	13.3	2.4	6-29	10.3	90 (8")
Largemouth Bass	156	12.6	83.9	15.4	2-17	7.2	21 (14")
Mimic Shiner	5	0.4	0.0	0.0	2-2	2.5	
Rainbow Trout	14	1.1	28.6	5.2	7-26	16.3	93 (8")
Rock Bass	67	5.4	22.3	4.1	2-11	7.4	90 (6")
Smallmouth Bass	59	4.8	53.6	9.8	2-17	11.8	25 (14")
White Sucker	102	8.3	310.8	57.0	15-24	19.6	
Yellow Perch	719	58.2	22.4	4.1	2-9	4.0	4 (7")
Total	1,235	100	545.4	100			

[1]Note some fish were measured to 0.1 inch, others to inch group: e.g., "5"=5.0 to 5.9 inch, 12=12.0 to 12.9 inches; etc.

[2]Percent legal size or acceptable size for angling. Legal size or acceptable size for angling is given in parentheses.

Table 4. Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Starvation, Kalkaska County, with trap nets, large mesh fyke nets, small mesh fyke nets, inland gill nets, May 13-16, 2008. The number of fish aged is given in parenthesis. A minimum of five fish per age group is statistically necessary for calculating a Mean Growth Index, for comparison to the State of Michigan average.

Species	Age I	II	III	IV	V	VI	VII	VIII	IX	Mean Growth Index
Bluegill		5.2 (6)	7.1 (6)	7.5 (3)	9.2 (1)	8.8 (1)	10.1 (1)	10.1 (4)	10.4 (1)	+1.8
Brown Trout		8.3 (8)						29.1 (1)		-0.1
Largemouth Bass	3.2 (10)	8.1 (13)	10.4 (18)	13,6 (10)	14.7 (2)	15.5 (13)	16.2 (9)			+0.6
Rainbow Trout	8.5 (7)	16.0 (1)	20.7 (4)	25.5 (1)						+0.3
Rock Bass	2.3 (1)		6.4 (19)	8.0 (14)	8.9 (2)	9.1 (2)	10.0 (3)	11.3 (1)	11.0 (1)	+1.6
Smallmouth Bass	4.5 (2)	7.2 (4)	9.0 (21)	12.7 (7)	13.4 (14)	14.3 (6)	16.9 (2)		16.4 (2)	-0.9
Yellow Perch	3.3 (15)	5.2 (16)	6.4 (19)	7.4 (11)	8.8 (3)		9.5 (1)			-0.1

Table 5. Number, weight, and length of fish collected from Starvation Lake, Kalkaska County, with trap nets, large mesh fyke nets, small mesh fyke nets, and inland gillnets, May 14-16, 2018.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches)[1]	Average length	Percent legal size[2]
Bluegill	119	21.1	56.6	13.1	5-10	8.6	97 (6")
Brown Trout	54	9.6	29.5	6.8	4-23	8.9	52 (8")
Iowa Darter	52	9.2	0.1	0.0	1-2	1.8	
Largemouth Bass	59	10.5	145.0	33.5	9-20	16.3	81 (14")
Rainbow Trout	13	2.3	18.0	4.2	7-19	14.7	85 (8")
Rock Bass	91	16.2	25.9	6.0	4-10	7.0	70 (6")
Smallmouth Bass	32	5.7	55.0	12.7	2-19	14.2	59 (14")
White Sucker	27	4.8	87.5	20.2	14-25	19.9	
Yellow Perch	116	20.6	15.0	3.5	3-8	6.8	26 (7")
Total	563	100	432.6	100			

[1]Note some fish were measured to 0.1 inch, others to inch group: e.g., "5"=5.0 to 5.9 inch, 12=12.0 to 12.9 inches; etc.

[2]Percent legal size or acceptable size for angling. Legal size or acceptable size for angling is given in parentheses.

Table 6. Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Starvation, Kalkaska County, with trap nets, large mesh fyke nets, small mesh fyke nets, inland gill nets, May 14-16, 2018. Number of fish aged is given in parenthesis. A minimum of five fish per age group is statistically necessary for calculating a Mean Growth Index, for comparison to the State of Michigan average.

	Age											Mean Growth Index
Species	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	
Bluegill			6.8 (22)	8.4 (13)	9.2 (13)							+2.3
Brown Trout	9.3 (1)	12.5 (5)	13.3 (1)	22.6 (2)	23.1 (1)							+0.6
Largemouth Bass			12.9 (10)	14.5 (13)	15.7 (3)	15.8 (2)	17.6 (5)	18.1 (12)	18.7 (5)	19.3 (4)	19.8 (2)	+1.7
Rainbow Trout		13.3 (2)	16.5 (5)		19.4 (3)							+2.2
Rock Bass			6.0 (22)	7.3 (24)	8.6 (7)	9.9 (4)						+1.3
Smallmouth Bass				13.6 (12)	14.2 (7)	15.2 (4)	17.9 (6)	17.7 (1)				+0.8
Yellow Perch				6.5 (13)	7.0 (12)		8.7 (1)					-1.3