Fife Lake

Grand Traverse County
Manistee River Watershed, last surveyed 2013

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Environment

Fife Lake is a natural lake of glacial origin located in southeast Grand Traverse County (Fig. 1 and 2) about 18 miles southeast of Traverse City, Michigan. Gently rolling hills and deep sandy soils (Kalkaska and Rubicon sands) characterize the geography of the area. The watershed is predominantly a mixture of pine (white, jack and red), oak, and lowland conifers (balsam, tamarack, black spruce, and cedar). There is a scattering of farmland in the area. The immediate area along the south and southwest shoreline consists of mucky soils and lowland conifers. The remaining shoreline is developed uplands with a mixture of brush, hardwoods, and some conifers. The Village of Fife Lake is located on the northwest end of the lake.

Fife Lake is 617 acres (Fig. 2), featuring two islands (Helen's and Florence), and a maximum depth of 60 feet. Shoals, comprised primarily of sand and marl, cover 50-60% of the lake bottom. Muck and pulpy peat are found along the southwest part of the lake. There is one man-made rock reef located off the western tip of Florence Island that was installed in 1958. There are two small inlet streams flowing into Fife Lake (Fig. 2). One carries the outflow from Spring Lake and flows into the southeast corner of Fife Lake. Another (that originates from springs) is found at the northeast end of the lake. A small outlet stream, named Fife Lake Outlet, flows out on the south end of the lake (Fig. 1 and 2). Approximately two miles downstream, the Fife Lake Outlet is impounded by a dam which creates Headquarters Lake. Fife Lake Outlet is a Designated Trout Stream below the Headquarters Lake Dam in T25N, R9W, Sec. 10. It flows through lowland conifers and wetlands before joining the Manistee River just upstream of US-131 (Fig. 1). It has self-sustaining populations of brown and brook trout.

About 90% of the Fife Lake shoreline is developed with residential homes and cottages. Approximately 150 buildings were counted during a 1993 survey of the lake. A sanitary sewer system was installed around the lake in the 1940s. There is no development near the inlet from Spring Lake. There is a Michigan Department of Natural Resources (MDNR) owned Public Access Site with a boat launch on the north side of the lake within the village limits (Fig. 2), although the village maintains the site through a cooperative lease with MDNR. A private marina is also located on the lake near the public launch. Swimmer's itch has been a problem on Fife Lake in the past, and the lake was treated annually with copper sulfate by the Village of Fife Lake. Zebra mussels were first discovered in Fife Lake in 2000.

History

Fife Lake is one of the few inland lakes in Michigan known to have had Michigan grayling in it (Vincent 1962). It is likely that the grayling migrated back and forth between Fife Lake and the Manistee River utilizing the Fife Lake Outlet (Fig. 2). Grayling were extirpated from the Manistee River watershed sometime around 1900.

The first recorded stocking of Fife Lake occurred in 1876, when lake whitefish were stocked (Table 1). The lake whitefish likely did not survive, as they have never been documented in Fife Lake since. The next recorded stocking in Fife Lake was in 1929, when bluegill were stocked by MDOC (the Michigan Department of Conservation; the precursor to today's MDNR). Other fish stockings likely took place between 1876 and 1929, but records were lost in a fire in Lansing. Bluegill, yellow perch, largemouth bass, smallmouth bass, and walleye were stocked in varying numbers over the next nine years. Then from 1939-68 the only stockings were smallmouth bass (1946-48) and walleye (1961-62). Since 1969, Fife Lake has been intensively managed for walleye by MDOC and later MDNR Fisheries Division. Walleye fingerlings were stocked every year (except two) from 1969-86. Beginning in 1988, walleye were stocked every third year. Walleye stocking ceased after the 2004 stocking effort, due to concerns over the Viral Hemorrhagic Septicemia (VHS) disease. By 2011, practices that minimized concerns with VHS were implemented and stocking resumed. Walleye were most recently stocked into Fife Lake in 2011 and 2012.

Between 1946 and 2012, MDOC and MDNR Fisheries Division conducted 12 fisheries surveys of Fife Lake (Table 2; Hay 1982, Hay 1993, Tonello and Hay 2003, Tonello 2007, and Tonello 2013). Most of these were netting surveys, including trap nets, inland gill nets, fyke nets, and seines. Electrofishing has also been utilized to survey Fife Lake in recent years. Creel census studies were conducted in 1934-1937 (Eschmeyer 1935, Eschmeyer 1937, Eschmeyer 1939), 1946, 1950, 1956, and 1961-1964 (Christensen 1953).

The smallmouth bass stocked in 1946-1948 were part of a statewide experiment (Christensen and Cooper 1955). The fish were fin clipped, and creel census and netting was used to determine survival of the stocked fish and their contribution to the fishery. Returns on the marked fish were very poor, as only five of them were ever recaptured. The smallmouth bass population was estimated at 7,300 of legal size in 1950 (the minimum size limit for smallmouth bass in 1950 was 10 inches), and harvest estimates for the period from 1948 to 1953 was 2,954. The 1946 to 1950 creel census study conducted on Fife Lake was also used to help MDOC Fisheries Division determine that less restrictive regulations on panfish were not necessarily harmful to their populations (Christensen 1953).

Most management actions on Fife Lake have focused on walleye. In an attempt to improve walleye natural reproduction, an experimental walleye spawning reef, constructed of rock, was placed at the western end of Florence Island in 1958. In the mid-1960s another walleye spawning area was constructed with gravel in the mouth of the small inlet stream (at the northeastern end of the lake) between the lake and the road. In 1969 an experimental walleye rearing pond was constructed nearby by the Walton Junction Sportsmen's Club in cooperation with the MDOC. It was the first drainable walleye pond in the state, and its success resulted in the creation of many more walleye ponds, some of which are still in use. In most years the fingerlings reared in the pond were planted in Fife Lake. The program was in operation until the mid-1990s. Since then, walleyes from other MDNR rearing ponds have been stocked in Fife Lake.

File notes from 1936 indicate that pumpkinseed sunfish, suckers, and bullhead were abundant at that time. Northern pike, largemouth bass, smallmouth bass, rock bass, bluegill and yellow perch were common. Black crappie were scarce. These species were also present in a 1946 netting survey. Walleye were not mentioned in the 1936 note or captured in the 1946 survey, despite previous

stockings. Christensen (1960) did not find any walleye in a 1958 fisheries survey of Fife Lake. However, according to creel data (Schneider and Lockwood 1979), walleye were at least a small component of the sport catch in the years 1933-1937 and 1946-1965. In those years, the annual walleye catch estimates ranged from 16 to 502 fish per year.

Population estimates for walleye in Fife Lake were done for 1964, 1965, and 1974. Using mark/recapture netting surveys, Schneider (1969) estimated the walleye population in Fife Lake to be 1,397 in 1964 and 1,087 in 1965. Pettengill (1975) used netting and creel surveys to estimate the walleye population in Fife Lake in 1974. The 1974 netting estimate was 1,248 fish, and the creel estimate was 1,009 fish. Pettengill (1975) concluded that the sustained walleye stocking program begun in 1969 had not significantly changed the estimated population, but that it had resulted in increased catch per effort and estimated catch.

The 1982 (Hay 1982), 1987, 1993 (Hay 1993), and 2001 (Tonello and Hay 2003) fisheries surveys of Fife Lake were all comprehensive netting surveys which utilized fyke nets, trap nets, and sometimes inland gill nets to examine the overall fish community. The 1977, 1979, 2007 (Tonello 2007), and 2012 (Tonello 2013) surveys were electrofishing surveys conducted in the fall specifically to target walleye.

From 1994-2013, a total of 17 exceptional fish caught from Fife Lake have been entered into the DNR Fisheries Division Master Angler program (Table 3). Seven different species were represented, including black crappie, bluegill, pumpkinseed sunfish, rock bass, smallmouth bass, and walleye.

Current Status

The most recent comprehensive fish community survey of Fife Lake was conducted by MDNR in the spring of 2013. The netting portion of the survey took place from May 6th through May 10th. Survey gear used included two large-mesh fyke nets (8 net-nights), two trap nets (8 net-nights), one small-mesh fyke net (four net-nights), and two experimental graded-mesh inland gill nets (6 net-nights). The seining and electrofishing portion of the survey took place during the evening of July 31st. In that effort, five seine hauls were conducted, and three ten-minute transects were electrofished. The primary purpose of this survey was to assess the status of all fish populations in Fife Lake, with additional focus on the walleye population.

During the 2013 May netting survey, a total of 732 fish were caught, representing 12 different species (Table 4). Rock bass were the most frequently collected species, with a total of 250 caught. They represented 34.2% of the total catch by number and ranged from 3 to over 11 inches in length. Other panfish species collected included bluegill (83 from 3-9 inches), pumpkinseed sunfish (5 from 6-7 inches), and black crappie (10 from 8-13 inches). Yellow perch were noticeably absent from the netting portion of the 2013 survey. Growth rates for bluegill were slow (Table 5), at 1.2 inches below the State average. Rock bass were growing near the State average, and not enough black crappie or pumpkinseed sunfish were caught to make inferences regarding growth.

Game fish species caught in the 2013 May netting survey included largemouth bass, smallmouth bass, northern pike, and walleye (Table 4). Totals of 107 largemouth and 62 smallmouth bass were caught, with largemouth bass ranging up to 19 inches and smallmouth bass ranging up to 20 inches. The

largemouth bass averaged 14.5 inches, with 55% over 14 inches in length. The smallmouth bass averaged 16.0 inches, with 74% over 14 inches in length. The northern pike catch consisted of 34 individuals from 11 to 28 inches, averaging 21.1 inches. A total of 61 walleye were caught, ranging from 17-25 inches. Largemouth bass and northern pike were growing slowly (Table 5), at 1.3 and 2.3 inches below the State average, respectively. Smallmouth bass and walleye were growing near the State average.

In the July 2013 seining and electrofishing portion of the survey, a total of 352 fish were caught, representing 11 species (Table 6). Mimic shiners, yellow perch, and bluegill were the most commonly collected species from this portion of the survey. As with those collected in the netting portion of the survey, the bluegill from the electrofishing and seining efforts were growing slowly, at 1.3 inches below the State average (Table 7). Yellow perch were also growing slowly, at 1.0 inches below the State average.

Fish species that were not caught in the 2013 survey of Fife Lake but had been reported in previous surveys included common shiner, longear sunfish, and spottail shiner (Table 1). New species documented in the 2013 survey included black bullhead, bluntnose minnow, Iowa darter, and mimic shiner.

Analysis and Discussion

Several interesting trends were noted in the 2013 survey of Fife Lake. The first was the astonishing water clarity of the lake. In 1974, the Secchi depth reading for Fife Lake was 9 feet, and in the 2001 survey, it was 14 feet (Tonello and Hay 2003). A Secchi depth measurement was not taken during the 2013 fisheries survey, but if it had, it would likely have been in excess of 20 feet. This is probably a symptom of the intense colonization of the lake by zebra mussels. They were extremely abundant all over the lake, and were attached to any and all hard surfaces available. In particular, the rock reef off Florence Island was absolutely coated in zebra mussels. While the crystal-clear water may be aesthetically pleasing to some, it can have negative effects on some fish populations. Greater water clarity allows more sunlight penetration and therefore more nuisance aquatic weed growth. Also, zebra mussels may be affecting the food web in Fife Lake. They are filter feeders and have the potential to affect the lower trophic levels by filtering out plankton that would otherwise be utilized by juvenile fish.

Another trend from the 2013 survey was that fewer fish were caught overall than in 2001. This may have been due to colder water temperatures in the 2013 survey, which was conducted nearly a month earlier than the 2001 survey. Fewer panfish were caught in 2013, including only 83 bluegill compared to 547 in 2001. Also, only a handful of bluegill younger than age 5 were caught in 2013. In contrast, the largemouth bass catch of 107 fish from the netting portion of the survey far eclipsed the 2001 catch of only 18 largemouth bass. It is possible that the increased largemouth bass population has affected the abundance of bluegill in Fife Lake. Black crappie and pumpkinseed sunfish remain relatively scarce in Fife Lake, as they have in all previous fisheries surveys. Smallmouth bass numbers from the 2013 survey were similar to those encountered in 2001.

The reason for the increased largemouth bass population is unknown. Ten different year classes were present in the 2013 survey, with ages V, VI, and VII being particularly prevalent (Table 5). One

potential hypothesis for the increased largemouth bass abundance is climate change. Longer, hotter summers may favor species like largemouth bass, possibly to the detriment of other important species. Also, reduced harvest of largemouth bass may also play a role. "Catch and Release" angling has become very prominent among many anglers in recent years, particularly regarding largemouth bass.

The yellow perch population of Fife Lake seems to have declined precipitously since 2001. None were caught in the netting portion of the 2013 survey, compared to 67 caught in 2001. They are still present in the lake, as 72 yellow perch representing 4 year classes were caught in the seining and electrofishing portion of the 2013 survey. Unfortunately those fish only averaged 4.5 inches in length. While Fife Lake has been known for having an excellent yellow perch fishery at times in the past, the 2013 survey did not document a fishable yellow perch population. It is possible that the zebra mussel infestation in Fife Lake is hindering yellow perch survival and recruitment. On Lake Michigan, it has been shown that Dreissenid mussel populations have altered the food web and reduced the availability of zooplankton for yellow perch (Santucci et. al 2014).

One of the reasons for conducting the 2013 survey of Fife Lake was to evaluate the walleye stocking program, which has been ongoing since 1961 (Table 1). While the catch of 61 walleye representing nine different age classes was encouraging, the lack of young walleye in the catch of both the 2013 and 2012 (Tonello 2013) surveys is disconcerting. The 2001 (Age XII) and 2004 (Age IX) year classes were the most represented in the catch (Table 5). These were both stocked year classes. The other strong year class present in the catch (2007; Age VI) was not a stocked year class. Clearly, both stocking and natural reproduction play a role in the Fife Lake walleye fishery. However, it does not appear that the 2011 or 2012 walleye stocking efforts were successful, nor does it appear that natural reproduction has occurred to any degree since 2007. The walleye population in Fife Lake currently consists of older, larger fish. The lack of young walleye may affect the Fife Lake walleye fishery in coming years.

While the exact reason for the lack of juvenile walleye survival in Fife Lake in recent years is unknown, it may have something to do with the recent increase in largemouth bass abundance. According to Fayram et al. (2005), largemouth bass can negatively affect juvenile walleye year classes by preying on juvenile walleye. Therefore it is possible that the lack of walleye recruitment in Fife Lake in recent years is related to the elevated population levels of largemouth bass. It is also possible that juvenile walleye survival is being affected by food web changes related to the zebra mussel infestation.

In the past, Fife Lake was known for having large annual brown drake (ephemera simulans) mayfly hatches. However, in recent years, based on observations from Fife Lake riparians, the mayflies have almost completely disappeared, with very few individuals observed. No invertebrate sampling has ever been conducted on Fife Lake, so exact timeframes are not clear. Although the exact reason for the disappearance of the mayflies in unknown, it may be linked to copper sulfate. Copper sulfate is known to negatively affect invertebrate populations, and mayflies in particular (Warnick and Bell 1969; Wisconsin DNR 2012). For many years, Fife Lake was treated with large amounts of copper sulfate in an attempt to combat swimmer's itch. Although copper sulfate is no longer used on Fife Lake, the mayflies have not returned in any significant numbers. While the role of mayflies in the ecology of Fife Lake has never been studied in depth, it is possible that their loss has some part in the decline of certain Fife Lake fish species.

In recent years, anglers have commented on the lack of aquatic plants in Fife Lake. Aquatic nuisance treatments have been conducted on Fife Lake since 2000. While the treatments have generally targeted Eurasian milfoil, it is possible that native plants have been impacted as well. A healthy lake ecosystem consists of native aquatic plants, and the lack of such plant beds could contribute to the decline in abundance and growth of certain important fish species.

Lakes Cadillac and Mitchell are located approximately 25 miles south of Fife Lake. These lakes have similar fish communities to Fife Lake, and are facing some of the same issues as Fife Lake. Some of the same phenomena from the 2013 Fife Lake survey were observed in 2012 surveys of Lakes Cadillac (Tonello 2012a) and Mitchell (Tonello 2012b). These include dramatic increases in largemouth bass abundance, decreases in yellow perch populations, lack of walleye spawning success and variable survival of stocked walleye, and the loss of mayfly populations.

Management Direction

Fife Lake is an extremely popular lake for sportfishing. It is well-known for multiple fisheries, including walleye, largemouth and smallmouth bass, bluegill, and yellow perch. Healthy fisheries in Fife Lake are critical to the local economy and to the vitality of the Village of Fife Lake.

The largemouth and smallmouth populations of Fife Lake are robust and should offer outstanding fishing opportunities. Angler reports regarding bluegill fishing have continued to be good, despite the poor catch of bluegill in the 2013 survey. Angler reports regarding yellow perch have not been good, which is not surprising given the extremely poor catch of yellow perch in the 2013 survey.

The 2013 fisheries survey of Fife Lake showed that while walleye are still abundant, the population consists of older fish with little sign of younger year classes. The 2011 and 2012 stocking efforts do not appear to have been successful, and no recent natural year classes were observed either. Due to the popularity of the Fife Lake walleye fishery, the stocking program should continue. In 2015, the plan will be to stock 20,125 (35/acre) spring fingerling walleye into Fife Lake. If possible, an electrofishing survey should be conducted in the fall of 2015 in the style of Serns (1982, 1983) to verify the survival of the stocked walleye.

Comprehensive fisheries surveys of Fife Lake should be conducted by MDNR at least once every 10 years, though every five years would be preferable. Future fisheries surveys should continue to include electrofishing and seining efforts. While netting is often the most effective technique for catching panfish and sport fish, the electrofishing and seining efforts often catch juvenile and smaller minnow-type species, providing a better picture of the overall fish community. Also, a creel survey should be conducted on Fife Lake. Creel surveys provide important information about the use of the fishery by anglers, and can also be used to estimate generated economic activity. Creel surveys can also be used to gauge angler desires and concerns. Even if a creel survey is not conducted in the near future, MDNR Fisheries personnel will continue to work with Fife Lake citizens and anglers to monitor the fishery. Without frequent monitoring of the Fife Lake fish community, it will be very difficult to track changes in individual fish populations and the fish community of the lake.

Other opportunities for data-gathering on Fife Lake include conducting zooplankton surveys, invertebrate surveys, and sediment samples. Invertebrate surveys could be used in an attempt to explain the loss of mayflies on Fife Lake, and whether it would ever be possible for them to return to the lake. Sediment sampling could be conducted to determine the extent of copper present, and whether or not that is the reason for the disappearance of the mayflies. These investigations would have to be conducted by agencies or groups other than MDNR Fisheries Division.

Herbicide treatments may also be playing a role in the changing fish populations of Fife Lake. Some anglers have observed that there are far fewer aquatic plants in Fife Lake than in previous years. In 2013 for example, a total of eight different chemicals were used for aquatic weed control in Fife Lake. While we certainly recognize the need to control aquatic invasive species like Eurasian milfoil, a healthy native aquatic plant community is critical to healthy fish populations in Fife Lake. A "fishbowl" effect where few plants are present will undoubtedly have dramatic impacts on the fish community of any inland lake. Therefore, the need to combat nuisance plants should be balanced with the need for a healthy aquatic plant community. In particular, treatments should be extremely selective and only target the exact areas with intense milfoil infestation.

Past use of copper sulfate to combat swimmer's itch may be responsible for eradicating mayflies and possibly affecting other invertebrate populations in Fife Lake. When mayflies are present in a lake, they often present an important source of forage for many fish species. For this reason, copper sulfate should no longer be used under any circumstances on Fife Lake.

One potential restoration effort for Fife Lake would be to add woody structure to the lake, particularly in nearshore areas. Submerged woody structure is important habitat for a number of Fife Lake fish species and can increase spawning success and juvenile fish survival.

Any remaining riparian wetlands adjacent to Fife Lake should be protected as they are critical to the continued health of the aquatic community of Fife Lake. Future riparian development and wetland loss may result in deterioration of the water quality and aquatic habitat. Healthy biological communities in inland lakes require suitable natural habitat. Human development within the lake watershed, along the shoreline, and in the lake proper has a tendency to change and diminish natural habitat. Appropriate watershed management is necessary to sustain healthy biological communities, including fish, invertebrates, amphibians, reptiles, birds and aquatic mammals. Generally for lakes this includes maintenance of good water quality, especially for nutrients; preservation of natural shorelines, especially shore contours and vegetation; and preservation of bottom contours, vegetation, and wood structure within a lake. Guidelines for protecting fisheries habitat in inland lakes can be found in Fisheries Division Special Report 38 (O'Neal and Soulliere 2006).

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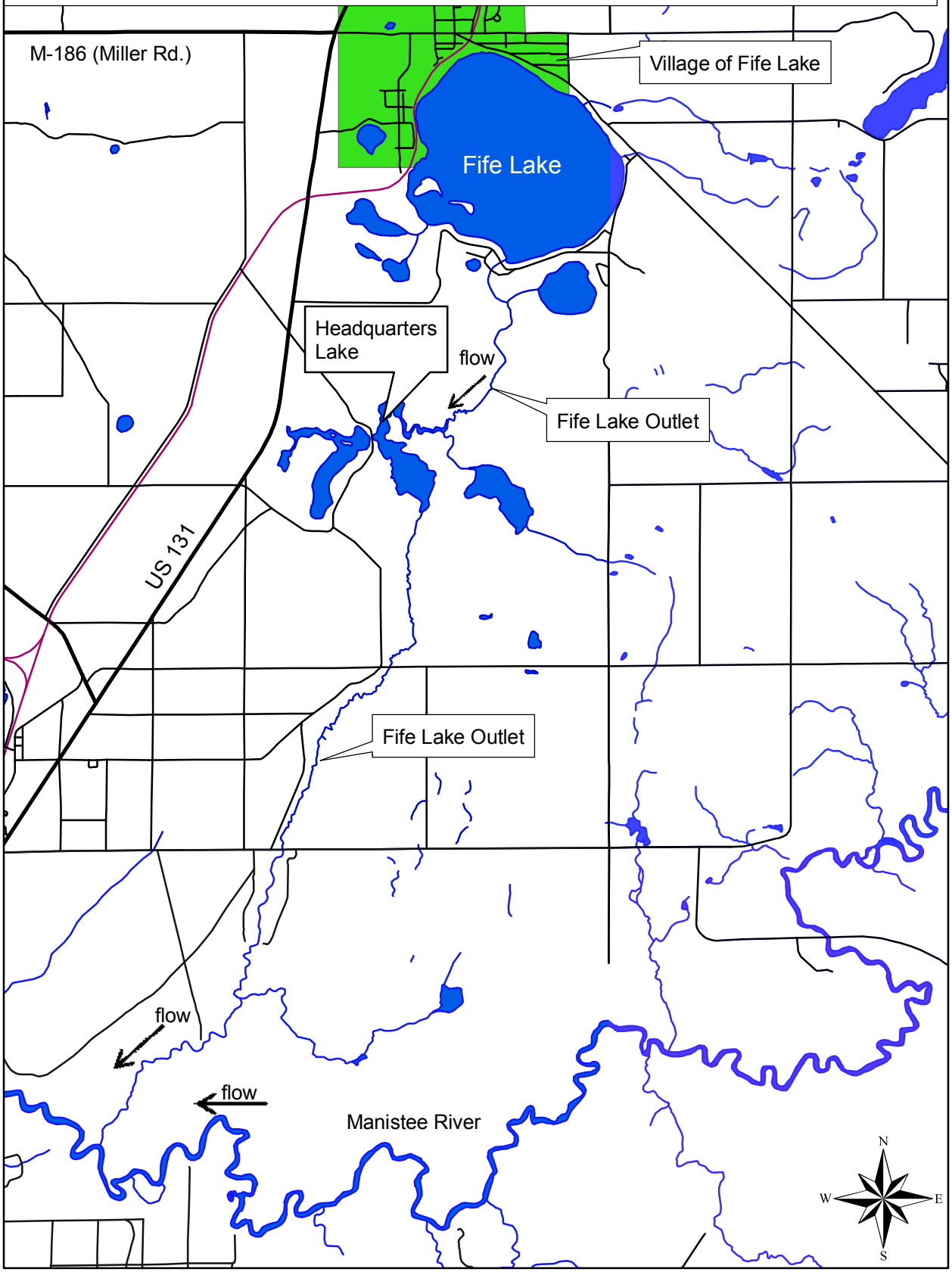
Figure 1. Fife Lake Outlet subwatershed, Grand Traverse, Kalkaska, and Wexford Counties, Michigan.



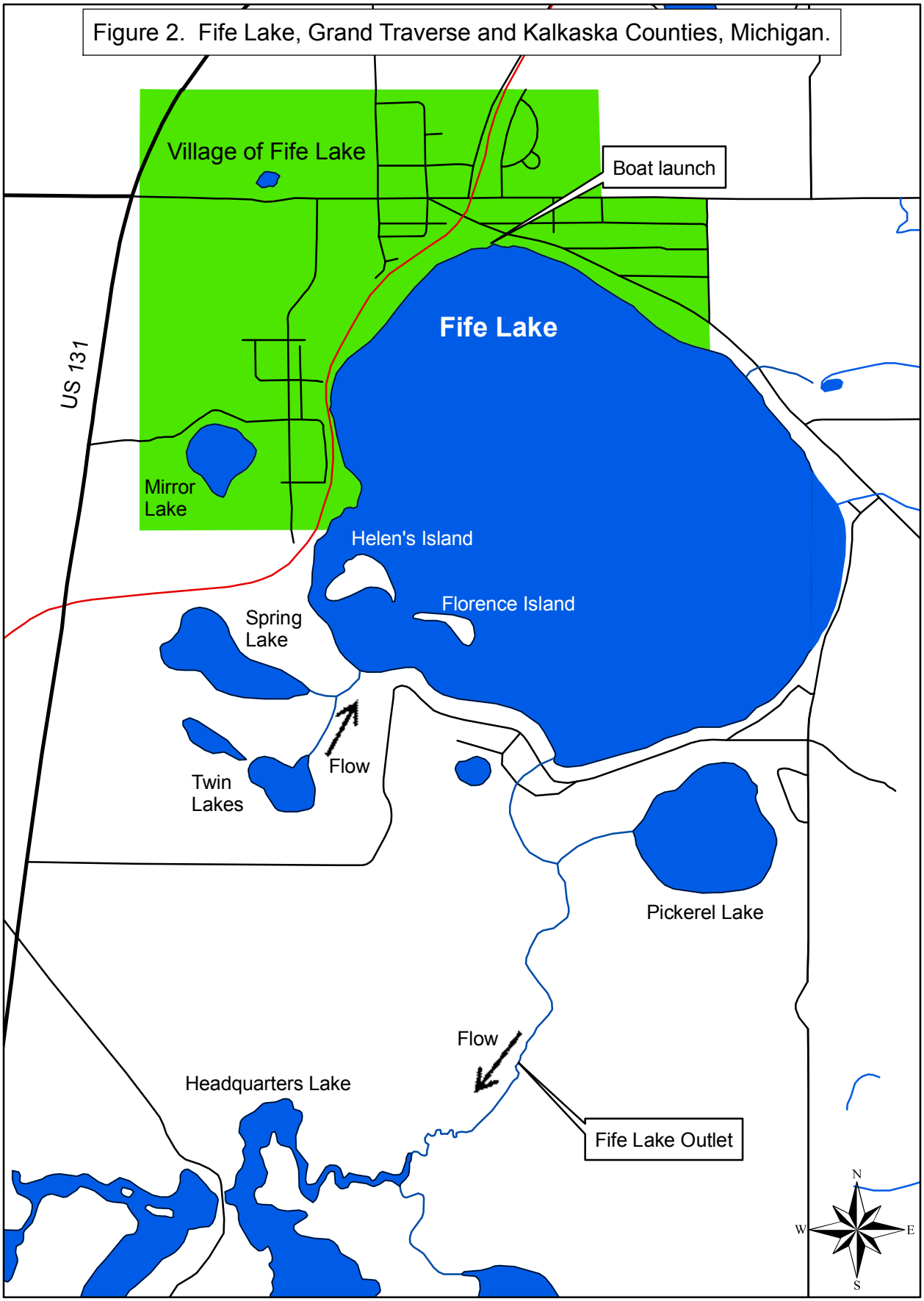


Figure 2. Fife Lake, Grand Traverse and Kalkaska Counties, Michigan.
Village of Fife Lake
Boat launch
Fife Lake
US 131
Mirror Lake
Helen's Island
Florence Island
Spring Lake
Flow
Twin Lakes
Pickerel Lake
Flow
Headquarters Lake
Fife Lake Outlet
N
W
E
S

Table 1. Fish stocked in Fife Lake, Grand Traverse County, 1876-2013.

Year	Species	Number	Size/age	Strain
1876	Lake whitefish	25,000	fry	Detroit River
1929	Bluegill	2,000	4 mo.	
1930	Bluegill	6,000		
1931	Bluegill	2,500	6 mo.	
	Smallmouth bass	250	6 mo.	
1932	Bluegill	200		
	Largemouth bass	400		
1933	Bluegill	1,500	6 mo.	
	Largemouth bass	2,000	6 mo.	
	Yellow Perch	10,000	7 mo.	
1934	Bluegill	8,000		
	Yellow Perch	5,000		
1935	Bluegill	4,000	4 mo.	
	Great Lakes shiners	500,000	fry	
	Walleye	255,000	fry	
1936	Bluegill	150	yearlings	
	Largemouth bass	190	yearlings	
	Walleye	300,000	fry	
1937	Bluegill	10,000	fingerlings	
	Largemouth bass	500	fingerlings	
	Smallmouth bass	300	fingerlings	
	Walleye	255,000	fry	
	Yellow Perch	25,000	fingerlings	
1938	Largemouth bass	3,500	4 mo.	
	Walleye	200,000	fry	
1939	Bluegill	34,000	5 mo.	
	Largemouth bass	1,850	5 mo.	
	Walleye	200,000	fry	
1940	Bluegill	400	yearlings	
	Largemouth bass	2,000	3-7 mo.	
	Walleye	200,000	fry	
1941	Bluegill	20,000	4 mo.	
	Largemouth bass	1,200	4 mo.	
1942	Largemouth bass	800	4 mo.	
	Walleye	200,000	fry	
1943	Bluegill	750	yearlings	
	Largemouth bass	1,600	4 mo.	
1944	Bluegill	1,500	4 mo.	
	Largemouth bass	1,000	3 mo.	
1946	Smallmouth bass	9,850	3" fingerlings	
1947	Smallmouth bass	5,861	3" fingerlings	
1948	Smallmouth bass	10,000	3" fingerlings	
1961	Walleye	22,950	fingerlings	
1962	Walleye	25,000	fingerlings	
1969	Walleye	5,200	fingerlings	
1970	Walleye	9,100	fingerlings	
1971	Walleye	18,200	yearlings	
1972	Walleye	14,414	yearlings	

Table 1 continued. Fish stocked in Fife Lake, Grand Traverse County, 1876-2013.

Year	Species	Number	Size/age	Strain
1973	Walleye	11,494	fingerlings	
1974	Walleye	9,412	fingerlings	
1975	Walleye	11,470	spring fingerlings	
1976	Walleye	456	fall fingerlings	
1978	Walleye	937	fall fingerlings	
1980	Walleye	15,076	spring fingerlings	Minnesota
1981	Walleye	21,300	fall fingerlings	Muskegon
1982	Walleye	600	fall fingerlings	Minnesota
1983	Walleye	500	fall fingerlings	
1984	Walleye	20,800	fall fingerlings	
1985	Walleye	30,180	fall fingerlings	Muskegon
1986	Walleye	5,064	fall fingerlings	
1988	Walleye	19,000	fall fingerlings	Muskegon
1992	Walleye	16,265	fall fingerlings	
1995	Walleye	20,295	spring fingerlings	
1998	Walleye	19,660	spring fingerlings	Muskegon
2001	Walleye	23,614	spring fingerlings	Muskegon
2004	Walleye	21,456	spring fingerlings	Muskegon
2011	Walleye	30,276	spring fingerlings	Muskegon
2012	Walleye	24,030	spring fingerlings	Muskegon

Table 2. Presence/absence of fish species in historical fisheries surveys of Fife Lake.

Species	1946	1958	1971	1977	1979	1982	1987	1993	2001	2007	2012	2013
Black bullhead												x
Black crappie	x	x				x	x	x	x			x
Bluegill	x	x	x			x	x	x	x	x		x
Bluntnose minnow												x
Brown bullhead							x		x			x
Bullhead (sp.)								x				
Common shiner	x											
Iowa darter												x
Largemouth bass	x	x	x			x	x	x	x	x	x	x
Longear sunfish	x											
Mimic shiner												x
Northern pike	x	x				x	x	x	x	x	x	x
Pumpkinseed sunfish	x					x	x	x	x	x	x	x
Rock bass	x	x	x			x	x	x	x	x	x	x
Smallmouth bass	x	x	x			x	x	x	x	x	x	x
Spottail shiner										x		
Walleye			x	x	x	x	x	x	x	x	x	x
White sucker			x			x	x	x	x			x
Yellow bullhead						x						x
Yellow perch	x		x		x	x	x	x	x	x		x

Table 3. Michigan DNR Master Angler awards issued for fish caught from Fife Lake, Grand Traverse County, 1994-2013.

Species	Number of Master Angler awards issued
Black crappie	1
Bluegill	3
Pumpkinseed	2
Rock bass	5
Smallmouth bass	2
Yellow perch	3
Walleye	1
Total:	17

Table 4. Number, weight, and length of fish collected from Fife Lake with large mesh fyke nets, small mesh fyke nets, trap nets, and inland gillnets on May 6-10, 2013.

Species	Number	Percent by number	Weight (Pounds)	Percent by weight	Length range (inches)[1]	Average length	Percent legal size[2]
black crappie	10	1.4	8.4	0.8	8-13	11.1	100 (7")
black bullhead	14	1.9	15.7	1.5	7-14	13.3	100 (7")
bluegill	83	11.3	20.8	2.0	3-9	6.9	71 (6")
brown bullhead	20	2.7	20.6	1.9	8-14	12.9	100 (7")
largemouth bass	107	14.6	178.9	16.9	10-19	14.5	55 (14")
northern pike	34	4.6	75.9	7.1	11-28	21.1	18 (24")
pumpkinseed sunfish	5	0.7	1.5	0.1	6-7	7.1	100 (6")
rock bass	250	34.2	173.5	16.3	3-11	9.6	99 (6")
smallmouth bass	62	8.5	142.4	13.4	9-20	16.0	74 (14")
walleye	61	8.3	190.8	18.0	17-25	21.1	100 (15")
white sucker	85	11.6	231.8	21.8	14-22	18.9	
yellow bullhead	1	0.1	1.4	0.1	14-14	14.5	100 (7")
Total	732	100	1061.7	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 5. Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Fife Lake with trap nets, fyke nets, and inland gill nets, May 6-10, 2013. 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, which is a comparison to the State of Michigan average.

	Age															
Species	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	Mean Growth Index
Black crappie					9.2 (3)	10.4 (3)	11.3 (1)	12.0 (1)	13.5 (1)	13.7 (1)						-
Bluegill					4.9 (8)	5.7 (8)	7.0 (18)	7.6 (9)	8.6 (5)	8.4 (1)						-1.2
Largemouth bass				11.3 (3)	12.6 (12)	13.9 (20)	14.6 (11)	15.5 (5)	16.6 (7)	16.9 (4)	18.8 (2)	19.1 (2)				-1.3
Northern pike	12.0 (2)	15.5 (3)	19.3 (4)	20.7 (10)	23.6 (10)	25.7 (4)	21.1 (1)									-2.3
Pumpkin-seed sunfish					6.8 (2)	7.0 (1)	7.8 (2)									-
Rock bass			3.8 (1)		6.7 (4)	7.4 (9)	8.2 (6)	8.9 (11)	10.2 (9)	10.5 (7)	10.0 (2)	11.3 (2)	10.2 (2)			-0.2
Smallmouth bass			9.4 (1)	12.0 (13)	14.6 (12)	15.3 (3)	17.3 (7)	17.2 (5)	18.4 (7)	18.5 (4)	19.1 (4)	19.1 (1)	19.3 (1)	19.8 (1)		+0.2
Walleye					20.2 (1)	21.0 (10)	20.2 (3)	20.8 (4)	20.2 (20)		19.8 (1)	21.6 (13)	24.3 (2)		22.8 (3)	-0.2

Table 6. Number, weight, and length of fish collected from Fife Lake with electrofishing and seining on July 31, 2013.

Species	Number	Percent by number	Weight (Pounds)	Percent by weight	Length range, (inches)[1]	Average length	Percent legal size[2]
bluegill	54	15.3	5.4	20.0	2-7	5.0	22 (6")
bluntnose minnow	11	3.1	0.1	0.4	1-3	2.9	
brown bullhead	2	0.6	2.3	8.5	12-14	13.0	100 (7")
Iowa darter	2	0.6	0.0	0.0	2-2	2.5	
largemouth bass	16	4.5	8.2	30.4	1-13	8.6	0 (14")
mimic shiner	144	40.9	0.7	2.6	2-3	2.5	
northern pike	1	0.3	0.4	1.5	12-12	12.5	0 (24")
pumpkinseed sunfish	24	6.8	2.2	8.1	2-6	4.6	8 (6")
rock bass	10	2.8	0.9	3.3	2-6	4.7	0 (6")
smallmouth bass	16	4.5	3.5	13.0	1-14	5.3	6 (14")
yellow perch	72	20.5	3.3	12.2	1-7	4.5	3 (7")
Total	352	100	27.0	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 7. Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Fife Lake with seining and electrofishing, July 31, 2013. 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, which is a comparison to the State of Michigan average.

				Age				Mean Growth Index
Species	I	II	III	IV	V	VI	VII	
Bluegill		4.1 (2)	4.7 (1)	4.2 (2)	5.2 (12)	6.7 (11)	6.5 (3)	-1.3
Largemouth bass		6.8 (4)	9.9 (3)	11.8 (2)	13.3 (1)	12.6 (3)		-
Northern pike		12.4 (1)						-
Pumpkin-seed sunfish		4.3 (6)	5.1 (5)	5.5 (4)	6.1 (1)	6.5 (1)		0
Rock bass			4.4 (4)	5.9 (3)	6.4 (1)			-
Smallmouth bass	5.4 (4)	7.3 (1)	10.2 (2)	14.3 (1)				-
Yellow perch		4.9 (12)	5.6 (17)	6.6 (3)	7.7 (1)			-1.0