

Lake Margrethe

Crawford County, T26N, R4W, Sec. 8, 9, 10, 15, 16, 17, 21, 22
Manistee River Watershed, Last Surveyed 2016

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Environment

Lake Margrethe is a 1,922 acre lake (Figures 1 and 2) in western Crawford County, three miles west of Grayling, MI. It is the largest lake in Crawford County. It is a mesotrophic lake, with a maximum depth of 65 feet. The northern lobes of the lake (Figure 2) are relatively shallow, with the central portion of the lake holding the deeper water. The lake lies in the Manistee River watershed, having Portage Creek as an outlet. Portage Creek joins the Manistee River approximately seven miles downstream from where it flows out of Lake Margrethe. Portage Creek is a Designated Trout Stream with populations of Brook and Brown Trout. The Lake Margrethe Property Owner's Association (LMPOA) is the primary citizen-based group for Lake Margrethe. LMPOA was incorporated in 1968 and has been very involved in management since then. There are approximately 300 members in LMPOA.

There is a lake level control structure on the Portage Creek outflow to control the lake level. The water level of Lake Margrethe was established in 1973 by the Crawford County Circuit Court. The normal level is 1,134.4 feet above sea level from April 30th until November 1st. After November 1st, boards are removed from the Portage Creek Dam, and the lake level is reduced to 1,133.7 feet above sea level. The reduction of water level in the winter is to protect human infrastructure from ice damage.

The country surrounding Lake Margrethe is hilly and mostly forested, with predominately sandy soils. Much of the eastern shore of the lake is owned by the State of Michigan as part of the Grayling Forest Management Unit within the Au Sable State Forest. The area to the west of Lake Margrethe is mostly conifer and tag alder swamp, locally known as the "Bear Swamp". There is a State Forest Campground with a paved boat launch located on the eastern shore, near the Portage Creek outflow (Figure 2). Much of the western and southern shores are owned by the National Guard as part of Camp Grayling, the nation's largest National Guard training facility. Camp Grayling encompasses about 147,000 acres. The eastern and northern shores are mostly privately owned, and are heavily developed with a mix of seasonal cottages and permanent homes.

Lake Margrethe has had reoccurring infestations with Eurasian milfoil, prompting LMPOA to have some areas of the lake treated with 2, 4-D and Reward, under permit from the Michigan Department of Environmental Quality (MDEQ). Eurasian milfoil is an extremely aggressive exotic aquatic macrophyte that can crowd out native aquatic plants and cause problems for boaters, swimmers, anglers, and fish populations. Treatments have taken place in Lake Margrethe in a number of different years. In 2016, a total of 18.5 acres of Eurasian milfoil were treated on Lake Margrethe.

History

Lake Margrethe was first stocked in 1877 and 1878 with Lake Whitefish (Table 1). The Michigan Fish Commission was likely responsible for these early stocking efforts. The Lake Whitefish stockings were

ultimately unsuccessful, as there are no subsequent records of Lake Whitefish in Lake Margrethe. Smallmouth Bass were first stocked in 1909 and 1910. Further stockings on Lake Margrethe were conducted by MDOC (the Michigan Department of Conservation, the precursor to the Michigan Department of Natural Resources) with Smallmouth Bass stocked in 1929 (Table 1). Largemouth Bass were first stocked in 1930, and then Lake Margrethe was intensively stocked by MDOC with Smallmouth Bass, Largemouth Bass, Walleye, Yellow Perch, and Bluegill between 1937 and 1945. Sporadic stockings of Walleye and Northern Pike occurred in the 1950s and 1960s.

Management of Lake Margrethe through the latter half of the 20th century primarily involved stocking Walleye, Northern Pike (via a spawning marsh adjacent to the lake), and Tiger Muskellunge (a hybrid between Northern Pike and Muskellunge). Northern Muskellunge were stocked in 2002, 2004-2005, 2009-2010 (Table 1). Only Great Lakes Muskellunge and Walleye are currently stocked (Table 1). Other management activities on the lake in the past included the installation of brush shelters for fish cover and spawning habitat for Smallmouth Bass. A rock spawning reef was installed in 1957, in an attempt to provide Walleye with spawning habitat. A manual removal of White Suckers was conducted in 1992, as they compete with juvenile Walleye, Yellow Perch, and panfish, and can inhibit growth and reproduction in these species. In 1996, fifty log structures were added to the lake to provide Smallmouth Bass spawning habitat. The Northern Pike spawning marsh was last operated in 2000.

The first known fisheries survey of Lake Margrethe was a creel survey conducted in the winter of 1935/1936 (Eschmeyer 1936). Survey results showed a substantial harvest of Northern Pike. General fisheries surveys (typically involving netting) on Lake Margrethe were conducted in 1947, 1954, 1961, 1962, 1971, 1979, 1987, 1988, 1993, 1994, 1995, 2001, and 2007 (Table 2). The 1993, 1994, and 1995 surveys were netting efforts aimed at catching adult Northern Pike to transplant into the rearing marsh, but other species were also recorded.

In the spring of 1993, a Walleye mark/recapture study was conducted in an attempt to obtain a population estimate. The population estimate was 837 Walleye, or a density of .44 Walleye per surface acre. However, due to a low recapture rate, it is likely that the estimate is not entirely accurate. Other fisheries surveys conducted on Lake Margrethe have included fall electrofishing efforts directed at determining year class strength for young-of-the-year and yearling Walleye; following the techniques described by Ziegler and Schneider (2000). These were conducted in 1990, 1992, 1994, 1997, 1998, 2002, 2006 and 2009 (Table 3). Prior to the 2016 general survey, the most recent general fisheries survey of Lake Margrethe was conducted in 2007 (Tonello 2007).

Since 1995, a total of 27 fish have been entered in MDNR's Master Angler program from Lake Margrethe (Table 4). Bluegill was the most commonly entered species, with 8 entries. Other species entered include Black Bullhead, Brown Bullhead, Muskellunge, Pumpkinseed Sunfish, Smallmouth Bass, Yellow Perch, Largemouth Bass, and White Sucker. One particularly impressive entry from 2014 was a 51 inch Muskellunge that weighed nearly 40 lbs.

Current Status

The most recent fisheries surveys of Lake Margrethe were conducted in the spring and summer of 2016. Fish sampling was conducted with trap nets, large-mesh fyke nets, small-mesh fyke nets, inland gill nets, minnow seines, and electrofishing gear. The netting portion of the survey occurred from April 25-29 and May 23-26, and the electrofishing and seining portion was completed on June 30.

A total of 2,577 fish, representing 19 different species, were caught in the netting portion of the 2016 survey (Table 5). Panfish species captured in the survey included Rock Bass (494 from 1-10 inches) Bluegill (234 from 4-10 inches) and Pumpkinseed Sunfish (113 from 4-10 inches). Yellow Perch were relatively rare in the netting portion of the survey, with 29 caught from 5-11 inches in length.

Predator species, including Largemouth Bass, Smallmouth Bass, Walleye, and Northern Pike were well-represented in the 2016 survey (Table 5). A total of 113 Largemouth Bass (9-20 inches), 100 Smallmouth Bass (9-19 inches), 90 Walleye (11-29 inches), and 54 Northern Pike (13-32 inches) were caught. White Suckers were very abundant, with 292 individuals caught, representing approximately 39% of the catch by weight. Mimic Shiners were the most abundant species in the netting portion of the survey, with 593 from 1-2 inches caught (all of which were caught in the small mesh fyke net). Other species caught in the netting portion of the 2016 survey included Bluntnose Minnow, Brook Trout, Brown Bullhead, Brown Trout, Common Carp, Hybrid Sunfish, Iowa Darter, and Johnny Darter (Table 5).

Bluegill and Pumpkinseed Sunfish captured during the netting part of the 2016 survey (Table 6) were growing above the state average length at age, while Rock Bass were growing slightly below the state average. Largemouth Bass, Smallmouth Bass, and Northern Pike from the netting portion of the 2016 survey were all growing above the state average length at age. Walleye were growing slightly below the state average length at age.

A total of 1,610 fish, representing 18 species, were caught in the seining and electrofishing part of the 2016 survey (Table 7). The vast majority of the fish captured in this portion of the survey were Mimic Shiners and Bluntnose Minnows. Bluegill, Sand Shiner, and Spottail Shiner were also well-represented.

Bluegill, Pumpkinseed Sunfish, Rock Bass, and Yellow Perch captured during the seining and electrofishing portion of the 2016 survey were growing below the state average (Table 8). Not enough individuals from other species were caught to make statistical inferences regarding age and growth.

New species (that had not been previously recorded in Lake Margrethe) caught in the 2016 survey included Common Carp, Hybrid Sunfish, and Iowa Darter. Species that had been caught in previous surveys but were not caught in 2016 included Black Crappie, Logperch, Longear Sunfish, Muskellunge, Rainbow Trout, Redhorse spp., and Tiger Muskellunge.

Shoreline data were collected on August 9, 2016 (Table 9). Lake Margrethe had 18.1 docks/km, 20.7 dwellings/km, 39.8% shoreline armoring, and 24.3 submerged trees/km. Lake Margrethe is heavily-developed with cottages and residences along much of its shoreline. Compared to other large, deep lakes in Michigan and in the Central Lake Michigan Management Unit (CLMMU; basically the northwestern portion of the Lower Peninsula), Lake Margrethe has an above-average number of docks and dwellings (Wehrly et al. 2015; Table 9). The shoreline armoring of Lake Margrethe was slightly below the average for other large, deep CLMMU lakes, but was more than the statewide average for large, deep, lakes. The number of submerged trees in Lake Margrethe was substantially higher than the average, both for the CLMMU and statewide.

Analysis and Discussion

The 2016 MDNR fisheries survey showed that Lake Margrethe has generally healthy and balanced gamefish populations. However, since the last fisheries survey (Tonello 2007), the Smallmouth Bass population seems to have decreased in abundance, while Largemouth Bass and Walleye have become more abundant. For example, in 2007 the trap/fyke net catch per unit effort (CPE) for Smallmouth Bass was 15.4 per net lift, while in 2017 it was only 5.2 per net lift. The Largemouth Bass population of Lake Margrethe seems to have expanded in recent years, and in the 2016 survey, Largemouth Bass for the first time outnumbered Smallmouth Bass. The populations of both Largemouth and Smallmouth Bass are well balanced, with over 50% of each species exceeding the minimum legal size limit of 14 inches (Table 5).

The Walleye population in Lake Margrethe also appears to be extremely healthy. While a few Walleye were present from non-stocking years, the vast majority were from year classes in which Walleye were stocked (Table 6). Therefore, the Walleye fishery in Lake Margrethe appears to be heavily dependent on stocked fish. Although Walleye were growing below the state average, the population is well-balanced with individuals present from seven different year classes. Nearly 80% of the Walleye caught in the 2016 survey were of legal size (over 15 inches). The somewhat slow growth exhibited by Lake Margrethe Walleye should not be a cause for concern, as this phenomenon is common in Walleye populations in Michigan inland lakes. Of particular interest is the large numbers of walleye from the 2006 and 2002 year classes, both of which were stocked (Ages X and XIV, Table 6). Clearly the stocked Walleye are surviving for many years.

The Muskellunge stocking program, which was started in 2002, has created a popular fishery. There are no other fisheries for Muskellunge with an hour of Lake Margrethe. The fishery is particularly popular among those who prefer to spear. Unfortunately, no Muskellunge were caught in the 2016 fisheries survey. The lack of Muskellunge in the 2016 survey is discouraging, as 13 Muskellunge were caught in the 2007 survey. Despite this, large Muskellunge are still present in the lake, and at least two are known to have been speared in the winter of 2016/2017. One was aged by MDNR Fisheries Technicians and found to be age 13, from the 2004 stocked year class. One recent change to MDNR's Muskellunge rearing program is a switch from Northern strain Muskellunge to Great Lakes strain (Table 1). Northern strain Muskellunge were last stocked in 2010, and Great Lakes strain Muskellunge were stocked in 2012, 2014, and 2016. So far, it appears that while the Northern strain Muskellunge thrived in Lake Margrethe and created a popular fishery, the Great Lakes strain Muskellunge have not been as successful, at least so far.

The Northern Pike population of Lake Margrethe also appears to be healthy. Individuals from five different year classes were present, and they were growing well. The presence of substantial numbers of young (age 2-4) Northern Pike in the survey confirm that they are continuing to reproduce well, despite the fact that the Northern Pike spawning marsh has not been operated for many years.

Rock bass remain the dominant panfish species in Lake Margrethe. However, fewer were caught in 2016 than in 2007 (494 compared to 845), despite more netting effort in 2016. While Rock Bass numbers were lower in 2016, the Bluegill and Pumpkinseed Sunfish catches were much higher in 2016 than in 2007. In 2016, the Bluegill averaged 8.0 inches in length, and the Pumpkinseed Sunfish averaged 7.2 inches. Lake Margrethe currently offers some excellent panfish fishing opportunities that did not exist in 2007. The Yellow Perch catch in the 2016 survey was relatively poor, as it also was in

the 2007 survey. Despite this, some large Yellow Perch are present in the lake, as is evidenced by a recent Master Angler entry for a Yellow Perch that was 14 inches in length.

The presence of Brown and Brook Trout in Lake Margrethe is likely due to the fact that Portage Creek flows out of Lake Margrethe. Portage Creek is a tributary to the Manistee River, and is known to have good populations of Brown and Brook Trout. While their populations are not overly numerous, the Brown and Brook Trout do add variety to the catch for Lake Margrethe anglers. Also, the potential for catching large individuals is there, particularly for Brown Trout. Individuals over 20 inches are caught by anglers every year, with some exceeding 25 inches.

Both Yellow and Brown Bullhead were very numerous in the 2016 survey, as they were in 2007. Most exceeded ten inches in length, and a good number also exceeded the minimum catch and release Master Angler threshold of 14 inches. Lake Margrethe continues to provide a very good opportunity for bullhead fishing.

The presence of a Common Carp in the 2016 survey is disconcerting. This is the first time Common Carp have been documented in Lake Margrethe. It is possible that this individual was inadvertently introduced to Lake Margrethe from an angler's bait bucket. Hopefully this species has not become established in Lake Margrethe. They are non-native and can have negative impacts on inland lake ecosystems. Any Common Carp that are caught by anglers should not be returned to the lake.

Management Direction

The Lake Margrethe Walleye fishery is dependent upon stocking. Therefore, spring fingerling Walleye (Muskegon River strain) should continue to be stocked into Lake Margrethe, at a rate of 31/acre (or 60,000 fish) every other year, starting in 2017. Although some natural reproduction occurs, it is not enough to support the fishery. Continued Walleye stocking, along with supplemental natural reproduction, should continue to allow Lake Margrethe to be one of the better Walleye fishing lakes in the northern lower peninsula of Michigan. Fall Walleye electrofishing surveys should continue to be conducted whenever possible both in stocking and non-stocking years, to assess the survival of stocked fish, and to monitor natural reproduction.

The Lake Margrethe Muskellunge fishery is entirely dependent upon stocking. Therefore, fall fingerling Great Lakes strain Muskellunge should continue to be stocked into Lake Margrethe at a rate of 2/acre (4,000 fish) every other year, beginning in 2018. The Muskellunge fishery of Lake Margrethe should be monitored by communicating with anglers. There has been much discussion in recent years regarding minimum size lengths for Muskellunge for Michigan lakes. In Lake Margrethe, the minimum size limit should remain at 42 inches.

The other fisheries of Lake Margrethe appear to be self-sustaining. Native and desirable species like Bluegill, Pumpkinseed Sunfish, Smallmouth Bass, Largemouth Bass, and Northern Pike should continue to thrive in Lake Margrethe. The Yellow Perch population continues to be an uncertainty. At times in the past Lake Margrethe has offered good fishing opportunities for Yellow Perch (MDNR files, Cadillac office).

Another comprehensive fisheries survey should be conducted within the next ten years to monitor the fish populations of Lake Margrethe. In particular, the Walleye and Muskellunge populations should be

targeted to assess the effectiveness of the stocking programs. Other goals of future fisheries surveys should include further scrutiny of the panfish, bass, and Northern Pike populations.

Eurasian milfoil will likely continue to require treatment, at least in some years. We recommend continued small-scale spot chemical treatments for dealing with the Eurasian milfoil. We also recommend that native macrophytes not be treated. A healthy aquatic macrophyte community is critical to healthy fish communities. Many of the desired fish species in Lake Margrethe, including Walleye, Northern Pike, Largemouth Bass, Bluegill, Pumpkinseed Sunfish, and Yellow Perch require healthy native aquatic plant communities.

Any remaining riparian wetlands adjacent to Lake Margrethe should be protected as they are critical to the continued health of the lake's fish community. Unwise riparian development and wetland loss in the future will result in deterioration of the water quality and fisheries habitat. Also, 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 Lake Margrethe. Lake Margrethe had more submerged trees than other large, deep inland lakes in Michigan (Table 9), but could certainly use more. Submerged trees are excellent habitat for many fish and aquatic invertebrate species.

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 water quality, especially for nutrients; preservation of natural shorelines, especially shore contours and vegetation; and preservation of bottom contours, vegetation, and wood debris within the lake. Guidelines for protecting fisheries habitat in inland lakes can be found in Fisheries Division Special Report 38 (O'Neal and Soulliere 2006).

References

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Figure 1. Area surrounding Lake Margrethe, Crawford and Kalkaska Counties, Michigan.

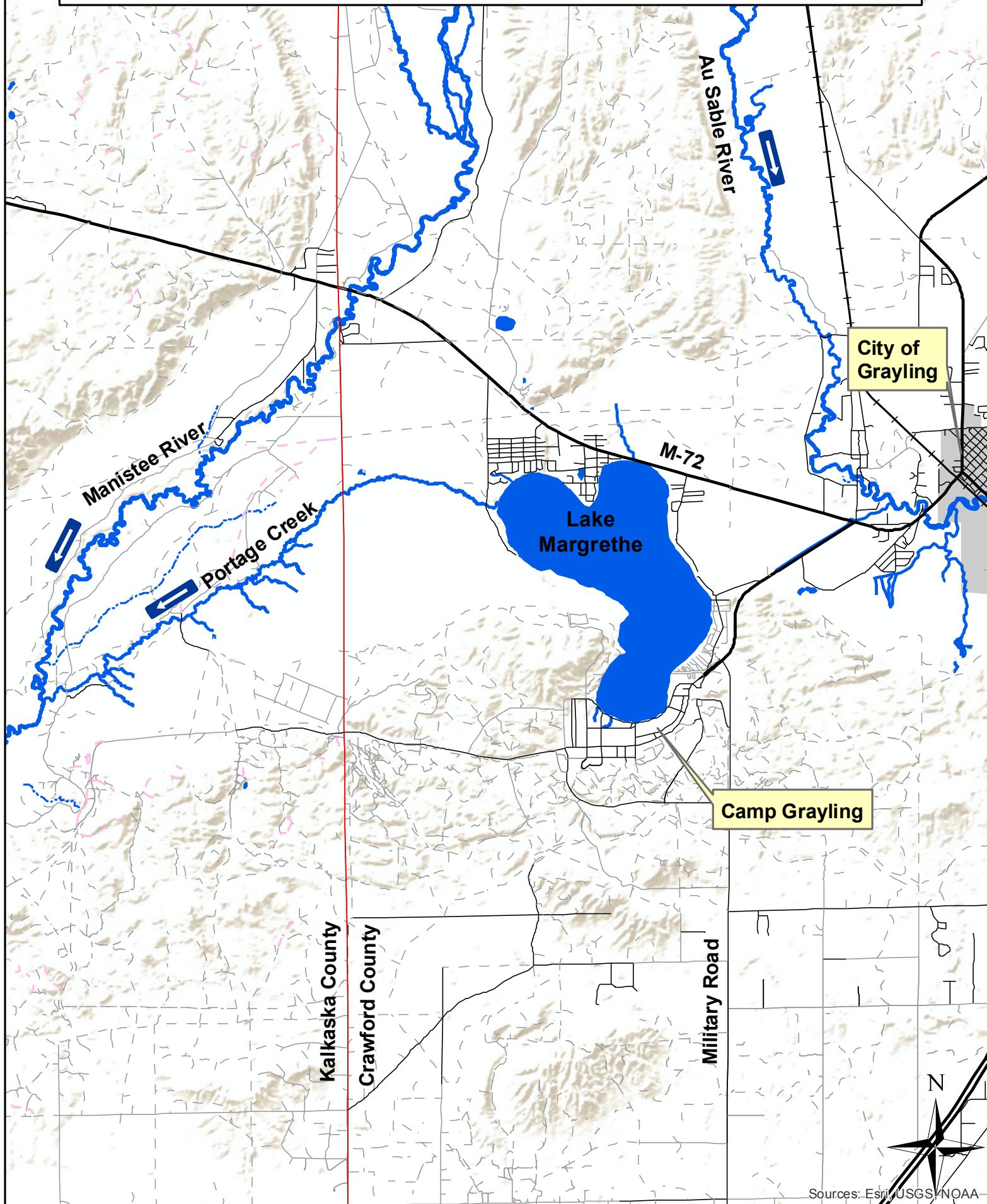


Figure 2. Lake Margrethe, Crawford County, Michigan.

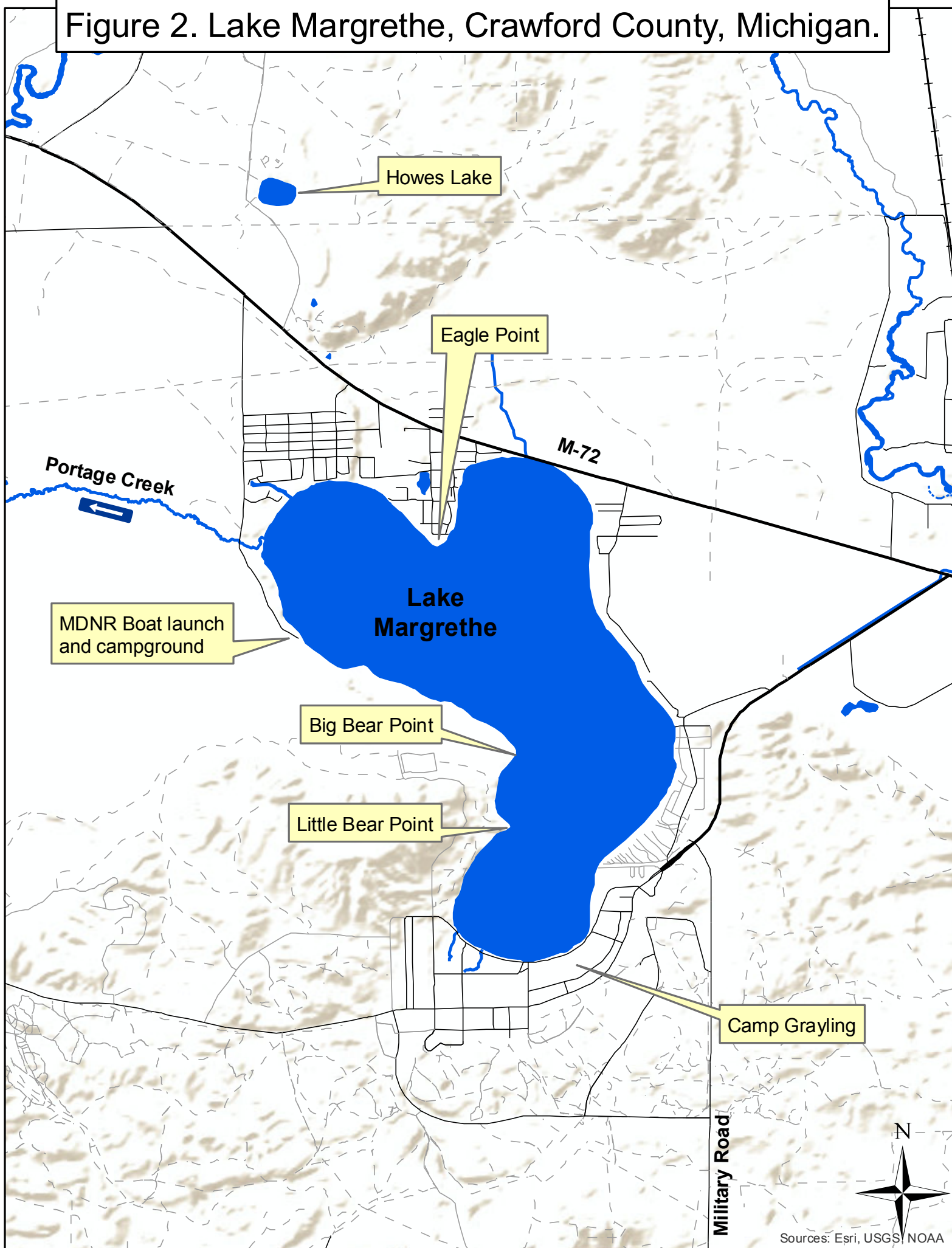


Table 1. Fish stocked in Lake Margrethe, Crawford County, 1877-2016.

Year	Species	Number	Size	Strain
1877	Lake Whitefish	35,000	fry	
1878	Lake Whitefish	100,000	fry	
1909	Smallmouth Bass	600	fingerlings	
1910	Smallmouth Bass	2,500	fingerlings	
1929	Smallmouth bass	600	5 months	
1930	Largemouth bass	230	2 months	
1933	Bluegill	4,650	4-5 months	
	Largemouth bass	500	5 months	
	Yellow Perch	9,000	6 months	
1934	Bluegill	3,500	5 months, adults	
	Largemouth bass	5,000	1 month	
	Rainbow Trout	750	6 months	
	Walleye	600,000	fry	
	Yellow Perch	5,500	7 months	
1935	Bluegill	6,400	4 months	
	Smallmouth Bass	800	4 months	
	Walleye	450,000	fry	
	Yellow Perch	5,625	7 months	
1936	Bluegill	3,320	4 months	
	Largemouth bass	550	yealings	
	Walleye	640,000	fry	
1937	Bluegill	28,000	3-4 months	
	Largemouth bass	1,000	5 months	
	Yellow Perch	9,800	7 months	
	Walleye	120,000	fry	
1938	Bluegill	25,000	5 months	
	Largemouth bass	2,000	4 months	
	Walleye	100,000	fry	
1939	Bluegill	40,000	5 months	
	Smallmouth bass	3,100	4 months	
	Smallmouth bass	196	adult	
	Walleye	1,600,000	fry	
	Yellow perch	25,000	7 months	
1940	Bluegill	59,000	3 months	
	Largemouth bass	1,000	4 months	
	Smallmouth bass	1,000	3 months	
	Smallmouth bass	150	adult	
	Walleye	640,000	fry	
	Yellow perch	10,000	7 months	
1941	Bluegill	504	yearling	
	Bluegill	100	adult	
	Largemouth bass	100	yearling	
	Largemouth bass	1,000	4 months	
	Smallmouth bass	1,000	4 months	
	Yellow perch	20,000	7 months	

Table 1 continued

1942	Bluegill	40,000	3 1/2 months	
	Largemouth bass	2,000	4 months	
	Walleye	400,000	fry	
1943	Bluegill	1,000	yearling	
	Smallmouth bass	3,000	4 months	
1944	Bluegill	25,000	4 months	
	Largemouth bass	2,000	4 months	
	Smallmouth bass	2,000	4 months	
	Walleye	600,000	fry	
1945	Bluegill	4,000	15 months	
	Largemouth bass	3,000	3 months	
1957	Walleye	20,000	fall fingerling	
1962	Northern pike	49	legal	
	Walleye	16,100	fingerlings	
1963	Northern pike	60	legal	
1964	Northern pike	83	legal	
1970	Walleye	50,000	fry	
1971	Walleye	5,000	fingerlings	
1972	Walleye	300,000	fry	
	Walleye	1,500	fingerlings	
1973	Northern pike	1,526	fingerlings	
1974	Northern pike	770	fingerlings	
1975	Northern pike	78	spring fingerlings	
	Walleye	5,381	spring fingerlings	
1976	Tiger muskellunge	4,078	fall fingerling	
1977	Tiger muskellunge	4,031	fall fingerling	
1978	Tiger muskellunge	4,000	fall fingerling	
1979	Tiger muskellunge	4,000	spring fingerlings	
	Walleye	2,476	fall fingerling	
	Yellow perch	464	fall fingerling	
	Yellow perch	143	adult	
1980	Northern pike	1,032	fall fingerling	
	Tiger muskellunge	4,000	fall fingerling	
	Walleye	1,788	fall fingerling	
1981	Northern pike	4,572	fall fingerling	
	Tiger muskellunge	4,000	fall fingerling	
	Walleye	150	yearling	
1982	Northern pike	1,812	fall fingerling	
	Tiger muskellunge	11,700	fall fingerling	
	Walleye	581	yearling	
1983	Northern pike	2,776	Spring fingerlings	
	Tiger muskellunge	2,000	Fall fingerlings	
1984	Northern pike	2,776	Spring fingerlings	
	Tiger muskellunge	2,000	Fall fingerlings	
1985	Northern pike	1,320	Spring fingerlings	
	Tiger muskellunge	4,000	Fall fingerlings	
	Walleye	123,072	Spring fingerlings	Muskegon

Table 1 continued

1986	Northern pike	5,000	Spring fingerlings	
	Tiger muskellunge	5,000	Fall fingerlings	
	Walleye	37,150	Spring fingerlings	Muskegon
1987	Tiger muskellunge	4,800	Fall fingerlings	
	Walleye	12	Adults	
1988	Tiger muskellunge	3,400	Fall fingerlings	
	Walleye	60,732	Spring fingerlings	
1989	Northern pike	7,000	Spring fingerlings	
	Tiger muskellunge	8,000	Fall fingerlings	
1990	Northern muskellunge	151	Fall fingerlings	
	Northern pike	10,540	Spring fingerlings	
	Tiger muskellunge	6,837	Fall fingerlings	
	Walleye	15,561	Fall fingerlings	
	Walleye	55,545	Fall fingerlings	Muskegon
1991	Tiger muskellunge	8,000	Fall fingerlings	
1992	Walleye	3.25mil	Fry	Muskegon
1993	Northern pike	10,000	Spring fingerlings	
	Walleye	397	Adults	Muskegon
	Walleye	360,000	Fry	Bay De Noc
1994	Northern pike	1,000	Spring fingerlings	
	Walleye	64,252	Spring fingerlings	Muskegon
1995	Northern pike	5,000	Spring fingerlings	
1996	Northern pike	5,000	Spring fingerlings	
1997	Northern pike	5,000	Spring fingerlings	
1998	Walleye	89,785	Spring fingerlings	Muskegon
	Walleye	7,306	Spring fingerlings	Tittabawassee
	Northern pike	5,000	Spring fingerlings	
1999	Walleye	21,610	Fall fingerlings	Muskegon
	Northern pike	5,000	Spring fingerlings	
2000	Northern pike	5,000	Spring fingerlings	
2002	Walleye	56,670	Spring fingerlings	Muskegon
	Northern muskellunge	2,011	Fall fingerlings	
2004	Northern muskellunge	5,893	Fall fingerlings	
2005	Northern muskellunge	5,000	Fall fingerlings	
2006	Walleye	69,903	Spring fingerlings	Muskegon
2009	Northern muskellunge	2,000	Fall fingerlings	
2010	Northern muskellunge	4,000	Fall fingerlings	
2011	Walleye	45,585	Spring fingerlings	Muskegon
2012	Great Lakes muskellunge	2,000	Fall fingerlings	Lk. St. Clair
2013	Walleye	69,298	Spring fingerlings	Muskegon
2014	Great Lakes muskellunge	1,450	Fall fingerlings	Lk. St. Clair
2015	Walleye	155,198	Spring fingerlings	Muskegon
2016	Great Lakes muskellunge	2,880	Fall fingerlings	Lk. St. Clair

Table 2. Presence/absence of fish species in historical fisheries surveys of Lake Margrethe, Crawford County, MI.

Species	1947	1954	1961	1962	1971	1979	1987	1988	1993	1994	1995	2001	2007	2016
Black Crappie													X	
Bluegill		x	x	x	x	x	x	x	x	x		x	x	x
Bluntnose Minnow		x												x
Brook Trout								x	x		x	x	x	x
Brown Bullhead		x			x	x						x	x	x
Brown Trout													x	x
Bullhead spp.								x		x				
Common Carp														x
Common Shiner		x												x
Creek Chub												x		
Green Sunfish							x							x
Hybrid Sunfish														x
Iowa Darter														x
Johnny Darter		x												x
Largemouth Bass		x	x		x	x	x	x	x			x	x	x
Logperch		x												
Longear Sunfish		x	x											
Mimic Shiner		x												x
Muskellunge													x	
Northern Pike	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Pumpkinseed		x	x	x	x	x	x	x	x	x		x	x	x
Rainbow Trout									x					
Redhorse spp.								x						
Rock Bass	x	x	x	x	x	x	x	x	x			x	x	x
Sand Shiner		x										x		x
Smallmouth Bass	x	x	x	x	x	x	x	x	x			x	x	x
Spottail Shiner								x				x		x
Tiger Muskellunge						x		x	x					
Walleye	x	x		x	x	x	x	x	x	x	x	x	x	x
White Sucker	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Yellow Bullhead						x							x	x
Yellow Perch	x	x	x	x		x	x	x	x			x	x	x

Table 3. Comparison of fall electrofishing surveys conducted on Lake Margrethe. These surveys follow the techniques laid out in Ziegler and Schneider (2000), and the abundance estimates follow procedures described by Serns (1982, 1983).

	# Walleye captured	Catch Rate (# Walleye/mile of shoreline sampled)	Year Class strength estimate	Serns Index (# Walleye/surface acre)
1990				
Age 0	5	1.25	561.6	0.293
Age1	0	0	0	0
1992				
Age 0	12	3.00	1347.8	0.702
Age1	1	0.25	93.1	0.049
1994				
Age 0	29	54.25	24373.4	12.695
Age1	22	6.00	2234.9	1.164
1997				
Age 0	1	0.29	128.4	0.067
Age1	2	0.57	212.8	0.111
1998				
Age 0	102	29.14	13093.3	6.819
Age1	1	0.29	106.4	0.055
2002				
Age 0	68	19.43	8728.9	4.546
Age1	22	6.29	2341.3	1.219
2006				
Age 0	58	15.68	7042.8	3.668
Age1	0			
2009				
Age 0	0			
Age1	0			

Table 4. Michigan DNR Master Angler awards issued for fish caught from Lake Margrethe, Crawford County, Michigan, 1994-2016.

Species	Number of Master Angler awards issued
Bluegill	8
Black Bullhead	3
Brown Bullhead	3
Muskellunge	3
Pumpkinseed Sunfish	3
Smallmouth Bass	2
Yellow Perch	2
Bullhead spp.	1
Largemouth Bass	1
White Sucker	1
Total:	27

Table 5. Number, weight, and length of fish collected from Lake Margrethe with trap nets, large mesh fyke nets, small mesh fyke nets, and inland gillnets, April 25-29, and May 23-26, 2016.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches) ¹	Average length	Percent legal size ²
Bluegill	234	9.1	92.4	3.8	4-10	8.0	91 (6")
Bluntnose Minnow	34	1.3	0.1	0.0	1-2	1.9	
Brook Trout	14	0.5	4.8	0.2	7-13	9.6	93 (8")
Brown Bullhead	139	5.4	181.3	7.4	10-16	14.1	100 (7")
Brown Trout	5	0.2	15.7	0.6	8-23	18.1	100 (8")
Common Carp	1	0.0	9.4	0.4	27-27	27.5	
Hybrid Sunfish	7	0.3	1.0	0.0	4-7	5.6	29 (6")
Iowa Darter	40	1.6	0.1	0.0	1-2	1.8	
Johnny Darter	10	0.4	0.0	0.0	1-2	1.8	
Largemouth Bass	113	4.4	202.7	8.3	9-20	14.8	60 (14")
Mimic Shiner	593	23.0	1.1	0.0	1-2	1.7	
Northern Pike	54	2.1	132.1	5.4	13-32	21.5	24 (24")
Pumpkinseed Sunfish	113	4.4	44.0	1.8	4-10	7.2	79 (6")
Rock Bass	494	19.2	178.8	7.3	1-10	7.4	75 (6")
Smallmouth Bass	110	4.3	184.7	7.6	9-19	14.4	54 (14")
Walleye	90	3.5	229.2	9.4	11-29	19.0	79 (15")
White Sucker	292	11.3	947.4	38.8	5-24	19.8	
Yellow Bullhead	205	8.0	213.8	8.7	8-17	13.0	100 (7")
Yellow Perch	29	1.1	5.9	0.2	5-11	7.5	45 (7")
Total	2,577	100	2444.5	100			

¹Note 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.

²Percent 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 Lake Margrethe with trap nets, large mesh fyke nets, small mesh fyke nets, and inland gill nets, April 25-29, and May 23-26, 2016. 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.

Species	Age													Mean Growth Index
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XIV	XVI	
Brook Trout	7.2 (1)	9.3 (5)	12.8 (2)											-0.1
Bluegill				4.9 (8)	6.1 (31)	7.9 (22)	8.5 (6)	9.4 (7)	10.0 (4)	10.2 (5)				+0.4
Brown Trout		8.9 (1)		18.5 (2)		22.4 (2)								--
Largemouth Bass			10.5 (8)	12.9 (29)	15.2 (20)	16.5 (11)	17.4 (8)	18.1 (3)	20.4 (1)					+1.5
Northern Pike		17.7 (20)	20.7 (17)	24.1 (11)	29.9 (5)	31.3 (2)								+1.2
Pumpkinseed Sunfish				6.0 (16)	6.4 (12)	8.1 (10)	8.2 (6)	9.0 (1)	9.3 (2)	9.4 (1)	9.7 (1)			+0.8
Rock Bass	1.4 (6)	2.6 (5)	3.8 (4)	4.5 (9)	6.3 (27)	7.9 (19)	9.3 (9)	10.2 (6)	10.4 (4)					-0.4
Smallmouth Bass			11.5 (32)	14.2 (19)	15.5 (13)	16.9 (4)	17.7 (13)	18.6 (3)	19.0 (2)		18.8 (1)			+1.2
Walleye			13.5 (23)		18.0 (8)			22.7 (2)	20.8 (1)	20.9 (38)		23.3 (10)	26.6 (1)	-0.7
Yellow Perch			6.4 (1)	7.0 (6)	7.0 (15)	9.6 (6)								-0.6

Table 7. Number, weight, and length of fish collected from Lake Margrethe with electrofishing and seining, June 30, 2016.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches) ¹	Average length	Percent legal size ²
Bluegill	87	5.4	8.1	19.8	2-9	4.6	18 (6")
Bluntnose Minnow	307	19.1	1.8	4.4	2-3	2.5	
Brown Bullhead	1	0.1	0.7	1.7	11-11	11.5	100 (7")
Common Shiner	18	1.1	0.2	0.5	2-3	3.2	
Green Sunfish	2	0.1	0.0	0.0	2-2	2.5	0 (6")
Iowa Darter	5	0.3	0.0	0.0	1-2	2.1	
Johnny Darter	7	0.4	0.0	0.0	2-2	2.5	
Largemouth Bass	8	0.5	7.2	17.6	8-14	12.3	14 (14")
Mimic Shiner	964	59.9	4.7	11.5	0-2	2.5	
Pumpkinseed Sunfish	21	1.3	4.0	9.8	3-8	5.8	57 (6")
Rock Bass	21	1.3	6.9	16.9	2-9	5.9	67 (6")
Sand Shiner	64	4.0	0.2	0.5	1-2	2.0	
Smallmouth Bass	8	0.5	3.5	8.6	0-17	6.3	13 (14")
Spottail Shiner	54	3.4	0.1	0.2	0-1	1.4	
Walleye	7	0.4	2.1	5.1	2-13	8.6	0 (15")
White Sucker	6	0.4	0.0	0.0	0-1	1.3	
Yellow Perch	29	1.8	1.0	2.4	0-6	4.2	0 (7")
Yellow Bullhead	1	0.1	0.4	1.0	9-9	9.5	100 (7")
Total	1,610	100	40.9	100			

¹Note 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.

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

Table 8. Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Lake Margrethe with seining and electrofishing, June 30, 2016. 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.

Species	Age									Mean Growth Index
	I	II	III	IV	V	VI	VII	IX	X	
Bluegill	2.5 (4)	3.2 (3)	3.9 (12)	5.5 (15)	6.8 (8)	8.3 (2)	8.4 (1)	9.8 (1)		-0.7
Largemouth Bass		8.0 (1)	11.7 (1)	12.9 (3)	13.5 (1)					--
Pumpkinseed Sunfish			3.5 (6)	6.2 (11)	7.6 (4)					-0.7
Rock Bass	2.5 (1)	3.9 (1)	4.7 (2)	6.6 (2)	5.8 (5)	8.0 (6)	9.1 (4)			-0.8
Smallmouth Bass	4.8 (3)	8.0 (2)					17.0 (1)			--
Walleye	7.7 (3)	7.2 (1)	14.1 (3)						21.7 (2)	--
Yellow Perch	3.0 (11)	4.3 (6)	5.3 (10)	6.1 (1)						-1.3

Table 9. Shoreline data for Lake Margrethe, Crawford County, compared with that for other medium, deep lakes in the Central Lake Michigan Management Unit (CLMMU) and statewide (from Wehrly et al. 2015). Sampling was conducted by MDNR Fisheries personnel on August 9, 2016.

	Total docks per km	Dwellings per km	Percent shoreline armoring	Submerged trees per km
Lake Margrethe	18.1	20.7	39.8	24.3
Average for large, deep lakes in the CLMMU	10.4	14.9	43.7	9.8
Michigan statewide average for large, deep inland lakes	4.3	9.2	24.2	8.4