

Yellowstone Lake
Lafayette County
2010-2011 Muskellunge Survey



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Introduction

Yellowstone Lake has become an interest to muskellunge anglers particularly after producing a 57 inch catch and release unlimited line class record. Beyond stocking and incidental catches while electrofishing, there is little data focusing on the muskellunge population of Yellowstone Lake. The Wisconsin Department of Natural Resources fisheries management staff conducted fyke net surveys targeting muskellunge during April of 2010 and 2011. The purpose of the surveys was to complete a muskellunge population estimate while also recording relative abundance, size structure and condition.

Location

Yellowstone Lake (WBIC: 903700) is located in northeast Lafayette County, T3NR4E, sections 01 and 02. Located in the township of Fayette just east of the village of Fayette it is an impoundment of the Yellowstone River (WBIC: 930700). Constructed in 1954, it was developed as a local recreational opportunity for southern Wisconsin.

Access

Yellowstone Lake is bordered by Wisconsin State Park and State Wildlife Area. Public access is allowed along the entire shoreline. Much of the access is located on the north side of the lake within Yellowstone Lake State Park. There are two paved boat launches, a gravel carry in launch, four disabled angler fishing pads, and just over 1.5 miles of accessible shore fishing.

Lake Characteristics

The physical characteristics of Yellowstone have changed over the years largely in part to the addition of 2 sub-impoundments and the deposition of sediment. Sedimentation and the building of 2 levees have led to the decrease of surface area and miles of shoreline. Sedimentation has decreased the depth of the lake throughout. Recent core samples have shown up to 72 inches of modern deposits in the upper end of the lake.

Aquatic vegetation is considered present in low densities however there are areas of the lake in which it is considered to be in high densities.

Yellowstone is eutrophic with an upper watershed dominated by row crop agriculture. Algae blooms are common in the summer months. During the periods shortly after ice out and late fall the water clarity is good with sechhi depths up to 1.5 meters recorded. During the summer months, runoff combined with re-suspension of sediment from recreational boating leads to low water clarity. Sechhi depths less than 0.5 meters have been recorded during these high turbidity periods.

Table 1. Surface area, maximum depth, and miles of shoreline for Yellowstone Lake in 1965 and 2013.

	2013	1965
Surface Area (acres)	400	455
Maximum Depth (feet)	14	16
Miles of Shoreline	5.23	6.34

Forage

There are multiple fish species muskellunge could utilize as forage. Bluegill sunfish, black crappies, golden shiners, white suckers, largemouth bass, walleye, common carp and bigmouth buffalo are all present in Yellowstone Lake. While other species are present in good numbers and stable, the black crappie and golden shiner populations are cyclical and often reach levels considered abundant.

Regulation

The current Yellowstone Lake regulation for muskellunge is catch and release.

Muskellunge Classification

Yellowstone Lake is classified as A1 muskellunge water. Class A1 waters are best known as "trophy waters" for their ability to consistently produce large muskellunge, but overall abundance of muskellunge may be relatively low. Angling action can be inconsistent, but the average size of fish caught is larger.

Reproduction

Yellowstone Lake is defined as category 3 reproduction water. Category 3 waters have no known natural reproduction of muskellunge. Stocking of muskellunge is required to maintain the population.

Musky Stocking

Yellowstone Lake remains on the statewide quotas to receive an annual stocking of 450 large fingerling muskellunge. Large fingerling muskellunge are stocked by the Wisconsin Department of Natural Resources each year. These stocked fish are surviving and creating a recreational opportunity for musky in Yellowstone Lake. The previous 15 years of stocking history are listed in table 2.

Table 2. Stocking history of musky in Yellowstone Lake from 1998 thru 2013

Year	Size	Number Stocked	Strain	Source
1998	Large fingerling	150	Unknown	Private
1999	Large fingerling	900	Unknown	Iowa DNR
2000	Large fingerling	900	Unknown	WDNR
2001	Large fingerling	900	Unknown	WDNR
2002	Large fingerling	900	Unknown	WDNR
2003	Large fingerling	900	Unknown	WDNR
2004	Large fingerling	900	Unknown	WDNR
2005	Large fingerling	800	Upper Chippewa	WDNR
2006	Large fingerling	501	Upper Chippewa	WDNR
2007	Large fingerling	607	Upper Chippewa	WDNR
2008	Large fingerling	275	Unknown	Private
2008	Large fingerling	910	Upper Wisconsin	WDNR
2009	Large fingerling	450	Upper Chippewa	WDNR
2010	Large fingerling	450	Upper Wisconsin	WDNR
2011	Large fingerling	450	Upper Chippewa	WDNR
2012	Large fingerling	450	Upper Wisconsin	WDNR
2013	Large fingerling	450	Upper Wisconsin	WDNR

Methods

Fyke nets were set on April 5 for 2010 and 2011. The netting protocol was kept identical for both years for the survey. Nets were set and lifted on the same dates from the same locations. Fyke nets have a frame measuring 4 feet high and 6 feet wide with a ¾ inch bar mesh. The nets were pulled on April 14 for a total effort of 63 net nights.

Table 3. Latitude and longitude coordinates of fyke nets during 2010/2011 Yellowstone Lake muskellunge survey

Net number	Latitude	Longitude
1	42.75726	89.95784
2	42.75466	89.96429
3	42.75616	89.96983
4	42.75771	89.97042
5	42.76374	89.97491
6	42.76596	89.98182
7	42.76743	89.96992

The mean surface water temperature was 52 °F in 2010 with a high of 62°F on day one and a low of 46°F on days five and six. In 2011 the mean surface water temperature was 50°F with a high of 58°F on day eight and a low of 43°F on day one.

During the survey, length to the nearest tenth of an inch and weight to the nearest tenth of a pound was recorded for all muskellunge. Relative weights were calculated using the (overall) standard weight equation ($\log W_s = a + b \log L$) (Neumann and Willis, 1994). The intercept (a) for English units is -4.052, slope (b) is 3.325. Muskellunge were given a partial left pectoral fin clip in 2010 and a partial left pelvic clip in 2011. A single census Peterson mark and recapture population estimate was conducted. The equation used was $N=MC/R$ where N is the estimated population at time of marking, M is the number of marked fish, C is the number of fish captured for census, and R is the number of recapture marks in the sample. The mark run was conducted in 2010 and the recapture run was in 2011.

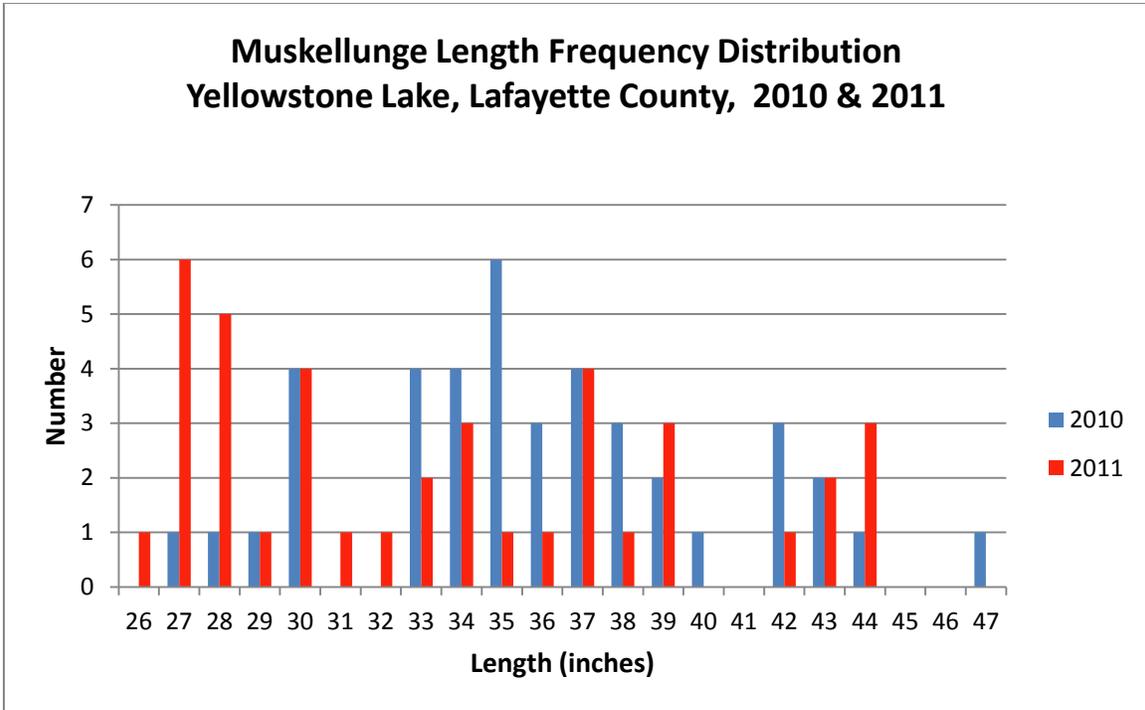
Results

Summary of catch

In 2010 there were 42 individual muskellunge netted, 21 males and 21 females. Total catch per effort was 0.66 muskellunge per net night. Total length in inches ranged 27.5 to 47.5 with a mean of 36.1. Weight in pounds ranged 5.0 to 36.0 with a mean of 14.3. The sample has a mean relative weight index of 99.9 with a range of 75.2 to 122.9. Length frequency of the muskellunge sampled in 2010 is displayed in Figure 1.

In 2011 there were 41 individual muskellunge netted, 28 males, 12 females, and 1 immature. Thirteen were recaptures from 2010, 6 males and 7 females. Total catch per effort was 0.65 muskellunge per net night. Total length in inches ranged 13.6 to 44.5 with a mean of 33.5. Weight in pounds ranged 0.5 to 28.0 with a mean of 11.6. The sample has a mean relative weight index of 96.3 with a range of 70.3 to 112.3. Length frequency of the muskellunge sampled in 2011 is displayed in Figure 1.

Figure 1. Length frequency of muskellunge, 2010 and 2011 fyke net surveys, Yellowstone Lake, Lafayette County



The proportional stock density (PSD) in 2010 was 90. The relative stock density for preferred size of 38 inches (RSD_{38}) was 30. Relative stock density for memorable sized muskellunge of 42 inches (RSD_{42}) was 16. Relative stock density for trophy sized muskellunge of 50 inches (RSD_{50}) was 0. In 2011 the PSD was 67. The RSD_{38} was 25 and the RSD_{42} was 15. The RSD_{50} remained at 0. A summary of PSD's and RSD's is given in table 4. Proportional and relative stock densities were based upon the maximum lengths of 20 inches for stock sized muskellunge, 30 inches for quality size, 38 inches for preferred size, 42 inches for memorable size, and 50 inches for trophy size (Gabelhouse, 1983).

Table 4. Muskellunge proportional stock densities (PSD) and relative stock densities (RSD) from the 2010 and 2011 fyke net survey of Yellowstone Lake, Lafayette County.

	2010	2011
PSD	90	67
RSD_{38}	30	25
RSD_{42}	16	15
RSD_{50}	0	0

Forty-two individual muskellunge were marked in 2010. In 2011, 41 individual muskellunge were captured with 13 recaptures from the 2010 survey. The mark and recapture population estimate was 132 (0.33 per acre) for all sizes of muskellunge.

Currently the population is estimated at 0.33 adult muskellunge per acre. This is sufficient for providing a recreational muskellunge opportunity for anglers. Yellowstone Lake is capable of producing a fishable population of muskellunge in excess of 40 inches and possibly larger looking at angler reports.

The spillway structure allows for surface flow over the dam. There is no barrier preventing muskellunge from migrating out of the lake. While no study has been conducted to define the amount of escapement it is sufficient to provide a fishery below the dam with anglers reports of catching adult muskellunge within the spillway area annually.

References

- Gablehouse, D.W. Jr., A length categorization system to assess fish stocks. *North American Journal of Fisheries Management*. 4: 273-285 (1984).
- Nuemann, R.M. and D.W. Willis, Relative weight as a condition index for muskellunge. *Journal of Freshwater Ecology*, 9: 13-18 (1995).