

**Leigh Flowage, Oconto County Wisconsin
Fisheries Survey Report, 2015**

Report Approval signatures

Tammie Paoli, Fisheries Biologist, Date

Michael Donofrio, Fisheries Supervisor, Date

Steven Hewett, Bureau of Fisheries Management, Date

Leigh Flowage, Oconto County Wisconsin Fisheries Survey Report, 2015

Tammie Paoli
Fisheries Biologist
February 2016

SUMMARY

Lake and location

Leigh Flowage, Oconto County, T30N R18E Section 25; T30N R19E Sections 29, 30, 31.
Located in the towns of Brazeau and Bagley.

Physical / chemical attributes

Surface acres: 238
Maximum depth: 52 feet
Lake type: drainage
Water chemistry: hard water, slightly alkaline, clear
Littoral substrate: primarily sand and muck, with limited gravel
Shoreline: 6.2 miles. Mostly upland (mixed hardwoods/conifers); moderately developed with homes and seasonal cottages.
Aquatic vegetation: Extensive areas of emergent vegetation present; submergent vegetation also present but species-specific data is not available. A WDNR Water Resources aquatic plant survey is planned for summer 2016.
Aquatic invasives: Banded mystery snail, Chinese mystery snail, zebra mussels
Other features: There is a dam owned by Oconto County at the outlet on the northeast end of the impoundment that maintains a head of 21 feet.

Purpose of surveys

Baseline lake survey Tier 1 assessment

Dates of fieldwork

Spring Fyke netting survey: April 8 through April 16, 2015
Electrofishing surveys: May 18 and 19, 2015

Fishery

Largemouth bass, bluegill, rock bass, walleye, northern pike, yellow perch, pumpkinseed, black crappie, green sunfish, smallmouth bass, white sucker, and yellow bullhead are present.

Acknowledgements

Data collection for the 2015 survey was completed by WDNR fisheries staff Ronald Rhode, Brad Ryan, and Tammie Paoli. Fish aging and data entry was completed by Ronald Rhode.

SUMMARY

- Leigh Flowage is a hard water flowage lake with an area of 238 acres and a maximum depth of 52 feet. The last comprehensive fyke netting survey was completed in 1987.
- Overall, 2,799 fish representing 14 species were collected during the 2015 spring fyke netting and electrofishing survey. The five most abundant species collected by number were bluegill (54% of total), largemouth bass (11%), black crappie (8%), rock bass (7%), and bullhead spp. (6%).
- A total of 1,528 bluegill were collected. Bluegill ranged in length from 1.9 to 10.3 inches and averaged 6.4 inches. The number caught was considerably more than the 1987 survey, when 525 bluegill were captured. Growth rates in Leigh Flowage have improved since 1987 and are slightly better than other northeast Wisconsin Lakes.
- A total of 225 black crappie were sampled. The average length was 7.6 inches with a range from 4.2 to 13.7 inches. Growth rates are better than other northeast Wisconsin lakes.
- There were a total of 302 largemouth bass sampled, with an additional 5 fish that were recaptured. Average length was 12.4 inches with a range from 5.4 to 21.2 inches. The size structure was fair, with 26% being 14 inches or greater (legal size). Growth rates are slower than the 1987 survey and the northeast Wisconsin averages, but this may be exaggerated by the use of different aging structures (scales in 1987; spines on larger fish in 2015).
- There were a total of 148 northern pike sampled, including 56 individuals sent to UW Stevens Point as part of a study on aging structures. The pike catch rate during spring fyke netting was 1.8/net night compared to 7.3/net night in 1987. Average length was 18.2 inches with a range from 11.5 to 25.1 inches. The size structure was poor with only 17% of the fish greater than 21 inches.
- A total of 25 walleye were sampled, plus an additional 3 fish that were recaptured. The 2015 population estimate was 78 walleye (0.3 per acre), with a 95% confidence range between 32 and 192. Average length was 16.3 inches with a range from 7.6 to 23.8 inches.

BACKGROUND

Leigh Flowage is a hard water flowage with spring inputs, comprising an area of 238 acres and a maximum depth of 52 feet. A dam with a twenty-one foot head was constructed at the outlet in 1935. The outlet flows into Jocka Lake. There are three named lobes that comprise Leigh Flowage. They are Lee Lake, Marl Lake, and Rice Lake. The flowage has several lobes and bays, encompassing 6.9 miles of shoreline that is moderately developed. A total of 129 piers were counted on a 2013 aerial photo, averaging one dock for every 282 feet of shoreline. The majority of the shoreline is privately owned with the exception of a segment near the dam on the east end and a segment along the far western tip that are both owned by Oconto County. The littoral area is primarily sand and muck with limited gravel and cobble. There are two public boat landings (Figure 1). These access locations are owned and maintained by the Town of Brazeau. The Lee and Underwood Lake Conservation Club is a non-governmental group that is active in the flowage community.

Aquatic invasive species present in Leigh Flowage include banded mystery snails, Chinese mystery snails, narrow leaf cattail, and *Phragmites*. An adult zebra mussel specimen was brought into the Green Bay DNR office in June 2015 from this waterbody but Water Resources staff did not find any adult zebra mussels during a follow up survey in 2015. Veliger plankton tows were conducted and will be analyzed to determine whether or not a reproducing population is present (M. Nault, pers. comm.). Habitat projects on the lake include the construction of a walleye reef along the point on the southeast portion of the flowage. The permit was granted in 1997 but the exact date of construction was not on file.

Current fishing regulations are listed in Table 1 and follow the general inland regulations. State and private fish stocking history for all species from 1973 to 2015 for Leigh Flowage is summarized in Table 2.

Small and large fingerling walleye were stocked regularly by the Wisconsin Department of Natural Resources (WDNR) from 1996 to 2012. The Lee and Underwood Lake Conservation Club has stocked walleye nearly annually from 2003 to present, and yellow perch were stocked by the club in 2007 and 2011 (Table 2).

Fisheries surveys conducted from 1978 to 2015 are shown in Table 3. Prior to 2015, the most recent comprehensive (netting and electrofishing) survey was conducted in 1987.

METHODS

Data collection

Ten standard 3' x 6' hoop fyke nets with ¾" bar, 1 ½" stretch mesh were set at ice-out on April 8, 2015. Nets were lifted daily until April 16, 2015 for a total effort of 80 net nights (Figure 1). All fish captured were identified to species. Up to 250 panfish and gamefish per species were measured to the nearest 0.1 inch. Bass and walleye were given a top caudal fin clip (for mark recapture population estimate). Aging structures were collected from 5 fish per 0.5 inch group for gamefish species. Scales were collected from 5 panfish per 0.5 inch group per species (bluegill, crappie, yellow perch) with a length to the nearest 0.1 inch.

Leigh Flowage was one of several waterbodies selected to participate in a statewide study to compare various aging structures on northern pike. The study was a joint effort with the WDNR Northern Pike Species Team and the University of Wisconsin Stevens Point Fishery

Analysis Center (UWSP FAC) with a goal to develop standard protocols for age structure collection on northern pike. As part of the study, three northern pike per inch group per sex were sacrificed and sent to UW-Stevens Point. Once a length and sex category was filled, northern pike were measured, sexed, and released. A total of up to five scales from the remaining pike per half inch group per sex were collected and aged using standard WDNR protocols.

A WDNR double anode electrofishing boat was used to sample approximately 5.5 miles of shoreline on the evenings of May 18 and 19, 2015. On May 18, pulsed direct current (DC) was used to sample 3.5 miles of shoreline. On May 19, alternating current (AC) was used to sample the remaining 2 miles of shoreline. The use of AC seemed to be more effective given the low conductivity conditions in Leigh Flowage. All panfish and gamefish were collected for two staggered 0.5 mile transects, and only gamefish were collected for the remaining shoreline per protocol (Spring Electrofishing II). Fish collected were measured to the nearest 0.1 inch and inspected for a top caudal fin clip.

Data was entered into the WDNR Bureau of Fisheries Management Biology Database.

Data analysis

Total catch and catch per gear type was calculated for all species (Tables 6 and 7). Ages were assigned to fish after scales and spines were aged using standard WDNR procedures, with the exception of northern pike. Northern pike cleithra were prepared and aged by Zach Witzel of UWSP FAC under supervision of Dr. Daniel Isermann. An age-length key was created to assign ages to un-aged fish based on proportional representation of the known age fish subsample, within the 0.5 inch length bins. The modified Schnabel population estimation technique was used for largemouth bass and walleye and was calculated using fish captured in fyke nets and the Spring Electrofishing II survey in 2015.

Age and length frequency distributions and mean length at age analyses were performed for gamefish and panfish where aging structures were collected. Proportional stock density (PSD) and relative stock density of preferred length fish (RSD-preferred) were calculated (Anderson and Neumann 1996; Bister et al. 2000). Proportional stock density (PSD) is the ratio of 'quality-length' fish to 'stock-length' fish multiplied by 100. Relative stock density (RSD-preferred) is the ratio of 'preferred-length' fish to 'stock length fish' multiplied by 100. Both indices are commonly used as a measure of population size structure (Table 4). PSD and RSD data was combined for all gear types from all samples from 2015. Age-frequency distribution was calculated after ages were allocated to all fish in the sample. Mean length at age was calculated as mean length at time of capture. Mean lengths of aged fish were plotted against northeast Wisconsin averages and the 1987 survey for those species in which aging data was available.

RESULTS AND DISCUSSION

Water temperature during the spring netting survey ranged from 41-50F and 62-63F during the spring electrofishing survey. A total of 2,799 fish (including recaptures) of 14 different species were collected throughout the survey period (Table 5). Catch per gear type is shown for each species sampled (Tables 6 and 7). Bluegill, largemouth bass, black crappie, rock bass, northern pike, green sunfish, and yellow, black, and brown bullhead were common. Other species captured include pumpkinseed sunfish, walleye, yellow perch, white sucker, and smallmouth bass. A total of 38 mudpuppies (*Necturus maculosus*), a salamander species of special concern in Wisconsin, were captured in the fyke nets. Mudpuppy data was sent to

WDNR Bureau of Science Services and was also entered into the WDNR Fisheries Management Database.

Black Crappie

A total of 225 black crappie were sampled. The catch rate was 2.8 per net night during spring fyke netting (Table 6). The average length was 7.6 inches with a range from 4.2 to 13.7 inches. The length frequency distribution indicated a bimodal distribution (Figure 2), which corresponds with two dominant year classes in the age distribution (Figure 3). 59% of fish were greater than 8 inches (PSD), which is within the acceptable range of 30-60%, and 9% of the fish were greater than 10 inches (RSD-preferred). The mean length at age shows that black crappie in Leigh Flowage are growing faster compared to other populations in northeast Wisconsin (Figure 4), and may be a result of low density of black crappie.

Bluegill

Bluegill were the most abundant panfish species captured, with a total of 1,528 sampled. The catch rate was 18.7/net night in the spring and 31/mile for electrofishing (Tables 6 and 7). Average length was 6.4 inches with a range from 1.9 to 10.3 inches. 62% of the fish were greater than 6 inches (PSD), which surpasses the acceptable range of 20-60%. Also, 17% were greater than the “preferred” size of 8 inches (RSD-preferred), which is within the desirable range of 5-20% (see Table 4; Figure 5). There was good representation of ages 3 through 6 (Figure 6). The oldest bluegill, estimated at 13 years old, was 9.9 inches. The growth rate of bluegills is above the northeast Wisconsin average and has improved since the 1987 survey (Figure 7). Bluegill were the dominant species captured in the 2006 mini-fyke netting survey, providing further evidence of good recruitment of that species.

Largemouth Bass

Largemouth bass were the dominant predator species captured, with a total of 307 sampled including 5 recaptured individuals. The catch rate for spring fyke netting was 2.3/net night (Table 6). Catch rates (22.7/mile) for spring electrofishing surveys were moderately high (Table 7). The population estimate for largemouth bass was 6,637 fish (28 per acre), with a 95% confidence range between 3,143 and 15,179. This is a very high population density compared to other area lakes. That estimate should be viewed cautiously because of a low recapture rate which is reflected by the very wide confidence range. Average length of largemouth bass was 12.4 inches with a range from 5.4 to 21.2 inches. The size structure was fair, with 26% being 14 inches or greater (legal size) (Figures 8 and 9). There appears to be steady recruitment of largemouth bass, with several ages being represented (Figure 10). Recruitment of young-of-year largemouth bass was also evident in the 2006 mini-fyke netting survey. It takes approximately 7 years for a largemouth bass to reach 14 inches in Leigh Flowage. Growth rates for largemouth bass appear considerably slower compared to both the 1987 survey and northeast Wisconsin averages (Figure 11) and may be related to higher density of largemouth bass. However, it should be noted that only scales were used to age bass in 1987. Scales can be difficult to interpret in older fish and can result in fish being under-aged. Current WDNR protocol is to collect scales on bass under 12 inches and a dorsal spine from bass greater than 12 inches.

Northern Pike

There were a total of 148 northern pike sampled, including 56 individuals sent to UWSP FAC. The catch rate during spring fyke netting was 1.8/net night (Table 6) compared to 7.3/net night in 1987. Because some fish were sacrificed for the aging study, a population estimate was not generated. Average length was 18.2 inches with a range from 11.5 to 25.1 inches. The size structure was poor with only 17% of the fish greater than 21 inches (PSD), which is below the acceptable range of 30-60% (Figure 12; Table 4). The age frequency distribution was dominated by several year classes (Figure 13). Growth rates are below both the 1987 survey and northeast Wisconsin averages (Figure 14). It should be noted that scales were used to calculate the northeast Wisconsin averages and the 1987 survey while a combination of cleithra and scales were used for the 2015 survey. Pike in Leigh Flowage matured about a year earlier than many other area populations. In this survey, we noted that males were mature at age 2 and females at age 3. The smallest ripe female pike was 12.8 inches and was estimated at age 2 (cleithra). This fact, coupled with slow growth rates, suggests that pike have shifted energy resources into reproduction instead of growth. This shift may be a result of high mortality rates and high exploitation of large individuals (Diana 1987).

Walleye

A total of 28 walleye were sampled, including 3 recaptured individuals. The catch rate during spring fyke netting was 0.3/net night in both 1987 and 2015 (Table 6). The population estimate for walleye was 78 adults (0.3 per acre), with a 95% confidence range between 32 and 192. This is considered a low population density for walleye. Average length in 2015 was 16.3 inches with a range from 7.6 to 23.8 inches. The size structure was excellent with 71% of the fish being greater than 15 inches (PSD) (Figure 15; Table 4). Multiple year classes were represented in the age frequency distribution (Figure 16). Growth rates are similar to northeast Wisconsin averages (Figure 17). One yearling walleye was captured in the fyke net set on the rock reef. Seventeen out of 21 walleye were caught in Nets 1, 4, and 5 combined.

Other species

Other panfish captured include rock bass (187 total), green sunfish (94), pumpkinseed sunfish (66), yellow perch (30), and sunfish hybrids (4). Average length of those panfish species was good (Table 5). Aging structures collected on yellow perch indicate that growth rates are slightly slower than in other northeast Wisconsin lakes. Other species captured include four smallmouth bass, 173 bullheads (yellow and brown), and five white suckers (Table 5). The 2006 mini-fyke netting survey indicated good recruitment for yellow perch, pumpkinseed sunfish, green sunfish, and largemouth bass.

CONCLUSIONS AND RECOMMENDATIONS

Leigh Flowage supports a quality bluegill fishery. There is abundant woody habitat in the form of stumps and logs as a result of flooding of the landscape when the dam was built. The shoreline is moderately developed, but large areas of natural shoreline still exist, particularly in the Marl Lake lobe. Several deep holes throughout the flowage as well as extensive littoral areas with submergent and emergent vegetation provide for a diverse fish habitat. Spawning habitat for northern pike is common but fewer pike were captured than expected, based on 1987 survey results.

Although population density of largemouth bass is high and growth rates are slow, size structure is fair with 26% sampled being 14 inches or greater. There was interest in 2009 to propose a slot limit regulation in Leigh Flowage. That proposed regulation was a 14 -18 inch protected slot limit with a 3 fish daily bag limit with only one fish over 18 inches. Protected slot limits are intended to increase harvest of smaller fish and reduce overall abundance, reduce competition, thereby increasing growth rates and size structure of bass. However, slot limits can act as an 18 inch size minimum if anglers are not willing to harvest smaller bass. On the other hand, one of the objectives of the current 14 inch minimum size limit on bass is to increase juvenile bass density to increase predation on panfish and increase panfish growth and size structure. This objective appears to be met. Because bluegill abundance and size structure are exceptional in Leigh Flowage, changes to bass regulations could have uncertain consequences to the already outstanding bluegill population. Therefore, I do not suggest adjusting regulations for bass at this time.

Walleye in Leigh Flowage exhibit average growth rates and good size structure. However, the current population density of 0.3/acre is very low. The rock reef that was constructed in the late 1990's does not appear to be providing adequate spawning habitat. The rocks do not receive enough wave action to keep them clean of algae. During the spring netting survey, one yearling and zero adult walleye were captured in the net placed over the rock reef (Net 6). Leigh Flowage's physical and chemical characteristics will likely not support a self-sustaining walleye population but a minor recreational walleye fishery may be provided through continued stocking.

Northern pike in Leigh Flowage are in low abundance yet slow growing. Slow growth rates are more common in pike populations with high abundance and few large individuals. Pike in this waterbody are also maturing about a year earlier than most pike populations. This may be a result of high exploitation and mortality rates on larger pike. Although a more conservative regulation for northern pike may bolster abundance and size structure of pike, there is some concern that more pike could result in lower abundance and smaller size structure of bluegill (Jolley et al. 2008), particularly since yellow perch are not in high abundance to serve as a preferred prey for pike.

Managing the lake for bass, pike, and panfish was the general recommendation from the 1987 fish survey (Langhurst, 1988) and I agree with that recommendation based on 2015 data. Although Leigh Flowage has diverse habitat throughout, additional fish habitat could be gained by the placement of large woody debris ("fish sticks") along shorelines. The addition of coarse woody debris in the near-shore zone may serve to increase growth rates of largemouth bass and increase recruitment of yellow perch (Sass et al. 2006) that require woody or vegetated structure to drape their egg skeins upon.

The next comprehensive survey for Leigh Flowage is scheduled for 2025.

REFERENCES

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Bister, T. J., D. W. Willis, M. L. Brown, S. M. Jordan, R. M. Neumann, M. C. Quist, and C. S. Guy. 2000. Proposed standard weight (W_s) equations and standard length categories for 18 warmwater nongame and riverine fish species. North American Journal of Fisheries Management 20:570-574.
- Diana, J. S. 1987. Simulation of mechanisms causing stunting in northern pike populations. Transactions of the American Fisheries Society 116:612-617.
- Jolley, J. C., D. W. Willis, T.J. DeBates, and D.D. Graham. 2008. The effects of mechanically reducing northern pike density on the sport fish community of West Long Lake, Nebraska, USA. Fisheries Management and Ecology 15:251-258.
- Langhurst, R. 1988. Leigh (Lee) Flowage Survey. Internal memo within Leigh Flowage file, Wisconsin Dept. of Natural Resources, Peshtigo office.
- Sass, G. G., J. F. Kitchell, S. R. Carpenter, T. R. Hrabik, A. E. Marburg, and M. G. Turner. 2006. Fish community and food web responses to a whole-lake removal of coarse woody habitat. Fisheries 31(7):321-330.

TABLES AND FIGURES

TABLE 1.— Current (2015) fishing regulations for Leigh Flowage.

Species	Open Season	Daily limit	Minimum length
Largemouth and Smallmouth Bass	first Saturday in May – first Sunday in March	5	14 inches
Walleye	first Saturday in May – first Sunday in March	5	15 inches
Muskellunge	Saturday nearest Memorial Day to November 30 th .	1	40 inches
Northern Pike	first Saturday in May – first Sunday in March	5	none
Panfish (bluegill, pumpkinseed, yellow perch, black crappie)	Open all year	25 in total	none

TABLE 2.— Stocking history of Leigh Flowage from 1973 to 2015.

Year	Species	Strain Stock	Age Class	Number Fish Stocked	Avg Fish Length In	Source Type
1973	WALLEYE	UNSPECIFIED	FINGERLING	12000	3	DNR COOP PONDS
1977	WALLEYE	UNSPECIFIED	FINGERLING	11500	3	DNR COOP PONDS
1996	WALLEYE	UNSPECIFIED	FINGERLING	10281	1.6	DNR HATCHERY
1997	WALLEYE	UNSPECIFIED	LARGE FINGERLING	11000	2.7	DNR PONDS
1998	WALLEYE	UNSPECIFIED	SMALL FINGERLING	11000	1.2	DNR HATCHERY
2000	WALLEYE	UNSPECIFIED	SMALL FINGERLING	11000	1.7	DNR HATCHERY
2003	WALLEYE	UNSPECIFIED	LARGE FINGERLING	1000	6.8	PRIVATE HATCHERY
2004	WALLEYE	LAKE MICHIGAN	SMALL FINGERLING	10987	1.3	DNR HATCHERY
2005	WALLEYE	UNSPECIFIED	LARGE FINGERLING	1700	6.5	PRIVATE HATCHERY
2005	WALLEYE	LAKE MICHIGAN	SMALL FINGERLING	11520	1.4	DNR HATCHERY
2006	WALLEYE	UNSPECIFIED	LARGE FINGERLING	995	6.5	PRIVATE HATCHERY
2006	WALLEYE	LAKE MICHIGAN	SMALL FINGERLING	8082	1.4	DNR HATCHERY
2007	WALLEYE	UNSPECIFIED	LARGE FINGERLING	1055	7.25	PRIVATE HATCHERY
2007	YELLOW PERCH	UNSPECIFIED	FALL YEARLING	800	6.5	PRIVATE HATCHERY
2008	WALLEYE	UNSPECIFIED	LARGE FINGERLING	963	7	PRIVATE HATCHERY
2008	WALLEYE	MISSISSIPPI HEADWATERS	SMALL FINGERLING	8079	1.4	DNR HATCHERY
2009	WALLEYE	UNSPECIFIED	LARGE FINGERLING	750	7	PRIVATE HATCHERY
2010	WALLEYE	LAKE MICHIGAN	SMALL FINGERLING	8000	1.4	DNR HATCHERY
2011	WALLEYE	UNSPECIFIED	LARGE FINGERLING	850	7	PRIVATE HATCHERY
2011	YELLOW PERCH	UNSPECIFIED	LARGE FINGERLING	850	7	PRIVATE HATCHERY
2012	WALLEYE	UNSPECIFIED	LARGE FINGERLING	989	8	PRIVATE HATCHERY
2012	WALLEYE	LAKE MICHIGAN	SMALL FINGERLING	8085	1.5	DNR HATCHERY
2013	WALLEYE	UNSPECIFIED	LARGE FINGERLING	1068	7	PRIVATE HATCHERY
2014	WALLEYE	UNSPECIFIED	LARGE FINGERLING	1113	7	PRIVATE HATCHERY
2015	WALLEYE	LAKE MICHIGAN	LARGE FINGERLING	1046	7.5	PRIVATE HATCHERY

TABLE 3.— WDNR fisheries surveys completed on Leigh Flowage from 1978 to 2015.

Date	Survey Type	Effort	Primary survey purpose
April 9-April 16, 2015	Fyke net	80 net nights	Gamefish population estimate & panfish assessment
May 18-19, 2015	Electrofishing	5.0 miles	Gamefish/panfish assessment (SEII)
October 18, 2010	Electrofishing	3.0 miles	Fall walleye index
October 26-27, 2006	Electrofishing	4.0 miles	Gamefish/panfish assessment
July 26-27, 2006	Mini fyke net	6 net nights	Littoral zone fish community assessment
October 7, 1987	Electrofishing	4.0 miles	Gamefish/panfish assessment
April 7-14, 1987	Fyke net	48 net nights	Gamefish population estimate & panfish assessment
September 11, 1985	Electrofishing	4.0 miles	Gamefish/panfish assessment
August 29, 1979	Electrofishing	4.0 miles	Gamefish/panfish assessment
June 13, 1978	Electrofishing	4.0 miles	Gamefish/panfish assessment

TABLE 4.— Proposed length categories used to calculate Proportional stock density (PSD) and Relative stock density (RSD) for various fish species. Measurements are total lengths for each category in inches. Updated from Anderson and Neumann (1996) and Bister et al. (2000).

Species	PSD	RSD-P	Stock	Quality	Preferred	Memorable	Trophy
Black crappie			5	8	10	12	15
Bluegill	20 - 60	5 - 20*	3	6	8	10	12
Brown bullhead			5	8	11	14	17
Largemouth bass	40 - 70	10 - 40*	8	12	15	20	25
Muskellunge			20	30	38	42	50
Northern pike	30 - 60		14	21	28	34	44
Pumpkinseed			3	6	8	10	12
Rock bass	20 - 60		4	7	9	11	13
Walleye	30 - 60		10	15	20	25	30
Yellow perch			5	8	10	12	15
Yellow bullhead			4	7	9	11	14

*Range based on management strategy for balanced populations.

TABLE 5.— Total number, percent of total, average length, and length range of fish species captured with all gear types in 1987 and 2015 in Leigh Flowage. Numbers include recaptured individuals.

*COMMON NAME OF FISH	1987				2015			
	NUMBER	PERCENT	AVERAGE LENGTH	LENGTH RANGE (inches)	NUMBER	PERCENT	AVERAGE LENGTH	LENGTH RANGE (inches)
Black Crappie	33	2.6%	9.2	5.7 - 12.9	225	8.0%	7.6	4.2 - 13.7
Bluegill	525	41.0%	5.8	3.3 - 8.4	1528	54.6%	6.4	1.9 - 10.3
Largemouth Bass	96	7.5%	14.9	6.0 - 21.6	307	11.0%	12.4	5.4 - 21.2
Northern Pike	389	30.3%	16.9	11.8 - 26.6	148	5.3%	18.2	11.5 - 25.1
Pumpkinseed	121	9.4%	5.5	3.9 - 7.9	66	2.4%	5.8	3.6 - 8.6
Rock Bass	65	5.1%	6.8	3.8 - 10.3	187	6.7%	7.5	3.8 - 11.4
Walleye	14	1.1%	24.4	20.9 - 27.5	28	1.0%	16.3	7.6 - 23.8
Yellow Perch	38	3.0%	6.7	6.0 - 7.8	30	1.1%	7.0	4.9 - 11.1
Smallmouth Bass	1	0.1%			4	0.1%	12.0	9.9 - 13.4
Pumpkinseed Hybrid		0.0%			2	0.1%	8.1	6.6 - 9.5
Green Sunfish		0.0%			94	3.4%	6.0	4.2 - 8.1
Green Sunfish Hybrid		0.0%			2	0.1%	7.9	6.6 - 9.1
Bullhead Sp.		0.0%			173	6.2%		
White Sucker		0.0%			5	0.2%		
Total	1,282	100.0%			2,799	100.0%		

TABLE 6.— Catch summary for spring fyke (1987 and 2015) and summer mini-fyke netting (2006) in Leigh Flowage. Totals include recaptured individuals. See Methods for additional sampling details.

	2015 Spring Fyke Netting		1987 Spring Fyke Netting		2006 Summer Mini-Fyke Netting	
	(80 net nights)		(48 net nights)		(6 net nights)	
	Total	Catch per	Total	Catch per	Total	Catch per
	Catch	net night	Catch	net night	Catch	net night
Black Crappie	225	2.8	33	0.7		
Bluegill	1497	18.7	525	10.9	511	85.2
Largemouth Bass	182	2.3	85	1.8	64	10.7
Smallmouth Bass	0	0.0	0	0.0	1	0.2
Northern Pike	145	1.8	348	7.3		
Pumpkinseed	63	0.8	121	2.5	45	7.5
Rock Bass	184	2.3	65	1.4	20	3.3
Walleye	21	0.3	14	0.3		
Yellow Perch	29	0.4	38	0.8	21	3.5
Bullhead Sp.	171	2.1			16	2.7
White Sucker	5	0.1				

TABLE 7.— Catch summary for electrofishing surveys in Leigh Flowage in 1987, 2006, 2010, and 2015. Totals include recaptured individuals. See Methods for additional sampling details in 2015.

	2015 Spring		2010 Fall		2006 Fall		1987 Fall	
	Electrofishing ^a		Electrofishing ^b		Electrofishing ^c		Electrofishing ^d	
	18-May-2015		18-Oct-2010		26-Oct-2006		7-Oct-1987	
	19-May-2015				27-Oct-2006			
	Total	Catch	Total	Catch	Total	Catch	Total	Catch
Catch	per mile	Catch	per mile	Catch	per mile	Catch	per mile	
Black Crappie	0	0.0			3	3.0		
Bluegill	31	31.0			349	349.0		
Largemouth Bass	125	22.7	170	56.7	162	40.5	11	2.8
Smallmouth Bass	4	0.7			3	0.8	1	0.3
Northern Pike	3	0.5	12	4.0	8	2.0	41	10.3
Pumpkinseed	3	3.0			26	26.0		
Rock Bass	3	3.0			74	74.0		
Walleye	7	1.3	0	0.0	1	0.3		
Yellow Perch	1	1.0			44	44.0		
Bullhead	2	2.0			25	25.0		

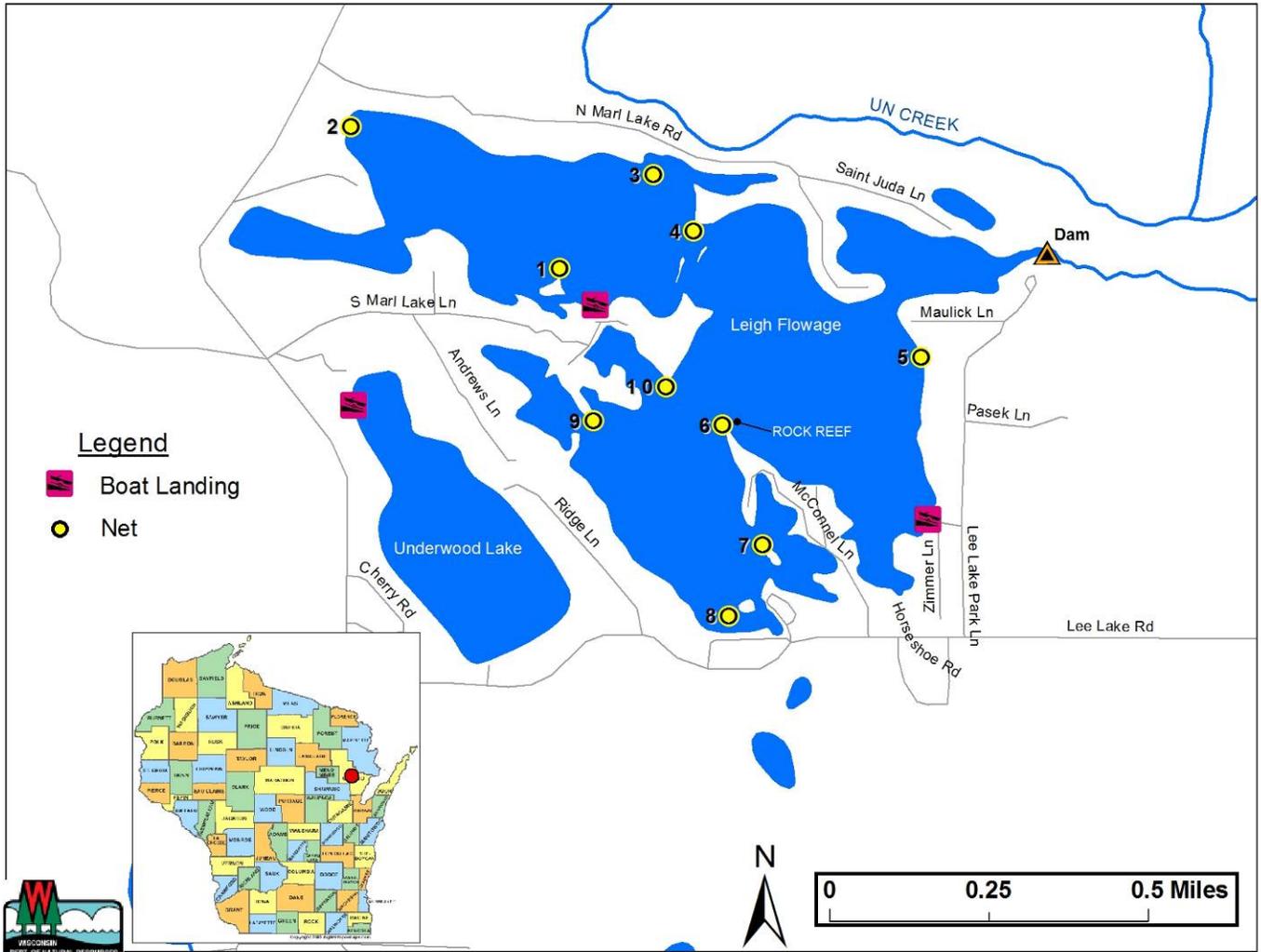
^aGamefish collected for 5.5 miles shoreline. Panfish also collected for two 1/2 mile stations

^bGamefish collected for 3.0 miles shoreline. Did not sample Marl Lake.

^cGamefish collected for 4.0 miles shoreline. Panfish also collected for two 1/2 mile stations

^dGamefish collected for 4.0 miles shoreline.

FIGURE 1.— Locations of 10 fyke nets set on April 8 and removed on April 16, 2015 on Leigh Flowage, Oconto County (effort = 80 net nights).



Date: 01/25/2016

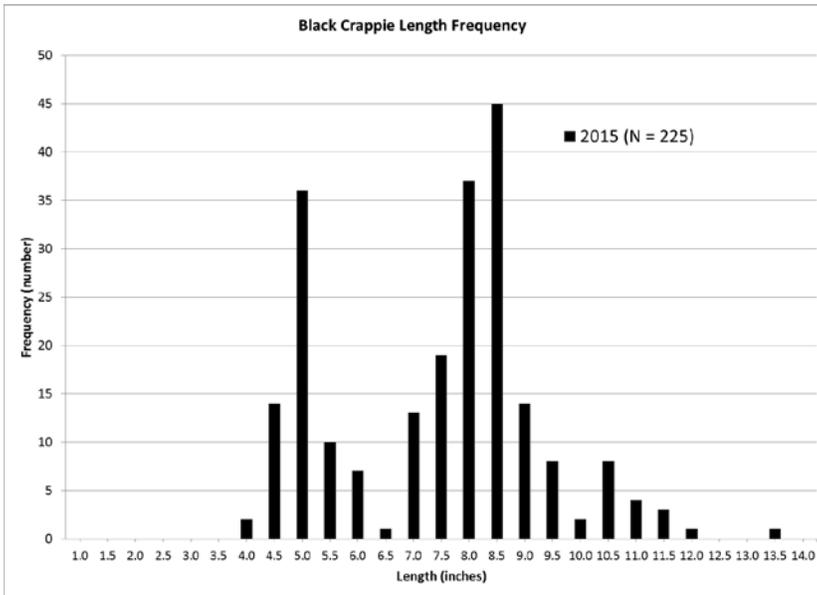


FIGURE 2. – Black crappie length frequency distribution from Leigh Flowage, 2015.

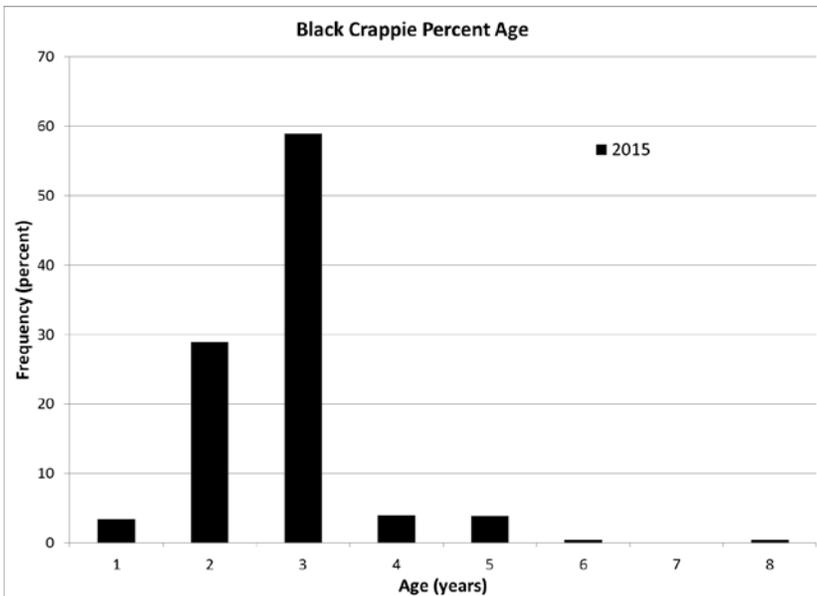


FIGURE 3. – Black crappie age frequency distribution from Leigh Flowage, 2015.

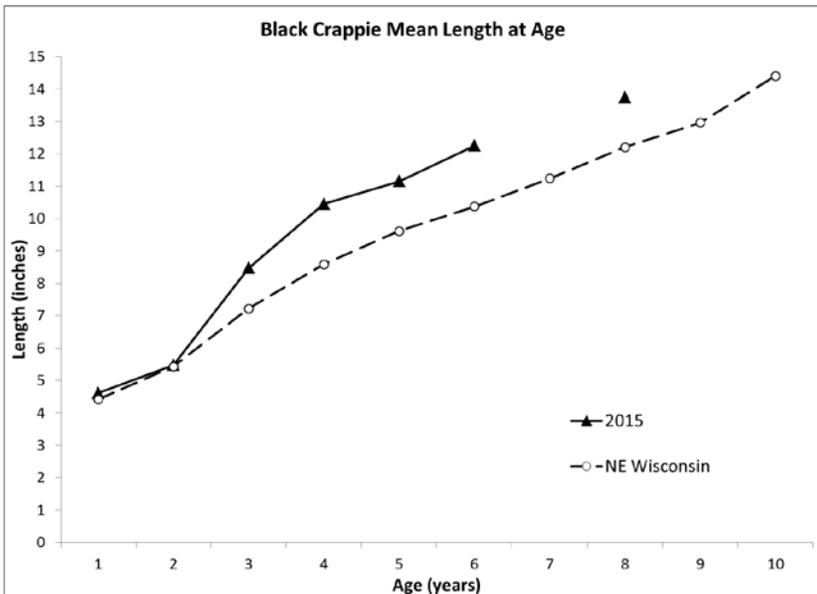


FIGURE 4. – Black crappie mean length at age, Leigh Flowage, 2015, compared to northeast Wisconsin averages.

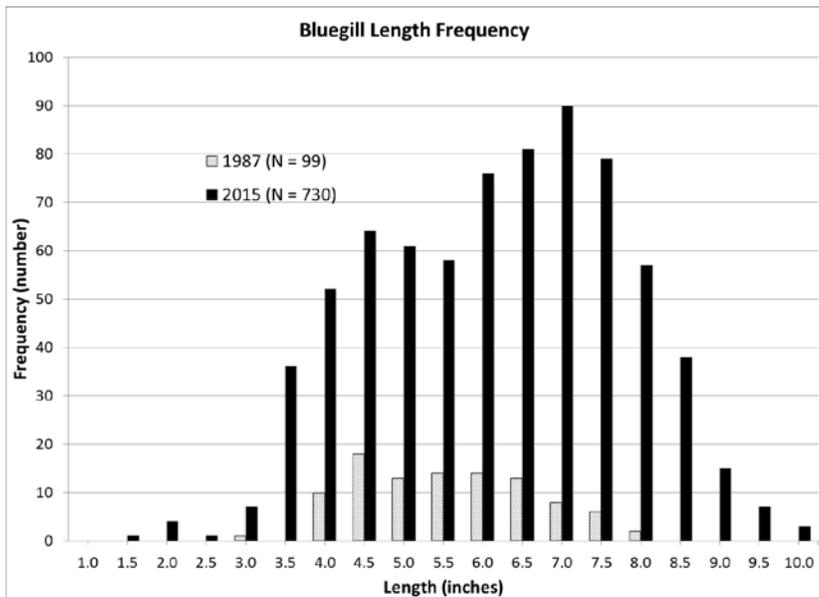


FIGURE 5. – Bluegill length frequency distribution, Leigh Flowage, 1987 and 2015.

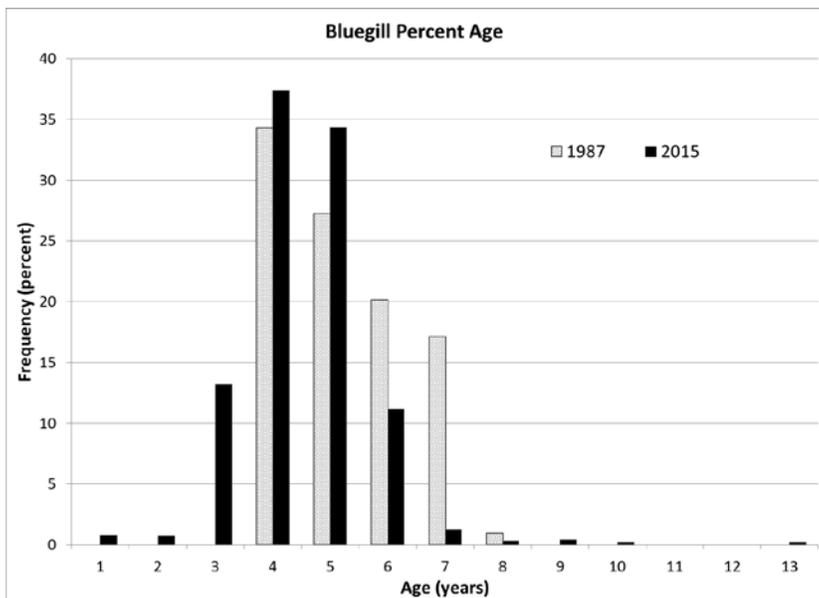


FIGURE 6. – Bluegill age frequency distribution from Leigh Flowage, 1987 and 2015.

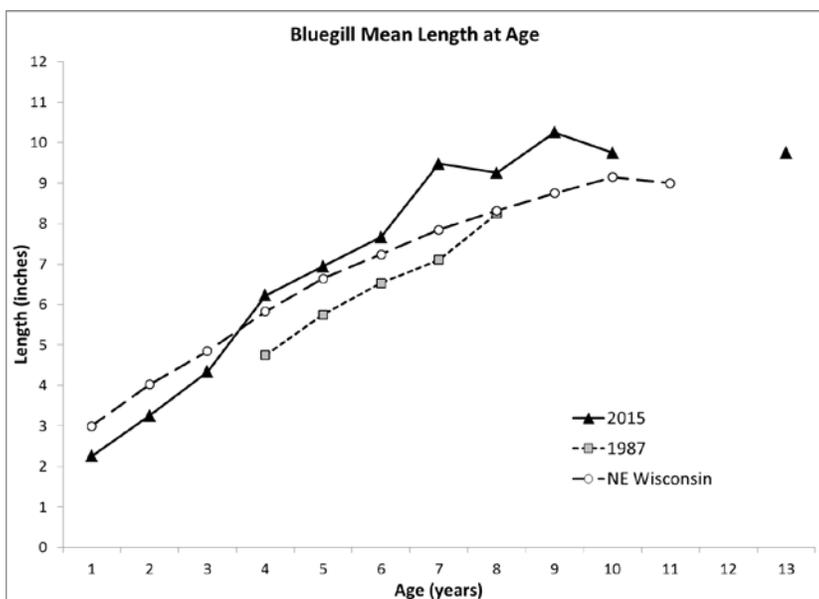


FIGURE 7. – Bluegill mean length at age, Leigh Flowage, 1987 and 2015, compared to northeast Wisconsin averages.

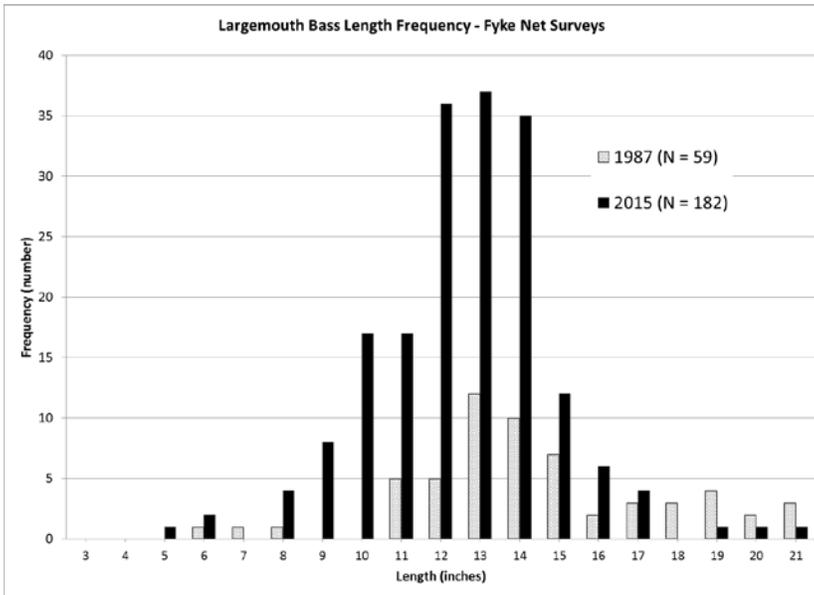


FIGURE 8. – Largemouth bass length frequency distribution from Leigh Flowage fyke net surveys, 1987 and 2015.

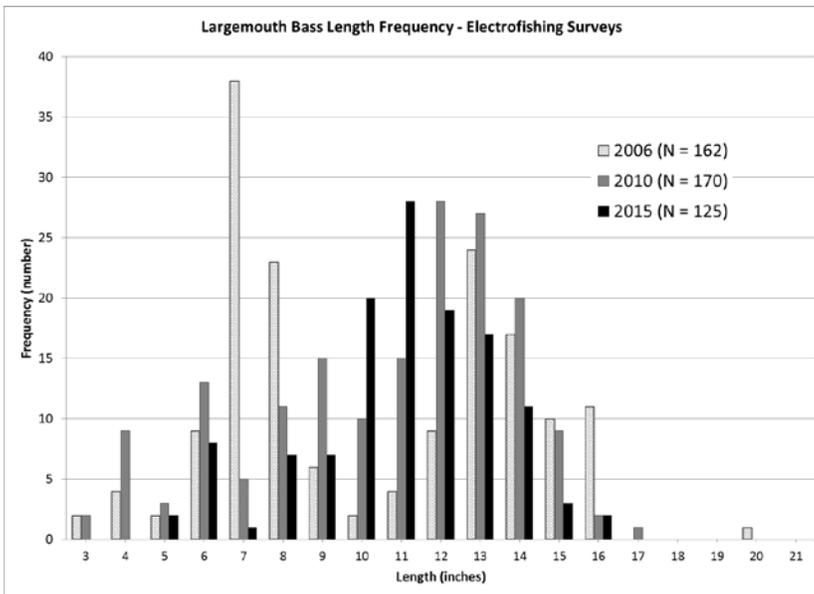


FIGURE 9. – Largemouth bass length frequency distribution from Leigh Flowage electrofishing surveys, 2006, 2010, and 2015.

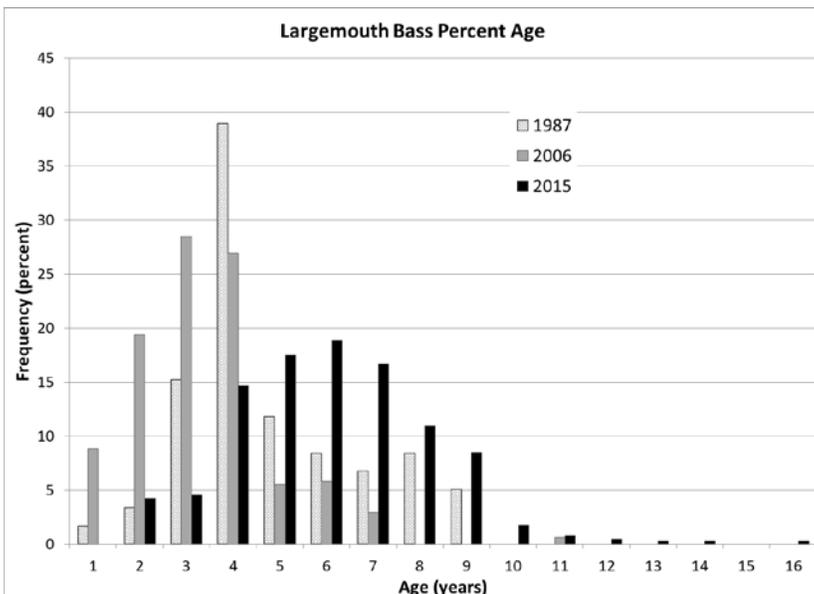


FIGURE 10. – Largemouth bass age frequency distribution from Leigh Flowage, 1987 fyke nets, 2006 fall electrofishing, and 2015 fyke nets and spring electrofishing.

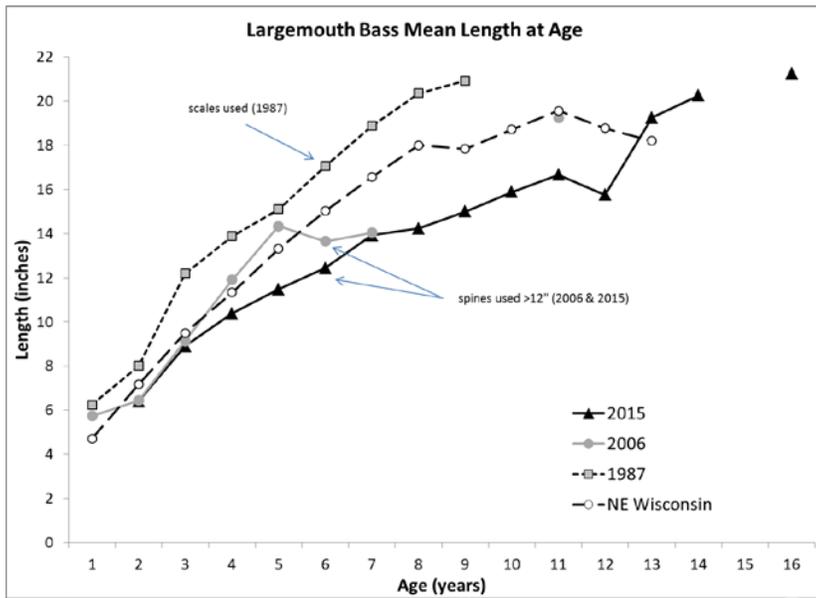


FIGURE 11. – Largemouth bass mean length at age, Leigh Flowage, 2015, 2006, and 1987, compared to northeast Wisconsin averages.

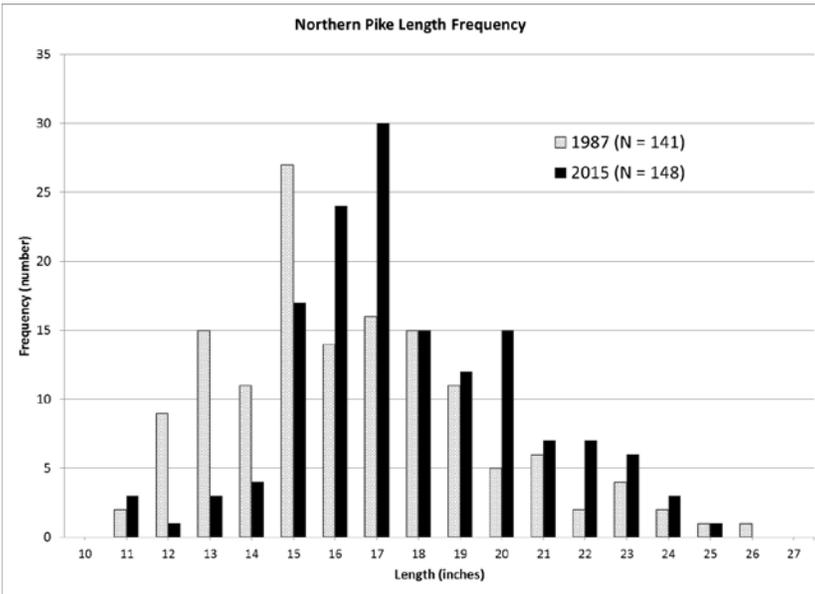


FIGURE 12. – Northern pike length frequency distribution from Leigh Flowage, 1987 and 2015.

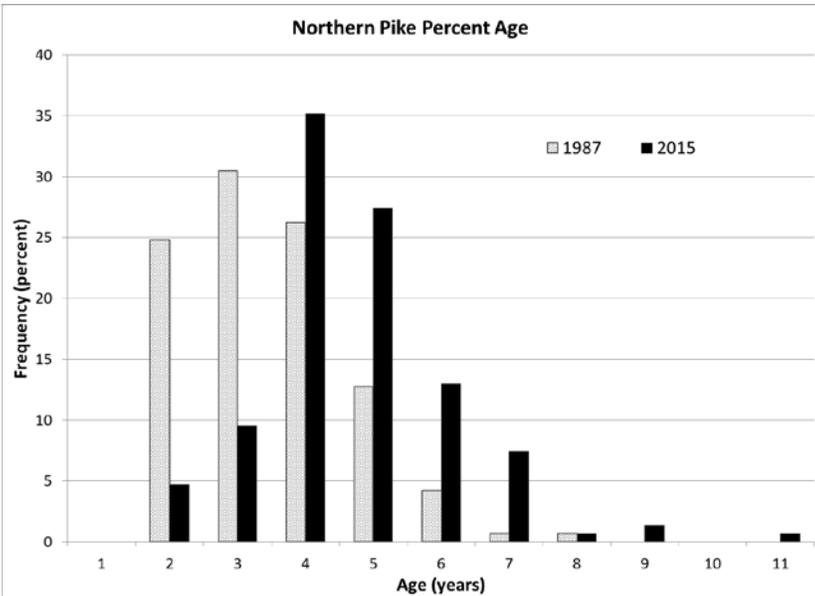


FIGURE 13. – Northern pike age frequency distribution from Leigh Flowage, 1987 and 2015.

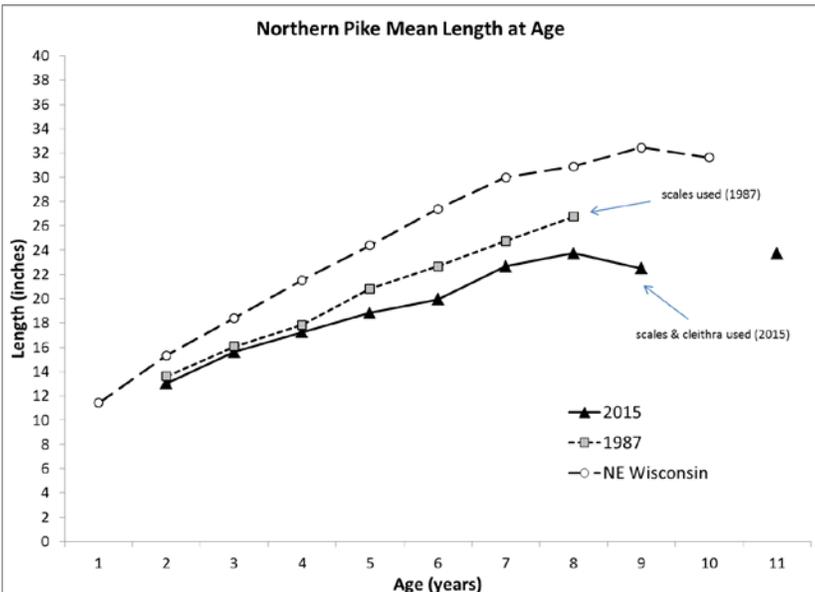


FIGURE 14. –Northern pike mean length at age, Leigh Flowage, 1987 and 2015, compared to northeast Wisconsin averages.

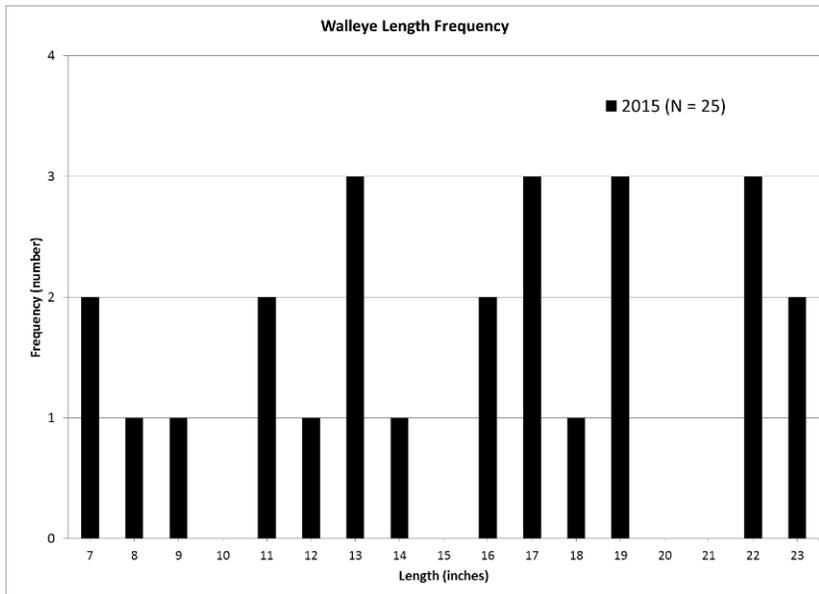


FIGURE 15. – Walleye length frequency distribution from Leigh Flowage, 2015.

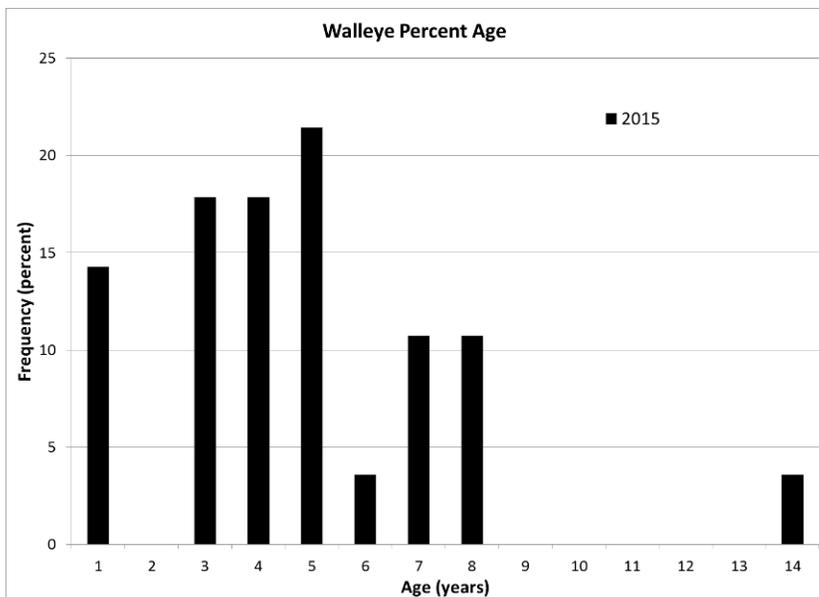


FIGURE 16. – Walleye mean length at age frequency distribution from Leigh Flowage, 2015.

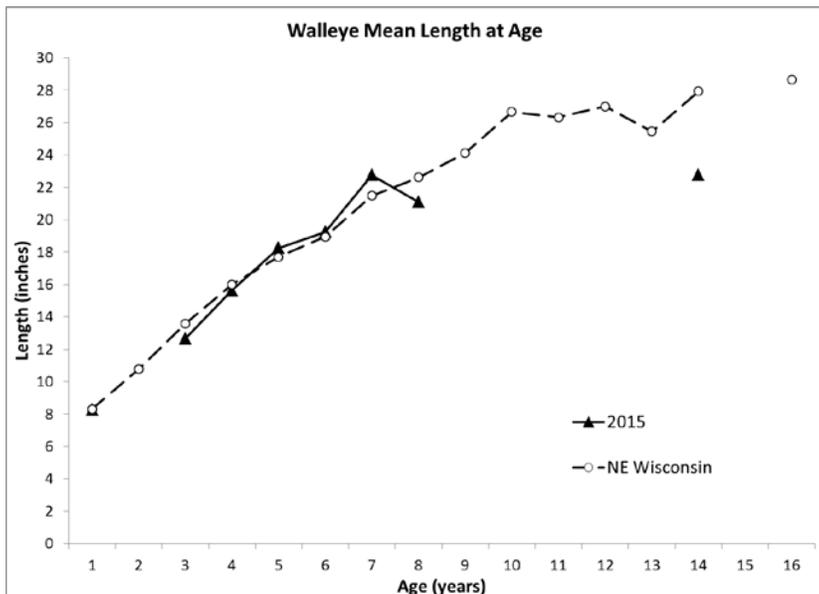


FIGURE 17. – Walleye mean length at age, Leigh Flowage, 2015, compared to northeast Wisconsin averages.

APPENDIX - PHOTOS



The dam at the outlet of Leigh Flowage was built in 1935 and has a 21 foot head.



View of the dam from the top.



The Marl Lake lobe of Leigh Flowage with good amounts of emergent vegetation and natural shoreline.

APPENDIX - PHOTOS



Light snow at the boat landing on South Marl Lake Lane on the morning of April 10, 2015.



A fyke net set in Leigh Flowage.



Ron Rhode holds a 10.3 inch bluegill, aged at 9 years old.

APPENDIX - PHOTOS



The rocks comprising the walleye spawning reef along the point at the end of McConnel Lane were algae covered in April 2015.



Mudpuppies (*Necturus maculosus*), a salamander species of special concern in Wisconsin, were regularly captured in the fyke nets.



Tammie Paoli holds a 21 inch largemouth bass, aged at 16 years old, captured in the fyke nets.