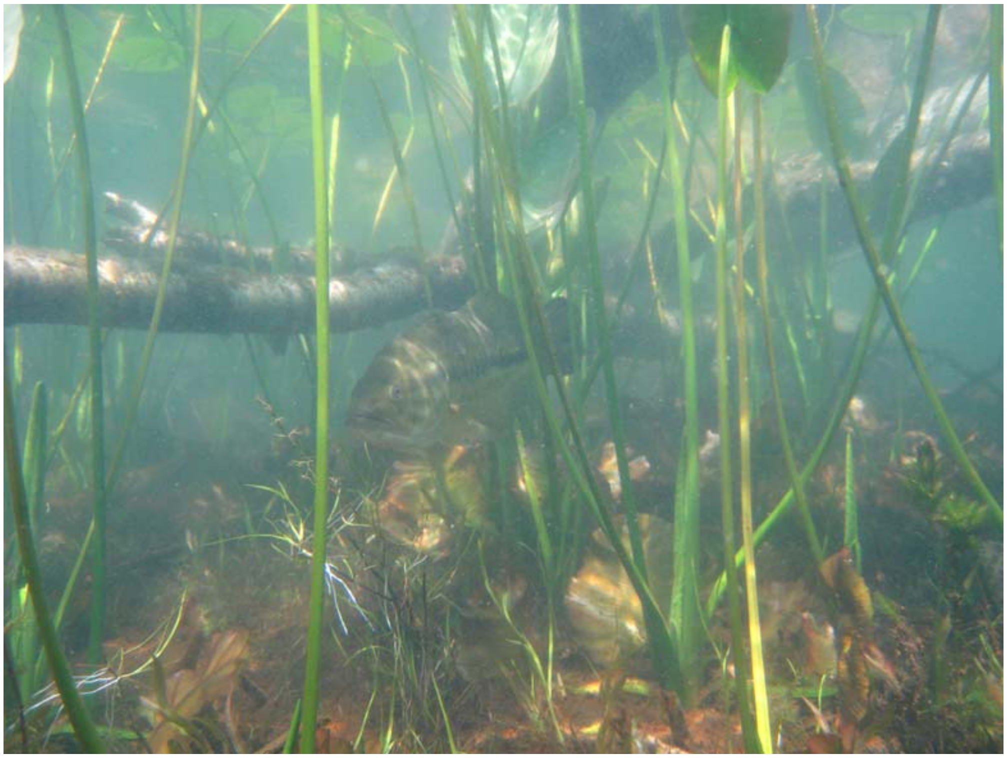
Fishery Survey – Bony Lake
Bayfield County, 2007-2008
WBIC Code – 2742500



Scott Toshner
Senior Fisheries Biologist
Wisconsin Department of Natural Resources
Northern Region - Brule
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Executive Summary

The fisheries of Bony Lake (Bayfield County) were surveyed during 2007-2008. Results indicated adult walleye abundance (≥ 15 in and sexable fish) was 3.1 fish/acre, similar to previous surveys on Bony Lake and higher than the statewide management objective of 3.0 fish/acre. The walleye size structure has remained stable since 1998. Muskellunge and northern pike were both present in low abundance. Largemouth and smallmouth bass, and panfish were not targeted in the 2007 survey and therefore analysis of population parameters was not possible. Angling pressure during the 2007-2008 fishing season was 19.3 hrs/acre, slightly below average for Bayfield and Douglas County creel surveys of 23.4 hrs/acre. Smallmouth bass and walleye were the most sought after gamefish species (22% and 20% respectively of directed effort). There was no estimated harvest of any gamefish species in 2007-2008 due to lack fish encountered by the creel clerk. Bluegill and yellow perch were the most sought after panfish species (8% and 2% respectively of directed effort). Management recommendations include, 1) Discontinue walleye stocking to determine levels of natural reproduction, 2) Complete targeted surveys for panfish, largemouth and smallmouth bass in 2010, 3) Continue to support citizens in their efforts to protect and enhance habitat in Bony Lake, and 4) Consider efforts to monitor rusty crayfish populations and aquatic plant communities.

Introduction

Bony Lake is a 200 acre soft water drainage lake with an outlet flowing into Middle Eau Claire Lake at a rate estimated at 6.0 cubic feet per second (Johannes, et. al. 1970). The Eau Claire Lakes Chain, of which Bony Lake is included, is located in the southwestern section of Bayfield County. The Eau Claire River runs through the chain from Upper to Middle to Lower Eau Claire Lake. Bony Lake drains into Middle Eau Claire Lake. Maximum depth of Bony Lake is 52 feet with a mean depth of 23 feet and total alkalinity of 55 mg/L. The lake has a highly developed shoreline. There is no developed public access on Bony Lake, however, there is navigable public access from the Middle Eau Claire Lakes public access, which was renovated in 2006. Average summer secchi disk depth trophic state index (TSI) value for the deep hole on Bony Lake was 33.5 (SD = 1, N = 4), for the time period between 2000 and 2003. Average summer chlorophyll-a and total phosphorus TSI values for the deep hole on Bony Lake were 37.9 (SD = 1.98, N = 2) and 47.4 (SD = 1.49, N = 2) from samples taken in 2003 and 2006. TSI is an index for evaluating trophic state or nutrient condition of lakes (Carlson 1977 and Lillie et. al. 1993). TSI values can be computed for water clarity (secchi disk measurements), chlorophyll-a, and total phosphorus values. TSI values represent a continuum ranging from very clear, nutrient poor water (low TSIs) to extremely productive, nutrient rich water (high TSIs). The data on Bony Lake indicate the nutrient condition was mesotrophic when considering total phosphorus TSI indices and oligotrophic for secchi disk and chlorophyll-a TSI index.

Bony Lake has a diverse fishery consisting of walleye *Sander vitreus*, muskellunge *Esox masquinongy*, northern pike *E. lucius*, largemouth bass *Micropterus salmoides*, smallmouth bass *M. dolomieui*, bluegill *Lepomis macrochirus*, pumpkinseed *L. gibbosus*, warmouth *L. gulosus*, rock bass *Ambloplites rupestris*, black crappie *Pomoxis nigromaculatus*, yellow perch *Perca flavescens*, white sucker *Catostomus commersoni*, yellow bullhead *Ictalurus natalis*, shorthead redhorse *Moxostoma macrolepidotum*, logperch *Percina caprodes*, johnny darter *Etheostoma* *nigrum*, iowa darter *E. exile*, bluntnose minnow *Pimephales notatus*, spottail shiner *N. hudsoniu*, blackchin shiner *N. heterodon* and golden shiner *Notemigomus crysoleucas*.

Historic management of Bony Lake has included fishery surveys, stocking, and various length and bag regulations. Historic surveys for walleye occurred in 1989, 1998 and 2004 utilizing Wisconsin Department of Natural Resources (WDNR) standardized treaty protocols (Hennessey 2002). Basic fishery surveys utilizing a variety of gear types were conducted by WDNR in 1950, 1964-65, 1974 and 1981. Fall electrofishing surveys were utilized to assess recruitment of walleye in 1988, 1991 and 1998.

Bony Lake has a long stocking history (Table 1) and has been stocked with a number of fish species, including walleye, muskellunge, largemouth bass and various panfish species, since at least 1936. Walleye fry were first stocked into Bony Lake in 1938. Results from a 1950 survey recommended a management program for bass, and largemouth bass were stocked in 1952 and 1953. Anglers were complaining about poor fishing during the early 1960s, which prompted a 1963 survey. A large population of perch and minnows were found and walleye stocking was recommended for 1964. Overall survival was good and walleyes were stocked until 1976 (Schram 1983). Anglers were again complaining about poor fishing and another survey was conducted in 1974. It was then recommended to supplement the native muskellunge population with stocked fish in an effort to supplement natural reproduction and enhance a “trophy fishery”. Muskellunge stocking was discontinued in 1981 due to survey results which found adequate natural reproduction. In 1983, walleye stocking was again initiated to increase the predator population to control overabundant panfish populations (Kampa 1990). Walleye stocking has continued since then on a roughly alternate year basis, with the exception of fry planted in 1991 (Red Cliff Tribal Hatchery) and large fingerlings in 1993 and 1996 (Eau Claire Lakes Conservation Club).

Fishing regulations have changed over time on Bony Lake. Walleye and muskellunge fishing regulations on Bony Lake have been dictated by regulation changes on Middle Eau Claire Lake due to the fact that the public access is through the channel connecting the lakes and enforcement would be difficult if the lakes had separate regulations. There was no minimum length limit for walleye until 1990 when a 15 in minimum length limit was instituted statewide. A no length limit, but only one walleye over 14 in bag limit was instituted in 1997 when the Middle Eau Claire regulation changed (Toshner 2006). Bag limits for walleye have been adjusted annually according to tribal harvest declarations that began in 1988 on Middle Eau Claire Lake. Muskellunge regulations for minimum length increased from 30 in to 32 in in 1983 and to 40 in in 1996. Panfish regulation changes have been approved that lower the bag limit from 25 to 10 panfish per day in 2008, and are a result of declining panfish populations on Middle Eau Claire Lake.

Recent management has focused on walleye stocking, regulation changes, public outreach and education and habitat protection/enhancement. Rusty crayfish *Orconectes rusticus*, have been present in Bony Lake since at least the 1980s, however it has not been well documented when they first entered the lake. Rusty crayfish, from anecdotal accounts, have reduced the amount of aquatic vegetation dramatically. A large scale shoreline restoration project began in 2007 that is intended to increase large wood in the near shore area and reestablish or protect shoreline vegetation that is beneficial to the fishery, water quality and wildlife. This project was initiated by concerned riparian land owners and is the first of its kind in the state.

The objectives of the 2007 survey was to determine the status of the walleye, muskellunge, northern pike, largemouth and smallmouth bass populations, along with sport use of these species. More specifically, we were interested in determining population abundance, growth, size structure and harvest of walleye, largemouth and smallmouth bass.

Methods

Bony Lake was sampled during 2007 following the Wisconsin Department of Natural Resources comprehensive treaty assessment protocol (Hennessey 2002). This sampling included spring fyke netting and electroshocking to estimate walleye, bass (both largemouth and smallmouth) and northern pike abundance, fall electroshocking to estimate year class strength of walleye young-of-the-year (YOY), and a creel survey.

Walleye were captured for marking in the spring shortly after ice out with fyke nets. Each fish was measured (total length; inches and tenths) and fin-clipped. Adult (mature) walleyes were defined as all fish for which sex could be determined and all fish 15 in or longer. Adult walleyes were given a lake-specific mark. Walleyes of unknown sex less than 15 inches in length were classified as juveniles (immature) and were marked with a different lake-specific fin clip. Marking effort was based on a goal for total marks of 10% of the anticipated spawning population estimate. To estimate adult abundance, walleyes were recaptured by electrofishing 1-2 days after netting. Because the interval between marking and recapture was short, electrofishing of the entire shoreline was conducted to ensure equal vulnerability of marked and unmarked walleyes to capture. All walleyes in the recapture run were measured and examined for marks. All unmarked walleyes were given the appropriate mark so that a total population estimate could be estimated. To estimate total walleye abundance, a second electrofishing recapture run was conducted 2 weeks after the first recapture run. Again, the entire shoreline of the lake was electrofished. Population estimates were calculated with the Chapman modification of the Petersen Estimator using the equation:

$$N = \frac{(M+1)(C+1)}{(R+1)}$$

where N is the population estimate, M is the total number of marked fish in the lake, C is the total number of fish captured in the recapture sample, and R is the total number of marked fish captured. The Chapman Modification method is used because simple Petersen Estimates tend to overestimate population sizes when R is relatively small (Ricker 1975). Abundance and variance were estimated for walleye that were ≥ 15 in and sexable.

Largemouth and smallmouth bass encountered during fyke netting and the adult walleye electroshocking run were marked. For comparison purposes catch per unit effort (CPUE: the number of largemouth or smallmouth bass caught/hour of electroshocking) was calculated from the first and second electroshocking surveys. Size structure for all years surveyed utilized all largemouth and smallmouth bass captured from the first and second electroshocking surveys.

Walleye age and growth were determined from dorsal spine cross sections viewed microscopically at 100X (Margenau 1982). Age and growth of other fish species were determined by viewing acetate scale impressions under a 30X microfilm projector. Growth rates for all species were compared to an 18 county regional mean (Northern Region) using the Fisheries and Habitat database. Size structure quality of species sampled was determined using the indices proportional (PSD) and relative (RSD) stock densities (Anderson and Gutreuter 1983). The PSD and RSD value for a species is the number of fish of a specified length and longer divided by the number of fish of stock length or longer, the result multiplied by 100 (Appendix Table 1). Changes in population size structure were determined using Kolmogorov-Smirnov tests.

Creel surveys used a random stratified roving access design (Beard et al. 1997; Rasmussen et al. 1998). The survey was stratified by month and day-type (weekend / holiday or weekday), and the creel clerk conducted interviews at random within these strata. The survey was conducted on all weekends and holidays, and a randomly chosen two or three weekdays. Only completed-trip interview information was used in the analysis. The clerk recorded effort, catch, harvest, and targeted species from anglers completing their fishing trip. The clerk also measured harvested fish and examined them for fin-clips.

Results

Total survey effort in 2007 included 36 fyke net lifts targeting spawning gamefish. Two electroshocking surveys of the entire shoreline totaling 2.4 hours in spring (first and second recapture surveys) and 1.1 hours in fall (walleye recruitment survey) were conducted.

Walleye. Adult walleye abundance (≥ 15 in and sexable fish) was 597 (CV = 17; 3.1 adults/acre) in 2007. Adult walleye density has remained stable since 1989 (Figure 1). Density estimates during this period ranged from 2.4 to 3.3 fish/acre in four sampling periods. Adult density was lowest in 2004.

Length of walleye captured in fyke nets in 1989, 1998, 2004 and 2007 suggest significant shifts in size structure between 1989 and the three subsequent survey periods (1989 vs 1998, $D = 0.47$, $P < 0.0001$; 1998 vs 2004, $D = 0.08$, $P = 0.90$; 2004 vs 2007, $D = 0.06$, $P = 1.0$; 1989 vs 2007, $D = 0.49$, $P < 0.0001$; Figure 2). Proportional stock densities (PSD) of walleye captured in fyke nets indicated a high quality size structure with values of 85 and 75 in 1989 and 1998. PSD values of 69 and 64 for 2004 and 2007 indicated a fair quality size structure. RSD-20 values of 53 in 1989 indicated a walleye population with a high proportion of fish over 20 in in length. However, RSD-20 values declined from 7 to 5 in 1998 and 2004 then increased to 7 in 2007 which indicated a low proportion of fish over 20 in in length since 1998. Mean length for sexable walleye ranged from 19.9 (SD = 4.34, N = 146), to 16.4 (SD = 2.21, N = 124), to 16.0 (SD = 2.31, N = 153), to 16.3 (SD = 2.41, N = 192) in for survey years 1989, 1998, 2004 and 2007.

Age of adult walleye sampled during the 2007 survey period ranged from III to XIII. Male and female walleye first reached maturity at III and IV, respectively. Age IV and V walleye accounted for 41% of the adult stock. Age distribution data from 1998, 2004 and 2007 indicated variable year class strength (Figure 3). Growth rates for both sexes were dimorphic with males reaching 15 inches at age V and females at age IV in the 2007 survey. Growth rates in 1989 were above Northern Region averages. In 1998, growth was above Northern Region averages until age VII. In 2004 and 2007 growth rates were predominantly below Northern Region averages, especially for older aged walleye (age VI and older; Figure 4).

Relative abundance of Young of Year (YOY) walleye in Bony Lake in 2007 was 20 fish/mile (45 fish/hour). The average YOY/mile was 36.7 (SD = 42.3, N = 9) for surveys completed from 1974 to 2007 by both WDNR and GLIFWC. With only nine surveys being conducted in 28 years it is difficult to discern trends of natural reproduction. Four of nine YOY surveys took place in stocked years (Figure 5). There is no clear correlation between stocking and relative abundance of YOY walleye in fall surveys.

Northern Pike and Muskellunge. Relative abundance (the number of fish caught with each fyke net lift) of northern pike increased from 1.2 to 1.5 to 2.7 to 3.4 in 1989, 1998, 2004 and 2007, respectively. Mean length for northern pike (fyke net samples) decreased from 19.3 in (SD = 5.5, N = 33) to 17.4 in (SD = 3.4, N = 82) to 17.1 in (SD = 5.7, N = 40) to 14.2 in (SD = 4.9, N = 123) from 1989 to 1998 to 2004 to 2007. PSD for spring fyke net samples was 39, 13, 29 and 20 for 1989, 1998, 2004 and 2007. RSD-28 for spring fyke net samples was 11, 1, 4 and 2 for the same time period. Northern pike longer than 30 in have been rare in Bony Lake (Figure 6). The largest northern pike caught during the 2007 survey was 28.6 in.

One muskellunge (41.4 in) was captured in Bony Lake during fyke netting and all electoshocking surveys. In 1989, a total of 23 muskellunge were captured, of which 44% had clipped fins which indicated they were from hatchery origin. In 1998 and 2004, one and two muskellunge were captured, respectively.

Largemouth and Smallmouth Bass. In 2007, thirteen largemouth bass and 10 smallmouth bass were captured during the 1st and 2nd electroshocking surveys. In contrast, two largemouth bass and one smallmouth bass were captured during the 1st and 2nd electroshocking surveys in 1989. Largemouth bass mean length (1st and 2nd electroshocking samples) was 15.5 in (SD = 2.3, N = 19), 16.2 in (SD = 2.9, N = 9) and 17.2 in (SD = 2.2, N = 13) in 1998, 2004 and 2007. Smallmouth bass mean length (1st and 2nd electroshocking samples) was 10.7 in (SD = 3.5, N = 12), 14.5 in (SD = 3.1, N = 12) and 14.2 in (SD = 3.4, N = 10) in 1998, 2004 and 2007.

Panfish. Bluegill were the most abundant panfish species (N = 203) sampled in Bony Lake during spring fyke netting in 2007. Comparison of bluegill abundance to comparable surveys in the past was difficult due to only 6 and 39 fish having been sampled in 2004 and 1998, respectively. Rock bass were the second most abundant panfish species (N = 29) sampled during spring fyke netting in 2007. Similarly to bluegill, low numbers rock bass (N = 10, 2004; N = 10, 1998) were sampled during spring fyke netting. Black crappie were the only other panfish species sampled in 2007 during spring fyke netting (N = 4).

Sport and Tribal Fishery. Anglers fished an estimated 3,680 hours (19.3 hrs/acre) during the 2007 open water and ice fishing seasons on Bony Lake, which is below open water and ice fishing combined averages of 23.4 hrs/acre (SD = 10.8, N = 35) for Bayfield and Douglas County walleye lakes and below the Northern Region (21 counties) average of 33.1 hrs/acre. Fishing pressure has varied over time during the open water fishing season on Bony Lake. The highest fishing pressure was in 1998 (22.8 hrs/acre) and the lowest was in 2004 (13.8 hrs/acre). The directed effort, i.e. effort targeted toward a specific fish, was highest for smallmouth bass (22%) in 2007. In contrast, the directed effort was highest for walleye in 1998 (25%) and 2004 (30%). The most sought after panfish species was bluegill, with 8% of the directed effort in 2007.

Bluegills were also the most sought after panfish in 1998, with 5% of the directed effort. In 2004, the most sought after panfish was yellow perch (4%).

Despite having 178 days of creel survey effort which included 352 angler counts completed by the creel clerk during the open water and ice fishing seasons of 2007-2008, no fish of any species were recorded as harvested, however, catch data was collected. Due to the lack of any harvest data angler exploitation of walleye could not be calculated for 2007. No walleye were recorded as being caught or harvested on Bony Lake in 2007. Anglers caught 482 northern pike and 720 smallmouth bass on Bony Lake in 2007, which were the only two gamefish species with recorded catch data. In 2004, anglers caught 301 walleye of which 27% (80) were harvested. Angler walleye catch in 1998 was 16 with 100% (16) being harvested. Care should be taken when comparing Bony Lake catch and harvest data due to the low number of angler interviews and resulting sparse data set.

There were no walleye tribally harvested in 2007 on Bony Lake. Since tribal harvest began in 1986, the tribes have harvested walleye in only two years (1991 and 1992), and a total of 47 walleye were harvested in those years. In comparison, tribal harvest was 5,346 walleye on Middle Eau Claire Lake from 1986 to 2007.

Anglers pursuing panfish fished an estimated 660 hours and accounted for 11% of the total directed angling effort for the 2007-2008 open water and ice fishing seasons combined. Bluegill were the most sought after panfish by anglers in 2007-2008 with 8% of the directed effort. Directed effort for bluegill has increased since 2004 (2%) and 1998 (5%). Estimated catch of bluegill increased to 1,192 in 2007-2008 from 0 and 149 in 2004-2005 and 1998-1999. Yellow perch were the second most sought after panfish species by anglers in 2007-2008 with 2% of directed effort. Directed effort for yellow perch has declined from 2004-2005 (4%) but increased since 1998-1999 when there was no directed effort recorded. Estimated catch of yellow perch was 433 in 2007-2008; there was no estimated catch of yellow perch recorded for 2004-2005 and 1998-1999. Rock bass were the third most sought after panfish species by anglers in

2007-2008 with 1% of directed effort. This equaled the directed effort toward rock bass in 1998-1999; there was no recorded directed effort for rock bass in 2004-2005. Estimated catch of rock bass was 104 in 2007, which was an increase from 0 in 2004-2005 and 82 in 1998-1999.

Summary and Discussion

Bony Lake has supported and continues to support diverse fish communities and popular sport fisheries. Natural reproduction is the predominant form of recruitment for all species with the possible exceptions of walleye and muskellunge. Managing harvest has largely been accomplished with regulations intended for fish communities in Middle Eau Claire Lake due to enforceability. Creel harvest data have been sparse in the years Bony Lake had been surveyed so detailed conclusions on harvest management are difficult to surmise. In any case, the change in habitat abundance and function seems to have had a larger effect on the overall fish community than harvest management. Rusty crayfish, an aquatic invasive species, appears to have had an effect on the fish assemblage in Bony Lake since they were first found in the 1980s by dramatically reducing the amount of aquatic vegetation. The reduction of littoral zone habitat has been reported in both natural and laboratory conditions (Wilson et al. 2004; Lodge and Lorman 1987).

Adult walleye densities in Bony Lake have averaged 3.0 fish/acre (SD = 0.39, N = 4) from 1989 to 2007 and were equal to the state walleye management objective of 3.0 fish/acre. Adult walleye densities in Bony Lake are below the Bayfield and Douglas County average of naturally reproducing walleye lakes of 3.7 fish/acre (SD = 2.20, N = 60) using surveys from 1991 to 2007. In contrast, adult walleye densities in Bony Lake are above the Bayfield and Douglas County average of stocked walleye lakes of 1.9 fish/acre (SD = 0.83, N = 14) during the same time period. Despite the stocking of over 88,500 small fingerling and 1,300 extended growth walleye since 1989 the density of walleye in Bony Lake has not increased. Bony Lake presents an opportunity to gather information on walleye natural reproduction due to surveys occurring every third year. Since walleye stocking on Bony Lake seems to have been ineffective, consideration should be given to discontinuing stocking. Considering the frequency of surveys any changes in walleye abundance would be fairly quickly recognized. If declines in walleye abundance occur, walleye stocking could resume. In addition, genetic conservation of Middle Eau Claire Lake walleye stock may benefit from the discontinuation of walleye stocking in Bony Lake. Size structure of walleye declined significantly from 1989 to 1998 but has remained similar in subsequent surveys (Figure 2). Growth rates of walleye have declined since 1989 when they were above Northern Region averages. In 2004 and 2007, growth rates for walleye were predominantly below Northern Region averages, especially after age VI. Possible reasons for the slower growth rates and decrease in size structure of walleye may be related to a trophic cascade or biomanipulation effect brought on by reduced aquatic plant coverage due to rusty crayfish invasion along with near-shore human induced habitat loss (removal of coarse wood). These changes may have had a detrimental effect on planktivorious fish species thus reducing forage for predators in the system (Sass et. al. 2006). This intermediate trophic state hypothesis (Carney 1990) may be more common on mesotrophic lakes like Middle Eau Claire and is the result of high piscivore densities and low planktivore densities which allow zooplankton to reduce the amount of phytoplankton. The result is greater secchi disk transparency than expected from the lakes total phosphorus concentrations and is a possible reason Bony Lake has a mean secchi disk and chlorophyll-a TSI values from the summer months of 2003 of 34 (oligotrophic) while in the same summer the mean total phosphorus TSI value was 47 (mesotrophic).

Northern pike relative abundance has increased and average total length has decreased since the 1989 survey. While northern pike represent a small component of the sport fishery it does add to the lakes angling and species diversity. Only four muskellunge were sampled during surveys in 1998, 2004 and 2007. In 1989, twenty three muskellunge were sampled of which 44% were from hatchery origin. Since the discontinuation of muskellunge stocking, natural reproduction and migration from Middle and Upper Eau Claire Lakes has been driving muskellunge numbers in Bony Lake. The sampling techniques employed during the Bony Lake survey may not have adequately sampled the muskellunge population due to the focus of the fyke netting efforts on walleye spawning areas during colder water temperatures. Stocking of muskellunge should be considered carefully due to the low abundance of forage fish present in recent surveys, increasing muskellunge densities artificially could exacerbate the decline of panfish further. Small numbers of both largemouth and smallmouth bass were sampled during all surveys on Bony Lake likely due to survey timing and gear efficiency.

The panfish community was not targeted during surveys from 1998, 2004 and 2007. However, panfish were collected in spring fyke nets targeting spawning walleye during those survey years. Spring fyke netting data from 2007 indicated an increase in bluegill abundance with rock bass being the second most commonly surveyed panfish species. Creel survey results indicate bluegill populations are increasing along with yellow perch populations. However, care must be taken when analyzing both the fyke net data and creel survey data due to small sample sizes. Fyke net surveys targeting spawning bluegill were completed in 1981 and 1989.

Management Recommendations

1. Discontinue walleye stocking in Bony Lake to determine levels of natural reproduction. Walleye stocking could occur again following 2018 if surveys shows adult walleye abundance falls below 2.0 fish/acre.
2. Because of the navigable connection Bony Lake has with Middle Eau Claire Lake, fisheries regulations should continue to be consistent between the two waters in order for them to be more understandable for anglers and therefore more easily enforced.
3. The panfish and bass communities were not targeted during surveys from 1998, 2004 and 2007. In order to better assess changes in the panfish community since 1981 and 1989 we recommend replicating surveys targeting panfish in 2010. In order to initially assess

bass populations which have not been targeted in historic surveys we recommend a survey targeting bass in 2010.

4. Continue to support citizens in their efforts to protect and enhance habitat in Bony Lake. The project that began on Bony Lake in 2007 is the first of its kind in the state and will produce a template from which other lakes can create benefits to the fishery as well as water quality, wildlife and aesthetics benefits (Sass et. al. 2006). The lack of coarse woody habitat and disturbances to shoreline buffers is common in lakes in the Northern Region and statewide. Research has revealed that maintaining healthy aquatic habitat maintains healthy productive fisheries much better than stocking or regulation changes. Riparian landowners on Bony Lake are excellent examples of what can be done to proactively improve the resource.
5. Consider/continue efforts to monitor rusty crayfish populations and aquatic plant communities. Standardized rusty crayfish and aquatic plant community surveys may help to answer questions related to a perceived decline in rusty crayfish populations and an increase in aquatic plant distribution and densities. As in Middle Eau Claire Lake, documenting the above shift in populations of rusty crayfish and aquatic plants may be problematic due to a lack of standardized surveys prior to and following rusty crayfish introduction.

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Table 1. Fish Stocking History of Bony Lake, Bayfield County, Wisconsin

Year	Species	Number Stocked	Age/Size
1936	Bass (sp.)	200	
	Bluegill	200	
	Sunfish	200	
1937	Largemouth Bass	100	Small Fingerling
	Bluegill	50	Yearlings
	Bluegill	200	Small Fingerling
1938	Walleye	389,910	Fry
1939	Walleye	250,000	Fry
1940	Walleye	300,000	Fry
1941	Walleye	150,000	Fry
1943	Walleye	100,000	Fry
1944	Walleye	80,000	Fry
1947	Largemouth Bass	1,000	Small Fingerling
1948	Largemouth Bass	1,500	Small Fingerling
1949	Largemouth Bass	2,322	Small Fingerling
1950	Largemouth Bass	2,500	Small Fingerling
1951	Walleye	2,890	Small Fingerling
1952	Largemouth Bass	1,100	Small Fingerling
1953	Largemouth Bass	1,100	Small Fingerling
1964	Walleye	19,736	Small Fingerling
	Walleye	64	Large Fingerling
1967	Walleye	13,200	Small Fingerling
1969	Walleye	4,500	Small Fingerling
1970	Walleye	4,400	Small Fingerling
1971	Walleye	4,400	Small Fingerling
1972	Walleye	5,440	Small Fingerling
1973	Walleye	10,030	Small Fingerling
1974	Walleye	10,080	Small Fingerling
1975	Walleye	10,020	Small Fingerling
1976	Walleye	10,080	Small Fingerling
1977	Muskellunge	200	Large Fingerling
1978	Muskellunge	100	Large Fingerling
1979	Muskellunge	384	Large Fingerling
1980	Muskellunge	200	Large Fingerling
1983	Walleye	20,228	Small Fingerling
1985	Walleye	1,700	Large Fingerling
1986	Walleye	9,550	Small Fingerling
1989	Walleye	9,530	Small Fingerling
1991	Walleye	115,000	Fry
1992	Walleye	9,550	Small Fingerling

Table 1 (continued). Fish Stocking History of Bony Lake, Bayfield County, Wisconsin DNR

Year	Species	Number Stocked	Age/Size
1993	Walleye	9,550	Small Fingerling
	Walleye	819	Large Fingerling
1994	Walleye	2,250	Small Fingerling
1995	Walleye	9,768	Small Fingerling
1996	Walleye	525	Large Fingerling
1997	Walleye	9,550	Small Fingerling
1999	Walleye	9,550	Small Fingerling
2001	Walleye	9,550	Small Fingerling
2003	Walleye	9,550	Small Fingerling
2005	Walleye	9,748	Small Fingerling

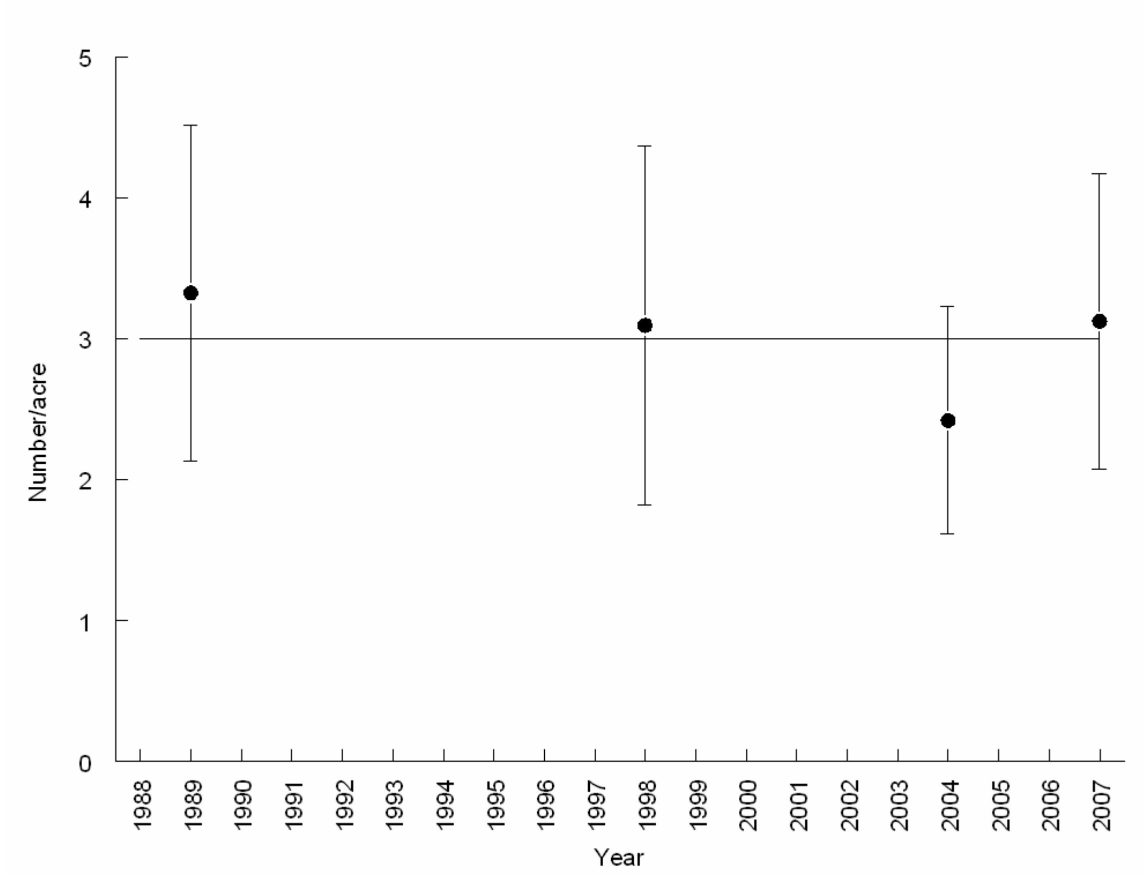

Figure 1. Number of adult walleye (≥ 15 in and sexable fish; number/acre ± 95% confidence intervals) by year in Bony Lake, Bayfield County, Wisconsin. Horizontal line represents the average of 3.0 fish/acre.

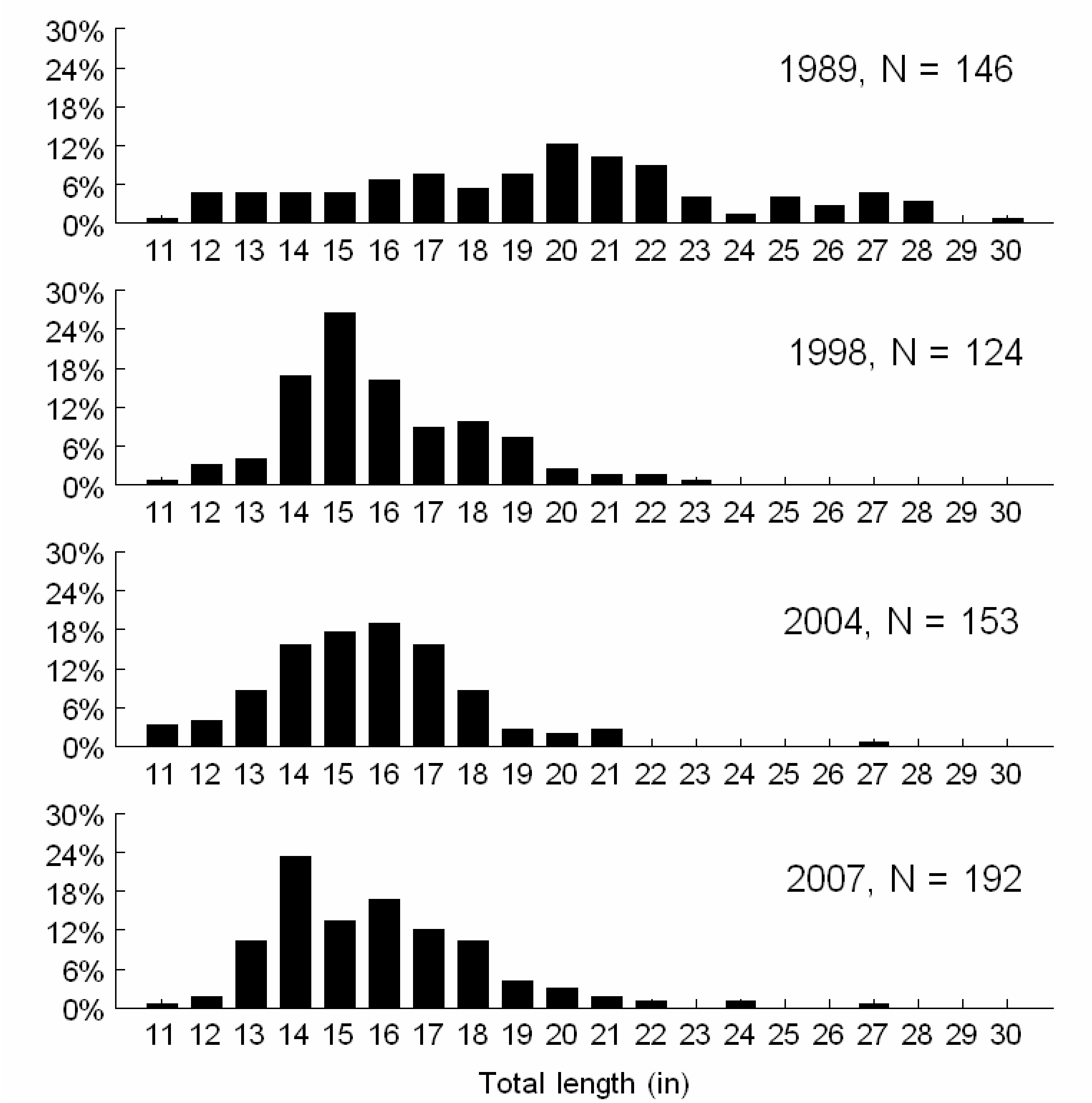

Figure 2. Percentage length frequency of fyke net catches for walleye by length interval in Bony Lake, Bayfield County, Wisconsin.

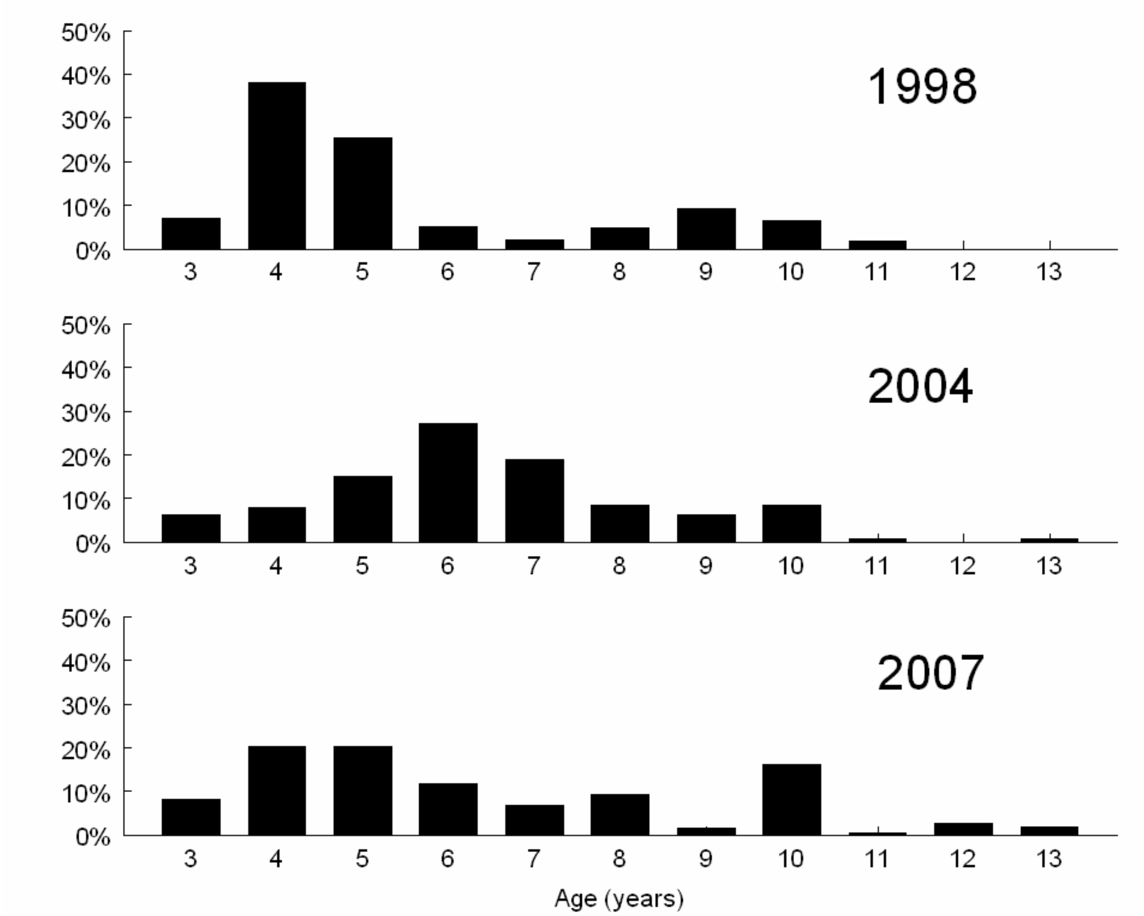

Figure 3. Percent distribution by age of walleye in Bony Lake, Bayfield County, Wisconsin.

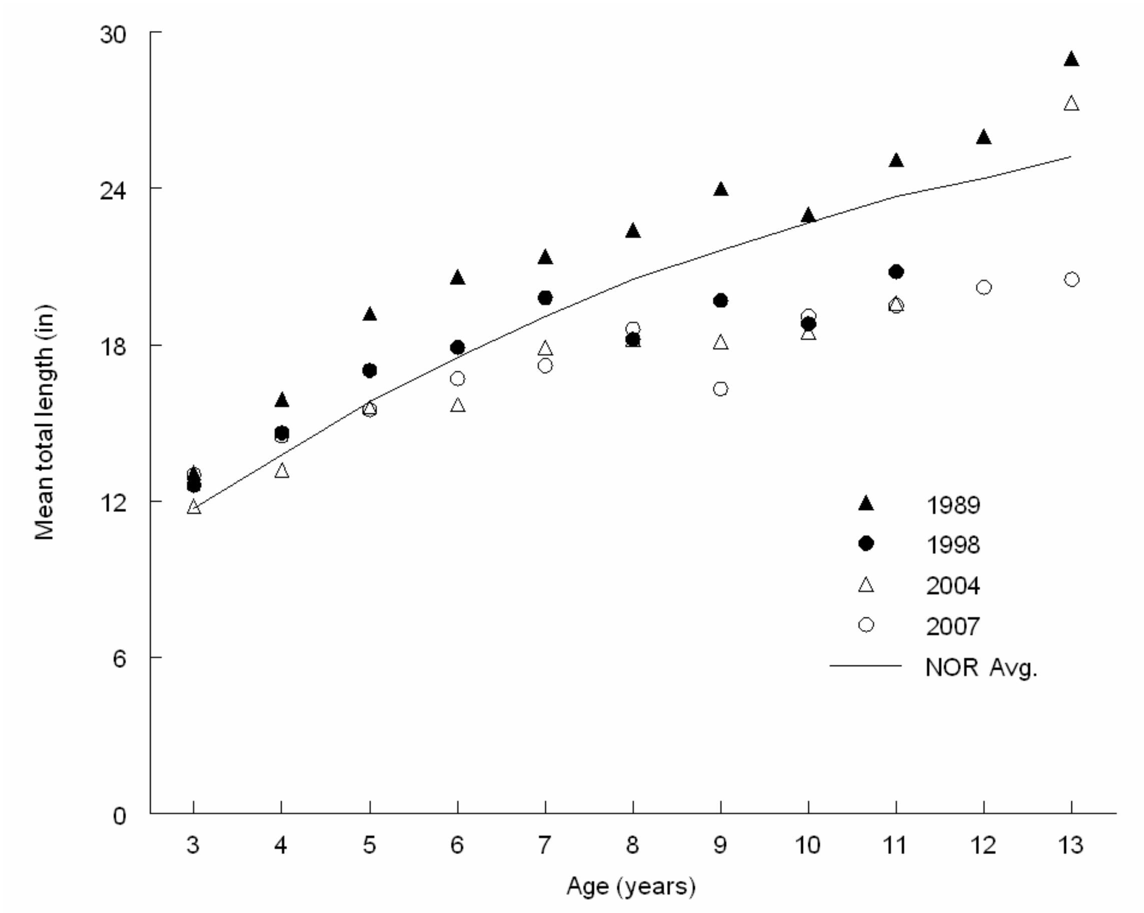

Figure 4. Age at length of walleye in Bony Lake, Bayfield County, Wisconsin.

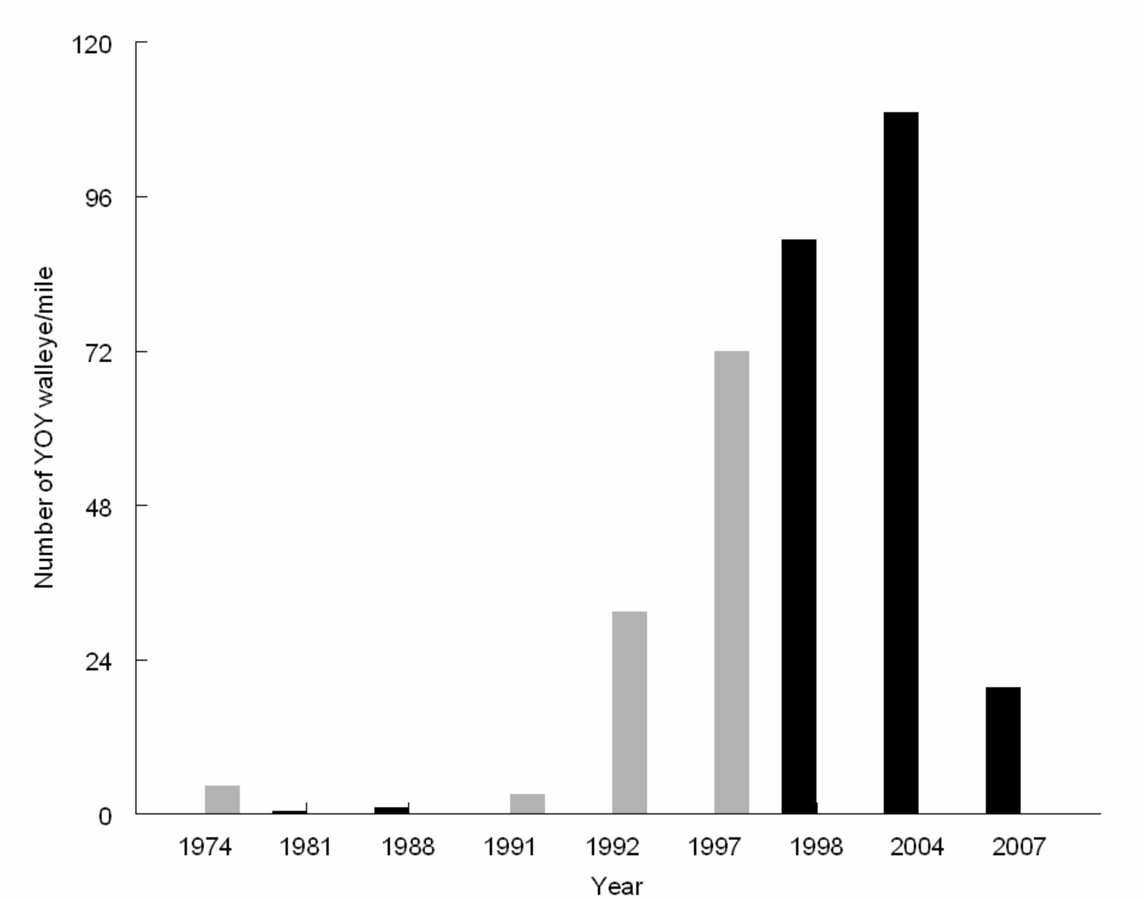

Figure 5. Young of the year walleye relative abundance determined by fall electroshocking in Bony Lake, Bayfield County, Wisconsin. Gray bars represent years which had stocking occur and black bars represent years when no stocking occurred.

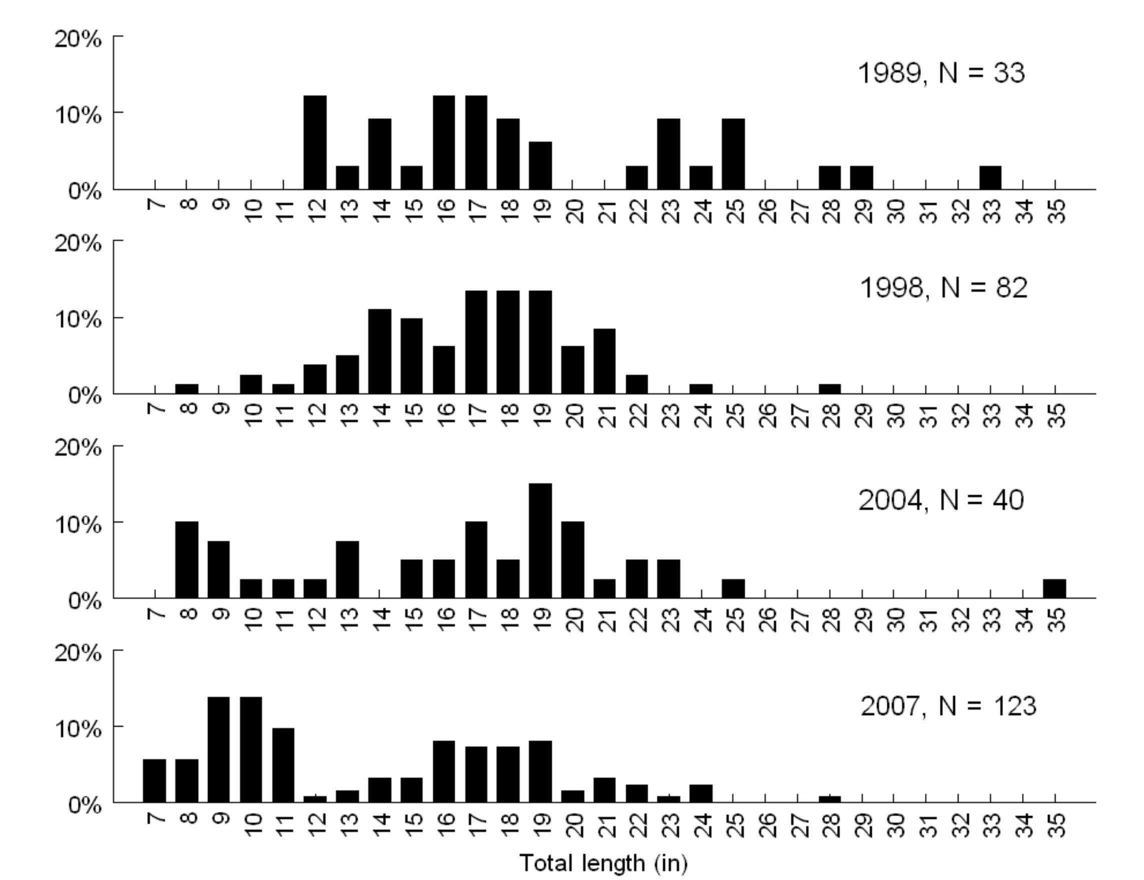

Figure 6. Percentage length frequency of fyke net catches for northern pike by length interval in Bony Lake, Bayfield County, Wisconsin.

Appendix Table 1. Proportional and relative stock density values.

Species	Stock Size (in)	Quality Size (in)	Preferred Size (in)
Northern Pike	14	21	28
Walleye	10	15	20