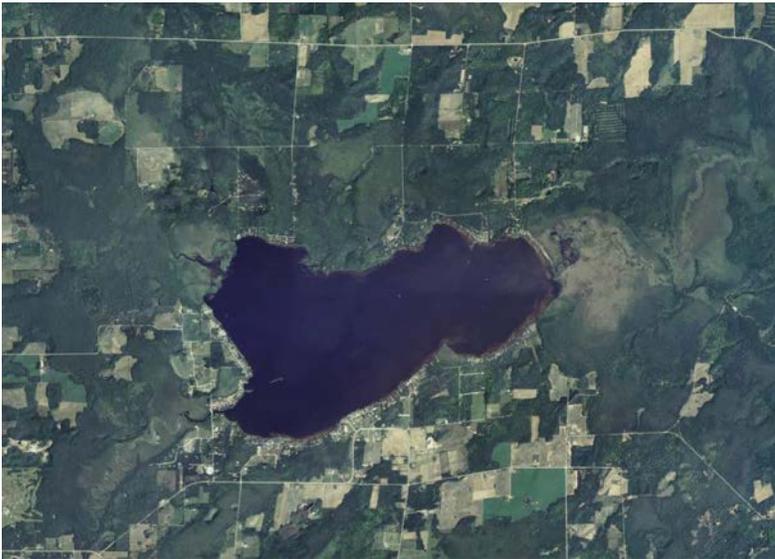
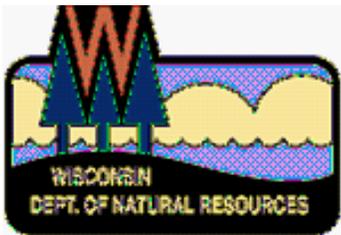


LAKE NOQUEBAY
Marinette County
2014 Fish Management Report

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Lake Noquebay - Marinette County, Wisconsin
2014 Fish Management Report

Christopher C. Long 1/22/2015

Christopher C. Long, Fisheries Biologist, Date

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Michael Donofrio, Fisheries Supervisor, Date

Randy Schumacher, Eastern District Supervisor, Date

Steve Hewett, Bureau of Fisheries Management, Date

SUMMARY

Lake and location:

Lake Noquebay, Marinette County, T32N R21E Sec 8

Physical / chemical attributes (Wisconsin DNR, 1975):

Surface acres: 2,409

Maximum depth (ft): 51

Average depth (ft): 10

Shoreline length (mi): 9.2

Lake type: Drainage

Basic water chemistry: Slightly alkaline, light-stained water of moderate transparency.

Littoral substrate: 70% sand, 25% muck and 5% exposed rock and gravel.

Aquatic vegetation: Diverse community of aquatic plants.

Other features: Marinette County Land and Conservation Department maintains a low-head dam at the outlet. A fall drawdown (2 ft) is conducted annually to reduce shoreline damage from ice shoves. Lake Noquebay has three inlets; Middle Inlet, Upper Middle Inlet and Lower Middle Inlet.

Purpose of survey:

Determine the current status of fishery and evaluate walleye fishing mortality.

Surveys:

WDNR Survey ID: 496447860 – Spring fyke netting (4/29/14 – 5/6/14)

WDNR Survey ID: 496447867 – Gamefish/Panfish electrofishing (6/9/14 & 6/12/14)

WDNR Survey ID: 515077075 – Fall juvenile walleye/muskellunge electrofishing (9/15/14)

WDNR Survey ID: 515077076 –Muskellunge stocking evaluation (10/8/14 & 10/21/14)

Fishery:

The fishery of Lake Noquebay is comprised of panfish species (bluegill, yellow perch, black crappie, pumpkinseed, and rock bass) and gamefish species (walleye, largemouth bass, muskellunge and northern pike).

EXECUTIVE SUMMARY

- Lake Noquebay is 2,409 acres and the largest inland lake in Marinette County. It is located three miles east of Crivitz, Wisconsin and offers a variety of recreational opportunities. There are 4 access points around the lake but only 2 have developed boat landings.
- The Wisconsin Department of Natural Resources (WDNR) has consistently stocked muskellunge since 1990. WDNR stocked small fingerling walleye intermittently since the 1970's however; private stockings of large fingerling walleye by the Lake Noquebay Sportsman's Club and Lake Noquebay Angler's Partnership (LNAP) have sustained this component of the fishery (Table 1).
- Overall, 8,941 fish representing 20 species and 1 hybrid were collected during the 2014 sampling season (Table 4). The five most abundant species collected by number were bluegill (58%), black crappie (15%), rock bass (6%), Northern pike (5%) and pumpkinseed (5%).
- A total of 5,222 bluegill was collected (Table 4). Bluegill ranged in length from 2.4 to 10.1 in (inches) and averaged 6.3 in (Figure 1). Fifty-eight percent of the bluegill measured were 6.0 in or greater and considered harvestable. Bluegill PSD was 61 and RSD^P was 12. A representative subsample of 63 bluegill was aged from 2 to 10 years old. Most age groups were well represented and growth was relatively average at all ages.
- During the survey, 1,344 black crappie were collected. Crappie ranged in length from 4.6 to 12.5 in and averaged 7.6 in (Figure 3). Growth was average at all ages and consistent to the mean length at age of crappie in northeast Wisconsin (Figure 4).
- Four hundred eighty-two northern pike were collected during the 2014 survey (Table 4). Pike ranged in length from 9.5 to 34.5 in and averaged 18.4 in (Figure 6).
- A total of 287 walleye was collected during both electrofishing and fyke netting (3.2/NN). Walleye ranged in length from 5.4 to 24.7 in and averaged 17.0 in across all samples (Figure 8). Two young-of-the-year (YOY) walleye were collected (5.4 and 5.8 inches) during the fall electrofishing survey which indicated that some natural reproduction is occurring. The Schnabel multiple census fyke net population estimate for walleye was 739 (95% CI of 549 to 1,130 and a recapture rate of 15%) or approximately 0.3 adult walleye/acre.
- During the survey, 200 largemouth bass were collected (Table 4). Bass ranged in length from 5.8 to 17.9 in and averaged 12.3 in (Figure 10). Thirty-six percent of largemouth bass measured were over the 14-in minimum length limit (Figure 10). Bass are reaching legal size (14 in) between ages 6 and 7. Largemouth bass growth was slightly below average at all ages compared to the average mean length at age for bass in northeast Wisconsin (Figure 11).
- Twelve muskellunge were collected in 2014. Muskellunge ranged in length from 15.5 to 47.2 in (Figure 13). One fish (15.5 in) was collected from the previous year's stocking and grew about 4 inches between 2013 and 2014.
- I recommend that LNAP pursue stocking large fingerling walleye annually until WDNR can fill the stocking quota for Lake Noquebay.
- Stocking of muskellunge in Lake Noquebay should continue. No adverse impacts to the fishery have been observed as a result of previous muskellunge stockings. Because the forage base and habitat are conducive to support a muskellunge fishery, we recommend stocking 2,400 large fingerling muskellunge / year.
- The current fishing regulations (Table 8) are adequate to provide quality fishing opportunities.
- The next comprehensive fisheries survey (fyke netting, spring and fall electrofishing) of Lake Noquebay is scheduled for 2020 and will focus on the age, growth, abundance, and recruitment of the dominant gamefish and panfish.

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INTRODUCTION

Lake Noquebay is located in Marinette County, just three miles east of Crivitz, Wisconsin. At 2,409 acres it is the largest inland lake in Marinette County and offers a variety of recreational opportunities in addition to fishing. There are 4 access points around the lake but only 2 have developed boat landings.

The Wisconsin Department of Natural Resources (WDNR) has consistently stocked muskellunge since 1990 (Table 1). WDNR stocked small fingerling walleye intermittently since the 1970's however; private stockings of large fingerling walleye by the Lake Noquebay Sportsman's Club and Lake Noquebay Angler's Partnership (LNAP) have sustained this component of the fishery (Table 1).

The last fisheries survey of Lake Noquebay was conducted in 2009 (Donofrio, 2010). The survey indicated healthy populations of panfish and gamefish. Donofrio (2010) recommended increasing the annual stocking of muskellunge from 1,000 to 2,500 fish to improve the fishery and offered some suggestions regarding the management of aquatic vegetation. The 2009 survey revealed predator species (largemouth bass, northern pike, and walleye) demonstrated slow growth while panfish species (bluegill, pumpkinseed, yellow perch and rock bass) displayed faster growth compared to panfish in other northeastern Wisconsin lakes.

The goal of the 2014 comprehensive fisheries survey was to assess the status of the fishery by characterizing gamefish populations based on relative abundance, proportional stock density (PSD), relative stock density (RSD), catch per unit effort (CPUE) and mean length at capture (age and growth). Comparisons to the 2009 fisheries survey were made where applicable.

METHODS

Data collection:

Standard fyke nets (3-foot hoop, $\frac{3}{4}$ -bar, 1.5-inch stretch), mini-fyke nets ($\frac{1}{4}$ -inch stretch with turtle exclusion) and a standard WDNR electrofishing boat were used to collect fish on Lake Noquebay. Sampling gear, effort, date, and target species for the survey are listed in Table 2. All gamefish and a subsample of panfish were measured to the nearest 0.1 inch total length (TL) and separated into half-inch groups (X.0-X.4 for inch group and X.5-X.9 for half-inch group). A subsample of scales or dorsal spines was collected for age and growth analysis from all gamefish. Aging structures (scales or spines) were collected from 5 non young-of-the-year (YOY) fish per

half inch group. If gender could be determined, structures from 5 fish per sex were collected per half inch group. Aging structures for panfish and nongame fish consisted of 5 samples per half inch group when gender could not be established. Ages were assigned to each fish using standard WDNR procedures. Passive integrated transponders (PIT tags) were implanted in all muskellunge collected.

Data analysis:

Relative abundance was calculated as the percentage each species represented from the total sample (i.e. 22 fish of a single species from a sample of 100 total fish = 22% relative abundance). Catch per unit effort (CPUE) was calculated as catch by gear divided by sampling effort for each species collected. Length frequency distributions were tabulated for dominant gamefish and panfish. These distributions consist only of fish that were measured and combined electrofishing and fyke net samples. Proportional stock density (PSD) and relative stock density for preferred length fish (RSD^P) were calculated for dominant gamefish (Anderson and Neumann 1996). Preferred lengths of various gamefish have a minimum length between 45 and 55% of the world record length for that species (Table 3; Anderson and Neumann 1996). Stock, quality, and preferred lengths were used as proposed by Gabelhouse (1984). Mean length at capture/age data was calculated for dominant gamefish and compared to the average of mean length at age for northeast Wisconsin.

A population estimate for walleye was obtained during the spring fyke net survey by giving each captured fish a top caudal fin clip. Marks (fin clips) were noted in subsequent collections until the survey was complete. The Schumacher-Eschmeyer and Schnabel formulas for multiple census were used to generate population estimates (Schneider, 1998; Schnabel, 1938).

RESULTS

Overall, 8,941 fish representing 20 species and 1 hybrid were collected during the 2014 sampling season (Table 4). The five most abundant species collected by number were bluegill (58%), black crappie (15%), rock bass (6%), Northern pike (5%) and pumpkinseed (5%).

A total of 5,222 bluegill was collected which accounted for 58% of the fish collected (Table 4). Bluegill ranged in length from 2.4 to 10.1 in (inches) and averaged 6.3 in (Figure 1). Fifty-eight percent of the bluegill measured were 6.0 in or greater and considered harvestable. Bluegill PSD was 61 and above the desirable range for a balanced population and RSD^P was 12

and within the desirable range of 5 to 20 (Table 3). Electrofishing CPUE was 195.7/h and fyke net CPUE was 60.4/NN (Tables 5 & 6). A representative subsample of 63 bluegill was aged from 2 to 10 years old. Most age groups were well represented and growth was relatively average at all ages compared to the mean length at age of bluegill in northeast Wisconsin (Figure 2). Successful reproduction and recruitment of bluegill was evident.

During the survey, 1,344 black crappie were collected. Crappie ranged in length from 4.6 to 12.5 in and averaged 7.6 in (Figure 3). Electrofishing CPUE was 2.6/h and fyke net CPUE was 16.0/NN (Tables 5 & 6). Black crappie PSD was 36 and RSD^P was 18. A representative subsample of 96 crappie was aged from 2 to 10 years old. By age 6, crappie averaged 10.6 inches in length (Figure 4). Growth was average at all ages and consistent to the mean length at age of crappie in northeast Wisconsin (Figure 4).

Rock bass made up 6% of the fish collected totaling 531 fish (Table 4). Rock bass ranged in length from 3.2 to 11.2 in and averaged 6.8 in (Figure 5). Electrofishing CPUE was 6.5/h and fyke net CPUE was 6.3/NN (Tables 5 & 6). Rock bass PSD was 45 and RSD^P was 21. Overall, the length frequency (Figure 5) suggests that the rock bass population is well balanced in terms of age and size structure.

Four hundred eighty-two northern pike were collected during the 2014 survey (Table 4). Pike ranged in length from 9.5 to 34.5 in and averaged 18.4 in (Figure 6). Electrofishing yielded a CPUE of 29.5/h and fyke netting a CPUE of 1.4/NN (Tables 5 & 6). Northern pike PSD was 19 and RSD^P was 4. Due to the difficulty of obtaining accurate ages of northern pike, no pike were aged from this survey.

Pumpkinseed sunfish accounted for 5% of the fish collected in 2014 (Table 4). A total of 469 pumpkinseed was collected and ranged in length from 3.6 to 8.4 in and averaged 5.7 in (Figure 7). Pumpkinseed electrofishing CPUE was 31.3/h and fyke netting CPUE was 5.3/NN (Tables 5 & 6). PSD was 46 and RSD^P was 6.

A total of 287 walleye was collected during both electrofishing and fyke netting (3.2/NN). This total does not include recaptured fish. Electrofishing for walleye was conducted in April and September with CPUE's of 1.4/h and 0.5/h, respectively. Walleye ranged in length from 5.4 to 24.7 in and averaged 17.0 in across all samples (Figure 8). Walleye PSD and RSD^P from the spring fyke net sample was 94 and 5, respectively. Walleye PSD was well above the desirable range of 30 to 60 (Table 3). Two young-of-the-year (YOY) walleye were collected (5.4 and 5.8

inches) during the fall electrofishing survey which indicated that some natural reproduction is occurring. A subsample of 99 walleye from fyke nets was aged from 3 to 16 years old. Walleye were reaching legal size (15 in) between ages 6 and 7 (Figure 9). Compared to the average length at age for northeast Wisconsin, walleye growth was below average beginning at age 5 (Figure 9). The Schnabel multiple census fyke net population estimate for walleye was 739 (95% CI of 549 to 1,130 and a recapture rate of 15%) or approximately 0.3 adult walleye/acre.

During the survey, 200 largemouth bass were collected (Table 4). Electrofishing yielded a CPUE of 6.7/h and fyke netting a CPUE of 1.6/NN (Tables 5 & 6). Bass ranged in length from 5.8 to 17.9 in and averaged 12.3 in (Figure 10). Largemouth bass PSD was 43 and RSD^P was 2 from the electrofishing sample while PSD was 78 and RSD^P was 26 from the fyke net sample. Bass PSD was within the desirable range for a balanced population from the electrofishing sample. The RSD^P for largemouth bass was in the desirable range from the fyke net sample (Table 3). Thirty-six percent of largemouth bass measured were over the 14-in minimum length limit (Figure 10). A subsample of 86 largemouth bass was aged from 2 to 10 years old. Largemouth bass growth was slightly below average at all ages compared to the average mean length at age for bass in northeast Wisconsin (Figure 11). Bass are reaching legal size (14 in) between ages 6 and 7. Successful reproduction and recruitment of largemouth bass was evident.

Yellow perch made up 2% of the fish collected totaling 194 fish (Table 4). Perch ranged in length from 3.8 to 11.1 in and averaged 6.7 in (Figure 12). Electrofishing CPUE was 20.9/h and fyke net CPUE was 2.1/NN (Tables 5 & 6). No yellow perch were aged from this survey however, successful reproduction and recruitment of yellow perch was evident.

Twelve muskellunge were collected in 2014. Muskellunge ranged in length from 15.5 to 47.2 in (Figure 13). One fish (15.5 in) was collected from the previous year's stocking and grew about 4 inches between 2013 and 2014. The largest muskellunge (47.2 in) was recaptured two days following its initial capture.

Additionally, hybrid sunfish, bullhead species (yellow, black and brown), and various sucker and redhorse species were also collected during the 2014 survey (Table 4).

DISCUSSION

Lake Noquebay is moderately fertile and offers anglers a wide variety of fishing opportunities. Good populations of panfish (bluegill, pumpkinseed, yellow perch, black crappie

and rock bass) and gamefish (northern pike, walleye, largemouth bass and muskellunge) are present.

It is very important to note that spring arrived late in northeast Wisconsin in 2014 and the ice did not go out on Lake Noquebay until April 28th. Spring fyke netting began April 29th, 2014. In 2009, spring fyke netting began April 9th and was completed by April 23rd. Therefore, comparisons between the fisheries survey data collected in 2009 versus 2014 may not be truly reflective of changes in the fishery.

Bluegill was the most abundant species collected in both 2009 and 2014. However, twice as many bluegill were collected in 2014 than 2009 (Table 7). PSD was similar between years (62 in 2009 versus 61 in 2014) but RSD^P increased from 8 in 2009 to 12 in 2014. The number of bluegill in the 4, 5, and 6-inch length groups was similar in 2014 but there were noticeably more 7-inch bluegill collected in 2014 (Figure 1). While the number of 8-inch bluegill collected increased between surveys, very few 9 inches and larger were collected in either the 2009 or 2014 surveys (Figure 1). Bluegill growth, while average compared to other lakes in northeast Wisconsin, was comparable between surveys (Figure 2). Reproduction and recruitment are sufficient to maintain their numbers.

The relative abundance of black crappie almost tripled between 2009 and 2014 from 6% to 15%, respectively (Table 7). Crappie are cyclic spawners meaning that successful reproduction and recruitment can be highly variable and unpredictable from year to year. The 2009 survey revealed a strong year class of crappie around 8 inches (Figure 3). The recent survey indicated two large year classes, one around 5 inches and the other around 7 inches. These year classes made up a significant proportion of the crappie measured during the 2014 survey (Figure 3). This example illustrates the inconsistency of reproduction and recruitment however, crappie fishing should be good for the next several years.

The number of northern pike collected was similar between the 2009 and 2014 surveys. However, more pike were collected in most inch groups from 18 inches and larger in 2014 (Figure 6). This resulted in a 1-inch increase in the average length of pike collected between 2009 and 2014 from 17.4 to 18.4 inches, respectively. Only 10% of northern pike were 23 inches or longer and 5% were 26 inches or longer.

Pumpkinseed sunfish provide a significant contribution to the panfish fishery in Lake Noquebay. Even though PSD declined from 81 in 2009 to 46 in 2014 and RSD^P fell from 10 to 6,

the population of pumpkinseed is healthy. The elevated PSD reported in 2009 was the result of the large number of 7-inch fish collected (Figure 7). Additionally, the abundance of aquatic vegetation is beneficial for the foraging behavior and prey items often selected by pumpkinseed.

The walleye fishery in Lake Noquebay is marginal. In 2009, a total of 554 walleye comprised 9% of the total catch during the survey. In 2014, walleye made up only 3% of the total catch when 287 fish were collected. On the other hand, fyke net CPUE increased to 3.2 walleye/NN in 2014 from 2.7 walleye/NN in 2009. The improved CPUE can undoubtedly be attributed to the timing and duration of fyke net sampling (2 weeks in 2009 vs. 1 week in 2014). Additionally, late ice-out causes water temperatures to rise at a greater rate than if the ice goes out in late March or early April. The increased rate at which the water warms, coupled with increased photoperiod (daylight), stimulates spawning within a shorter timeframe. When the ice goes out early (i.e. late March / early April), weather patterns often create fluctuating surface water temperatures. This change in turn causes walleye to move in-and-out of spawning areas for a longer period of time. Therefore, fyke netting must continue in order to mark and recapture enough adults to generate a meaningful population estimate which ultimately affects CPUE.

While the overall catch of walleye declined between surveys, size structure improved (in terms of the number of larger fish available: Figure 8). A large number of 13 and 14-inch walleye were collected in 2009. These fish correspond to the stocking of large fingerling walleye in 2007 and have only averaged 1 inch of growth per year (Figure 8 and Table 1). The 16 to 18-inch walleye collected in 2014 are likely this same year class (Figures 8 & 9). This is especially probable considering the below average growth observed between 2009 and 2014 (Figure 9).

A population estimate for walleye indicated that adult density (fish/acre) declined between 2009 and 2014 from 0.5 to 0.3 walleye/acre, respectively. The decline in density is likely a result of minimal stocking and negligible natural reproduction. Previous stockings have only been a fraction of the recommended rate of 5 fish/acre and natural reproduction is not capable of sustaining a fishable population. The decline in walleye density should not be alarming because the fishery is maintained *mostly* by stocking. Two YOY walleye (5.4 and 5.8 inches) were collected during the fall electrofishing assessment. This is evidence that a low level of natural reproduction is occurring. No YOY walleye were collected in 2009 (Donofrio, 2010).

Small fingerling walleye were stocked by WDNR in the 1970's, 1980, 1998 and 2000 (Table 1). Between 2003 and 2013, the Lake Noquebay Sportsman's Club stocked large fingerling

walleye every other year, except 2011 (Table 1). A stocking quota for large fingerling walleye (5/acre or 11,989 total) was approved in 2014 through the Wisconsin Walleye Initiative. Unfortunately, WDNR was unable to fill this quota due to strain specific production constraints. Therefore, LNAP purchased and stocked 2,000 large fingerling walleye in the fall of 2014 and will likely pursue this again in 2015.

Largemouth bass abundance decreased and size structure waned between the 2009 and 2014 surveys (Table 7 and Figure 10). Also, PSD, RSD^P, average length, and the number of largemouth bass collected over the 14-inch minimum length limit decreased between surveys. The large decline in PSD can likely be attributed to size selectivity of bass due to sampling bias associated with gear selectivity (Ney, 1999). This bias can occur in large systems with diverse habitats such as Lake Noquebay. Figure 14 demonstrates the size selectivity of largemouth bass from electrofishing and fyke netting samples in both 2009 and 2014. More small bass (≤ 11 inches) were caught electrofishing whereas more big bass (≥ 14 inches) were captured fyke netting in both years (Figure 14). It's important to note that the timing and duration (i.e. hours, days, miles of shoreline) of sampling can also drastically influence catch rates. Nonetheless, the length frequency of largemouth bass demonstrated good reproduction and recruitment but growth was slightly below average and showed little change since 2009 (Figures 10 & 11). Bass fishing on Lake Noquebay should continue to provide the same consistent opportunity that it has in previous years.

Between 2009 and 2014, fyke net CPUE for yellow perch increased from 0.5/NN to 2.1/NN, respectively. This change is even more notable because no yellow perch were collected during the 1996 fisheries survey. Overall, yellow perch reproduction and recruitment has been consistent as evidenced by their length frequency distribution (Figure 12). Perch began to spawn before the ice went out April 29th. As such, most perch moved off to deeper water before sampling began. It is conceivable that CPUE may have been higher if the ice had gone out earlier. Future surveys will help determine how robust the perch population actually is in Lake Noquebay.

Only 12 muskellunge were collected during the 2014 survey (Table 7). A population estimate was not calculated due to the low catch rate; only 1 fish was recaptured during the survey. Muskellunge have been stocked in Lake Noquebay annually since 1999 (Table 1). In 2011, WDNR began stocking the maximum allowable rate of 1 fish per acre. Previous stockings averaged only 1,000 fish per year (Table 1). Currently, Lake Noquebay is a study lake for a

statewide muskellunge project investigating the success of muskellunge reared entirely on minnows versus muskellunge started on artificial feed and transitioned to minnows. Each treatment group (minnow reared vs. pelleted started) is given a different fin clip (right ventral vs. left ventral). During the fall, WDNR crews electrofish the entire shoreline multiple times per year in an attempt to capture and estimate survival of each treatment group. After 2 years of stocking and electrofishing, only a handful of YOY muskellunge have been collected. There are several factors that have affected our sampling efficiency for muskellunge in both the spring and fall; lake size, large shallow flats and dense aquatic vegetation. Because the fish from this study are fin clipped, identification of adults in future surveys is possible and may provide a more meaningful contribution to the study than the collection of YOY.

CONCLUSIONS & RECOMMENDATIONS

The late arrival of spring in 2014 diminished the comparability of spring fyke netting data between recent survey years. Even so, the 2014 fisheries survey of Lake Noquebay indicated good numbers of gamefish including panfish species such as bluegill, black crappie, pumpkinseed, rock bass, and yellow perch. Predator species such as northern pike, walleye and largemouth bass were somewhat well represented. All species showed good size structure compared to other lakes in northeast Wisconsin. Growth for most species, except walleye and largemouth bass, was average compared to other lakes in northeast Wisconsin.

Walleye stocking has not been aggressively pursued by WDNR (Table 1). Minimal (fish per acre) private walleye stockings have managed to sustain a small, fishable population and natural reproduction was documented in 2014. WDNR was unable to fill the stocking quota of large fingerling walleye in 2014. Hopefully, since large fingerling walleye quotas are stocked in alternate years, Lake Noquebay should receive fish from WDNR in 2016. In the meantime, I would recommend that LNAP pursue stocking large fingerling walleye annually until WDNR can fill the stocking quota for Lake Noquebay.

WDNR staff identified several areas that would be ideal for creating and enhancing walleye spawning habitat. Throughout 2014, WDNR and LNAP developed a proposal in cooperation with a single property owner, Jim Klukas, to construct a walleye spawning reef over the next several years. This shoreline receives a great deal of wind and wave action that should stimulate walleye spawning. Additional spawning areas should be identified and evaluated for future habitat work

(spawning reefs). Walleye stocking, in combination with enhancing spawning habitat, will increase the density of walleye in Lake Noquebay. However, both activities should continue in order to develop a quality walleye fishery. Habitat improvements alone will not sustain or maintain a fishable population of walleye.

Stocking of muskellunge in Lake Noquebay should continue. It does not appear that natural reproduction is capable of sustaining a fishable population of muskellunge. No adverse impacts to the fishery have been observed as a result of previous muskellunge stockings. Because the forage base and habitat are conducive to support a muskellunge fishery, we recommend that WDNR should continue stocking 2,400 large fingerling muskellunge / year (1 fish/acre). It is also recommended that these fish are fin clipped prior to stocking several years after the muskellunge rearing project is complete. Fin clips should alternate between years (i.e. RV in even years; LV in odd years) to distinguish stocked fish from those that may be the result of natural reproduction. Fin clipping will also help identify individual year classes, potentially making it easier to assess age and growth in future surveys.

The current fishing regulations (Table 8) are adequate to provide quality fishing opportunities. No changes to fishing regulations are recommended at this time. There has been an interest in restructuring panfish regulations to produce larger panfish, specifically bluegill. However, bluegill abundance, size structure and growth are better than any other lake in Marinette County. Improving bluegill size structure (i.e. more bluegill \geq 8 inches) will be challenging. While there are many potential regulatory options to improve panfish populations, WDNR has developed a statewide panfish management plan and research study to identify which, if any, fishing regulation(s) are successful at improving panfish size structure; see the following link (<http://dnr.wi.gov/topic/fishing/outreach/panfishplan.html>). Once the analysis of this project is complete, we (WDNR, LNAP and other stakeholder groups) can determine which option (if any) is suitable for Lake Noquebay.

Lake Noquebay has long been known for its abundant pike population however, most are small (pike between 15 and 20 inches). Northern pike are not overabundant. The population has poor size structure and is comprised mostly of fish less than 20 inches. There is nothing preventing pike from successfully reproducing in Lake Noquebay and that will probably not change due to the abundant and diverse community of aquatic vegetation present. Therefore, a potential fishing regulation option to improve northern pike size structure would be to liberalize

the daily bag limit (> 5 fish / day) and allow harvest of only one large fish / day (i.e. \geq 26 inches). This type of regulation would reduce the abundance of smaller fish but still maintain a quality fishing opportunity for northern pike. Currently there is not a more consumptive regulation option available other than the current statewide regulation for northern pike (no minimum size and a daily limit of 5 / day). Future collaboration with the WDNR Northern Pike Management Team is necessary before such a regulation could be proposed and implemented.

The next comprehensive fisheries survey (fyke netting, spring and fall electrofishing) of Lake Noquebay is scheduled for 2020 and will focus on the age, growth, abundance, and recruitment of the dominant gamefish and panfish. Boat access to Lake Noquebay is adequate since anglers have two boat landings to choose from but shore-fishing opportunities are very limited relative to the size of the lake. Boaters are reminded to remove all vegetation from their boat and trailer before leaving to limit the spread of this and other invasive species. A map of Lake Noquebay can be found at the following internet address;

<http://dnr.wi.gov/lakes/maps/DNR/0525900a.pdf>

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APPENDIX I – TABLES

Table 1. Stocking history of Lake Noquebay; Marinette County, WI.

Year	Species	Strain Stock	Age Class	Number Stocked	Average Length	Source Type
1990	MUSKELLUNGE	UNSPECIFIED	FINGERLING	869	10.0	DNR COOP PONDS
1991	MUSKELLUNGE	UNSPECIFIED	FINGERLING	748	12.0	DNR HATCHERY
1992	MUSKELLUNGE	UNSPECIFIED	FINGERLING	1000	11.0	DNR HATCHERY
1993	MUSKELLUNGE	UNSPECIFIED	FINGERLING	1000	10.8	DNR COOP PONDS
1995	MUSKELLUNGE	UNSPECIFIED	FINGERLING	614	9.8	DNR HATCHERY
1999	MUSKELLUNGE	UNSPECIFIED	YEARLING	100	16.0	PRIVATE HATCHERY
1999	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	1000	10.9	DNR HATCHERY
2000	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	1700	11.4	DNR HATCHERY
2001	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	1000	10.6	DNR HATCHERY
2002	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	999	9.9	DNR HATCHERY
2003	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	999	10.5	DNR HATCHERY
2004	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	999	10.5	DNR HATCHERY
2005	MUSKELLUNGE	UNSPECIFIED	LARGE FINGERLING	997	10.6	DNR HATCHERY
2006	MUSKELLUNGE	UPPER WI RIVER	LARGE FINGERLING	1000	10.5	DNR HATCHERY
2007	MUSKELLUNGE	UPPER WI RIVER	LARGE FINGERLING	667	13.0	DNR HATCHERY
2008	MUSKELLUNGE	UPPER WI RIVER	LARGE FINGERLING	1000	10.3	DNR HATCHERY
2009	MUSKELLUNGE	UPPER WI RIVER	LARGE FINGERLING	1000	9.1	DNR HATCHERY
2010	MUSKELLUNGE	UPPER WI RIVER	LARGE FINGERLING	729	13.2	DNR HATCHERY
2011	MUSKELLUNGE	UPPER WI RIVER	LARGE FINGERLING	2497	9.2	DNR HATCHERY
2012	MUSKELLUNGE	UPPER WI RIVER	LARGE FINGERLING	2409	10.2	DNR HATCHERY
2013	MUSKELLUNGE	UPPER WI RIVER	LARGE FINGERLING	1596	11.4	DNR HATCHERY
2014	MUSKELLUNGE	UPPER WI RIVER	LARGE FINGERLING	2299	8.9	DNR HATCHERY
1988	RAINBOW TROUT	UNSPECIFIED	YEARLING	1500	8.0	FIELD TRANSFER
1972	WALLEYE	UNSPECIFIED	FINGERLING	30000	3.0	DNR COOP PONDS
1974	WALLEYE	UNSPECIFIED	FINGERLING	30000	4.0	DNR COOP PONDS
1978	WALLEYE	UNSPECIFIED	FINGERLING	29548	4.0	DNR COOP PONDS
1979	WALLEYE	UNSPECIFIED	FINGERLING	40000	3.0	DNR COOP PONDS
1980	WALLEYE	UNSPECIFIED	FINGERLING	35000	3.0	DNR COOP PONDS
1993	WALLEYE	UNSPECIFIED	YEARLING	800	7.0	PRIVATE HATCHERY
1998	WALLEYE	UNSPECIFIED	SMALL FINGERLING	20000	1.7	DNR PONDS
2000	WALLEYE	UNSPECIFIED	LARGE FINGERLING	719		PRIVATE HATCHERY
2000	WALLEYE	UNSPECIFIED	SMALL FINGERLING	20000	1.7	DNR HATCHERY
2003	WALLEYE	UNSPECIFIED	LARGE FINGERLING	578	10.0	PRIVATE HATCHERY
2005	WALLEYE	UNSPECIFIED	LARGE FINGERLING	650	7.5	PRIVATE HATCHERY
2007	WALLEYE	UNSPECIFIED	LARGE FINGERLING	1362	7.5	PRIVATE HATCHERY
2009	WALLEYE	UNSPECIFIED	LARGE FINGERLING	678	8.0	PRIVATE HATCHERY
2013	WALLEYE	UNSPECIFIED	LARGE FINGERLING	1000	7.0	PRIVATE HATCHERY
2014	WALLEYE	GREAT LAKES	LARGE FINGERLING	2000	8.0	PRIVATE HATCHERY

Table 2. Sampling gear, date, target species, sampling effort, and location (distance) for 2014 fisheries survey on Lake Noquebay; Marinette County, WI.

Gear	Date	Target	Sampling Effort	Shoreline
		Species	hours (h) or net night (NN)	Distance (mi)
Fyke net	April 29 - May 6	All fish	84 NN	
Electrofishing	06-May	Walleye, Muskellunge	2.1 h	4.0
Electrofishing	June 9 & June 12	All fish	0.7 h	1.5
		Gamefish	2.9 h	6.0
Electrofishing	15-Sep	YOY Walleye	2.7 h	6.0
Electrofishing	October 8 & October 21	Muskellunge	8.2 h	17.0

Table 3. Proposed length categories for various fish species. Measurements are total lengths for each category in inches. Updated from Anderson and Neumann (1996), Bister et al. (2000), Hyatt and Hubert (2001).

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

*Range based on management strategy for balanced populations.

Table 4. Number, relative abundance (%), and length range (in) of fishes collected in 2014 from Lake Noquebay; Marinette County, WI.

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER			
*COMMON NAME OF FISH	NUMBER	PERCENT	LENGTH RANGE (inches)
Bluegill	5,222	58.4%	2.4 - 10.1
Black crappie	1,344	15.0%	4.6 - 12.5
Rock bass	531	5.9%	3.2 - 11.2
Northern pike**	482	5.4%	9.5 - 34.5
Pumpkinseed	469	5.2%	3.6 - 8.4
Walleye	287	3.2%	5.4 - 24.7
Largemouth bass**	200	2.2%	5.8 - 17.9
Yellow perch	194	2.2%	3.8 - 11.1
Warmouth	63	0.7%	
Yellow bullhead	47	0.5%	
Bowfin	35	0.4%	
White sucker	21	0.2%	
Muskellunge**	12	0.1%	15.5 - 47.2
Shorthead redhorse	9	0.1%	
Brown bullhead	8	0.1%	
Hybrid sunfish	7	0.1%	
Silver redhorse	4	<0.1%	
Brown trout	2	<0.1%	
Smallmouth bass	2	<0.1%	
Black bullhead	1	<0.1%	
Lake chubsucker	1	<0.1%	
Total	8,941		
* Common names of fishes recognized by the American Fisheries Society.			
** Includes recaptured fish.			

Table 5. Comparison of spring fyke netting data between 2009 and 2014 collected from Lake Noquebay; Marinette County, WI.

2014 Fyke Netting (84*)			2009 Fyke Netting (185*)		
Species	Total Catch	Mean Catch per net night	Species	Total Catch	Mean Catch per net night
Bluegill	5072	60.4	Bluegill	1928	10.4
Black crappie	1342	16.0	Rock bass	1130	6.1
Rock bass	526	6.3	Northern pike**	508	2.7
Northern pike**	478	5.7	Walleye	506	2.7
Pumpkinseed	445	5.3	Largemouth bass**	392	2.1
Walleye	272	3.2	Black crappie	290	1.6
Yellow perch	178	2.1	Pumpkinseed	252	1.4
Largemouth bass**	133	1.6	Yellow Perch	85	0.5
Muskellunge	9	0.1	Muskellunge**	19	0.1
* Sampling effort in net nights for each corresponding year.					
**Includes recaptured fish.					

Table 6. Seasonal electrofishing summary between 2009 and 2014 surveys on Lake Noquebay; Marinette County, WI.

Species	Spring electrofishing						Gamefish/Panfish electrofishing						Fall electrofishing					
	2014 April			2009 April			2014 June			2009 May/June			2014 September			2009 October		
	Total Catch	CPUE / hour	CPUE / mile	Total Catch	CPUE / hour	CPUE / mile	Total Catch	CPUE / hour	CPUE / mile	Total Catch	CPUE / hour	CPUE / mile	Total Catch	CPUE / hour	CPUE / mile	Total Catch	CPUE / hour	CPUE / mile
Bluegill							150	195.7	100.0	128	102.4	64						
Yellow perch							16	20.9	10.7	1	0.8	0.5						
Northern pike							4	1.4	0.7	3	0.7	0.4				24	6.2	3.0
Black crappie							2	2.6	1.3	68	54.4	34.0						
Walleye	18	1.4	0.7	59	28.3	14.8	4	1.4	0.7	13	2.9	1.6	3	0.5	1.1	17	4.4	2.1
Largemouth bass	10	6.7	3.3				57	19.9	9.5	142	31.9	17.8				23	5.9	2.9
Pumpkinseed							24	31.3	16.0	13	10.4	6.5						
Rock Bass							5	6.5	3.3	13	10.4	6.5						
Muskellunge	1	0.7	0.3							1	0.2	0.1	1	0.2	0.4			
Smallmouth bass																1	0.3	0.1

Table 7. Comparison of species relative abundance between 2009 and 2014 surveys on Lake Noquebay; Marinette County, WI.

2014			2009		
Species	No.	%	Species	No.	%
Bluegill	5,222	58.4%	Bluegill	2,056	33.0%
Black crappie	1,344	15.0%	Rock bass	1,143	18.4%
Rock bass	531	5.9%	Walleye	554	8.9%
Northern pike**	482	5.4%	Largemouth bass**	557	8.9%
Pumpkinseed	469	5.2%	Northern pike**	535	8.6%
Walleye	287	3.2%	Black crappie	358	5.7%
Largemouth bass**	200	2.2%	Yellow bullhead	281	4.5%
Yellow perch	194	2.2%	Pumpkinseed	265	4.3%
Warmouth	63	0.7%	Bowfin	126	2.0%
Yellow bullhead	47	0.5%	Brown bullhead	119	1.9%
Bowfin	35	0.4%	Yellow perch	86	1.4%
White sucker	21	0.2%	Shorthead redhorse	39	0.6%
Muskellunge**	12	0.1%	White sucker	27	0.4%
Shorthead redhorse	9	0.1%	Muskellunge**	20	0.3%
Brown bullhead	8	0.1%	Lake chubsucker	17	0.3%
Hybrid sunfish	7	0.1%	Golden redhorse	13	0.2%
Silver redhorse	4	<0.1%	Warmouth	12	0.2%
Brown trout	2	<0.1%	Black bullhead	4	0.1%
Smallmouth bass	2	<0.1%	Longnose gar	4	0.1%
Black bullhead	1	<0.1%	Silver redhorse	4	0.1%
Lake chubsucker	1	<0.1%	Smallmouth bass	3	<0.1%
			Bluntnose minnow	2	<0.1%
Total	8,941		Brook trout	1	<0.1%
			Burbot	1	<0.1%
			Total	6,227	
**Includes recaptured fish					

Table 8. Current (2014-2015) fishing regulations for Lake Noquebay; Marinette County, WI.

Species	Fishing Season	Daily Limit	Minimum Length
Largemouth bass	May 3- March 1	5	14 inches
Smallmouth bass	May 3- June 20	Catch and release	
	June 21- March 1	5 in total with LMB	14 inches
Northern pike	May 3 - March 1	5	None
Muskellunge	May 24-Nov 30	1	40 inches
Walleye	May 3- March 1	5	15 inches
Panfish (bluegill, pumpkinseed, crappie, and yellow perch)	Open all year	25 in total	None
Bullheads	Open all year	None	None
Rock bass	Open all year	None	None

APPENDIX II – FIGURES

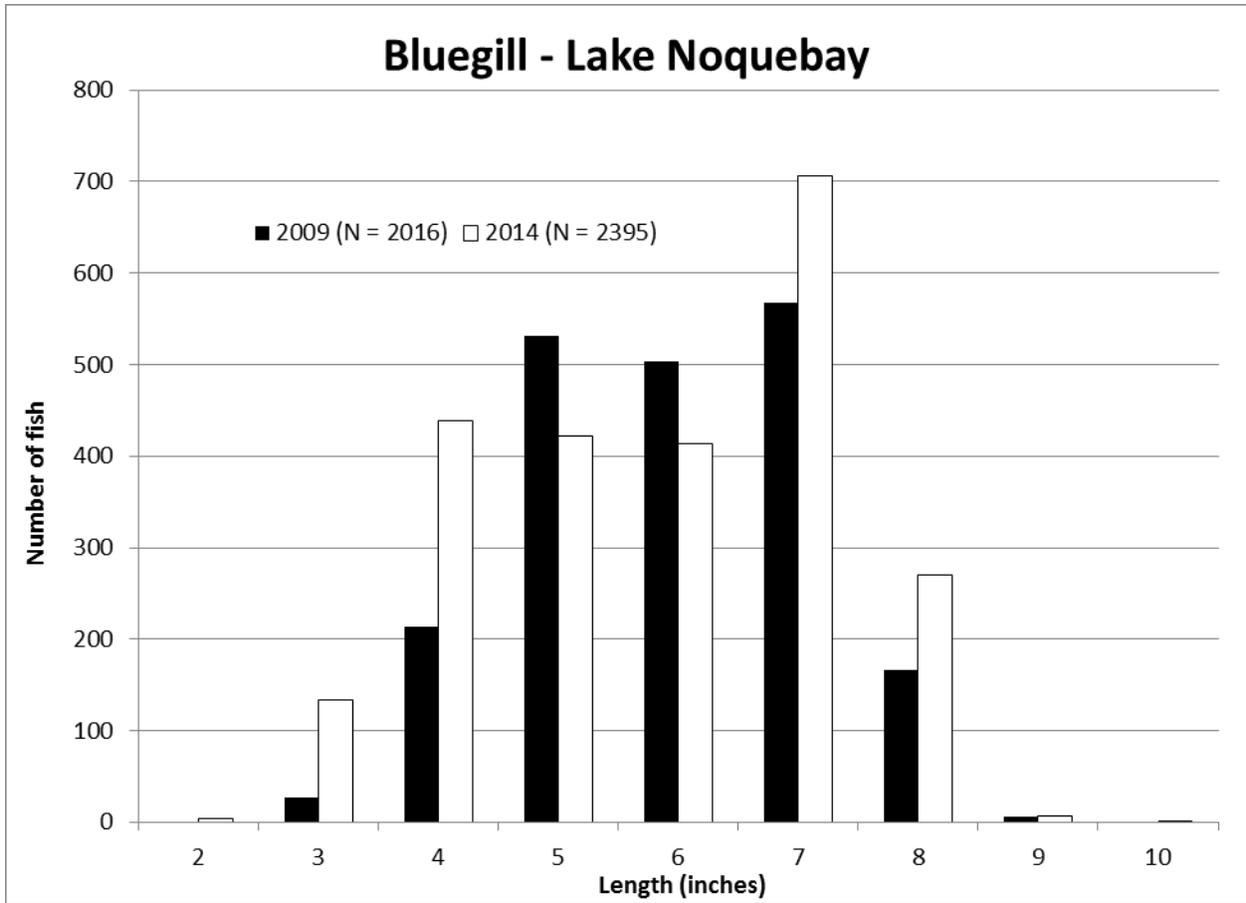


Figure 1. Bluegill length frequency from 2009 and 2014 fisheries surveys at Lake Noquebay; Marinette County, WI.

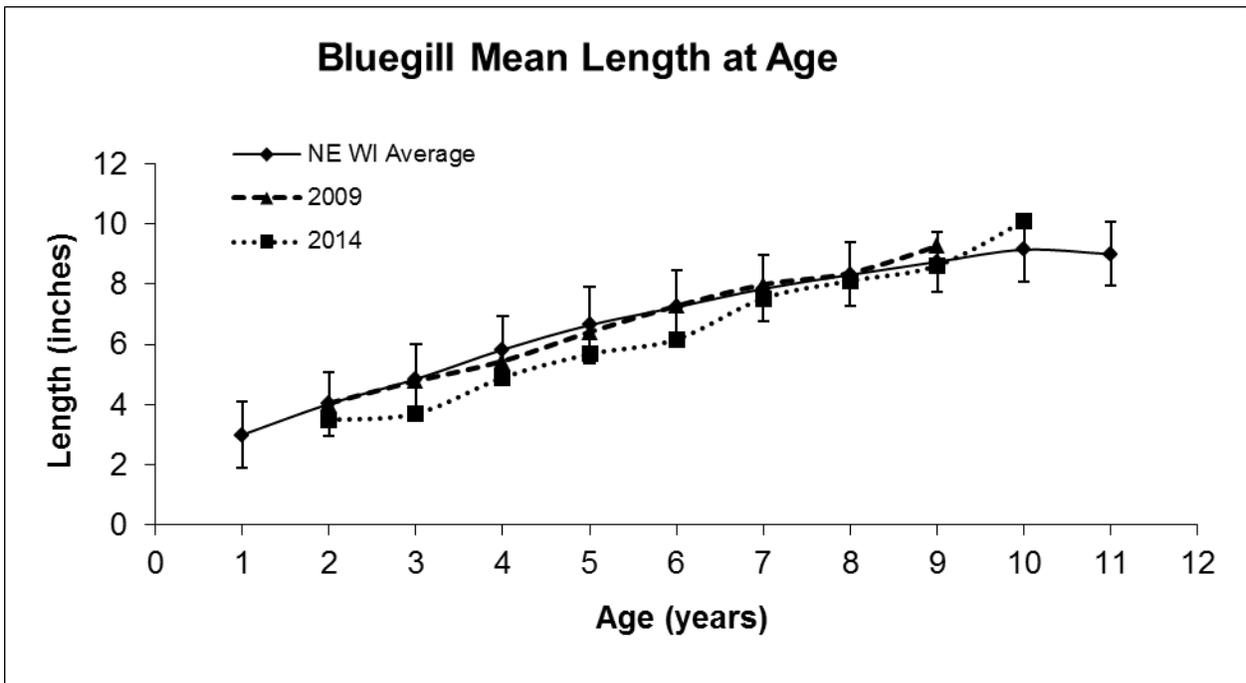


Figure 2. Bluegill mean length at age comparison from Lake Noquebay; Marinette County, WI.

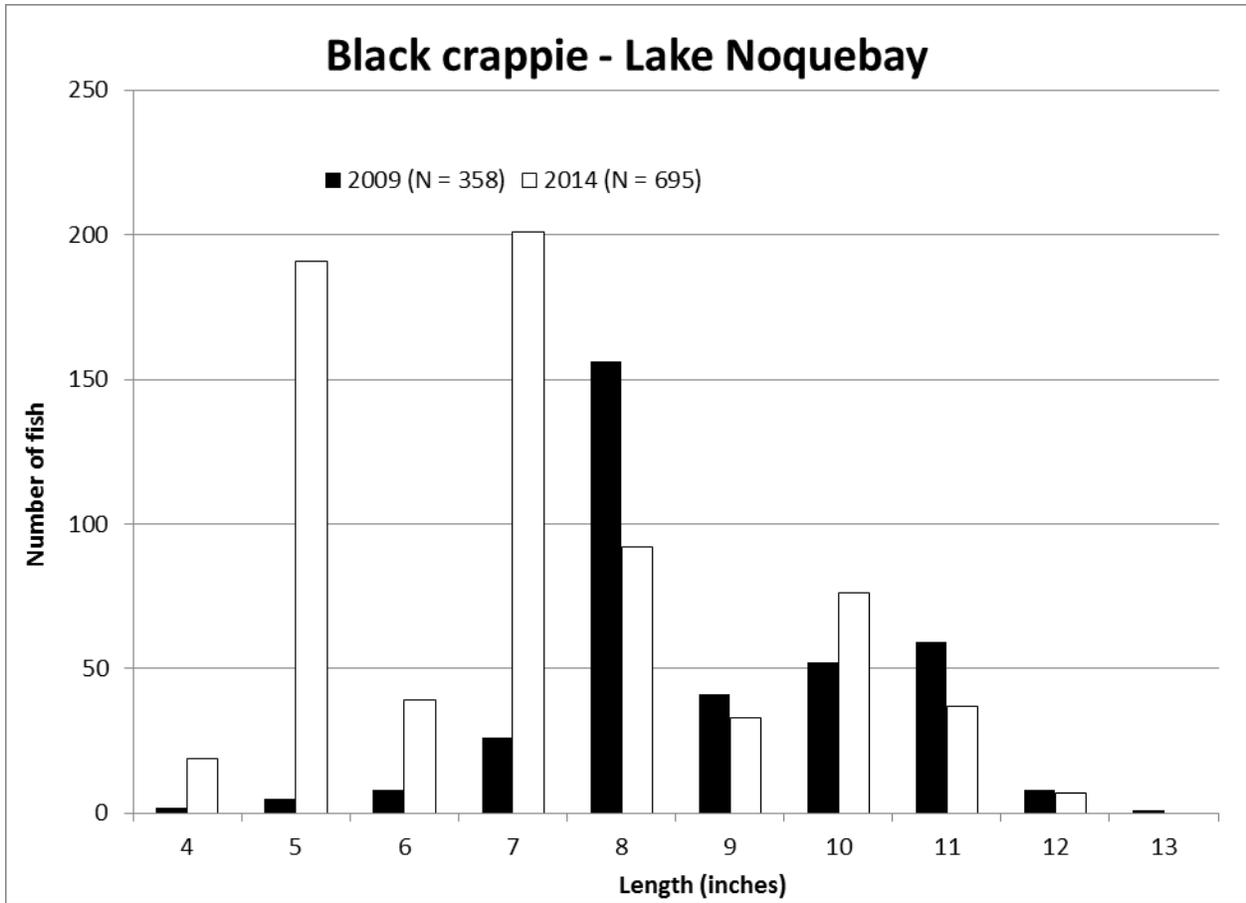


Figure 3. Black crappie length frequency from 2009 and 2014 fisheries surveys at Lake Noquebay; Marinette County, WI.

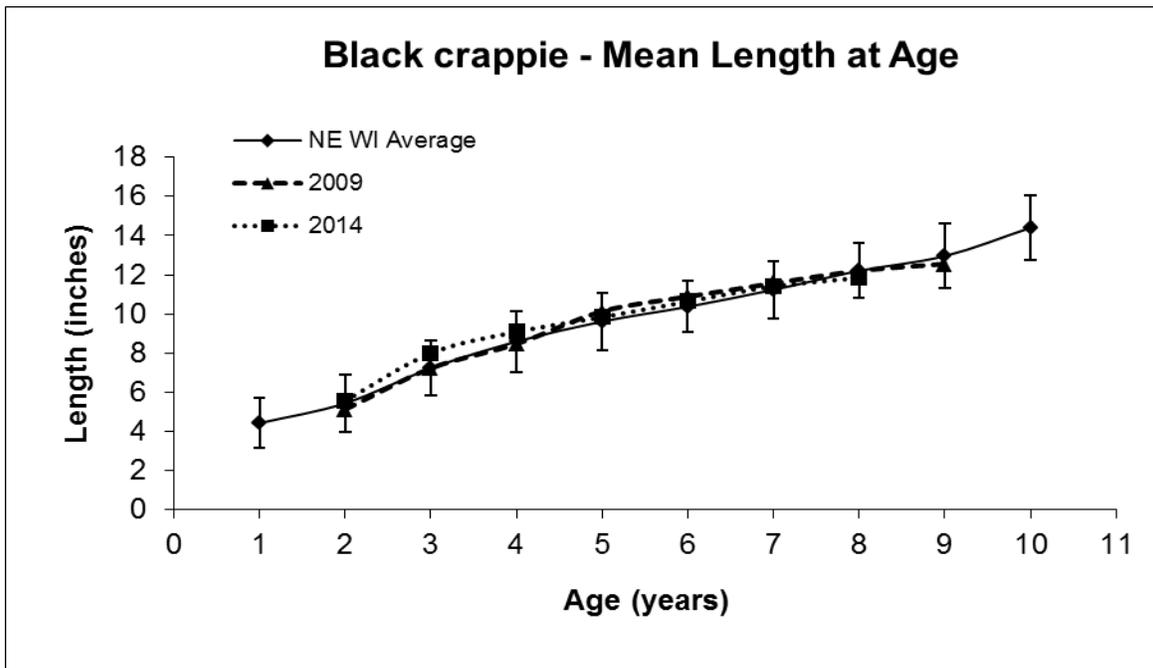


Figure 4. Black crappie mean length at age comparison from Lake Noquebay; Marinette County, WI.

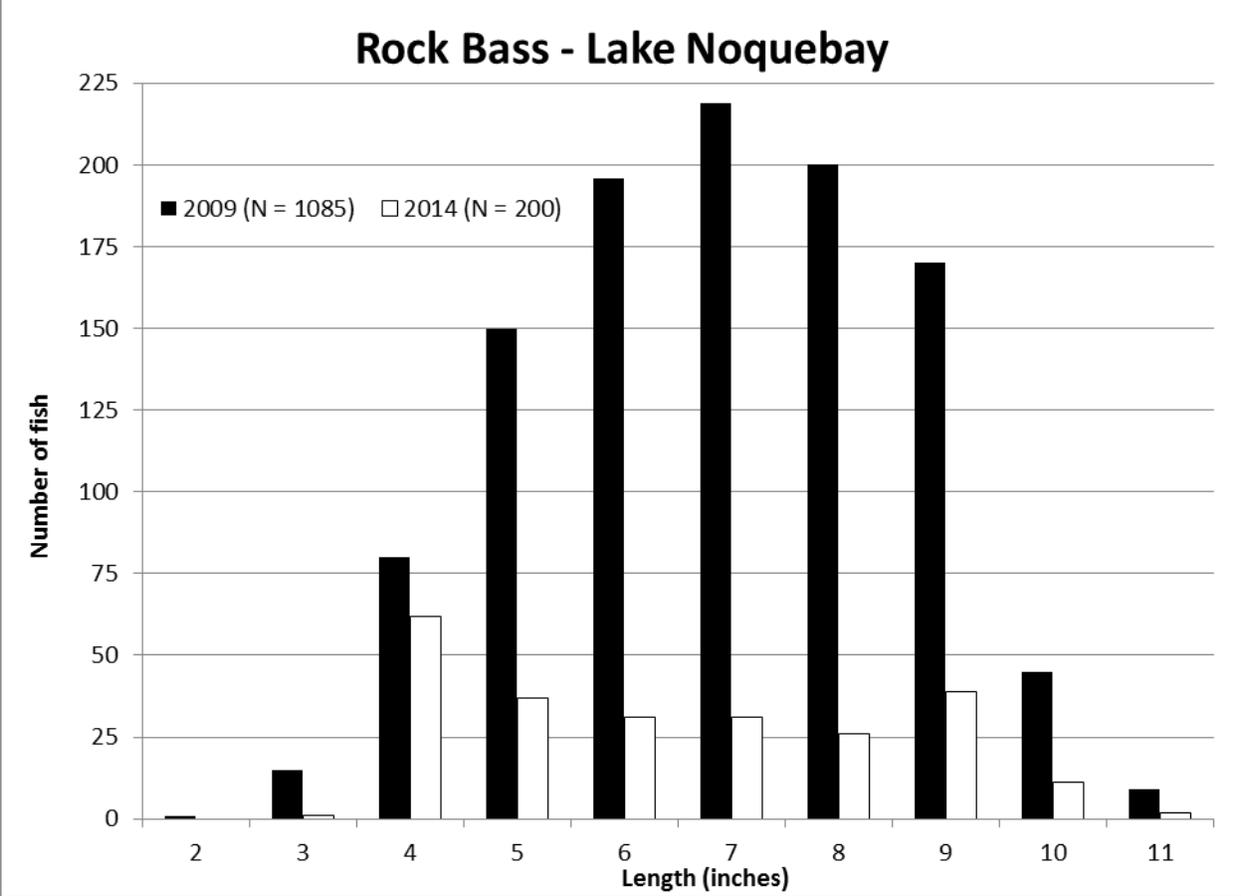


Figure 5. Rock bass length frequency from 2009 and 2014 fisheries surveys at Lake Noquebay; Marinette County, WI.

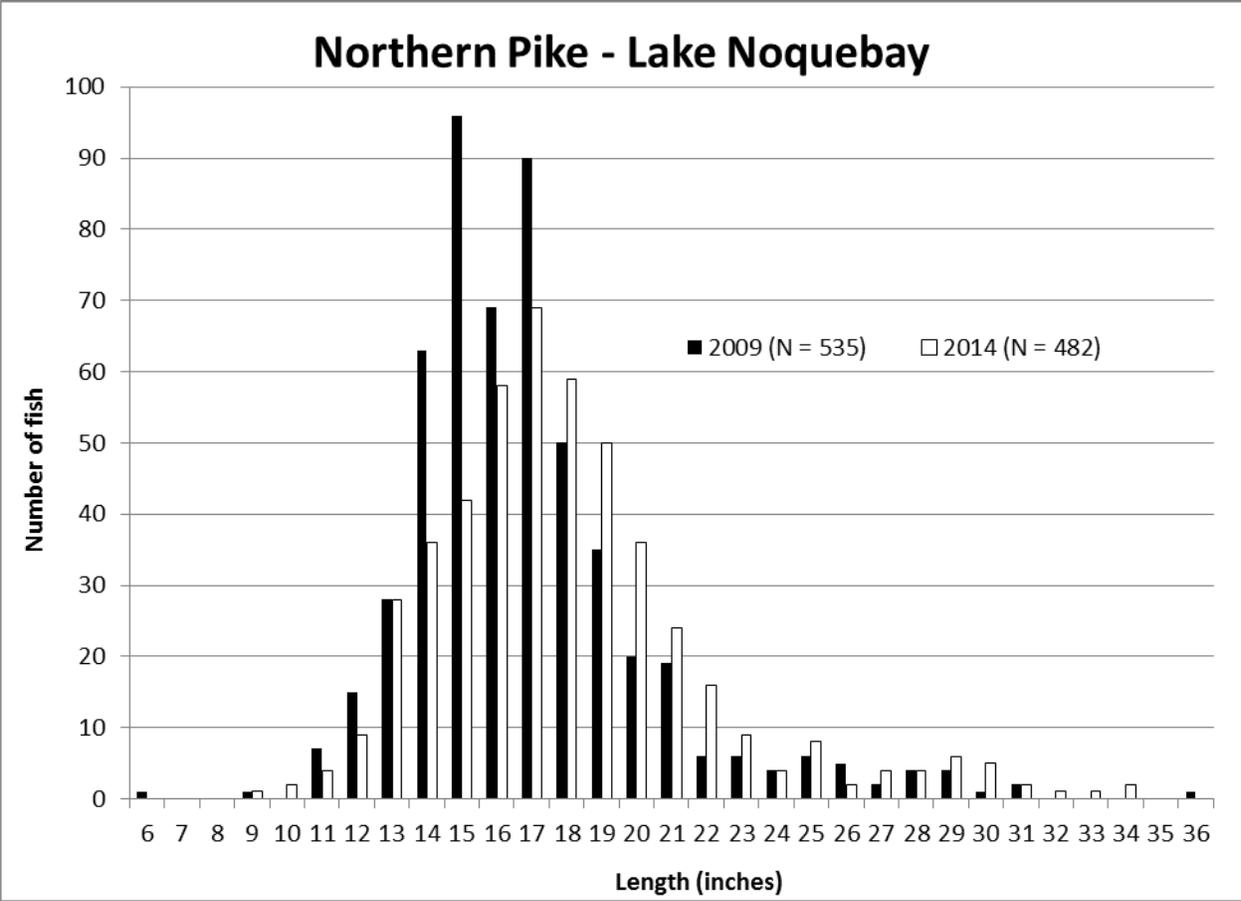


Figure 6. Northern pike length frequency from 2009 and 2014 fisheries surveys at Lake Noquebay; Marinette County, WI.

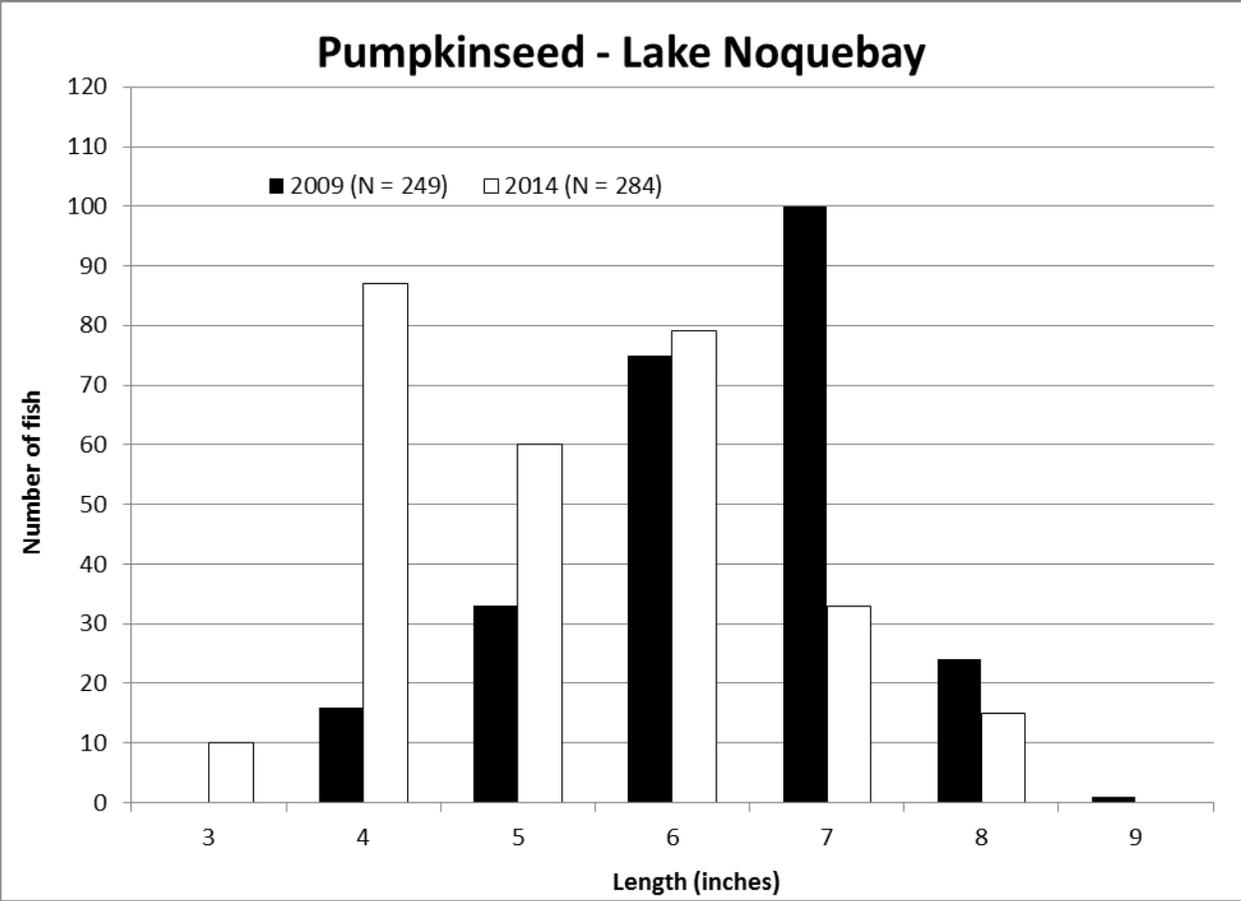


Figure 7. Pumpkinseed length frequency from 2009 and 2014 fisheries surveys at Lake Noquebay; Marinette County, WI.

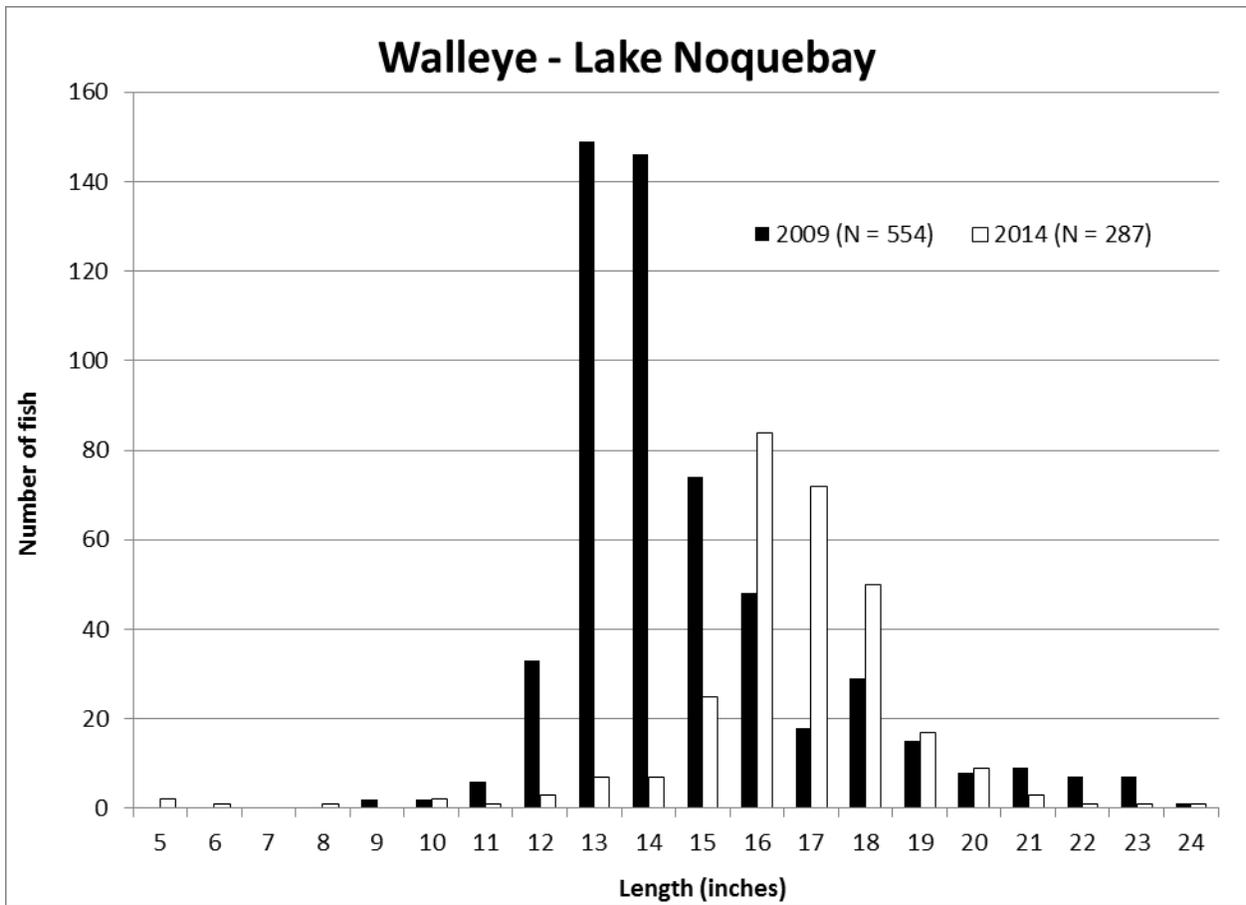


Figure 8. Walleye length frequency from 2009 and 2014 fisheries surveys at Lake Noquebay; Marinette County, WI.

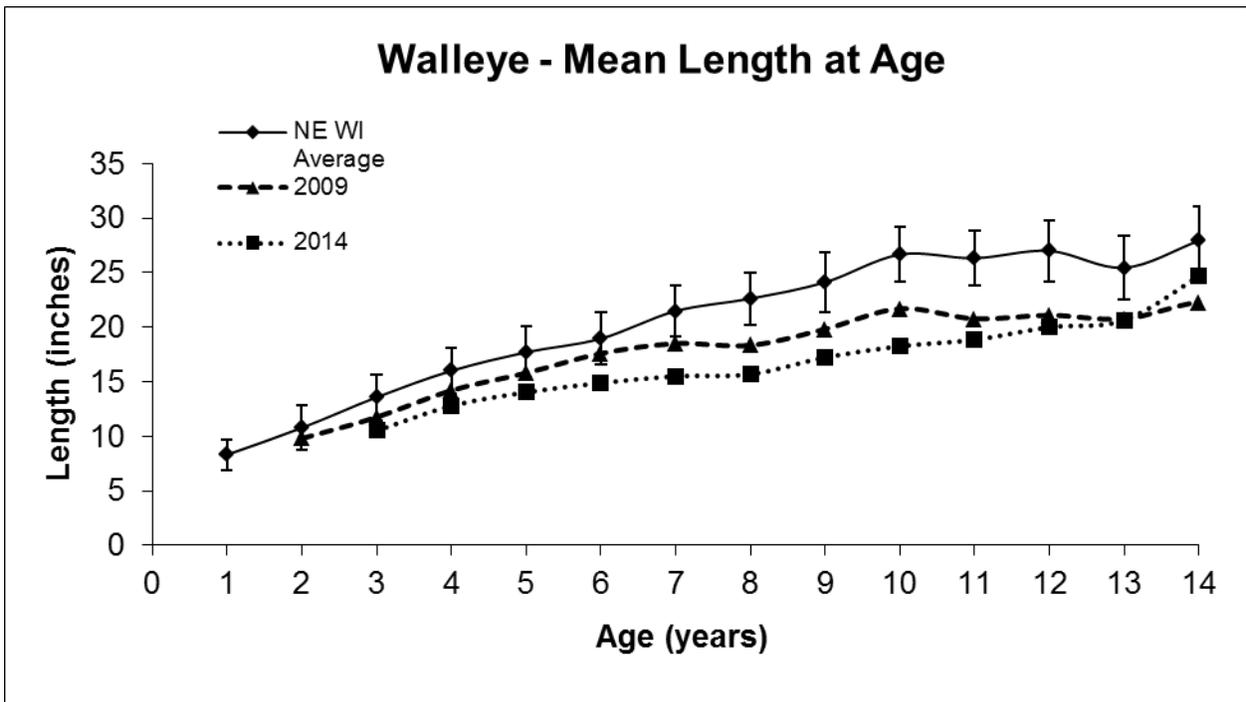


Figure 9. Walleye mean length at age comparison from Lake Noquebay; Marinette County, WI.

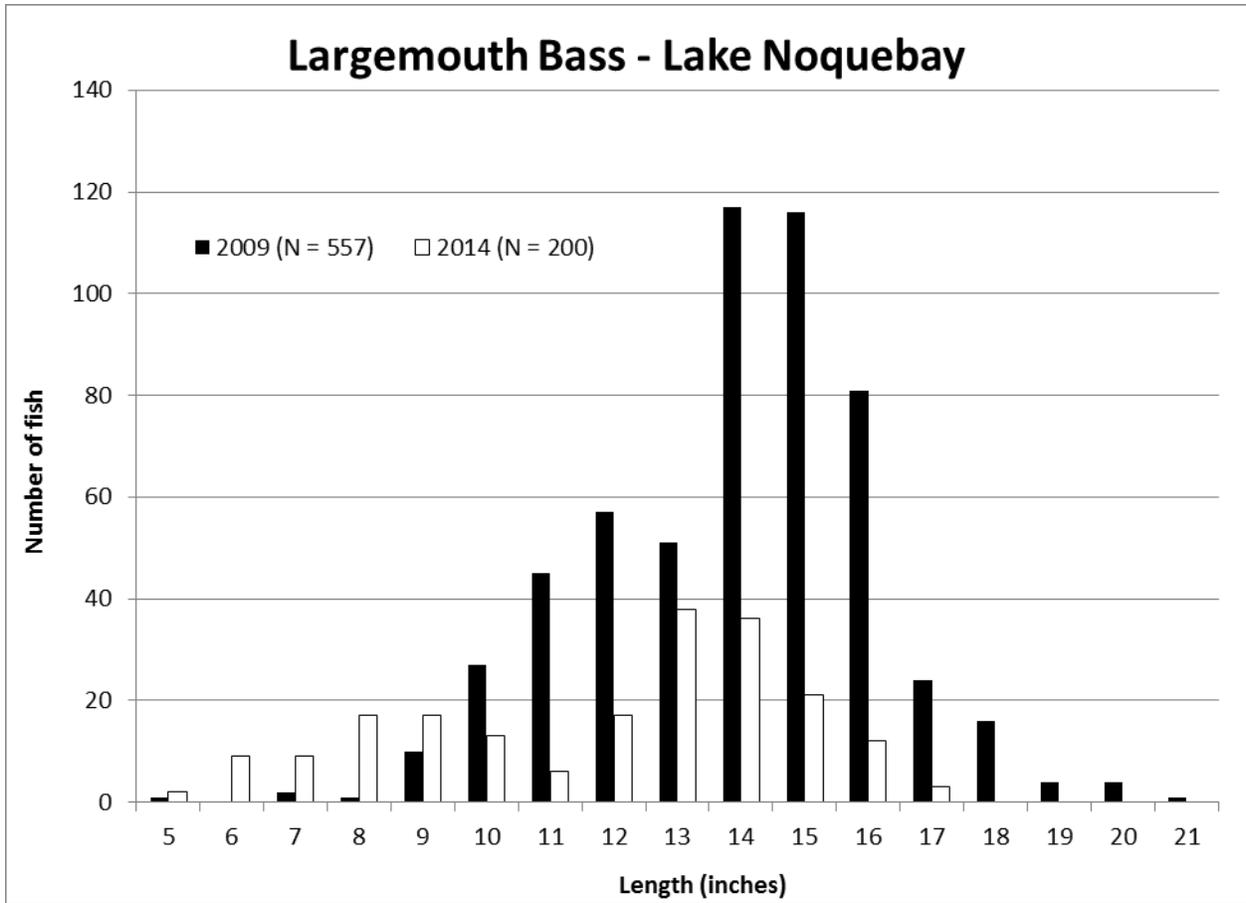


Figure 10. Largemouth bass length frequency from 2009 and 2014 fisheries surveys at Lake Noquebay; Marinette County, WI.

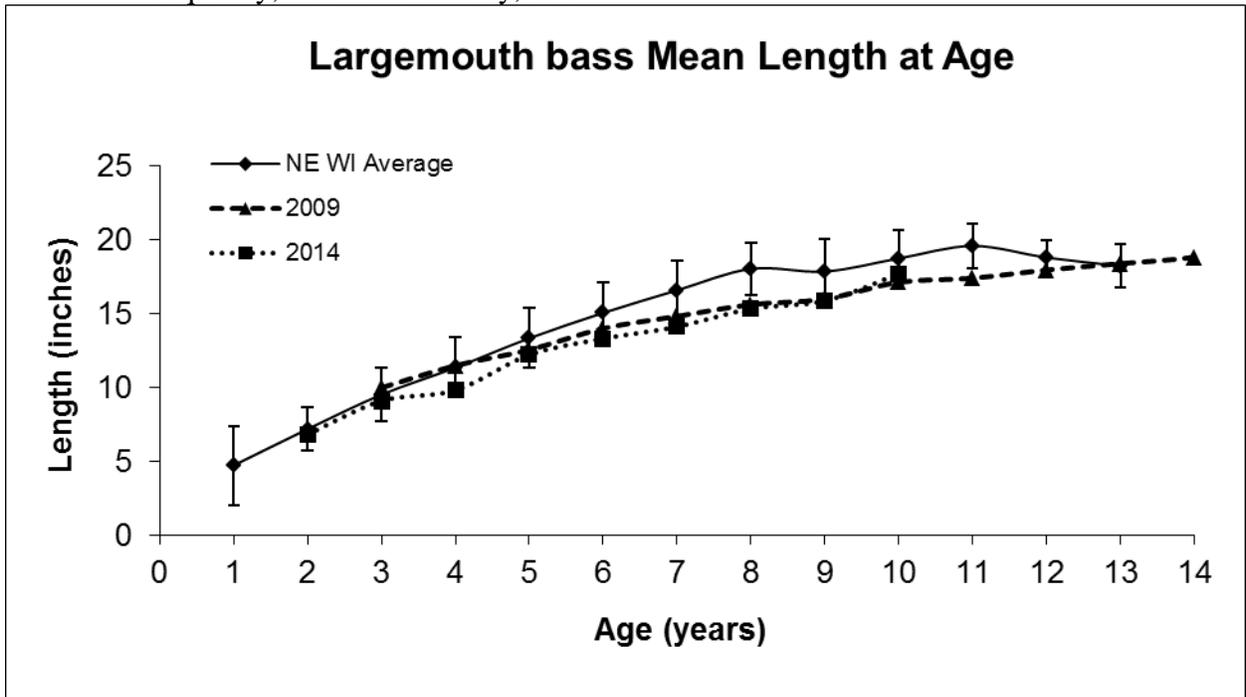


Figure 11. Largemouth bass mean length at age comparison from Lake Noquebay; Marinette County, WI.

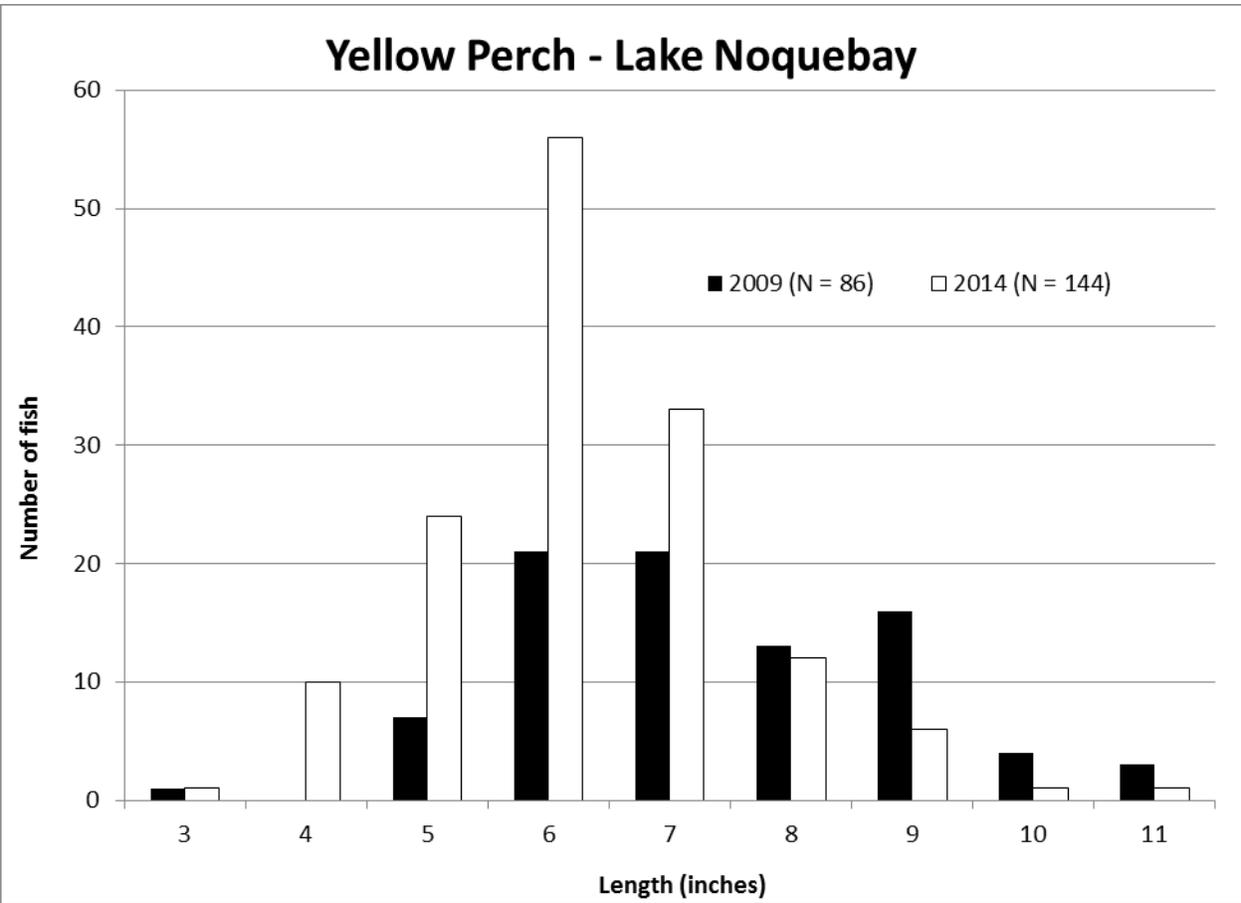


Figure 12. Yellow perch length frequency from 2009 and 2014 fisheries surveys at Lake Noquebay; Marinette County, WI.

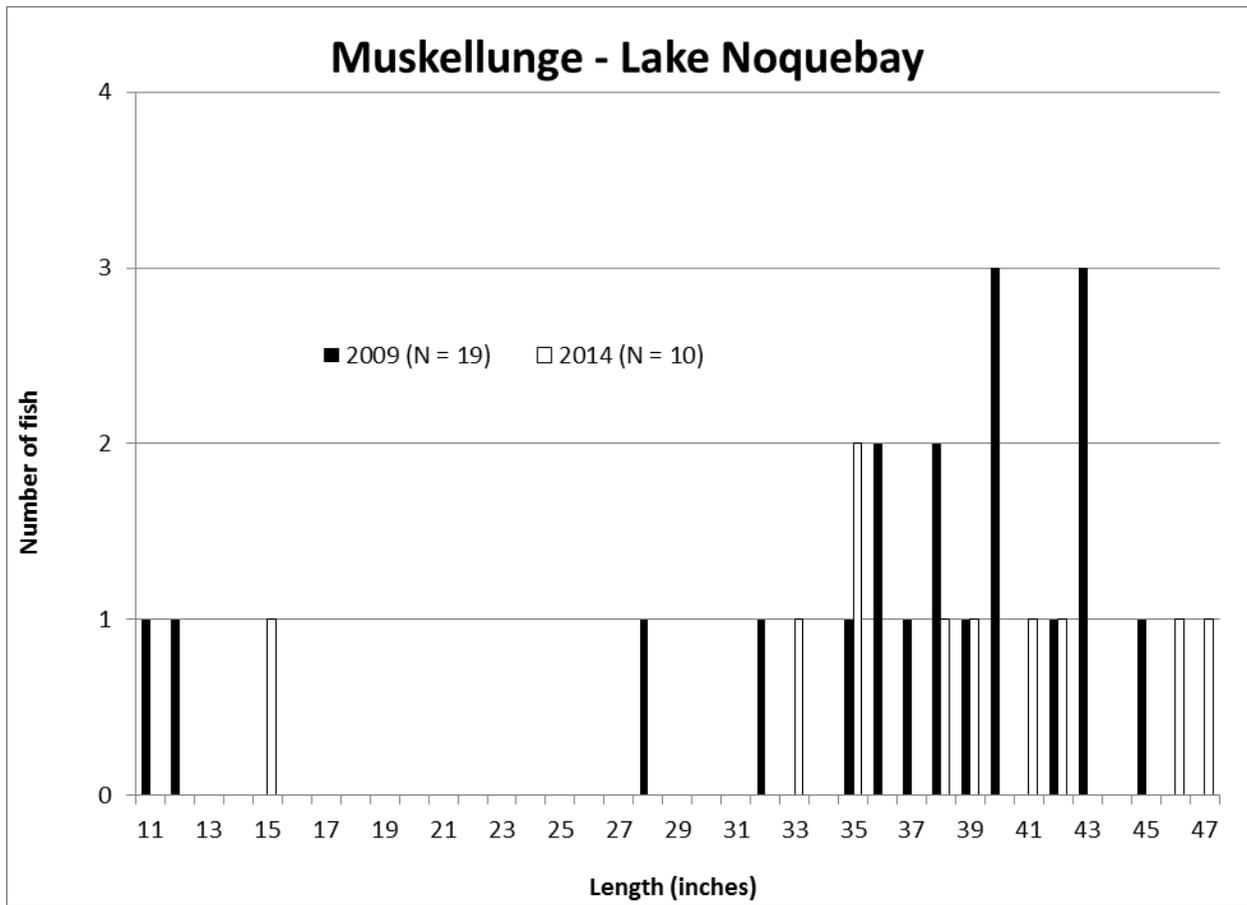


Figure 13. Muskellunge length frequency from 2009 and 2014 fisheries surveys at Lake Noquebay; Marinette County, WI.

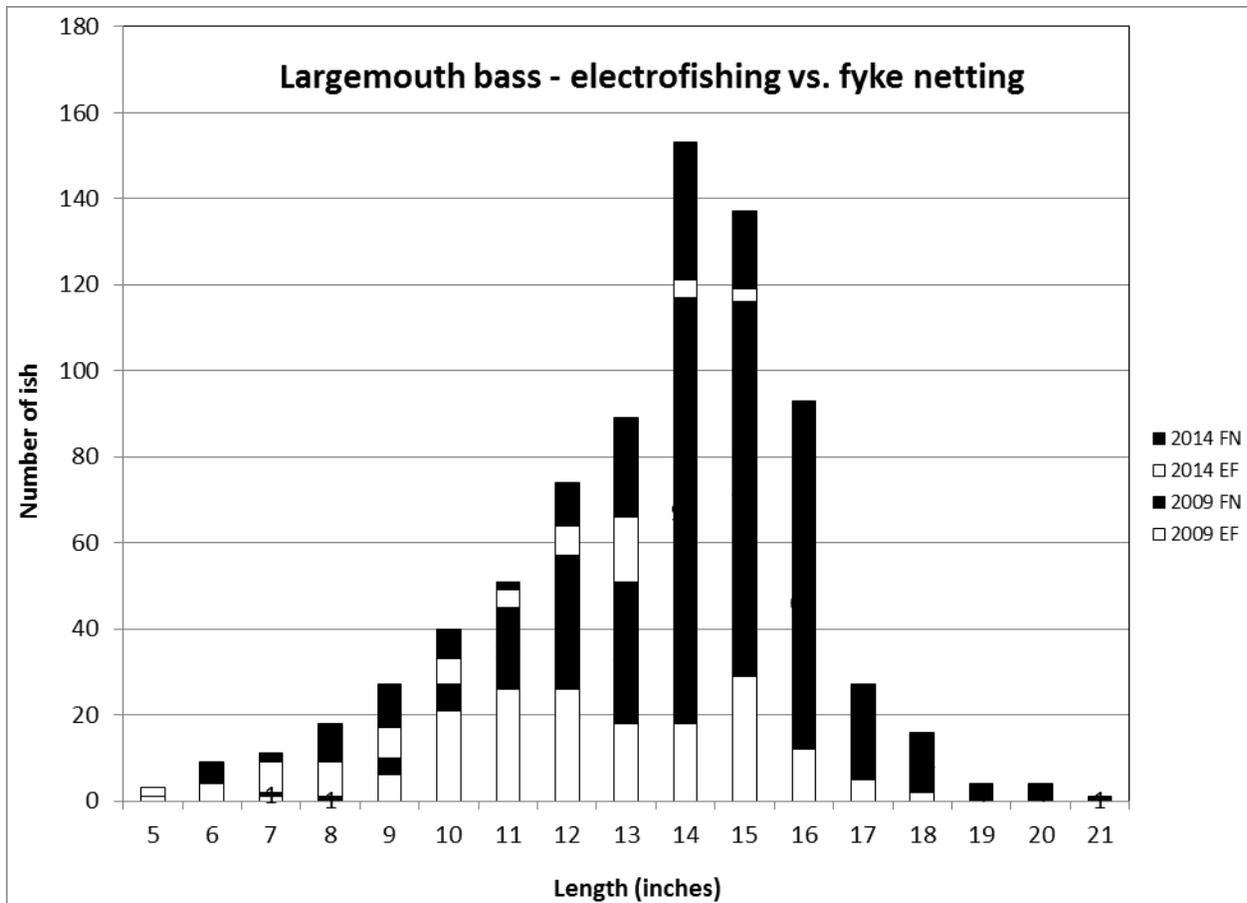


Figure 14. Comparison of electrofishing and fyke net catch of largemouth bass for 2009 and 2014 fisheries surveys in Lake Noquebay; Marinette County, WI.

APPENDIX III – SAMPLING LOCATIONS

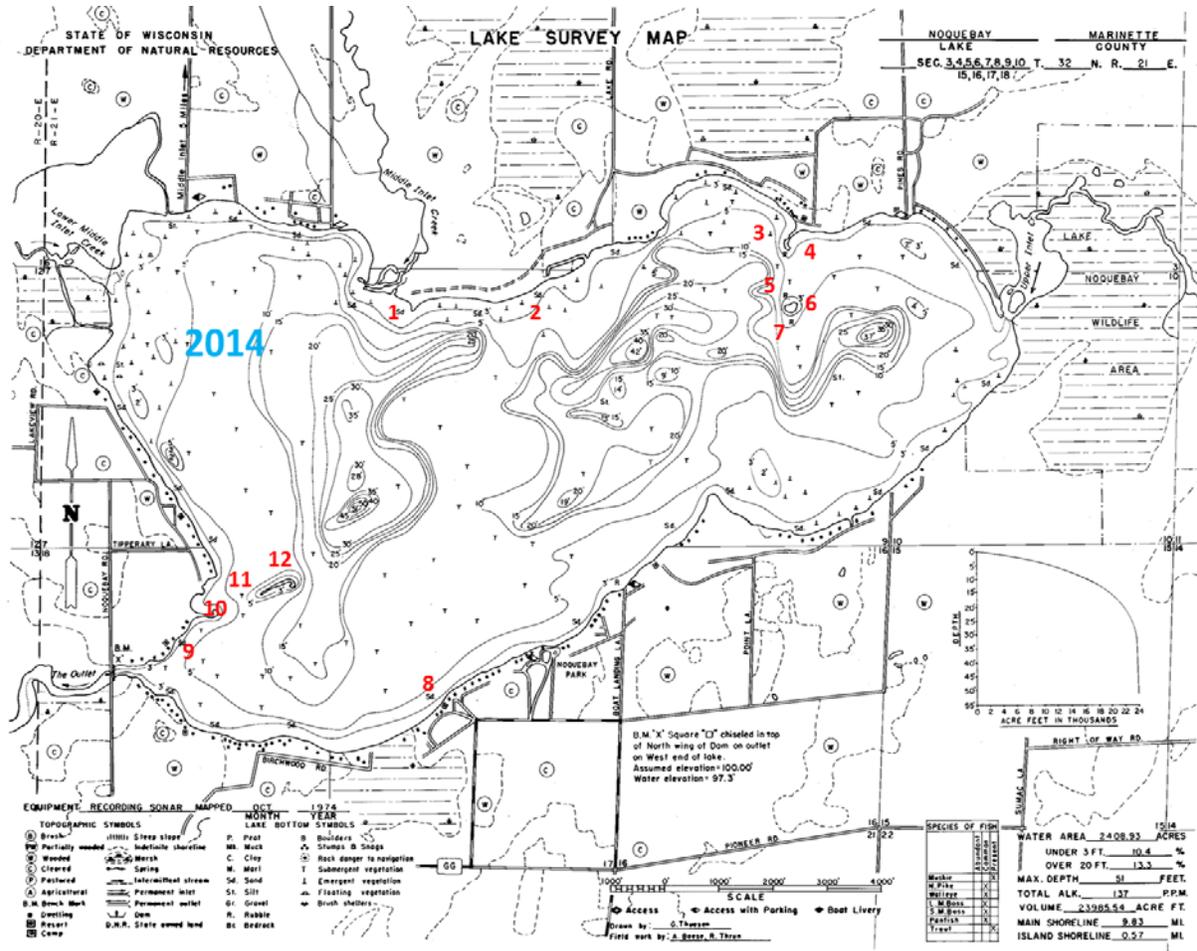


Figure 15. Fyke net locations during 2014 comprehensive survey of Lake Noquebay; Marinette County, WI.