Comprehensive Fishery Survey of Dutch Hollow Lake,
Sauk County, Wisconsin 2016

Waterbody Identification Code: 1286500

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Approvals

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EXECUTIVE SUMMARY

A comprehensive fishery survey was conducted on Dutch Hollow Lake in 2016, including early fyke netting for northern pike and walleyes (SN1), early spring electrofishing to recapture marked walleyes (SE1), late spring electrofishing efforts targeting bass and panfish (SE2), and a fall electrofishing survey to assess walleye stocking success. In total, 3,184 fish representing 11 species from 5 families were collected.

Largemouth bass was the most abundant of all sport fish species collected (panfish or gamefish) from Dutch Hollow Lake (n = 907, includes recaptures). The 2016 SE2 CPE8, CPE12, and CPE15 values of 76.2, 43.3, and 5.7 fish/mile ranked in the 86th, 99th, and 45th percentiles, respectively. Fish were marked during SE1 but too few fish were recaptured during SE2 in 2016 to provide a valid population estimate. Based on mean length-at-age values, largemouth bass in Dutch Hollow Lake reach legal harvest size as early as age 4 and average over 14 inches by age 7. Ages of fish in the sample ranged from 2 to 12 years with age 5 being the most common. Total annual mortality was 57% for ages 5 and older in 2016 and this is relatively high compared to other area lakes and may indicate high harvest as many fish are legally harvestable by age 5. Body condition was good; relative weights averaged 104.2.

Northern pike was the second most abundant of all sport fish species collected from Dutch Hollow Lake (n = 703, includes recaptures), and most were collected during early spring netting. Quality spawning habitat exists in several of the small bays around the lake contributing to good recruitment. The Schnabel population estimate for northern pike was 700 sexually mature fish, or 4.2 fish/acre. Fyke net CPE was 4.6 fish/net night, the male: female sex ratio was 3:1, growth was slow for both males and females, and mortality of legally harvestable fish is high. Male northern pike ranged from 2 to 7 years of age and 14.1 to 26.8 inches in length, averaging 18.5 inches (n = 312). Female northern pike ranged from 2 to 8 years of age and 14.4 to 35.9 inches in length, averaging 21.3 inches (n = 102).

Walleyes are stocked in Dutch Hollow Lake to maintain a fishable population and the adult population density was estimated at 2.2 adults ≥ 15 inches/acre which is very good relative to the statewide average for a stocked fishery which is 1.7 adults/acre. Male walleyes (n = 198) ranged from 15.3 to 21.1 inches, averaging 18.0 inches. Female walleyes (n = 63) ranged from 17.9 to 24.8 inches, averaging 20.6 inches.

Bluegill was the most common panfish species collected from Dutch Hollow Lake in 2016. The SE2 catch rate was 141.3 fish/mile, ranking in the 67th percentile statewide. Bluegills in Dutch Hollow Lake grow at rates consistent with the area and state averages, averaging 6.1 inches by age 5 and 8.0 inches by age 8. Bluegill PSD, PSD-7, and PSD-P values calculated from SE2 were 53, 24, and 5, respectively. Total annual mortality for age 4 and older bluegills was 41% which is relatively low compared to other area lakes. This allows bluegills with average growth to reach older ages and larger sizes contributing to good size structure overall.

Other fish species including black crappie, pumpkinseed, yellow perch, smallmouth bass, white sucker, and yellow bullhead are present in Dutch Hollow Lake. Detrimental species such as common carp were not collected in 2016 and have been historically absent from Dutch Hollow Lake.

Lake & location
Dutch Hollow Lake, Sauk County
T13N, R2E Sections 13, 24 (Town of Woodland)
T13N, R3E Sections 18, 19 (Town of La Valle)

Physical/chemical attributes
Morphometry: 166 acres (WDNR SWDV, 2015 aerial imagery), maximum depth of 40 feet, 7.3 miles of shoreline.
Watershed: 3,078 acres (4.8 square miles, Hatleli 2017).
Lake type: Drainage
Water Clarity: Clear
Trophic status: Mesotrophic (Hatleli 2017)
Aquatic vegetation: High species richness with 22 species found in 2016 point-intercept survey. *Chara sp.*(muskgrasses), Eurasian watermilfoil, and coontail were the three most common plants. Curly leaf pondweed was only found at 4/350 sites shallower than 29 feet (maximum rooted plant depth was 28.5 feet) in 2016. Significant decreases in *Nitella sp*., sago pondweed, and Illinois pondweed were noted in 2016 compared to 2015 (Hatleli 2017).
Winterkill: Infrequent
Boat Landings: One public boat access point is near the dam and is maintained by the Town of La Valle. A second public boat access is near the west end of the lake on Auble Landing Rd., and is maintained by the Town of Woodland.

Purpose of survey
Baseline lake survey Tier 1 assessment.

Dates of fieldwork
The fyke netting survey was conducted March 14 through April 19, 2016 (SN1).
The spring electrofishing surveys were conducted on April 12, 2016 (SE1) and May 23, 2016 (SE2).
The fall electrofishing survey was conducted on October 20, 2016 (FE).

Fishery
Largemouth bass and northern pike are abundant. Walleyes and bluegills are common. Black crappies, pumpkinseeds, smallmouth bass, white suckers, yellow bullheads, and yellow perch are present. Fishing regulations for Dutch Hollow Lake follow the general statewide inland length and bag limits, and can be found in Table 1.

BACKGROUND

Dutch Hollow Lake is a drainage lake located in northwestern Sauk County in the townships of La Valle and Woodland, approximately 5 miles northwest of the Village of La Valle. The lake was formed by the construction of a dam on Dutch Hollow Creek approximately one mile upstream from its confluence with the Baraboo River in 1970. The watershed of Dutch Hollow Lake is relatively small at 3,078 acres (4.8 square miles, Hatleli 2017). In addition to Dutch Hollow Creek, the lake is fed by several small intermittent streams that drain the valleys that lead down to the lake. The lake was constructed for the purpose of creating a real-estate development (Branigar Lake Properties). Presently the development encompasses around 2,500 acres and is managed by the Dutch Hollow Lake Property Owners Association. There are 1,163 zoned lots (single family), but currently there are only about 300 homes constructed (http://dutchhollowlake.org/). Approximately 700 acres is considered "Greenway" and is open to use by Association members (http://dutchhollowlake.org/).

The surface area of the lake has been reported as 210 acres (WDNR 2009), and 136 acres (Wisconsin Register of Waterbodies) but a digitized measurement on the 2015 aerial photo layer of the WDNR Surface Water Data Viewer places the surface area at 166 acres. The maximum depth of Dutch Hollow Lake is 40 feet, there is approximately 7.3 miles of shoreline, and the lake is considered mesotrophic (Hatleli 2017). Since 1981, the property owner's association has periodically utilized two high capacity wells to maintain water levels in the lake when porous underlying geology caused the lake to lose water faster than the inflowing creeks could replace it (Larson 1994). The deep section of the lake stratifies thermally during the summer, but temperature and oxygen profiles measured from 1986-1998 indicated that oxygen levels at greater depths did not remain high enough through summer to support a two-story trout fishery (WDNR unpublished data). Recent efforts by WDNR to classify the lakes of Wisconsin places Dutch Hollow Lake in the Complex-Warm-Clear category.

Dutch Hollow Lake supports a diverse aquatic plant community. The clear water allows plants to grow at depths less than 29 feet (Hatleli 2017). A point-intercept aquatic plant survey completed by Endangered Resource Services LLC on August 28, 2016 sampled 436 points on the lake, 350 of which were shallower than 29 feet (maximum depth of plants) and 89% of those sites (n = 312) had aquatic vegetation present (Hatleli 2017). The survey found a total of 22 species with muskgrasses (*Chara sp*., 17.5%), Eurasian watermilfoil (EWM, 14.3%), and coontail (13.2%)

being the most common species in terms of relative frequency (Hatleli 2017). Eurasian watermilfoil was found to grow at depths up to 20 feet in 2016, and most beds were canopied up to 13 foot depths (Hatleli 2017). Curly-leaf pondweed, an exotic invasive plant, was uncommon with a relative frequency of 0.21%; it was found on the rake at 2 sample points and was observed visually at 2 additional points (Hatleli 2017). The 2016 survey noted significant decreases in 4 native species and significant increases in 9 native species as well as filamentous algae and EWM compared to a point-intercept survey conducted in August 2015 (Hatleli 2017). Floristic quality is an assessment metric that is used to evaluate how representative a particular plant community is of undisturbed conditions (Nichols 1999). The floristic quality index of Dutch Hollow Lake in 2016 was 24.5 which was higher than both state and regional averages, and is indicative of a low level of disturbance (Hatleli 2017).

Past fishery survey work has primarily consisted of electrofishing, with occasional fyke netting effort. Surveys that occurred prior to 2016 focused primarily on panfish and largemouth bass, with no targeted sampling of northern pike or walleyes during the spring spawning period when adult fish of those species are most easily sampled. Larson (1994) noted that daytime electrofishing surveys occurred in June 1978, August 1982, and September 1983. A more thorough survey occurred in 1993 with fyke netting effort for panfish from May 4-6 and night electrofishing surveys on May 19, June 8, and October 12. Night electrofishing surveys occurred in the fall of 1997, 1998, and 2000. Another more thorough survey occurred in 2002, with night electrofishing surveys on April 4, May 21, and October 8 and fyke netting for panfish on June 5-6. Fall electrofishing surveys took place in 2003 and 2005, and a May electrofishing survey and June panfish netting occurred in 2006. The 2016 comprehensive fishery survey marked the first survey of Dutch Hollow Lake in 10 years, and comprehensive surveys will occur on a 10-year basis moving forward.

Currently, the fish populations in Dutch Hollow Lake are self-sustaining with the exception of the walleye population which is maintained by stocking. Because of this, walleye has been the fish species most often stocked in Dutch Hollow Lake, having been stocked in 27 of 33 years for the period 1984-2016 (Table 2). Most often, small fingerlings were stocked, but yearlings (1995), fry (1998-2000), and large fingerlings (1996, 1998, 2002, 2009, 2010, 2014, and 2016) have also been stocked over the years. Yellow perch (1978), northern pike (1983, 1997, and 1998), and smallmouth bass (2006, 2007) are additional species that have been stocked in Dutch Hollow Lake. Wisconsin DNR hatcheries and cooperative rearing ponds have been the primary source of

stocked fish with the exception of the smallmouth bass stockings and the 2009 and 2010 large fingerling walleye stockings which came from a private hatchery. Currently, state-raised extended growth (EG) walleye fingerlings are stocked at the rate of 5 fish/acre in the fall of even-numbered years.

METHODS

Data collection-spring netting and electrofishing

As ice out began, one standard 3-foot frame fyke net with 0.75 inch bar, 1.5 inch stretch mesh was set on March 14, 2016. A second 3-foot frame net was set on March 15, and a 4-foot frame fyke net with 0.75 inch, 1.5 inch stretch mesh and two additional 3-foot frame nets were set on March 16, 2016; these fyke nets targeted northern pike and walleyes (SN1). Four additional nets were set on March 17 upon the conclusion of ice-out, for a total of 9 nets. Nets were moved to new locations or removed from the lake as necessary before the final four nets were removed from the lake on April 1. Four nets were re-set on April 17 in an effort to catch additional panfish; the nets fished for two days before being removed on April 19. Total netting effort was 134 net nights and all nets were constructed of white nylon mesh. The net dimensions, set dates, and GPS coordinates of the net locations can be found in Table 3.

Gamefish and panfish were measured to the nearest 0.1 inch and a subsample of each species was weighed using electronic pan scales. Panfish and small gamefish were weighed on a scale with a capacity of 2 kilograms and a precision of 0.001 kg (1 gram). Larger gamefish were weighed on a scale with a capacity of 20 kg with a precision of 0.01 kg (10 grams). Both scales were manufactured by Yamato Corporation (model PPC-200W). Metric mass measurements were mathematically converted to pounds prior to data analysis. Aging structures were taken from a subsample of bluegills, black crappies, largemouth bass, smallmouth bass, walleyes, and northern pike (Table 4). The goal was to take structures from 5 fish per half-inch group for bluegill, black crappie, largemouth bass, and smallmouth bass, and 5 structures per half-inch group from each sex for northern pike and walleye; sex was recorded when evident based on expression of eggs or milt. All walleyes $\geq$ 15 inches and all sexually mature walleyes $\leq$ 15 inches were marked with a top caudal fin clip and all immature walleyes < 15 inches were marked with a bottom caudal fin clip. Sexually mature northern pike captured during fyke netting were marked with a top caudal fin clip for the purpose of calculating a population estimate, while immature fish were marked with a bottom caudal fin clip. All northern pike captured after the first lift day were examined for

marks. During SN1, largemouth bass ≥ 8 inches were marked with a top caudal fin clip and those ≤ 8 inches were marked with a bottom caudal fin clip.

A WDNR standard direct current (DC) boom shocker boat was used to sample fish on Dutch Hollow Lake during the spring of 2016. The first electrofishing survey occurred on the night of April 12, 2016 (SE1) to recapture walleyes that were marked during SN1, and also to mark largemouth bass for a population estimate. The entire shoreline was sampled and all gamefish were collected and measured to the nearest 0.1 inch. Hard structures were removed and fish were weighed as needed to fill out length bins for age and growth analysis. Walleyes were examined for marks for calculation of the PE. Largemouth bass ≥ 8 inches were marked with a top caudal fin clip and those ≤ 8 inches were marked with a bottom caudal fin clip.

The second electrofishing survey began in the evening on May 23, 2016 (SE2), and ended in the early morning hours of May 24. A total of three electrofishing stations were chosen and the first station began at a randomly selected start point. Each station was 2 miles in length, and panfish and gamefish were collected during the first 0.5 mile while gamefish only were collected for the remaining 1.5 miles. All gamefish and panfish were measured to the nearest 0.1 inch. Aging structures were taken and weights were recorded from gamefish and panfish as necessary to fill out length bins. Starting and ending GPS coordinates for electrofishing stations can be found in Table 5.

The fall electrofishing survey (FE) occurred on the night of October 20, 2016. The entire shoreline of the lake was sampled and only gamefish were collected. Juvenile walleyes were examined for the presence of left ventral (LV) or right ventral (RV) fin clips that would indicate that the fish was stocked in either 2014 (LV) or 2016 (RV). Gamefish were measured to the nearest 0.1 inch and released. No aging structures were collected during the fall survey.

Data Analysis

The walleye PE (number of adult fish ≥ 15 inches) was calculated using the Chapman modification of the Petersen single-census method where fish are marked during multiple fyke netting events (SN1), followed by a single recapture event (SE1). The formula is noted here:

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

Where N is the estimated population size, M is the number of fish that were marked, C is the number of fish captured on the recapture run and examined for marks, and R represents the

number of fish captured on the recapture run that had marks. Once the estimate was calculated, it was divided by the surface area of the lake to determine adult walleye density (number of fish ≥ 15 inches / acre). This density was then compared to average densities for stocked walleye fisheries in Wisconsin.

The largemouth bass PE (number of fish ≥ length *x*) would have been calculated using the Petersen method but the recapture percentage was too low during SE2 to allow for calculation of a meaningful PE.

A multiple census mark-recapture population estimate for northern pike was calculated using the Schnabel method. The formula for the Schnabel method is noted here:

$$N = \frac{\Sigma(C_t M_t)}{R + 1}$$

Where N is the population size, C_t is the number captured on day t, M_t is the number marked on day t, and R is the total number of recaptures from the survey (Ricker 1975).

For SN1, SE1, SE2, and FE total catch and catch per unit of effort (CPE) were calculated by gear type for all species collected in each survey. Length frequency distributions were generated for panfish and gamefish species of interest, including bluegill, black crappie, walleye, northern pike, largemouth bass, and smallmouth bass. Length range, mean length, and median length were calculated for all species. Proportional size distribution values were calculated for all panfish and gamefish species with more than 100 stock-size individuals collected (Guy et al. 2007). Length designations for stock, quality, legal or accepted harvest sizes, preferred, memorable, and trophy sizes of the panfish and gamefish species collected from Dutch Hollow Lake can be found in Table 6; these values were used for calculation of proportional size distributions (Anderson and Neumann 1996, Guy et al. 2007). For bluegills, proportional size distribution calculations were made from the fyke net catch and the SE2 catch. Possible bias toward larger fish exists for the fyke net data because fyke nets have been shown to be selective for larger bluegills (Laarman and Ryckman 1982).

Calcified structures (scales, dorsal spines, and anal fin rays) were used to estimate ages of a subsample of each species of interest, and age and length data from these fish were used to

generate age-length keys to estimate the age frequency of the population as a whole based on the aged subsample.

Once age frequency distributions were completed for each species, inferences were made about year class strength and mortality when possible. Total annual mortality estimates were calculated using catch curves. Mean length-at-age was used to make inferences about growth of fish in Dutch Hollow Lake by comparing the lake to area and statewide averages. The area average was calculated from mean length-at-age values for lakes managed out of the Poynette Fisheries office that were surveyed from 2006-2016 (up to 14 lakes, 15 total surveys depending on the species).

Mean length-at-age was calculated using methods outlined in Bettoli and Miranda (2001), with the formula listed here:

$$\overline{Li} = (\sum N_{ij}\bar{l}_{ij})/N_i$$

Where $\overline{L}_i$ represents the mean length of the *i*th age group, $N_{ij} = N_j(\frac{n_{ij}}{n_j})$, N_j is the number of fish in the *j*th length group, n_{ij} = number of fish of the *i*th age group subsampled in the *j*th length group, n_j is the number of fish subsampled in the *j*th length group, and $N_i = \sum N_{ij}$ over all *j* length groups. The inputs to this equation are derived from the length frequency distribution of the sample and the age-length key. The midpoints of each length group were used for the values of $\bar{l}_{ij}$.

The mean age at length 14.0-14.9 inches (MAL14) is a metric used to compare growth in largemouth bass populations in Wisconsin, and this metric was calculated for largemouth bass from Dutch Hollow Lake and compared to the MAL14 values for several other lakes in Columbia, Sauk, and Dane counties surveyed since 2006.

Relative weights were calculated to evaluate body condition of fish. Relative weight (W_r) is a tool that compares the length of the fish to an expected weight for that length. Standard weights were calculated for individuals of each species that had weights recorded and standard weights were only calculated for individuals larger than the minimum recommended length for each species (Murphy et al. 1991, Anderson and Neumann 1996). Relative weights for each fish were calculated by dividing a fish's actual weight by the standard weight for a fish of that length. Average relative weight was then calculated for each species, and was done for each sex separately when sex data were available. Relative weight values between 75 and 100 indicate

normal weight for a given length. A relative weight value greater than 100 indicates that a fish is in excellent condition. A relative weight value less than 75 indicates that a fish is in poor condition.

RESULTS AND DISCUSSION

General Fish Community

A total of 3,184 fish representing 11 different species from 5 families was sampled during spring netting and spring and fall electrofishing on Dutch Hollow Lake in 2016. Catch by gear type is shown for each species collected in Table 7.

Largemouth bass

In total, 907 largemouth bass were collected during the spring and fall including recaptures; catch rates were 0.2 fish/net night during SN1, 26.4 fish/mile of shoreline during SE1, 79.2 fish/mile during SE2, and 29.6 fish/mile during FE (Table 7). Largemouth bass was the most abundant of the 11 species collected during the survey. The catch rate of fish ≥ 8 inches (stock size, CPE8) during SE2 was 76.2 fish/mile which ranked in the 86th percentile in a comparison of lakes in four southern Wisconsin drainage basins. The catch rate of fish ≥ 12 inches during SE2 (quality size, CPE12) was 43.3 fish/mile and this value ranked in the 99th percentile in a comparison of lakes statewide. The catch rate of fish ≥ 15 inches during SE2 (preferred size, CPE15) was 5.7 fish/mile and this value ranked in the 45th percentile in a comparison of lakes statewide. These values indicate that bass are abundant in Dutch Hollow Lake and larger bass are common when compared to other lakes across Wisconsin. On a local level, the largemouth bass population in Dutch Hollow Lake compares very favorably with other area lakes when comparing size-specific catch rates (Figure 1). The overall catch rate of largemouth bass during the May survey was 79.2 fish/mile, ranking 4th in a comparison of catch rates from May electrofishing surveys of 16 lakes sampled in Columbia, Sauk, and northwestern Dane counties (17 total surveys, one lake surveyed twice) from 2008-2016. Dutch Hollow Lake fared even better when comparing catch rates of fish ≥ 12 inches (43.3 fish/mile) and ≥14 inches (legal harvest size, 11.3 fish/mile), ranking 3rd in each category, while ranking 6th for both CPE15 and CPE18.

In total, 866 unique largemouth bass were collected during SN1 (n = 23), SE1 (n = 193), SE2 (n = 454), and FE (n = 216). Calcified structures were taken from a subsample of 124 fish and weights were recorded from a total of 125 fish. Largemouth bass captured during SE2 ranged

from 5.6 to 18.5 inches in length and the mean and median values were 12.0 and 12.1 inches, respectively (Table 8). The length frequency distribution for largemouth bass is represented in Figure 2. Length and stock density index data for each sampling period can be found in Table 8.

Largemouth bass ages ranged from 2 to 12 years with age 5 fish being the most common in the distribution (33%), followed by age 6 (25%) and age 7 (7%) (Figure 3). Based on the catch curve, total annual mortality for ages 5 through 12 was 57% in 2016 (Table 9, Figure 4). This value is relatively high compared to five other area lakes that were surveyed from 2012 to 2016 (Table 10). Largemouth bass growth in Dutch Hollow Lake (mean length-at-age) is similar to area and state averages through age 5 and is generally lower than these averages for ages 6 and older (Figure 5). Largemouth bass in Dutch Hollow Lake reach the minimum harvest size of 14 inches as early as age 4, and average over 14 inches by age 7 (Figure 5). Similarly, in 2006 largemouth bass in Dutch Hollow Lake reached legal harvest size as early as age 5 and averaged over 14 inches by age 7. Mean length at ages 2 through 5 was nearly identical in 2006 and 2016 (Figure 6). However, mean length at age in 2016 was slightly lower compared to 2006 for fish aged 6 and older (Figure 6). The MAL14 value was 6.7 years in 2016, which is slightly higher than the area mean and median values of 6.5 years, indicating slightly slower growth relative to other area lakes (Table 11).

Overall, largemouth bass larger than 6 inches were in good condition; the mean relative weight was 104.2. There was no discernable positive or negative relationship between fish length and relative weight. No fish had a relative weight below 75, and 72% of weighed fish (71 out of 99) had relative weights greater than 100. Relative weights for largemouth bass in Dutch Hollow Lake are represented in Figure 7.

Northern Pike

In total, 703 northern pike were collected during the spring and fall including recaptures; overall catch rates were 4.6 fish/net night during SN1, 4.9 fish/mile of shoreline during SE1, 3.0 fish/mile during SE2, and 5.3 fish/mile during FE (Table 7). Northern pike was the second most abundant of the 11 species collected during the survey. The Schnabel population estimate was 700 sexually mature northern pike, or 4.2 fish/acre (95% CI 603 – 812 total, or 3.9 – 4.9 fish/acre).

Overall, 428 unique northern pike collected in fyke nets (total excluding recaptures) ranged from 10.3 to 35.9 inches, averaging 19.1 inches (Table 8). The sex ratio was 3:1, males to females. Male northern pike ranged from 14.1 to 26.8 inches (n = 312), averaging 18.5 inches. Female northern pike ranged from 14.4 to 35.9 inches (n = 102), averaging 21.3 inches. Unknown sex or immature pike ranged from 10.3 to 27.3 inches (n = 14), averaging 16.7 inches. The length frequency distribution for northern pike captured during SN1 is represented in Figure 8. Size structure was poor with PSD, PSD-P, and PSD-M values of 21, 2, and <1, respectively. Only 3.5% of northern pike collected during SN1 (15/428) were ≥ 26 inches (PSD-26); legally harvestable northern pike are rare in Dutch Hollow Lake.

Overall, northern pike ages ranged from 1 to 8 years. Northern pike smaller than 12 inches were sexually immature. Seven fish ranging from 8.4 to 11.2 inches were age 1, and one age 2 fish measured 11.5 inches. Males ranged from 2 to 7 years and age 3 was the most common in the distribution (Figure 9). One male, a 26.8 inch age 7 fish, was large enough to be legally harvested. Total annual mortality for males aged 3 to 6 years was 43%, but when the catch curve is expanded to include ages 3 to 7, total annual mortality increases to 65% (Table 9, Figure 10). This likely reflects an increase in mortality due to harvest because by age 7, males have finally reached legal harvest size. Growth is relatively slow; mean length at age of male northern pike lags behind the area average for ages 3 through 6 (Figure 11).

Females ranged from 2 to 8 years and age 2 was the most common in the distribution (Figure 9). Females reached legal harvest size as early as age 4 and averaged over 26 inches by age 7. Total annual mortality for ages 2 through 8 was 39% (Figure 12). However, marked stepwise decreases in numbers at age from age 4 to ages 5 and 6, and from age 6 to ages 7 and 8 may indicate increases in harvest mortality due to proportionally more females reaching legal harvest size at these older ages. Growth of female northern pike is poor; mean length at age values lag far behind area averages after age 2 (Figure 13).

Condition of northern pike was average to poor. Relative weights for northern pike were generally lower for males which ranged from 53.4 to 187.6 with a mean of 81.2 (n = 98). Females ranged from 48.6 to 156.7 with a mean of 84.6 (n = 91). Immature northern pike ranged from 77.0 to 95.5 with a mean of 87.9 (n = 10). Twenty-four percent of females and 31% of males had relative weight values below 75 indicating poor body condition. The SN1 period covered more than two weeks of the northern pike spawning period but there was no correlation

between relative weight of females or males and time. That is to say relative weight did not decrease over time when theoretically a larger proportion of the fish sampled should have been partially or almost totally spent. Relative weights for northern pike are represented in Figure 14.

Walleye

In total, 441 walleyes were collected during the spring and fall including recaptures; catch rates were 2.2 fish/net night during SN1, 12.3 fish/mile of shoreline during SE1, 4.2 fish/mile during SE2, and 4.1 fish/mile during FE (Table 7). Walleye was the fourth most abundant of the 11 species collected during the survey. The Petersen population estimate was 372 adult walleyes or 2.2 adults/acre (95% CI 313 – 461 total, or 1.9 – 2.8 fish/acre). All fish ≥ 15 inches were sexually mature.

During SN1 and SE1, 264 unique walleyes ranged from 12.3 to 24.8 inches with mean and median length values of 18.6 and 18.4 inches, respectively. Male walleyes (n = 198) ranged from 15.3 to 21.1 inches with mean and median length values of 18.0 inches. Female walleyes (n = 63) ranged from 17.9 to 24.8 inches with mean and median values of 20.6 and 20.4 inches, respectively. Three immature fish measured 12.3, 12.3, and 14.0 inches, respectively, and one of the 12.3 inch fish had a LV fin clip indicating that it was stocked in the fall of 2014 as an extended growth (EG) fingerling. The length frequency distribution for walleyes collected during SN1 and SE1 is represented in Figure 15.

Twenty-five walleyes were collected during SE2 and 13 of those were recaptures from the SN1 sampling period as indicated by their TC fin clips. There were 12 unique walleyes collected that ranged from 10.9 to 21.3 inches with a mean length of 16.2 inches. Four of the walleyes ranged from 10.9 to 11.8 inches and each of those fish had a visible LV clip, indicating that they were stocked in the fall of 2014 as EG fingerlings. Thirty unique walleyes were collected during fall electrofishing and they ranged from 14.8 to 23.6 inches with a mean length of 18.4 inches. Two fish measuring 14.8 and 15.2 inches respectively had visible LV clips indicating they were stocked in the fall of 2014. On September 28, 2016, 655 EG walleyes were stocked into Dutch Hollow Lake and they were marked with right ventral (RV) fin clips. However, none of these age 0 walleyes were captured during the fall survey.

Overall, ages ranged from 2 to 13 years, but all mature fish were age 4 and older. Male ages ranged from 4 to 13 years with age 6 (48%) and age 7 (25%) being the most common ages and age 9 (1%) being the least common age in the sample (Figure 16). Only one male from the aged subsample (prior to applying age-length key to the whole walleye sample) was estimated at 9 years old. Female ages ranged from 5 to 13 years, but no age 9 fish were present (Figure 16). The absence of age 9 fish from the sample makes sense because no walleyes were stocked in Dutch Hollow Lake in 2007. It is more likely that the single age 9 male was mis-aged rather than being a product of natural reproduction. Considering that varying numbers of varying size classes of walleyes have been stocked over the years in Dutch Hollow Lake and because it appears that EG fingerlings survive much better than small fingerlings, the assumption of constant recruitment is violated. Because of this, the application of a catch curve to the age structure data to determine total annual mortality is not possible. Despite this, it appears that the walleyes in Dutch Hollow Lake are not heavily exploited based on the population size and age structure.

Both male and female walleyes in Dutch Hollow Lake grow slightly slower than the area average for fish up to 10 years old. The area average is based on mean length at age values from 8 stocked walleye lakes in Columbia and Sauk counties that were surveyed from 2009-2016. Only ages for which there was data available from at least 4 of 8 lakes were included in the comparison. Lake Wisconsin was excluded because it is a natural reproduction lake with an abundant and diverse forage community and walleye growth rates there far outpace any of the stocked fisheries in the area. Male walleyes in Dutch Hollow Lake averaged 16.4 inches at age 4, and 18.4 inches at age 7 (Figure 17). Females averaged 18.7 inches at age 5, and 20.6 inches at age 7 (Figure 18). Overall, walleyes were in good condition based on relative weights. The average relative weights for males, females, and immature fish were 89.1, 91.8, and 94.7, respectively (Figure 19).

Bluegill

In total, 263 bluegills were collected during the spring; the catch rates were 0.4 fish/net night during SN1 (n = 51) and 141.3 fish/mile of shoreline during SE2 (n = 212, Table 7). In terms of the total number of fish caught during spring netting and electrofishing, bluegill was the sixth most abundant out of 11 species collected, and was the most abundant panfish species. The SE2 catch rate ranked in the 67th percentile statewide; bluegills are common in Dutch Hollow Lake.

On a more local scale, Dutch Hollow lake ranked 4th in a comparison of bluegill CPE from May electrofishing surveys of 16 lakes surveyed in Columbia, Sauk, and northwestern Dane counties (17 total surveys, one lake surveyed twice) from 2008-2016. Dutch Hollow Lake fared even better when comparing catch rates of fish ≥ 6 inches (CPE6, 69.3 fish/mile), ≥7 inches (CPE7, 30.7 fish/mile), and ≥ 8 inches (CPE8, 6.0 fish/mile), ranking 2nd in each category.

In total, 51 bluegills collected during SN1 and 212 collected during SE2 were measured. Aging structures were taken from a subsample of 65 fish and weights were recorded from a total of 64 fish. Bluegills captured during SN1 ranged from 3.0 to 8.9 inches in length and the mean and median length values were 5.7 and 5.2 inches, respectively. Bluegills captured during SE2 ranged from 1.8 to 9.0 inches in length and the mean and median values were 5.6 and 5.9 inches, respectively. The PSD, PSD-7, and PSD-P values calculated from SE2 were 53, 24, and five, respectively (Table 8). Length frequency distributions of bluegills caught during SN1 and SE2 are represented in Figure 20. Bluegills larger than 7 inches are often acceptable for anglers to harvest and are common in Dutch Hollow Lake. Larger bluegills are also present in Dutch Hollow Lake; the PSD-P value of 5 ranked second in a comparison of 8 area lakes surveyed from 2013 to 2016.

Bluegill ages ranged from 1 to 8 years in 2015, with age 4 fish being the most common in the distribution (32%), followed by age 5 (20%) and age 6 (20%) (Figure 21). Total annual mortality for ages 4 through 8 was 41% in 2016 (Table 9, Figure 22). Bluegill growth in Dutch Hollow Lake (mean length-at-age) is at or slightly below the area and state averages; bluegills average 6.1 inches by age 5 and 8.0 inches by age 8 (Figure 23). By contrast, in 2006 bluegills in Dutch Hollow Lake averaged 5.2 inches by age 5 and 7.6 inches at age 8; bluegill growth appears to have slightly improved over the past 10 years. However, both 2006 and 2016 lag behind mean lengths-at-age observed in 1993 when bluegills averaged 8.3 inches at age 5 and 10.0 inches at age 8 (Figure 24). Overall, bluegills larger than 3 inches were in good condition; mean relative weight was 108.2 (Figure 25). There was no discernable positive or negative correlation between bluegill length and relative weight.

Black Crappie

In total, 71 black crappies were collected during spring netting (SN1) and the catch rate was 0.5 fish/net night (Table 7). Black crappies ranged from 3.8 to 12.2 inches in length, with mean and

median lengths of 9.3 and 9.8 inches, respectively (Table 8). Five additional black crappies were collected during the May electrofishing survey that ranged from 6.6 to 10.4 inches, averaging 9.0 inches (Table 8). The length frequency distribution is represented in Figure 26. Black crappies ranged from 1 to 7 years old, with age 4 being most common in the age distribution (Figure 27). Black crappie mean length-at-age compared favorably on both local and statewide levels, with generally higher mean length-at-age values throughout life (Figure 28). Black crappies in Dutch Hollow Lake average 8.6 inches at age 3 and 10.2 inches at age 5, ranking 3rd in both categories in a comparison of 10 lakes in Columbia, Sauk, and northwestern Dane counties surveyed from 2008-2016. Estimation of crappie natural mortality using catch curves is often not possible due to highly variable recruitment from year to year. However, recruitment in Dutch Hollow Lake appears to be consistent enough to warrant fitting a catch curve to the data. Black crappie total annual mortality after age 4 in Dutch Hollow Lake was 58% in 2016, which is much lower than the only other area lake with somewhat consistent recruitment (Crystal Lake, 82% in 2015). The catch curve for black crappies is represented in Figure 29. Black crappies were in good condition; the mean relative weight was 95.6. Relative weight values are presented in Figure 30.

Smallmouth bass

In total, 24 smallmouth bass were collected during the spring and fall, all during electrofishing surveys. Catch rates were 0.5 fish/mile during SE1, 0.5 fish/mile during SE2, and 2.3 fish/mile during FE (Table 7). Lengths ranged from 6.5 to 20.3 inches with mean and median length values of 11.0 and 10.0, respectively (Table 8). Aging structures were removed from the 7 smallmouth bass collected during SE1 and SE2 and data for those individual fish can be found in Table 12. Smallmouth bass were in good condition; relative weight values averaged 96.3 (n = 7).

Other fish species of interest

Yellow bullheads are common in Dutch Hollow Lake; 475 were collected during the survey and nearly all were collected during SN1. Yellow bullhead was the third most abundant of the 11 species collected in the survey. In total, 397 yellow bullheads collected during SN1 were measured and lengths ranged from 4.0 to 14.9 inches, averaging 11.0 inches. Pumpkinseeds were present; a total of 40 ranged from 3.1 to 7.9 inches, averaging 6.1 inches. Yellow perch were present but very few were observed or collected. No common carp were observed or collected during the survey and they have been historically absent from Dutch Hollow Lake.

CONCLUSIONS AND RECOMMENDATIONS

Largemouth bass are abundant in Dutch Hollow Lake, and both small bass and harvestable bass are abundant relative to other lakes in Columbia, Sauk, and northwestern Dane counties based on size-specific catch rates during May electrofishing surveys. Within Dutch Hollow Lake, largemouth bass population size structure underwent a significant shift from the early 1980s to 2006. Electrofishing surveys in August 1982 and September 1983 indicated that largemouth bass ≤ 6 inches were abundant but fish larger than 10 inches were rare (Larson 1994). A statewide 14 inch minimum length limit for largemouth bass was instituted in 1989 and by 1993 small bass remained abundant, but a large buildup of fish in the 10 to 14 inch range was noted, with lesser numbers of bass larger than 14 inches (Larson 1994). May electrofishing surveys in 2002, 2006, and 2016 yielded CPE14 and CPE18 values that were very similar to those observed in 1993, although 2002 had somewhat higher CPE14 values than the other years (Figure 31). However, total CPE values in 2002 were reduced by 29% from 1993 values, and total CPE values in 2006 and 2016 were reduced by about 50% from 1993 (303.1 fish/hr 1993 vs. 158.3 fish/hr 2016).

Electrofishing time was used as the effort metric for this comparison as opposed to electrofishing distance because distances were not recorded for the 1993 electrofishing survey. While the exact reasons are unclear, the 50% decline in CPE occurred only for bass <14 inches so it is highly unlikely that harvest played a role. One explanation is that the minimum length limit instituted in 1989 led to far greater numbers of bass surviving to adulthood than survived prior to 1989 resulting in a much larger adult spawning population with a corresponding decline in recruitment over time as per Ricker (1975). Although perhaps not yet apparent in 1993 this change could have occurred over several years such that by 2002 the decline was underway and by 2006 the population had stabilized and then showed essentially no change in abundance from 2006 to 2016.

Eight fall electrofishing surveys that occurred during the period 1993-2016 lend additional insight into what the largemouth bass population looked like between 1993 and 2006, and the data would support the hypothesis that a gradual decline followed by a "leveling off" of bass numbers occurred after implementation of the new minimum length limit. Fall size-specific catch rates (fish/hr) for all sizes of bass declined over the period 1993-1998, and then leveled out and have been relatively stable since 2000 with the exception of an increase in overall CPE in 2002 (driven by small fish) and a corresponding increase in CPE 8 in 2003 (Figure 32). Values observed in

2016 may have been somewhat lower than other years due to it being the latest survey in the group by more than a week (October 20), and the water level was at least 2 feet higher than normal pool due to torrential rains in late September. It must also be noted that dense surface mats of EWM in shallow areas (bays) hampered the October 2016 electrofishing survey.

The recommended management goal for largemouth bass in Dutch Hollow Lake is to maintain a balanced population that offers anglers a good opportunity to catch harvestable fish while maintaining bass predation pressure on small panfish. The recommended management objectives are a spring electrofishing (SE2) CPE8 of 50 fish/mile, with a PSD between 40 and 70, and an PSD-P value between 10 and 40. These are presented as generally accepted size structure index ranges for balanced fish populations in Willis et al. (1993), with terminology modified as per Guy et al. (2007). Based on the 2016 survey, the CPE8 objective is being met at 76.2 fish/mile, and the size structure objectives are currently being met. It must be noted that while harvest does appear to be impacting the number of large bass in Dutch Hollow Lake and fish ≥ 18 inches are seldom sampled, the high density and slow-growing nature of the bass population do not make Dutch Hollow Lake a good candidate for a more protective minimum length limit. Resultant increases in bass densities and the potential reduction in growth rates stemming from such a regulation change would offset the benefits of having a few more large bass in the system. Dutch Hollow Lake has had a stable largemouth bass population for at least 10 years and it still has larger, harvestable bass than most lakes in Columbia, Sauk, and northwestern Dane counties. For those reasons, and because population goals and objectives are currently being met, changes to largemouth bass regulations on Dutch Hollow Lake are not recommended at this time.

Northern pike were not targeted using fyke nets during their spawning period in past surveys of Dutch Hollow Lake. The area WDNR fisheries biologist noted in correspondence with concerned anglers in 2001 that during the 1993 survey, few northern pike were found. However, by 2000 fall electrofishing survey data and reports from anglers indicated that northern pike had become more abundant and were very skinny in appearance. Because of their skinny appearance and concerns that their poor body condition may be the result of parasites or disease, a sample of 10 northern pike was submitted to WDNR fish health staff in June 2001 for necropsy. It was determined that the fish had varying levels of visceral fat and the fish had been eating regularly. In fact, 8 of 10 pike had food items in their stomachs including bluegills up to 120 millimeters (~4.7 inches), shiners, crayfish, and unidentifiable fish remains. A few had minor infestations of common parasites such as black spot and tapeworms, but were otherwise healthy. A second

sample of 5 fish was submitted in the fall of 2001, and similar results were reached with the added caveat that 3 of 5 fish submitted had hooking injuries (2 had hooks in their stomachs), with fish health staff ruling out parasites or diseases as the cause of poor body condition.

The 2016 survey revealed that northern pike are abundant in Dutch Hollow Lake and recruitment is excellent. This is not surprising because of the abundance of good spawning habitat. While the Schnabel population estimate calculated from data collected during SN1 indicated that pike were abundant, it may have actually greatly underestimated the population size. In a study of northern pike in Minnesota lakes, Pierce (1997) found that Schumacher-Eschmeyer and Schnabel multiple-census mark recapture estimates using trap (fyke) net data were very similar, but were consistently much lower (sometimes more than 50%) than Petersen estimates made for the same populations. The Petersen estimates were made using different sampling methods at different times of year. Specifically trap nets were used to capture and mark fish during the spawning period, and gill nets were used to recapture fish from different habitats after the spawning period had concluded. Using the two sampling methods at two different times helped to eliminate bias associated with violation of the assumption of equal catchability. Pierce (1997) identified size selectivity by the gear and unequal vulnerability of fish to near shore trap netting as the two greatest sources of bias in his work. Gill nets are rarely used in inland fisheries management in Wisconsin due to the potential lethal consequences for fish, and electrofishing is a relatively ineffective method of capturing northern pike. Thus WDNR fisheries managers are left to estimate northern pike population sizes using only trap net (SN1) data. The Schnabel population estimate derived for Dutch Hollow Lake during SN1 should be considered a low-end estimate, and the population size is likely much larger.

As a result of the high population density of northern pike, growth is poor and mean length-at-age values lag far behind the mean northern pike lengths at age for 13 lakes in Columbia, Sauk, and northwestern Dane counties surveyed from 2008-2016. Based on numbers at age, increases in the natural mortality rate of both male and female northern pike coincide with fish reaching legal harvest size. Growth of female pike lags far behind area averages after age 2, which is the age at which many female northern pike reach sexual maturity in Dutch Hollow Lake. The slow growth after age 2 may be reflective of a shift in energy allocation from somatic growth to egg production. As a result of slow growth and harvest pressure on larger individuals, size structure is poor. Growth rates of male and female northern pike are comparable to those observed during

a 2014 survey of Mirror Lake (Sauk County), another small lake with a high-density northern pike fishery and excellent spawning habitat and recruitment.

The recommended management goal is to reduce northern pike population density in Dutch Hollow Lake, and thus improve growth rates and population size structure. One objective is to reduce the northern pike population density to around three mature adults/acre in the spring Schnabel population estimate calculated from fyke net data (SN1). A second objective is to increase the PSD-P value (proportion ≥28 inches) from 2 to 10, and the PSD-M value (proportion ≥34 inches) from 0.5 to 2.5. In order to facilitate a reduction in northern pike population density and an improvement in population size structure, a regulation change from the current statewide general regulation of a 26 inch minimum length limit and 2 fish daily bag limit is recommended. The proposed regulation is no minimum length limit and a daily bag limit of 5 fish, but fish within a protected slot may not be kept, except one fish larger than 40 inches may be kept per day. This type of regulation does not currently exist in the pike management tool box. However, the statewide northern pike management team is currently working to address the need for a regulation of this type to address similar pike management issues (high density, slow growth) on lakes throughout central and southern Wisconsin. A regulation change for Dutch Hollow Lake can proceed once the northern pike management team formulates the appropriate guidance and regulation. Such a regulation change will ultimately facilitate a reduction in population density through removal of abundant small pike, thus improving growth rates by reducing competition. It will also improve population size structure by protecting larger pike from harvest, while still allowing an angler to keep a trophy pike if they wish to do so.

Dutch Hollow Lake has an above average population of walleyes compared to other stocked lakes across the state. Despite their relatively slow growth, probable low exploitation and natural mortality rates ensure these fish reach larger sizes. Currently the stockings of EG fingerlings in 2009 and 2010 compose 75% of the adult walleye population in Dutch Hollow Lake and those fish were ages 6 (2010 stocking) and 7 (2009 stocking) in 2016. Few fish from the 2014 stocking of EG fish from state hatcheries were collected during the survey, but few immature fish were collected overall, including fish from recent years when small fingerlings were stocked (2012, 2013). Additionally, no EG fingerlings that were stocked in 2016 were collected in the fall survey approximately 4 weeks after stocking. While it is possible that survival of these stocked fish was poor, it is also possible that these small young fish occupy habitats where they were not

effectively sampled by our fishing gear. Future surveys of the adult population using fyke nets and early spring electrofishing will provide the best evaluation of survival of stocked walleyes.

The management goal for walleyes is to maintain an adult population of sufficient abundance to allow anglers to catch and harvest adult fish. The objective is to maintain an adult walleye population of 2.0 fish/acre ≥ 15 inches. This objective is currently being met and no regulation change is necessary at this time. One strategy for maintaining the adult population moving forward is to continue stocking EG walleyes on an every other year basis because EG fingerlings appear to survive much better than small fingerlings. If possible, the stocking rate of EG fish should be increased from 5 fish/acre every other year to 10 fish/acre every other year. Also, at a minimum, the acreage used to calculate the number of fish stocked each year should be increased from 136 acres to 166 acres to correctly reflect the actual modern-day surface area of Dutch Hollow Lake. At the current stocking rate of 5 fish/acre, this would represent an additional 150 EG walleyes in each stocked year.

Bluegills in Dutch Hollow Lake grow slightly slower than bluegills in other area lakes, and other lakes across the rest of Wisconsin. The total annual mortality rate of bluegills after age 4 is relatively low at 41% considering that an unexploited (unfished) bluegill population has around 30% total annual mortality (Goedde and Coble 1981, Paukert et al. 2001). Thus it appears that Dutch Hollow Lake experiences considerably lower exploitation than other area lakes that have higher mortality rates. The low mortality rate allows fish to live long enough to reach sizes where they are desirable for anglers, despite slightly below average growth. The recommended management goal for Dutch Hollow Lake is to maintain a balanced bluegill population that provides forage for abundant predator fish while still providing anglers the opportunity to harvest fish. The measurable objective is an SE2 CPE3 ≥ 100 fish/mile with a PSD between 20 and 60, a PSD-7 value ≥ 20, and a PSD-P value ≥ 5. Currently all bluegill CPE and stock density metrics are being met and no panfish regulation change is recommended at this time.

Declines in both largemouth bass and bluegill growth (mean length-at-age) appear to have occurred between 1993 and 2006. A decline in largemouth bass growth over this time period would not necessarily be expected considering bass abundance appears to have decreased by 50% during that time period based on electrofishing catch rates. The apparent decline in largemouth bass growth (particularly after age 5) may be reflective, at least in part, of a switch from using scales to dorsal spines as a means of aging largemouth bass. Scales are the least reliable calcified

structure for aging bass, and particularly older bass (under-aging), after otoliths (best method) and dorsal spines (second best method). A decline in bluegill mean length at age from 1993 to 2006 may be reflective of reduced growth of bluegills due to the approximately 50% reduction in largemouth bass densities (increased competition among bluegills). However, it must be noted that bluegill electrofishing CPE was approximately 47% lower in 2016 compared to 1993, so if there truly was a dramatic drop in bluegill abundance, a reduction in growth rates would not be expected.

Reductions in growth rates of both species may be reflective of increased densities of aquatic macrophytes, and specifically EWM, in shallow areas of the lake that make it more difficult for both species to forage for their preferred prey; zooplankton for bluegills and bluegills for largemouth bass. User complaints of reduced navigability of portions of Dutch Hollow Lake with dense EWM beds have become common in recent years. Although not a problem in March, April, and May, WDNR staff noted that dense surface mats of EWM, particularly in the shallow bays, did make the fall 2016 electrofishing survey very challenging.

Aside from dense plant growth, another variable that could potentially be impacting growth of bluegills in particular is predator avoidance. The high densities of largemouth bass, northern pike, and walleyes in the lake may be forcing smaller bluegills to occupy the dense EWM beds in order to keep from being eaten by predators as opposed to foraging for zooplankton in more open water habitats outside of the EWM beds. Within the dense cover of the EWM beds, they experience a less favorable environment for zooplankton foraging, leading to slower growth. Whole-lake herbicide treatments aimed at reducing EWM densities have occurred on Dutch Hollow Lake as recently as 2013 and 2014, and were effective at reducing EWM in the lake on a short-term basis. However, conducting aggressive whole-lake treatments on an annual basis could increase the risk of negative impacts on the diverse native aquatic plant community in the lake, and any future treatments should carefully follow an approved aquatic plant management plan. Such a plan is currently being written for Dutch Hollow Lake by a private consultant with input from WDNR lakes specialists and fisheries staff.

One potential non-chemical solution to the problem of navigation through dense EWM beds is to allow mechanical harvesting to cut navigation lanes through the beds. These navigation lanes can also have positive impacts on fish growth. Aquatic macrophyte harvesting in the form of navigation lanes equivalent to 20-40% of the littoral zone increases the amount of edge habitat

which can have the effect of increasing the foraging efficiency of both panfish and predator fish, leading to improved growth rates (Olson et al. 1998). However, mechanical harvesting of EWM can also have the undesirable effect of spreading the invasive when new plants emerge from fragmented stems. Any such aquatic plant harvesting on Dutch Hollow Lake must be provided for in the approved aquatic plant management plan, and must follow the specific guidance outlined in the plan.

There are no species-specific management goals or objectives for other members of the panfish community. Black crappies provide anglers an additional opportunity to fish for panfish, and Dutch Hollow Lake appears to have a low-density, high quality population. Growth rates in 2016 were good compared to area and state averages, and fish larger than 12 inches were present. Yellow perch are present at low abundance and were nearly absent from spring netting and electrofishing catches. Several young-of-year perch were observed during the fall survey, and yellow perch in Dutch Hollow Lake likely serve as a valuable forage component for walleyes and northern pike. Yellow bullheads were numerous during the spring netting survey and the largest individuals (>14 inches) provide an opportunity for anglers, while smaller bullheads serve as valuable forage for predator fish. Large numbers of white suckers were sampled during spring netting, but all were large adult fish. While the adults are too large to be utilized as forage, their fry likely provide a valuable source of food for panfish in the spring, while juvenile and small adult suckers provide forage for predator fish.

A small self-sustaining population of smallmouth bass exists in Dutch Hollow Lake. This population was established from fish purchased with private funds from a private hatchery in 2006 and 2007. If increased opportunities for anglers to catch smallmouth bass are desired, additional stocking of fish purchased from a private hatchery should be considered as a means of increasing the size of the population in Dutch Hollow Lake. However, with such a robust population of largemouth bass, funds spent on improving the fishery in Dutch Hollow Lake may be better spent on habitat improvements such as Fish Sticks (addition of large woody habitat in the littoral zone of the lake). These types of projects are becoming increasingly popular in the state, and information on Fish Sticks projects in Wisconsin may be found at http://dnr.wi.gov/topic/fishing/outreach/fishsticks.html.

No detrimental species such as common carp or gizzard shad were captured during the 2016 survey. These species have been known to be detrimental to the water quality and fish

communities in lakes where they are present. Their continued absence from Dutch Hollow Lake will help to ensure good water quality and a healthy fish community moving forward. Both common carp and gizzard shad are found in Lake Redstone, a heavily-used lake located 4 miles east of Dutch Hollow Lake. Those who utilize both lakes for recreation should take all possible precautions to avoid inadvertently introducing these species to Dutch Hollow Lake.

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TABLES AND FIGURES

Table 1. Current fishing regulations and open season dates for Dutch Hollow Lake, Sauk County, Wisconsin.

Species	Season Dates	2016 Length and Bag Limits
Catfish	Open All Year	No minimum length limit and the daily bag limit is 10.
Bullheads	Open All Year	No minimum length limit and no daily bag limit.
Panfish (bluegill, pumpkinseed, sunfish, crappie, and yellow perch)	Open All Year	No minimum length limit and the daily bag limit is 25.
Largemouth bass and smallmouth bass	First Saturday in May through the first Sunday in March	The minimum length limit is 14" and the daily bag limit is 5.
Northern pike	First Saturday in May through the first Sunday in March	The minimum length limit is 26" and the daily bag limit is 2.
Walleye, sauger, and hybrids	First Saturday in May through the first Sunday in March	The minimum length limit is 15" and the daily bag limit is 5.
Rough fish	Open All Year	No minimum length limit and no daily bag limit.

Table 2. Stocking history for Dutch Hollow Lake, Sauk County, Wisconsin, 1972-2016.

Year	Species	Strain/Stock	Age Class	Number Stocked	Avg. Length (inches)	Source
1978	YELLOW PERCH	UNSPECIFIED	ADULT	10,013	-	OTHER STATE'S GVT. HATCHERY
1983	NORTHERN PIKE	UNSPECIFIED	ADULT	400	15.0	FIELD TRANSFER
1984	WALLEYE	UNSPECIFIED	FINGERLING	105	7.0	DNR COOP PONDS
1985	WALLEYE	UNSPECIFIED	FINGERLING	5,720	2.0	DNR COOP PONDS
1986	WALLEYE	UNSPECIFIED	FINGERLING	5,000	5.0	DNR COOP PONDS
1987	WALLEYE	UNSPECIFIED	FINGERLING	18,831	2.0	DNR HATCHERY
1989	WALLEYE	UNSPECIFIED	FINGERLING	5,280	2.0	DNR COOP PONDS
1991	WALLEYE	UNSPECIFIED	FINGERLING	4,992	3.0	DNR COOP PONDS
1992	WALLEYE	UNSPECIFIED	FINGERLING	6,435	3.0	DNR COOP PONDS
1995	WALLEYE	UNSPECIFIED	YEARLING	2,350	5.1	DNR COOP PONDS
1996	WALLEYE	UNSPECIFIED	LG FINGERLING	875	5.0	DNR COOP PONDS
1997	WALLEYE	UNSPECIFIED	SM FINGERLING	10,500	1.6	DNR PONDS
1997	NORTHERN PIKE	UNSPECIFIED	SM FINGERLING	1,050	3.7	DNR HATCHERY
1998	WALLEYE	UNSPECIFIED	FRY	232,520	0.4	DNR HATCHERY
1998	WALLEYE	UNSPECIFIED	SM FINGERLING	408	3.0	DNR COOP PONDS
1998	WALLEYE	UNSPECIFIED	LG FINGERLING	142	6.7	DNR COOP PONDS
1998	NORTHERN PIKE	UNSPECIFIED	SM FINGERLING	1,050	5.0	DNR HATCHERY
1999	WALLEYE	UNSPECIFIED	FRY	378,000	0.4	DNR HATCHERY
1999	WALLEYE	UNSPECIFIED	SM FINGERLING	21,000	1.5	DNR HATCHERY
2000	WALLEYE	UNSPECIFIED	FRY	378,000	0.5	DNR HATCHERY
2001	WALLEYE	UNSPECIFIED	SM FINGERLING	21,000	1.5	DNR HATCHERY
2002	WALLEYE	LAKE MICHIGAN	LG FINGERLING	2,125	7.7	DNR HATCHERY
2003	WALLEYE	LAKE MICHIGAN	SM FINGERLING	10,950	2.1	DNR PONDS
2004	WALLEYE	MISS HEADWATERS	SM FINGERLING	10,475	2.1	DNR PONDS
2005	WALLEYE	UNSPECIFIED	SM FINGERLING	6,500	1.8	DNR PONDS
2006	SMBASS	UNSPECIFIED	LG FINGERLING	1,976	4.0	PRIVATE HATCHERY
2006	WALLEYE	ROCK-FOX	SM FINGERLING	11,075	1.4	DNR HATCHERY
2007	SM BASS	UNSPECIFIED	LG FINGERLING	2,000	5.0	PRIVATE HATCHERY
2008	WALLEYE	ROCK-FOX	SM FINGERLING	3,780	1.3	DNR HATCHERY
2009	WALLEYE	UNSPECIFIED	LG FINGERLING	2,100	7.0	PRIVATE HATCHERY

2009	WALLEYE	ROCK-FOX	SM FINGERLING	3,780	1.4	DNR HATCHERY
2010	WALLEYE	UNSPECIFIED	LG FINGERLING	1,500	8.0	PRIVATE HATCHERY
2010	WALLEYE	ROCK-FOX	SM FINGERLING	4,448	1.7	DNR HATCHERY
2011	WALLEYE	ROCK-FOX	SM FINGERLING	2,373	1.5	DNR HATCHERY
2012	WALLEYE	ROCK-FOX	SM FINGERLING	2,400	1.7	DNR HATCHERY
2013	WALLEYE	ROCK-FOX	SM FINGERLING	4,896	1.7	DNR HATCHERY
2014	WALLEYE	MISS HEADWATERS	LG FINGERLING	696	6.4	DNR PONDS
2016	WALLEYE	MISS HEADWATERS	LG FINGERLING	655	6.7	DNR PONDS

Table 3. Locations of fyke nets (GPS coordinates) used during spring fyke netting (SN1) on Dutch Hollow Lake, Sauk County, Wisconsin in 2016.

Net	Date set	Date last lifted	Lead net length (feet)[1]	Frame height x width (feet)	Latitude	Longitude
1	03/14/2016	03/25/2016	50	3x6	43.60412	-90.20212
2	03/15/2016	03/28/2016	50	3x6	43.60538	-90.19946
3	03/16/2016	04/01/2016	35	4x6	43.60216	-90.18871
4	03/16/2016	03/31/2016	50	3x6	43.60675	-90.17985
5	03/16/2016	03/22/2016	50	3x6	43.60816	-90.18295
6	03/17/2016	03/31/2016	50	3x6	43.59355	-90.18742
7	03/17/2016	03/31/2016	50	3x6	43.59172	-90.19370
8	03/17/2016	03/22/2016	50	3x6	43.59184	-90.19350
9	03/17/2016	03/25/2016	50	3x6	43.59695	-90.19946
10	03/22/2016	04/01/2016	35	4x6	43.60443	-90.18365
11	03/22/2016	04/01/2016	35	4x6	43.60163	-90.19074
12	03/28/2016	04/01/2016	35	4x6	43.60217	-90.19388
13	04/17/2016	04/19/2016	35	4x6	43.60620	-90.18480
14	04/17/2016	04/19/2016	35	4x6	43.60640	-90.18420

[1]Leads were shortened on the 4x6 nets because they were set in locations with steep drop-offs.

Table 4. Calcified structures used to estimate age for the various fish species collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

Species	Size Category	Structure
Black crappie	ALL	scale
Bluegill	ALL	scale
Largemouth bass	≤8 inches	scale
Largemouth bass	≥8 inches	dorsal spine
Northern pike	ALL	first anal fin ray
Smallmouth bass	≤8 inches	scale
Smallmouth bass	≥8 inches	dorsal spine
Walleye	ALL	dorsal spine

Table 5. Locations of electrofishing stations (GPS coordinates) sampled during late spring electrofishing (SE2) on Dutch Hollow Lake, Sauk County, Wisconsin in 2016.

Sample date	Start time	End time	Substation name	Distance sampled (miles)	Start latitude	Start longitude	End latitude	End longitude
05/23/2016	21:12	21:25	PANFISH #1	0.5	43.60620	-90.18040	43.605920	-90.18598
05/23/2016	22:10	22:50	GAMEFISH #1	1.5	43.60592	-90.18598	43.605880	-90.19897
05/23/2016	23:30	23:48	PANFISH #2	0.5	43.60588	-90.19897	43.603700	-90.20285
05/24/2016	0:15	0:55	GAMEFISH #2	1.5	43.60370	-90.20285	43.599370	-90.19510
05/24/2016	1:28	1:42	PANFISH #3	0.5	43.59937	-90.19510	43.597350	-90.19023
05/24/2016	1:58	2:37	GAMEFISH #3	1.5	43.59735	-90.19023	43.596070	-90.18903

Table 6. Length categories (inches) that have been proposed for the sport fish species that were collected from Dutch Hollow Lake, Sauk County, Wisconsin in 2016 (Anderson and Neumann 1996, Guy et al. 2007).

Species	Stock	Quality (PSD)	Harvest (PSD-H)[1]	Preferred (PSD-P)	Memorable (PSD-M)	Trophy (PSD-T)
Bluegill	3	6	7 (Angler)	8	10	12
Black crappie	5	8	9 (Angler)	10	12	15
Smallmouth bass	7	11	14 (Legal)	14	17	20
Largemouth bass	8	12	14 (Legal)	15	20	25
Walleye	10	15	15 (Legal)	20	25	30
Northern pike	14	21	26 (Legal)	28	34	44

[1]The harvest column refers to size at which anglers are likely to harvest panfish, or the legal minimum length at which gamefish may be harvested in Wisconsin.

Table 7. Summary of catch and catch per unit effort (CPE) by gear type for spring netting and spring and fall electrofishing on Dutch Hollow Lake, Sauk County, Wisconsin in 2016.

	CATCH					CPE						
Species	n Fyke	n SE1	n SE2	n FE	n Total	fish/net night[1]	SE1 fish/hour[2]	SE2 fish/hr[3]	FE fish/hr[4]	SE1 fish/mile	SE2 fish/mile	FE fish/mile
Largemouth bass	23	193	475	216	907	0.2	53.6	158.3	58.4	26.4	79.2	29.6
Northern pike	610	36	18	39	703	4.6	10.0	6.0	10.5	4.9	3.0	5.3
Yellow bullhead	462	0	13		475	3.4		17.3		0.0		
Walleye	296	90	25	30	441	2.2	25.0	8.3	8.1	12.3	4.2	4.1
Bluegill	51	0	212		263	0.4		282.7		0.0	141.3	
White sucker	252	0	0		252	1.9		0.0		0.0	0.0	
Black crappie	71	0	5		76	0.5		6.7		0.0	3.3	
Pumpkinseed	18	0	22		40	0.1		29.3		0.0	5.9	
Smallmouth bass	0	4	3	17	24	0.0	1.1	1.0	4.6	0.5	0.5	2.3
Yellow perch	1	0	1		2	0.0		1.3		0.0	0.7	
Green sunfish	1	0	0		1	0.0		0.0		0.0		
Totals	1,785	323	774	302	3,184							

[1]Total fyke netting effort during SN1 was 134 net nights.
[2]During SE1, total shoreline distance sampled was 7.3 miles and total "on" time was 3.6 hours.
[3]During SE2, total shoreline distance was 6.0 miles for gamefish and 1.5 miles for panfish. Total "on" time was 3.0 hours for gamefish and 0.75 hours for panfish.
[4]During FE, total shoreline distance sampled was 7.3 miles and total "on" time was 3.7 hours

Table 8. Summary of lengths (inches) and stock density indices for panfish and gamefish collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

Species	Sample period	n unique fish[1]	Length range (inches)	Mean length (inches)	Median length (inches)	PSD	PSD-H	PSD-P	PSD-M
Northern pike-male	SN1	312	14.1-26.8	18.5	18.4				
Northern pike-female	SN1	102	14.4-35.9	21.3	20.2				
Northern pike-unk	SN1	14	10.3-27.3	16.7	16.1				
Northern pike-all	SN1	428	10.3-35.9	19.1	18.7	21	4	2	<1
Northern pike	SE1	27	8.4-27.8	18.7	19.6				
Northern pike	SE2	14	11.7-23.8	19.3	19.3				
Northern pike	FE	39	14.6-36.4	20.1	19.7				
Walleye-male	SN1+SE1	198	15.3-21.1	18.0	18.0				
Walleye-female	SN1+SE1	63	17.9-24.8	20.6	20.4				
Walleye-immature	SN1+SE1	3	12.3-14.0	12.9	12.3				
Walleye-All	SN1+SE1	264	12.3-24.8	18.6	18.4	99	99	19	0
Walleye	SE2	12	10.9-21.3	16.2	18.1				
Walleye	FE	30	14.8-23.6	18.4	18.1				
Largemouth bass	SN1	23	9.8-17.9	13.1	12.8				
Largemouth bass	SE1	193	6.7-17.9	12.8	12.9	67	27	13	0
Largemouth bass	SE2	454	5.6-18.5	12.0	12.1	57	15	7	0
Largemouth bass	FE	216	3.0-17.2	11.3	11.6	51	11	6	0
Yellow bullhead	SN1	462	4.0-14.9	11.0	11.0				
White sucker	SN1	252	17.3-24.8	21.0	21.2				
Black crappie	SN1	71	3.8-12.2	9.3	9.8				
Black crappie	SE2	5	6.6-10.4	9.0	9.6				
Bluegill	SN1	51	3.0-8.9	5.7	5.2				
Bluegill	SE2	212	1.8-9.0	5.6	5.9	53	24	5	0
Pumpkinseed	SN1+SE2	40	3.1-7.9	6.1	6.5				
Smallmouth bass	SE1+SE2+FE	24	6.5-20.3	11.0	10.0				
Yellow perch	SE2	1		8.0					
Green sunfish	SN1	1		5.0					

[1]Number of fish collected minus the number of recaptures.

Table 9. Total annual survival and mortality estimates for panfish and gamefish species collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

Species	Age fully recruited	Max age	Z	S	A	R-squared	p	Total annual mortality
Largemouth bass	5	12	-0.8364	0.43	0.57	0.97	<0.001	57%
Northern pike-male	3	6	-0.5670	0.57	0.43	0.94	<0.050	43%
Northern pike-male	3	7	-1.0368	0.35	0.65	0.82	<0.050	65%
Northern pike-female	2	8	-0.4875	0.61	0.39	0.83	<0.050	39%
Bluegill	4	8	-0.5315	0.59	0.41	0.89	<0.020	41%
Black crappie	4	7	-0.8580	0.42	0.58	0.91	<0.050	58%

Table 10. Total annual survival and mortality estimates for largemouth bass collected during 6 surveys of Columbia, Sauk, and Dane County lakes from 2012-2016.

Waterbody	County	Survey year	Fully recruited	Max age	Z	S	A	R-squared	p	total annual mortality
Crystal Lake	Dane	2015	4	22	-0.2136	0.81	0.19	0.84	<0.0010	19%
Lake Wisconsin	Columbia	2012	4	12	-0.3023	0.74	0.26	0.87	<0.0010	26%
Fish Lake	Dane	2015	7	16	-0.3814	0.68	0.32	0.99	<0.0001	32%
White Mound Lake	Sauk	2013	4	12	-0.6056	0.55	0.45	0.95	<0.0100	45%
Dutch Hollow Lake	Sauk	2016	5	12	-0.8364	0.43	0.57	0.97	<0.0010	57%
Lake Virginia	Sauk	2016	7	10	-1.5331	0.22	0.78	0.91	<0.0500	78%

Table 11. Mean age at 14.0-14.9 inches (MAL14) for largemouth bass populations in 13 Columbia, Sauk, and Dane County lakes (15 surveys), 2006-2016.

Waterbody	County	Year	MAL14	LMB density	Prey base
Lake Wisconsin	Columbia	2012	4.8	Low	GZS, BLG
Lake Delton	Sauk	2014	4.9	Moderate	BLG
Park Lake	Columbia	2011	5.3	Low	GZS, BLG
Swan Lake	Columbia	2009	5.8	Moderate	GZS, BLG
Redstone Lake	Sauk	2010	6.0	Low	GZS, BLG
Seeley Lake	Sauk	2008	6.1	Moderate	BLG
Mirror Lake	Sauk	2014	6.4	Moderate	BLG
White Mound Lake	Sauk	2013	6.5	High	BLG
Dutch Hollow Lake	**Sauk**	**2016**	**6.7**	**High**	**BLG**
Dutch Hollow Lake	Sauk	2006	6.9	High	BLG
White Mound Lake	Sauk	2006	7.2	High	BLG
Crystal Lake	Dane	2015	7.5	Low	BLG
Lake Virginia	Sauk	2016	7.5	High	BLG
Fish Lake	Dane	2015	8.1	Moderate	BLG
Devils Lake	Sauk	2013	9.3	High	BLG
Average-All Lakes			6.6		
Median-All Lakes			6.5		

Table 12. Date of collection, length (inches), weight (pounds), relative weight, and age (years) of smallmouth bass collected during two spring electrofishing surveys of Dutch Hollow Lake, Sauk County, Wisconsin in 2016.

Date Collected	Length	Weight	Relative weight	Age
05/23/2016	11.9	0.98	115	5
05/23/2016	12.2	0.99	107	4
05/23/2016	13.7	1.23	90	5
04/12/2016	13.7	1.26	92	5
04/12/2016	14.0	1.23	84	6
04/12/2016	15.3	1.72	88	6
04/12/2016	20.3	4.80	97	10

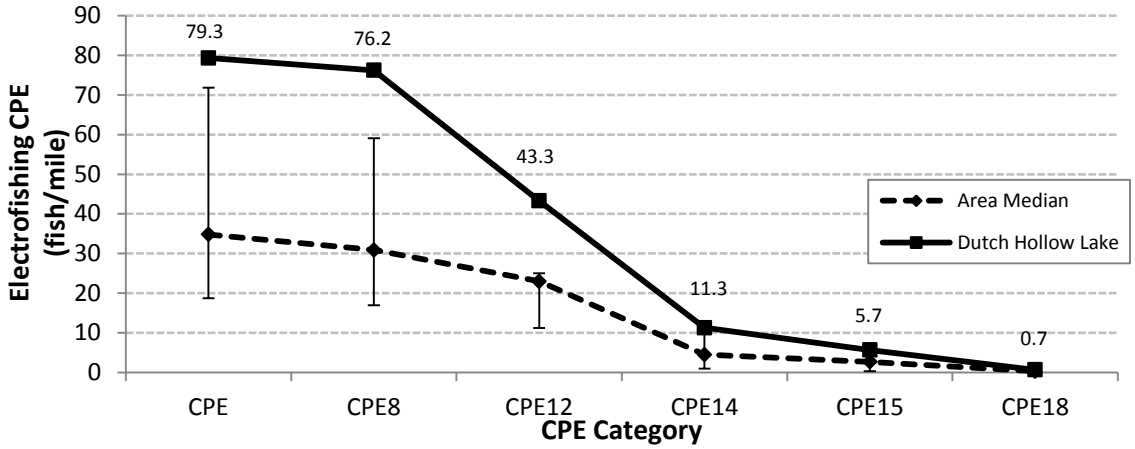

Figure 1. Largemouth bass size-specific catch per unit effort (CPE) calculated from May electrofishing surveys (SE2) on 16 lakes in Columbia, Sauk, and northwestern Dane counties from 2008-2016, and Dutch Hollow Lake, Sauk County in 2016. Error bars around median values represent the first and third quartiles for a given CPE metric (middle 50% of data).

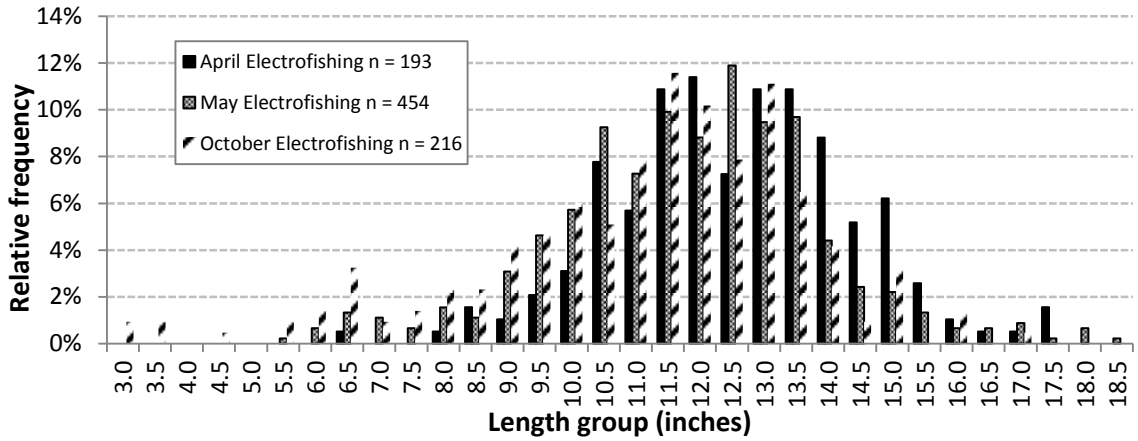

Figure 2. Length frequency distribution of largemouth bass captured during three electrofishing surveys (SE1, SE2, FE) of Dutch Hollow Lake, Sauk County, Wisconsin in 2016.

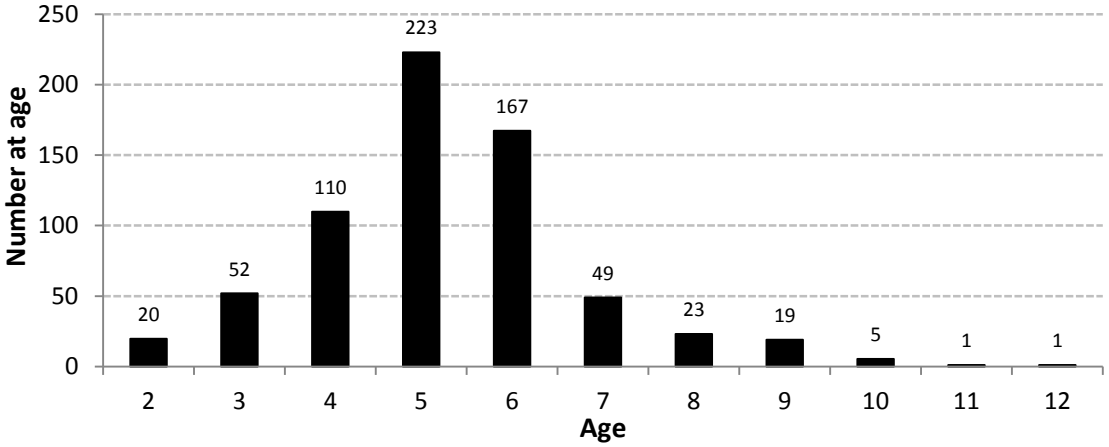

Figure 3. Age frequency distribution of largemouth bass captured during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

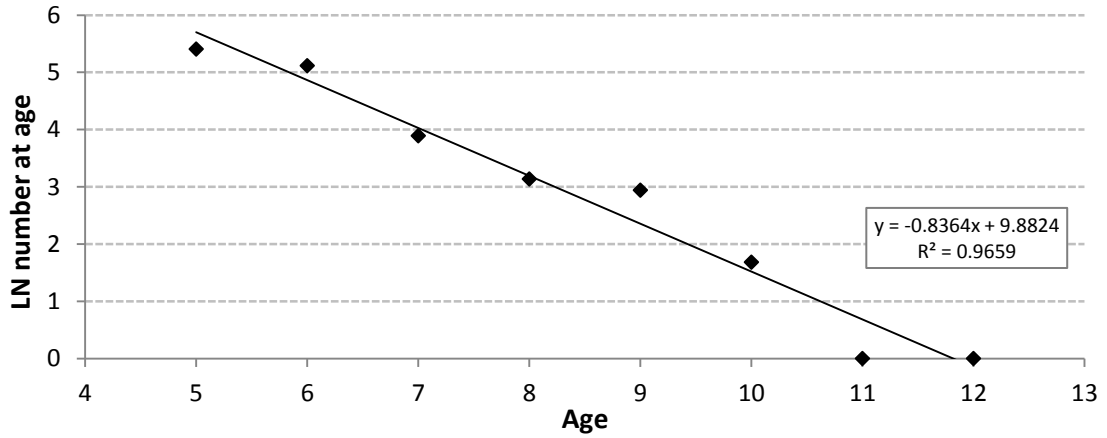

Figure 4. Catch curve for largemouth bass captured during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

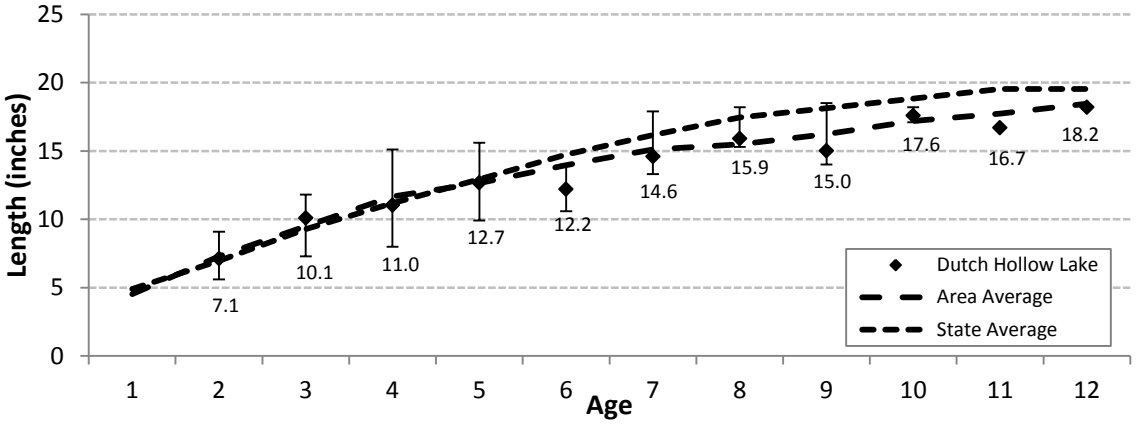

Figure 5. Mean length-at-age of largemouth bass captured during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin. Error bars represent minimum and maximum length values for a given age.

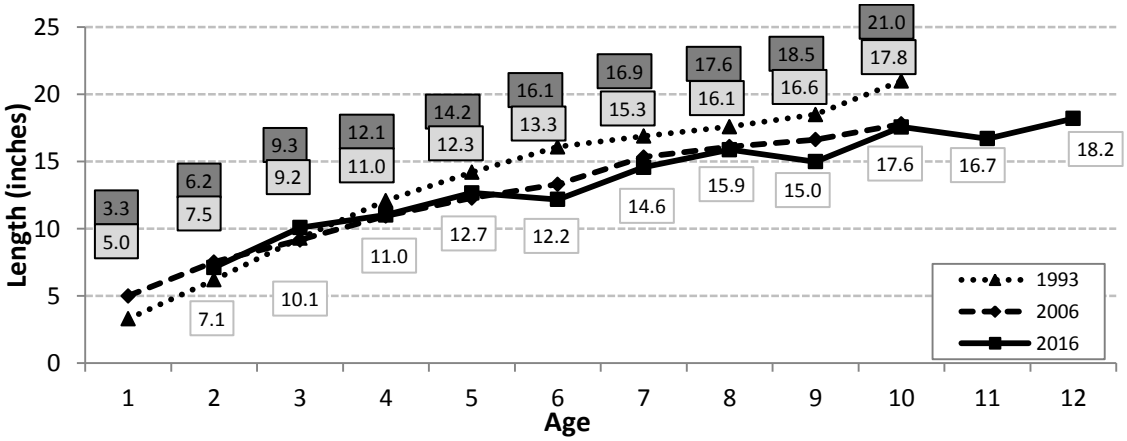

Figure 6. Mean length-at-age of largemouth bass captured during surveys of Dutch Hollow Lake, Sauk County, Wisconsin in 1993, 2006, and 2016. Values from the 1993 survey are in the dark gray boxes with the black border. Values from 2006 are in the light gray boxes with a black border. Values from 2016 are in the white boxes with the light gray border.

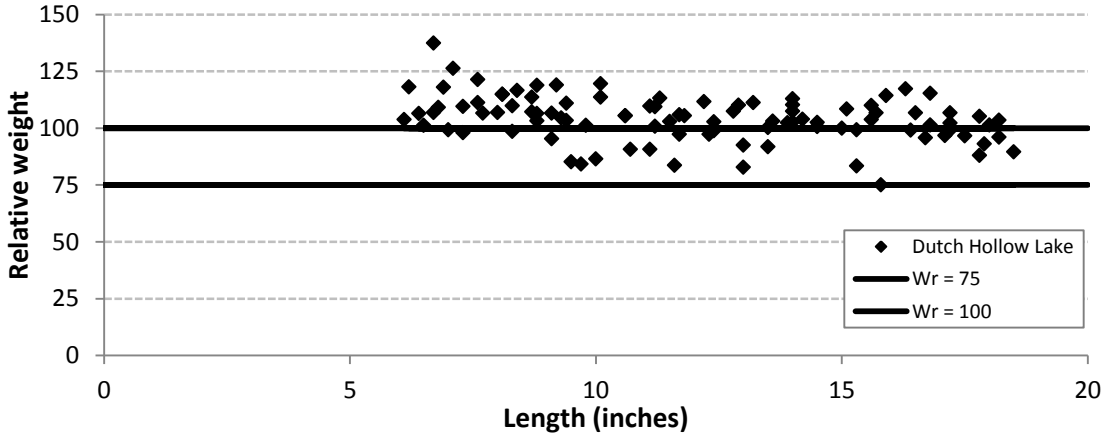

Figure 7. Relative weights of largemouth bass collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

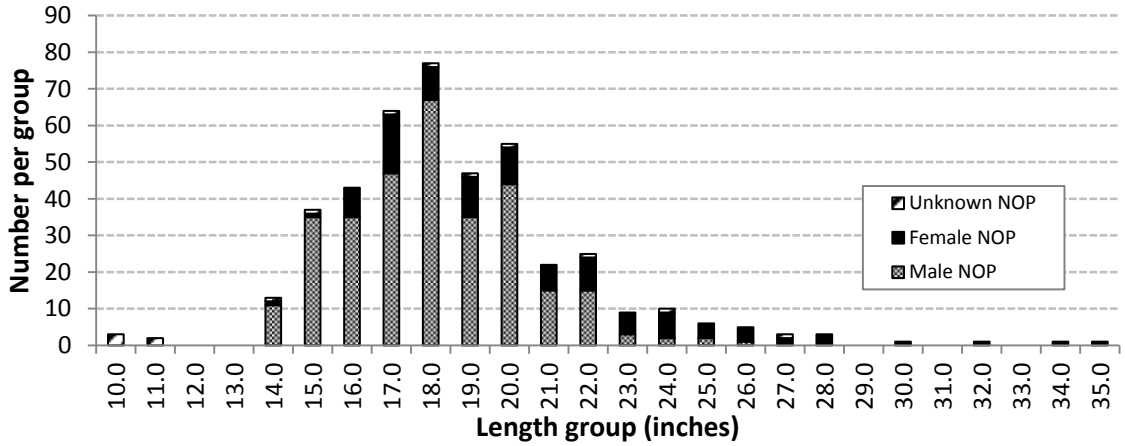

Figure 8. Length frequency distribution of northern pike captured using fyke nets during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

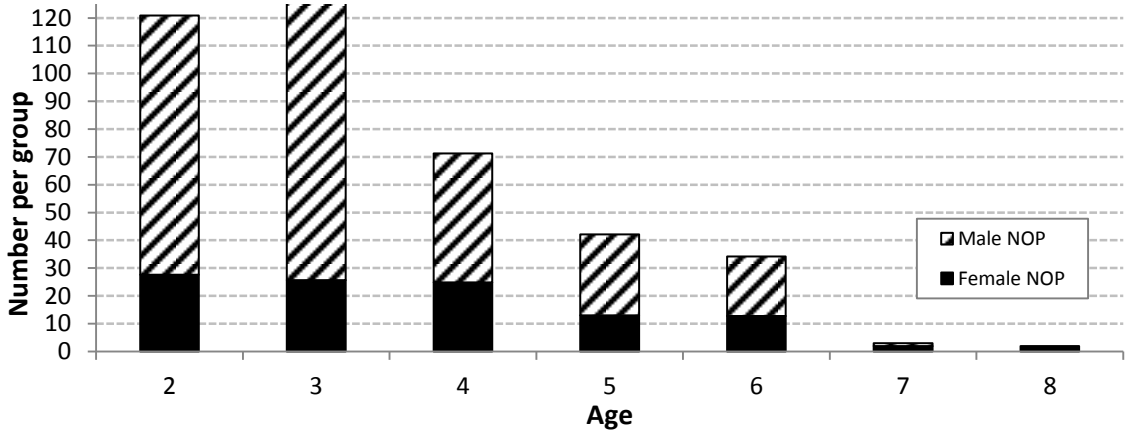

Figure 9. Age frequency distribution of northern pike captured using fyke nets during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

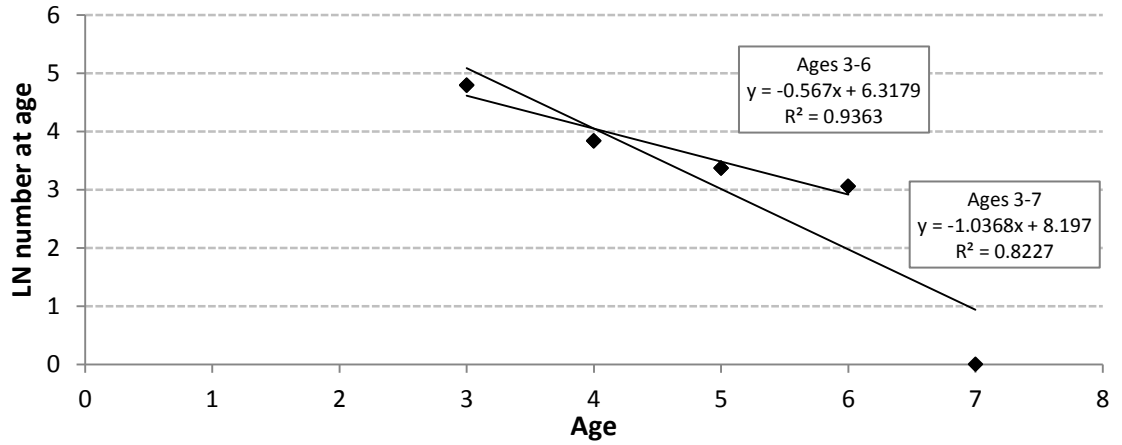

Figure 10. Catch curve for male northern pike captured during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

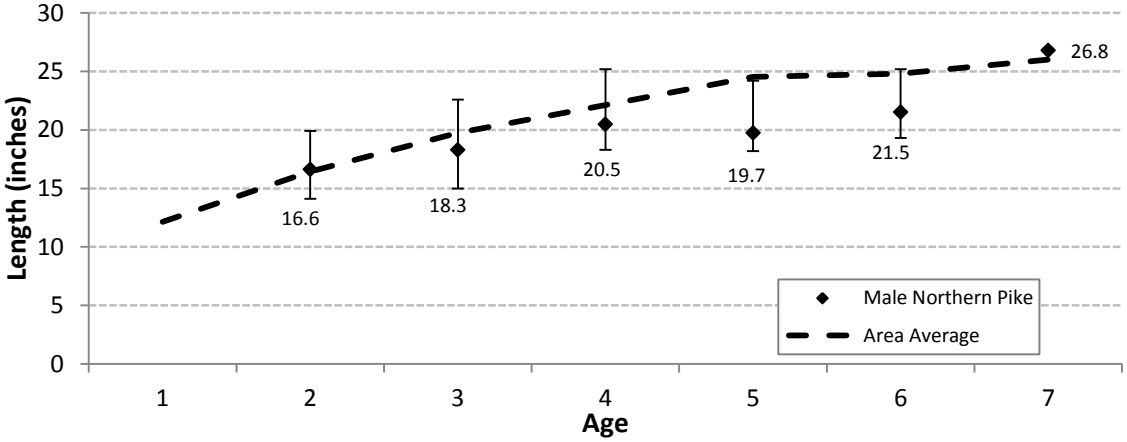

Figure 11. Mean length-at-age of male northern pike collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin. Error bars represent minimum and maximum length values for a given age.

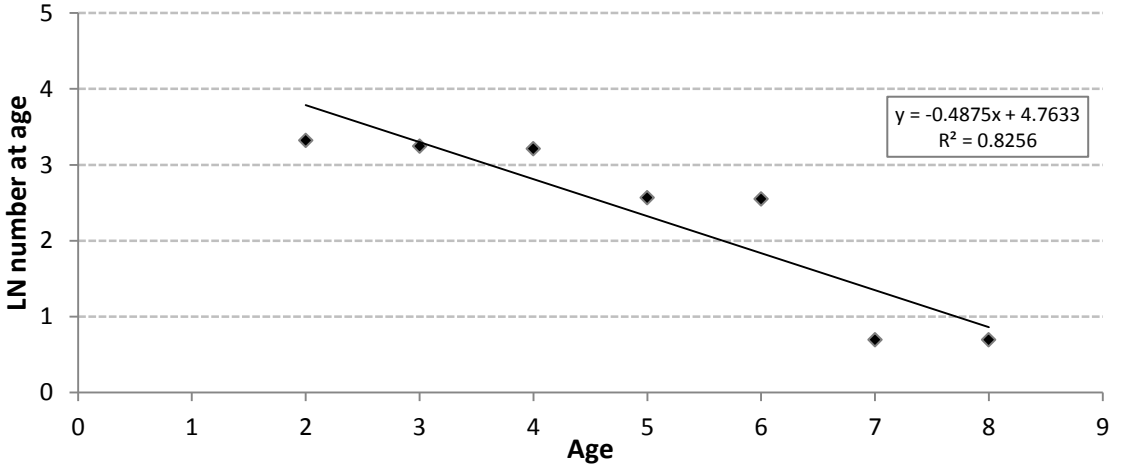

Figure 12. Catch curve for female northern pike collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

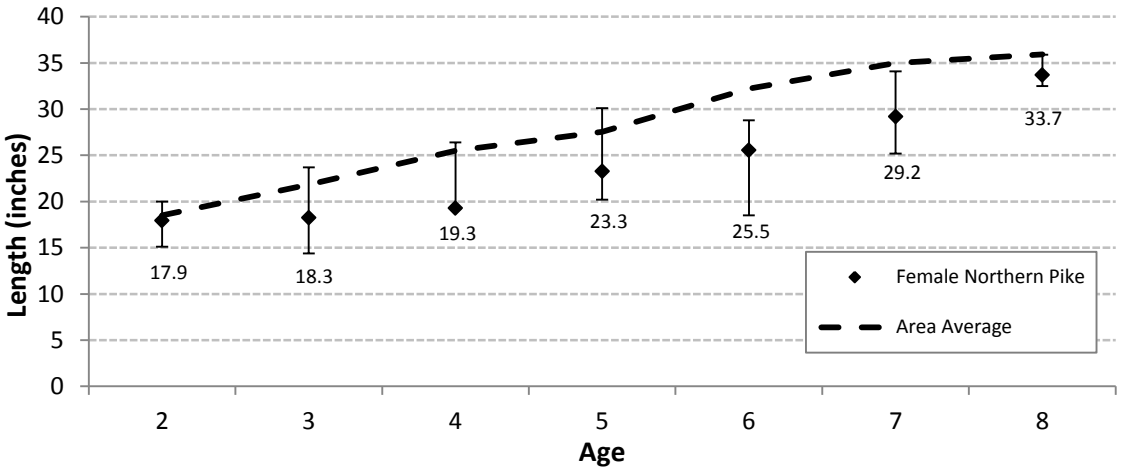

Figure 13. Mean length-at-age of female northern pike collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin. Error bars represent minimum and maximum length values for a given age.

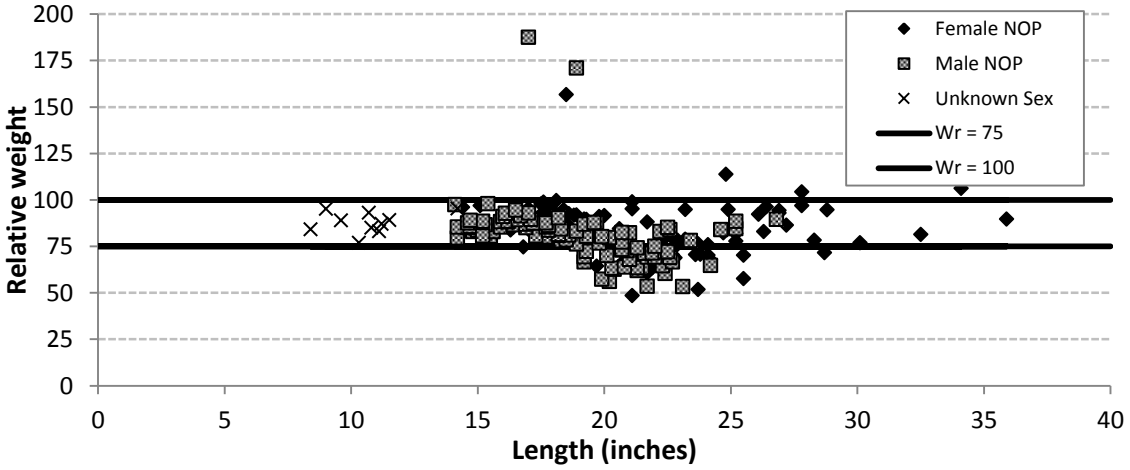

Figure 14. Relative weights of northern pike collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

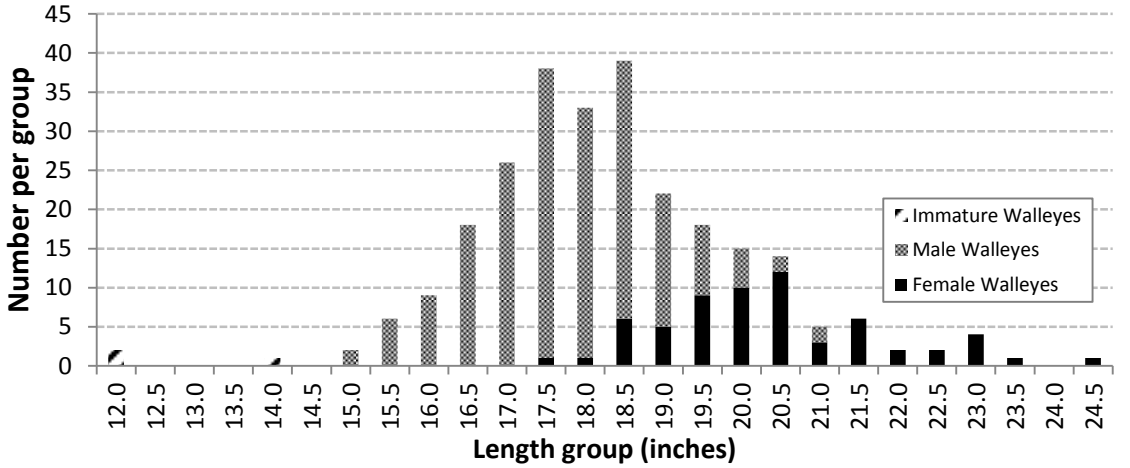

Figure 15. Length frequency distribution of walleyes collected during the 2016 early spring netting and electrofishing surveys (SN1, SE1) of Dutch Hollow Lake, Sauk County, Wisconsin.

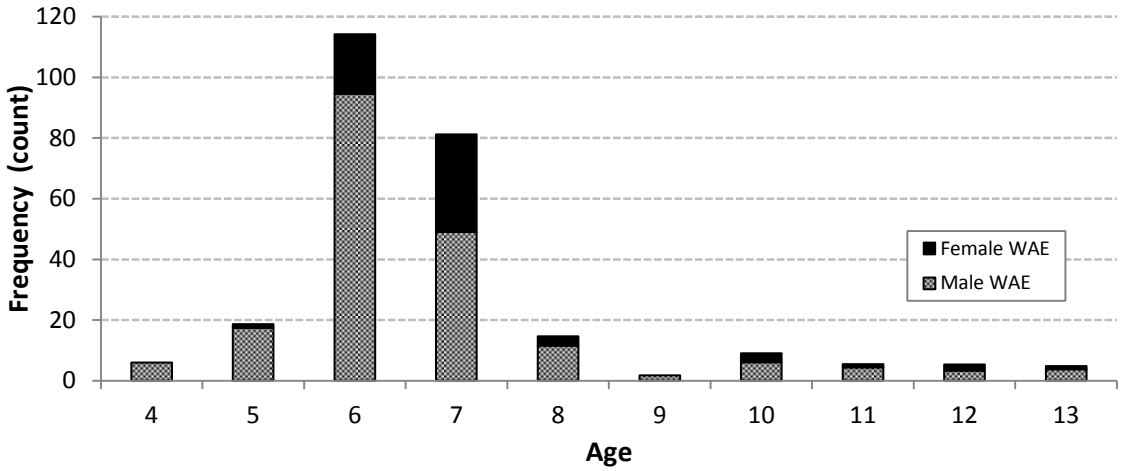

Figure 16. Age frequency distribution of walleyes collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

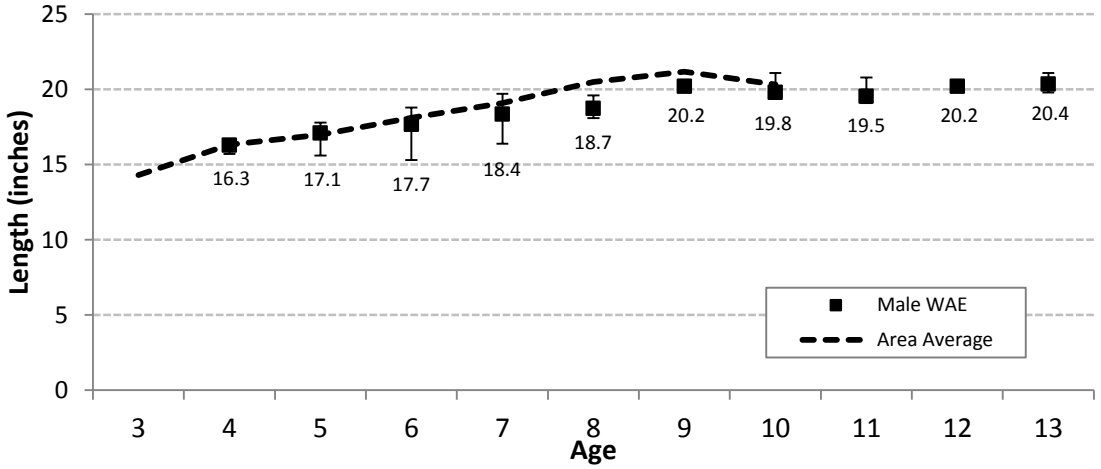

Figure 17. Mean length-at-age of male walleyes collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin. Error bars represent minimum and maximum length values for a given age.

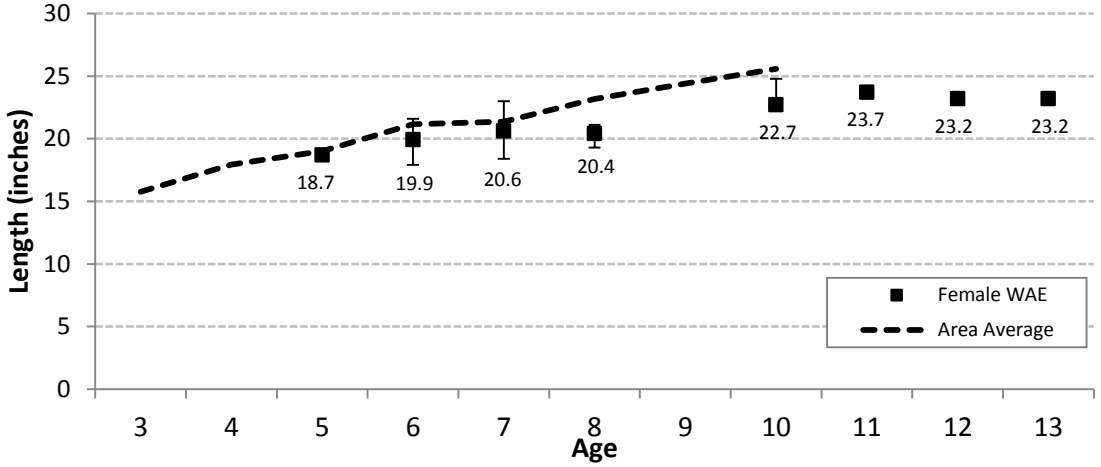

Figure 18. Mean length-at-age of female walleyes collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin. Error bars represent minimum and maximum length values for a given age.

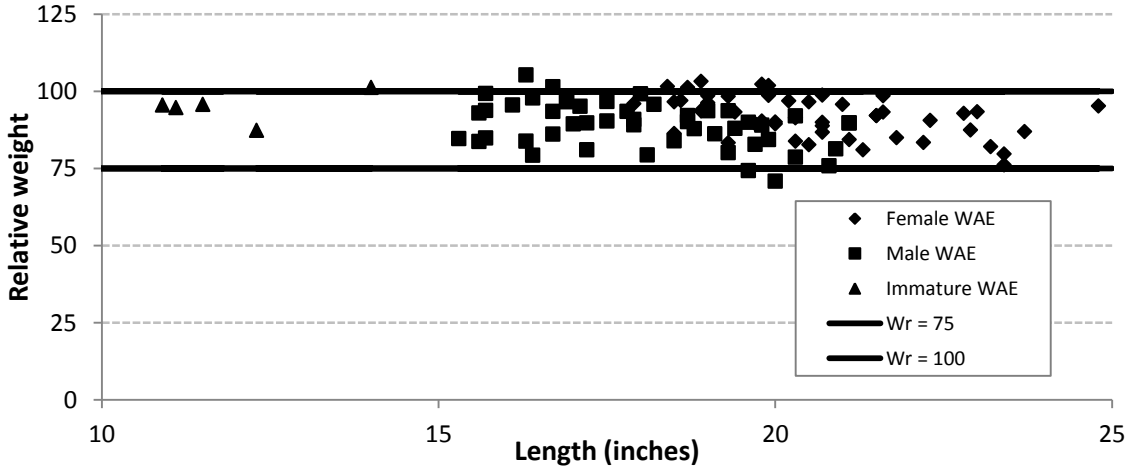

Figure 19. Relative weights of walleyes collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

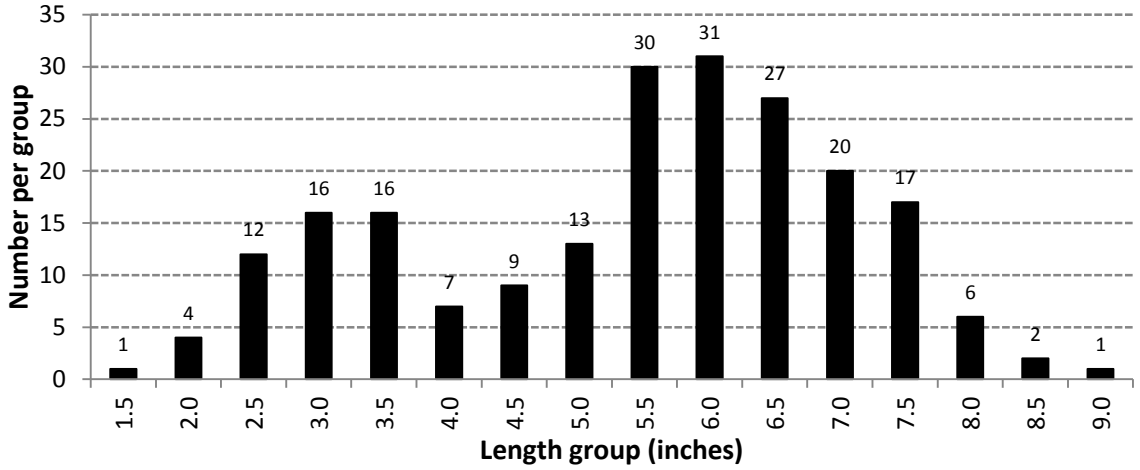

Figure 20. Length frequency distribution of bluegill collected during the May 2016 electrofishing survey of Dutch Hollow Lake, Sauk County, Wisconsin.

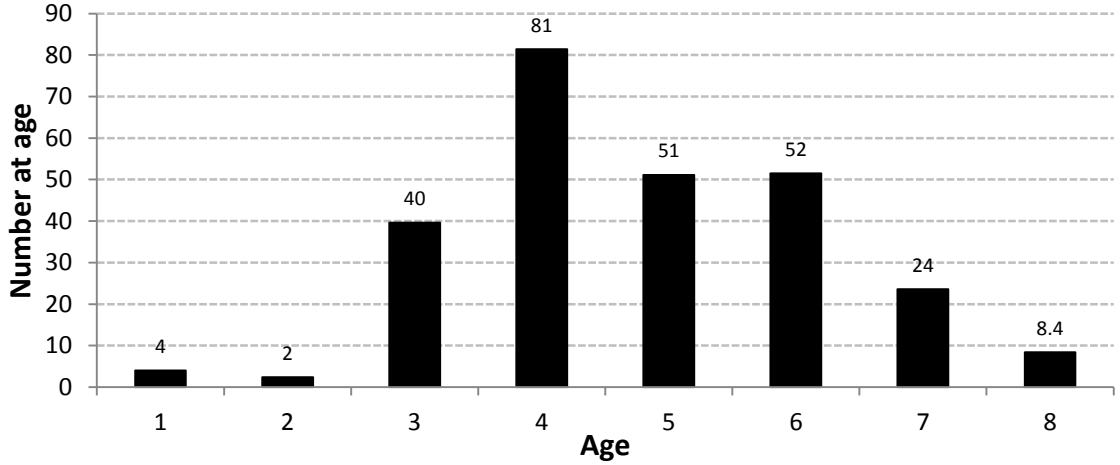

Figure 21. Age frequency distribution of bluegills collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

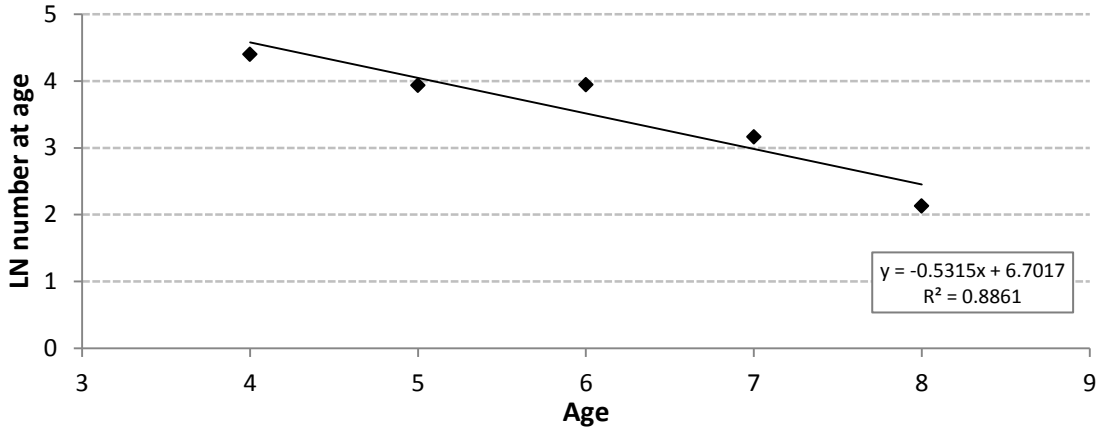

Figure 22. Catch curve for bluegill collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

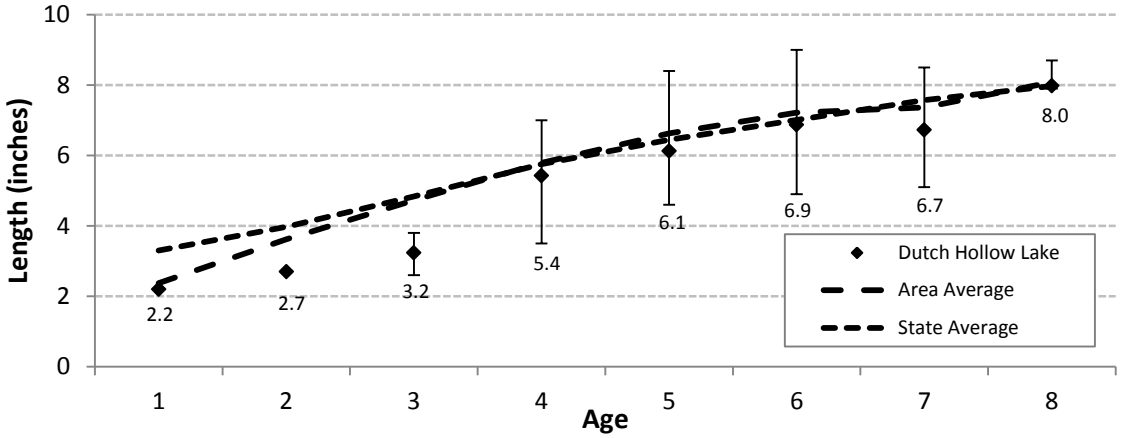

Figure 23. Mean length-at-age of bluegill collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin. Error bars represent minimum and maximum length values for a given age.

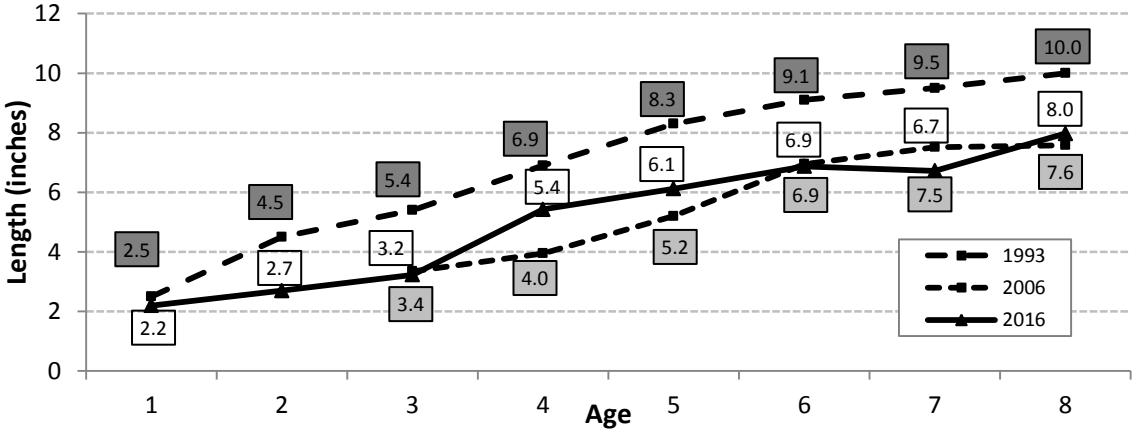

Figure 24. Mean length-at-age of bluegill collected during surveys of Dutch Hollow Lake, Sauk County, Wisconsin in 1993, 2006, and 2016. Values from the 1993 survey are in the dark gray boxes with the black border. Values from 2006 are in the light gray boxes with a black border. Values from 2016 are in the white boxes with the black border.

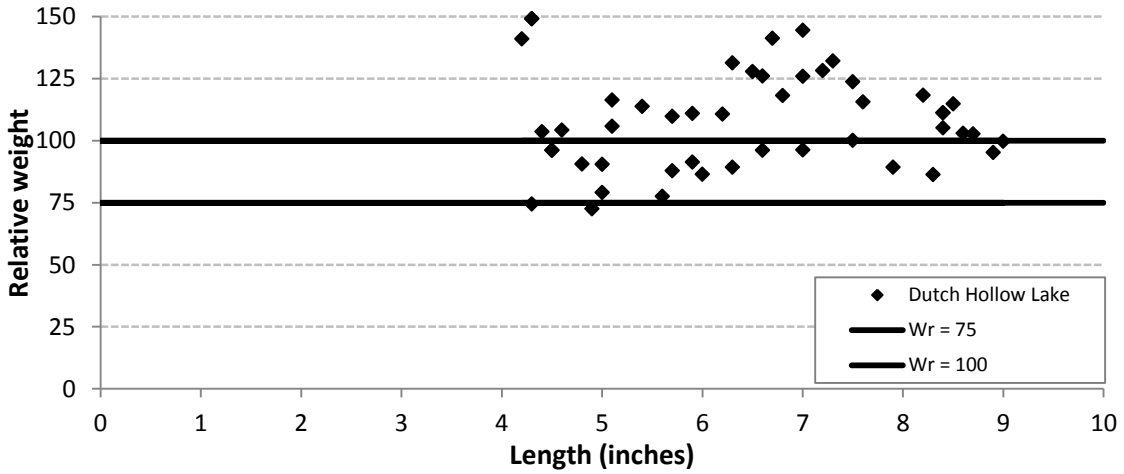

Figure 25. Relative weights of bluegills collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

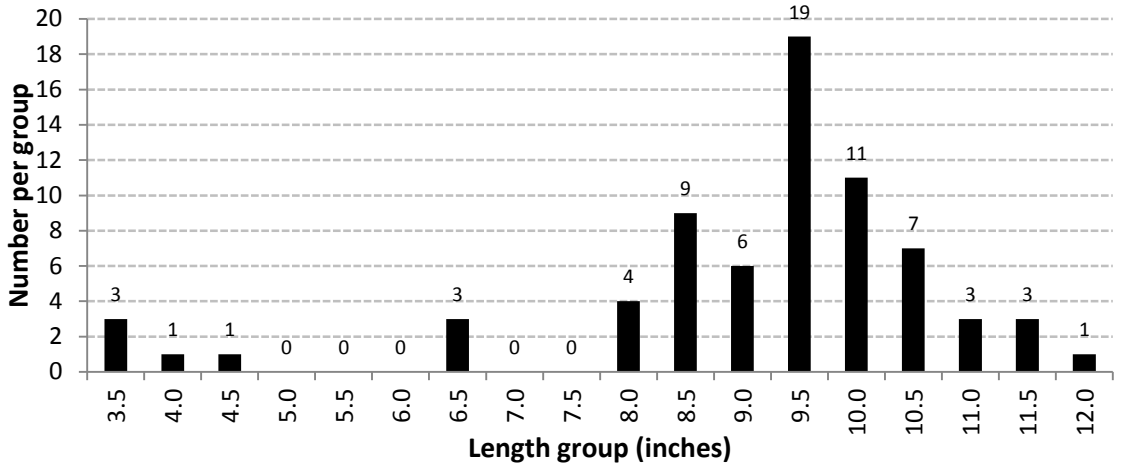

Figure 26. Length frequency distribution of black crappie collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

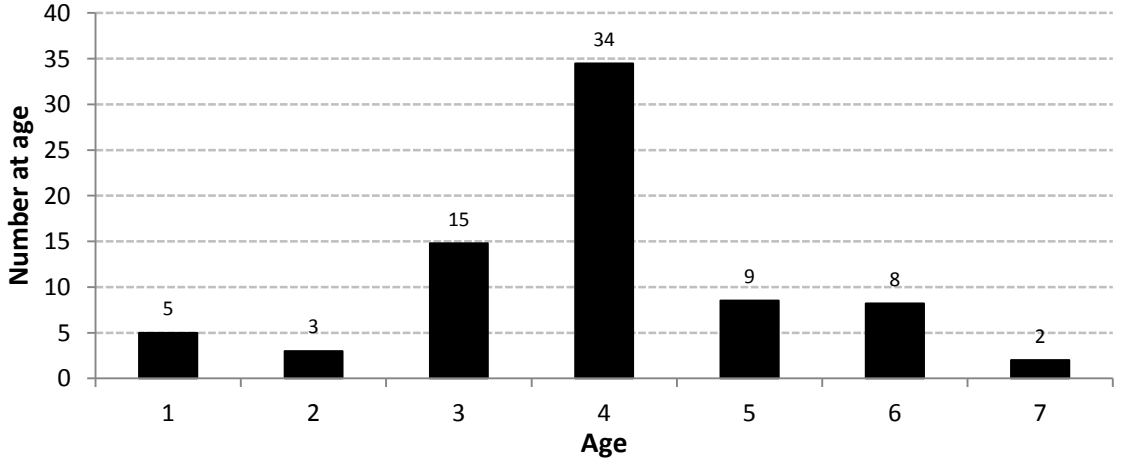

Figure 27. Age frequency distribution of black crappie collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

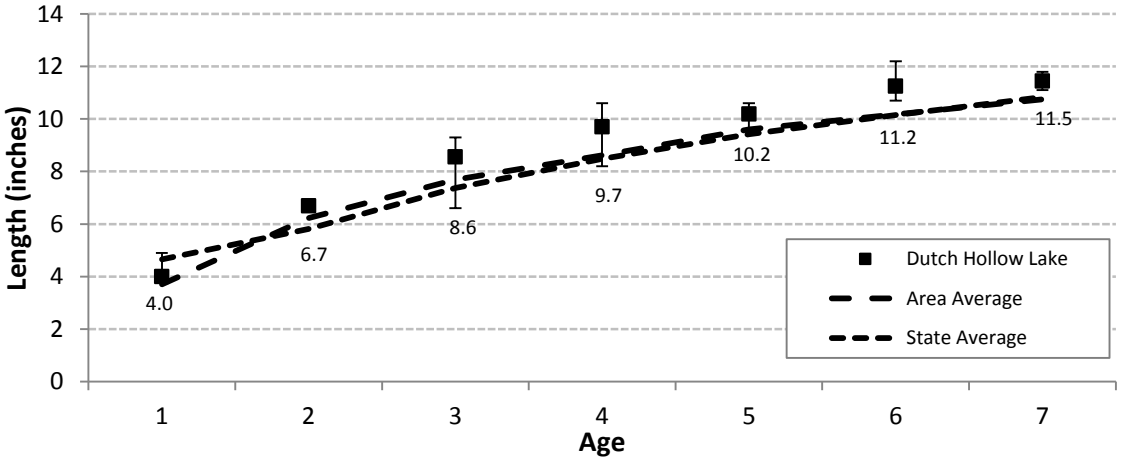

Figure 28. Mean length-at-age of black crappie collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin. Error bars represent minimum and maximum length values for a given age.

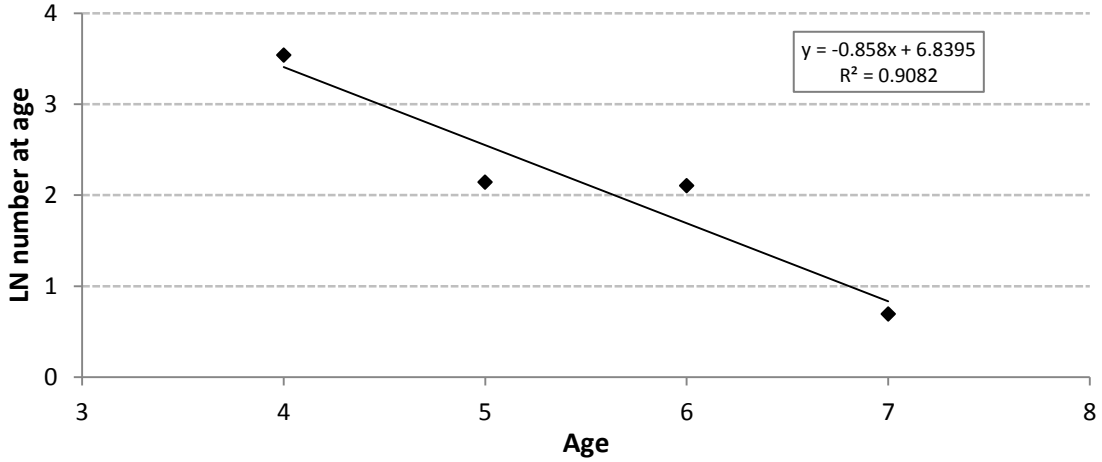

Figure 29. Catch curve for black crappie collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

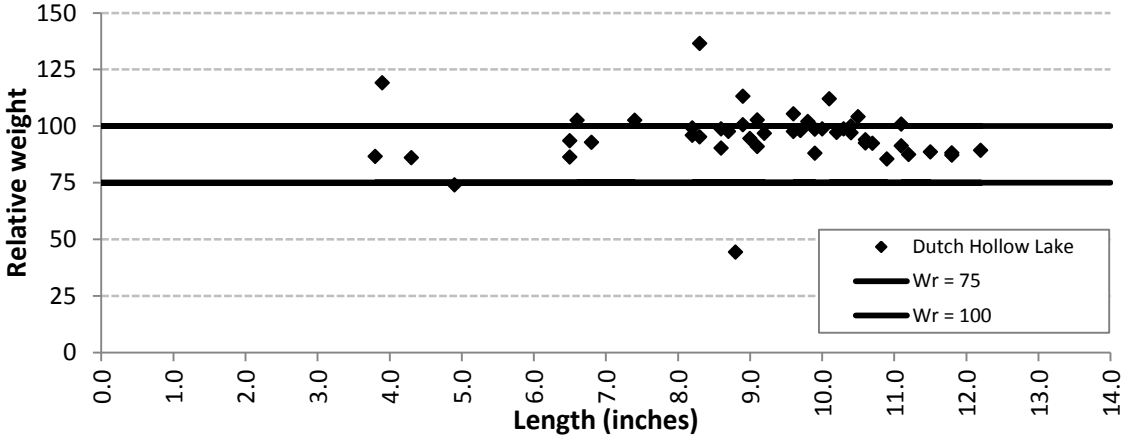

Figure 30. Relative weights of black crappies collected during the 2016 survey of Dutch Hollow Lake, Sauk County, Wisconsin.

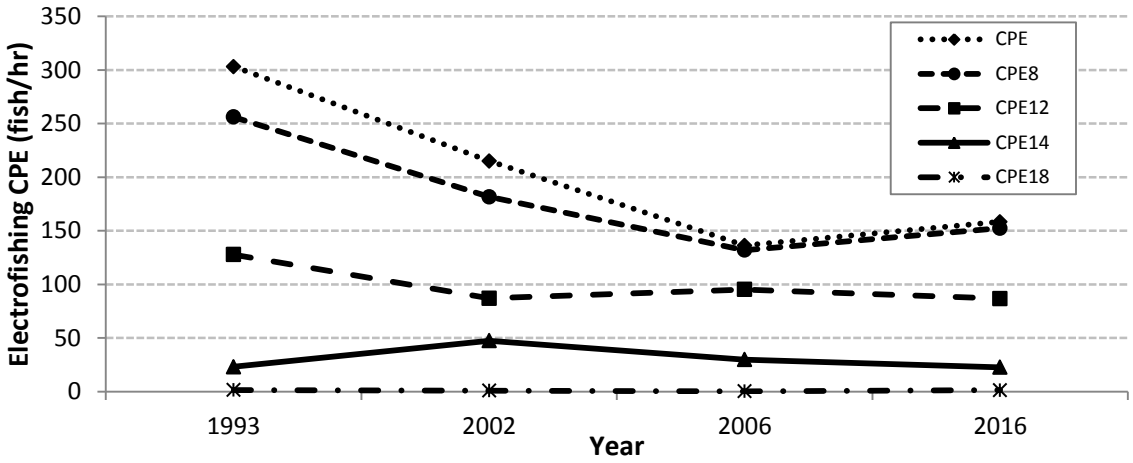

Figure 31. Size-specific electrofishing catch rates of largemouth bass during May surveys (SE2) of Dutch Hollow Lake, Sauk County, Wisconsin in 1993, 2002, 2006, and 2016.

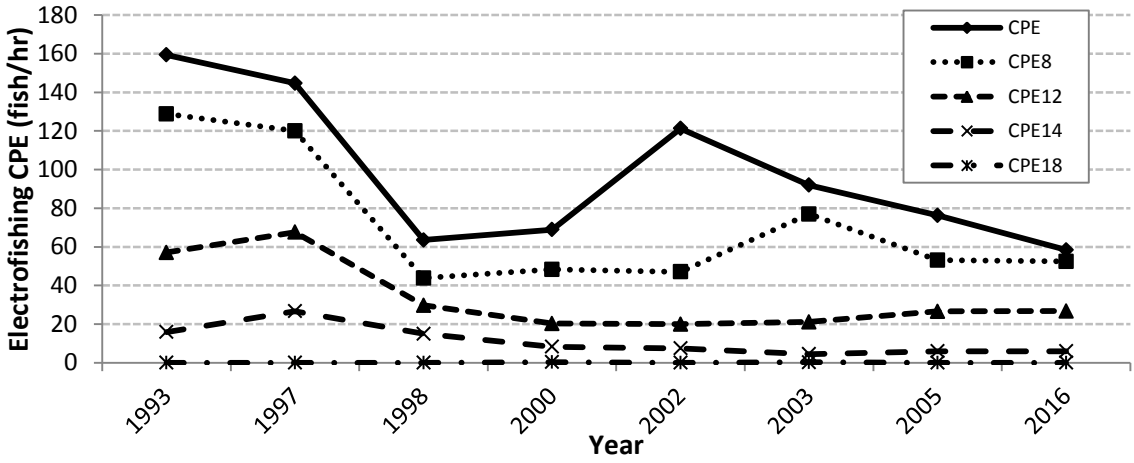

Figure 32. Size-specific electrofishing catch rates of largemouth bass during eight October surveys of Dutch Hollow Lake, Sauk County, Wisconsin from 1993-2016.