

Clam River Flowage Fishery Survey, Burnett County, Wisconsin

2012

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Executive Summary

A comprehensive survey of Clam River Flowage (Burnett County) was conducted during 2012 by the Wisconsin Department of Natural Resources. The primary objective of this survey was to assess the status of sport fish populations in Clam River Flowage.

The 2012 adult walleye population estimate on Clam River Flowage (883 fish, 2.5 fish/acre) was similar to previous estimates and regional averages. Growth rates for both male and female walleyes were also near regional averages. Catch curve analysis estimated annual mortality of adult walleye between ages three and nine at 36%. Northern pike continue to be an important component of the Clam River Flowage fishery. Largemouth bass catch rates were below average but size structure was excellent. Smallmouth bass densities were high but size structure was poor. Bluegill catch rates were below average and size structure was poor.

Management recommendations include: 1) Maintain walleye as the primary gamefish in Clam River Flowage and continue with the 15 in minimum size limit, 2) Monitor impacts of liberalized bass regulations, 3) Continue providing liberal harvest opportunities for northern pike, 4) Maintain ecologically important bluegill populations, 5) Continue monitoring common carp abundance, 6) Continue efforts to maintain and enhance habitat diversity whenever possible, and 7) Continue exotic species monitoring and control programs.

Introduction

Clam River Flowage is a hard water drainage impoundment of the Clam River in western Burnett County. The lake's shoreline has a mix of public and privately owned land. Clam River Flowage is 359 acres with a maximum depth of 29 feet and mean depth of 11 feet. Invasive species present in Clam River Flowage include curly-leaf pondweed (Potamogeton crispus). Clam River Flowage is a stained water, mesotrophic flowage. No water quality data are available for the lake.

Gamefish species present in Clam River Flowage include walleye Sander vitreus, largemouth bass Micropterus salmoides, smallmouth bass M. dolomieu, and northern pike Esox lucius. Panfish species include bluegill Lepomis macrochirus, black crappie Pomoxis nigromaculatus, pumpkinseed L. gibbosus, yellow perch Perca flavescens, and rock bass Ambloplites rupestris. Other fish species in Clam River Flowage include bowfin Amia calva, lake sturgeon Acipenser fulvescens, redhorse species Moxostoma spp., bullhead species Ameiurus spp., common carp Cyprinus carpio, and white sucker Catostomus commersoni.

Recent fisheries management activities on Clam River Flowage have focused on sport angler regulations and fish surveys. Since 1997, no fish have been stocked into Clam River Flowage. During this survey, all of the standard statewide fishing regulations applied to Clam River Flowage, except for a no minimum length limit on black bass (Appendix Table 1). Previous fisheries surveys were conducted in 1997 and 1991. The objective of this study was to assess the status of walleye, northern pike, black bass, and panfish populations on Clam River Flowage.

Methods

Clam River Flowage was surveyed during 2012 following Wisconsin Department of Natural Resources lake monitoring protocol. Spring sampling utilized fyke nets and

electrofishing to assess gamefish and panfish populations. Fall electrofishing targeted young-of-the-year (YOY) walleye.

The first phase of the survey targeted spawning walleye and northern pike soon after ice out. Fyke nets (4 x 5 ft frame) were set on 20 March. Nets were checked daily and set at areas expected to contain high concentrations of spawning northern pike. Nets were removed on 22 March, with a total effort of 10 net nights. All walleye and northern pike captured were measured to the nearest 0.5 in and given the appropriate fin clip for that day. Sex was determined by the presence of gametes.

In addition to fyke net sampling, adult walleye were also captured in the Clam River with a pulsed DC electrofishing boat. River sampling began on 20 March when water temperatures reached 46 F. Daily shocking runs to increase the number of adult walleye marked for a population estimate continued through 24 March. The total number of walleyes marked during fyke netting and river electrofishing from 20 March through 24 March were used as the number of marked adult walleyes for population estimate calculations. River sampling concluded 29 March with a recapture shocker run for adult walleyes.

The adult walleye population estimate included all sexable fish and unknown gender fish ≥ 15 in (Cichosz 2010). This estimate was calculated with the Chapman modification of the Petersen Estimator using the equation:

$$N=(M+1)(C+1)/(R+1)$$

where N is the population estimate, M is the total number of marked fish in the lake, C is the total number of fish captured in the recapture sample, and R is the total number of marked fish captured in the recapture sample.

An electrofishing survey targeting black bass and panfish was conducted on 22 May. Black bass were sampled over three, two-mile index stations. Panfish were sampled in three, 1/2 mile index stations (Figure 1).

The final sampling component consisted of a fall electrofishing run on 03 October. During this survey, only walleye <14.0 in were targeted and collected over the entire shoreline.

For age analysis, scale samples were removed from walleyes less than 12 in, while dorsal spines were removed from larger walleyes. Age interpretations on northern pike were not conducted due to the unreliability and difficulty of determining annuli. Casselman (1990) found this to be due to irregular growth and resorption or erosion on the midlateral region.

Mean length-at-age comparisons were made to regional (18 county Northern Region) and statewide data using the WDNR Fish and Habitat statewide database. Mean length at age was used to assess growth for largemouth bass using the following von Bertalanffy equation:

$$l_t = L_{\infty}(1 - e^{-K(t-t_0)})$$

Where l_t is length at time t , L_{∞} is asymptotic length, K is a growth parameter, t is age in years, and t_0 is the age at which l_t is zero (Van den Avyle and Hayward 1999). L_{∞} predicts the average ultimate length attained for fish in that population.

Size structure quality of species sampled was determined using the indices proportional (PSD) and relative (RSD) stock densities (Anderson and Gutreuter 1983). The PSD and RSD value for a species is the number of fish of a specified length and longer divided by the number of fish of stock length or longer, the result multiplied by 100 (Appendix Table 2).

Catch per Unit Effort (CPE) was calculated as the number of fish captured above stock, preferred, and quality sizes divided by the appropriate unit of sampling effort for that species. That value was then compared to surveys of similar waterbodies throughout Wisconsin using the Fisheries Assessment Classification Tool (FACT) to determine how that value compared to other fisheries. For example, in Table 1, CPE₈ was calculated by dividing the number of largemouth bass greater than 8 in captured during late spring electrofishing divided by the number of miles surveyed (2.4 fish/mile). This value exceeded 9 percent of surveys of similar waterbodies in Wisconsin.

Results

Walleye. The 2012 adult walleye population on Clam River Flowage was estimated at 883 fish (CV = 0.25), similar to the previous estimate in 1997 of 743 fish. This estimated density (2.5 fish/acre) was comparable to both the Burnett County and Northwest Wisconsin averages of 2.5 and 2.7 fish/acre, respectively (WDNR unpublished data).

Adult walleyes captured in the spring 2012 survey ranged from 12.0 to 27.9 in (Figure 2). Mean lengths of male and female walleyes were 16.4 (S.D. = 2.2) and 23.3 in (S.D. = 3.9), respectively. The proportional stock density (PSD) and relative stock density of preferred size (RSDP) walleyes captured during spring fyke netting was 72.9 and 11.0, respectively. Compared to similar Wisconsin waterbodies (FACT), these values exceeded 24% of surveys for PSD and 23% of surveys for RSDP.

Growth rates for both male and female walleyes on Clam River Flowage closely matched regional averages (Figures 3 and 4). Mean ultimate length as calculated from the von Bertalanffy growth curve for female and male walleyes was 28.2 and 22.6 in, respectively (Figures 5 and 6). Catch curve analysis estimated annual mortality of Clam River Flowage adult walleye between ages three and nine at 36.3% (Figure 7).

Catch rates of age 0+ and 1+ walleye were 0.67/mile and 3.00/mile, respectively, during the electrofishing survey on 03 October. The catch rates of walleye less than 10 in was 2.2 fish/mile, greater than 45% of similar surveys statewide (FACT).

Northern pike. A total of 33 northern pike, ranging in length from 14-29 in were captured during 2012 spring fyke netting surveys (Figure 8). Mean lengths of male and female northern pike captured in 2012 were 17.9 in (S.D. = 2.5) and 21.9 in (S.D. = 3.7), respectively.

Largemouth bass. The mean length of largemouth bass collected during the 22 May 2012 survey on Clam River Flowage was 12.3 in (S.D. = 3.7), with a range of 3-17 in (Figure 9). A total of 13 largemouth bass \geq 8.0 in (2.4 fish/mile) were collected during that survey, which was

greater than 28% of surveys in similar Wisconsin waterbodies (FACT). PSD and RSD-14 values of 92 and 62 in 2012 were similar to 1997 (PSD = 100; RSD14 = 55)(Table 1).

Smallmouth bass. The mean length of smallmouth bass collected during the 22 May 2012 survey on Clam River Flowage was 9.8 in (S.D. = 3.2), with a range of 3-16 in (Figure 10). Smallmouth bass catch rates exceeded averages from surveys of comparable waterbodies (Table 2). However, PSD and RSD-14 were both below surveys from comparable populations in Wisconsin.

Panfish. A total of 49 bluegills (mean length = 5.3, S.D. = 1.6) were captured during the 22 May sampling on Clam River Flowage (Figure 11). CPE3 (29 bluegill/mile) was greater than 22% of similar surveys of Wisconsin waterbodies. The PSD value of 41 was greater than three percent of statewide surveys. Low numbers of other panfish species were also collected during this survey (Table 3).

Discussion

Shifts in species abundance towards increasing centrarchid abundance and stable or decreasing percid abundance have been observed on many regional lakes (Benike 2005a; Benike 2005b, Benike 2005c, Benike 2006, Toshner 2009, Benike 2010). That shift does not appear to be occurring on Clam River Flowage where walleye are still at moderate densities and black bass and panfish species have remained stable at moderate densities. Due to its low water clarity and river spawning walleye population, Clam River Flowage may be more resistant to this shift than other area lakes.

Good to excellent natural reproduction supports all fish communities in the Clam River Flowage. Multiple year classes were represented in the adult walleye population, suggesting consistent levels of natural reproduction. Surveys to monitor levels of natural reproduction of walleye should continue. If walleye recruitment appears to be inadequate, efforts should be made to enhance natural reproduction. Maintaining the genetic integrity of the river spawning

stock of walleyes (Jennings et al. 1996, Franckowiak et al. 2009) should be a high priority. Therefore, walleye stocking should only be considered after efforts to enhance natural reproduction have been exhausted.

In 2012, a no minimum length limit for black bass on Clam River Flowage replaced the standard statewide 14 in minimum length limit. The intent of this county-wide regulation change was to improve largemouth bass size structure and allow greater harvest opportunity for anglers on high density fisheries. With relatively low density largemouth bass and moderate density smallmouth bass populations, Clam River Flowage does not have the same characteristics that this regulation change was intended to address. Future impacts of this regulations change should be closely monitored.

Northern pike have historically provided a popular sport fishery on Clam River Flowage. During a 1997-1998 creel survey on Clam River Flowage, northern pike was the second most targeted species behind walleye. Spring 2012 survey results suggest a stable, moderate density population with average size structure.

Sudden increases in common carp densities on Clam Lake, located approximately 24 miles upstream, have caused substantial ecological impacts (Wendel 2011). Similar changes in species abundance have not been observed on Clam River Flowage. Predation of carp larvae by a high density bluegill population likely inhibits carp reproductive success in Midwestern lakes (Bajer and Sorensen 2009). Though at below average densities, bluegill likely still inhibit carp reproductive success on Clam River Flowage.

Impacts of liberalized black bass regulations should also examine impacts to bluegill populations. Largemouth bass CPE has been found to be positively correlated with bluegill PSD (Guy and Wills 1990). Also, Gabelhouse (1987) found largemouth bass PSD values between 20-40 maximized production of large bluegill.

Conclusions and Management Recommendations

1. Walleye abundance and growth rates matched regional and local averages. Barring changes in recruitment or exploitation levels, the current regulation should remain in effect on the Clam River Flowage. Also, stocking of walleye into the Clam River Flowage should be discouraged.
2. Fishing regulation changes should be closely monitored for impacts to the black bass fishery. If decreases in black bass density or size structure are detected, more restrictive harvest regulations should be considered.
3. Continue providing liberal harvest opportunities for northern pike.
4. Bluegills may be important ecologically on Clam River Flowage as larval predators of common carp. No changes in panfish management are recommended.
5. Continue working cooperatively with St. Croix Environmental Services to monitor changes in common carp abundance on Clam River Flowage.
6. Critical fish habitat in Clam River Flowage needs to be protected and enhanced where possible. Efforts should be made to work with local property owners and angler groups stressing the importance of protecting critical habitat and water quality.
7. Exotic species monitoring and control programs should continue. Efforts to keep aquatic invasive species out of a waterbody are much more effective than controlling these species once they are established.

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Table 1. Largemouth bass PSD and RSDP values and catches per mile from fish collected during spring electrofishing assessments on Clam River Flowage, Burnett County. CPE_x was calculated as the number of fish captured above stock, preferred, and quality sizes divided by the number of miles sampled during the survey. The numbers in parentheses refers to the percentage of surveys of similar waterbodies in Wisconsin below the value for that survey as calculated from the FACT database.

Parameter	2012	1997
PSD (percentile)	92 (93%)	100
RSD14 (percentile)	62 (97%)	55
CPE8 (percentile)	2.4 (9%)	NA
CPE12 (percentile)	1.8 (22%)	NA
CPE15 (percentile)	0.7 (18%)	NA

Table 2. Smallmouth bass PSD and RSDP values and catches per mile from fish collected during spring electrofishing assessments on Clam River Flowage, Burnett County. CPE_x was calculated as the number of fish captured above x length divided by the number of miles sampled during the survey. The numbers in parentheses refers to the percentage of surveys of similar waterbodies in Wisconsin below the value for that survey as calculated from the FACT database.

Parameter	2012	1997
PSD (percentile)	43 (12)	92
RSD14 (percentile)	39 (13)	54
CPE7 (percentile)	3.8 (66)	NA
CPE12 (percentile)	2.5 (63)	NA
CPE15 (percentile)	1.2 (81)	NA

Table 3. Summary of rock bass, pumpkinseed, and black crappie captured during 2012 spring electrofishing assessments on Clam River Flowage, Burnett County.

Species	Mean Length	CPE
Rock bass	6.0	9
Pumpkinseed	5.6	4
Black crappie	5.3	11

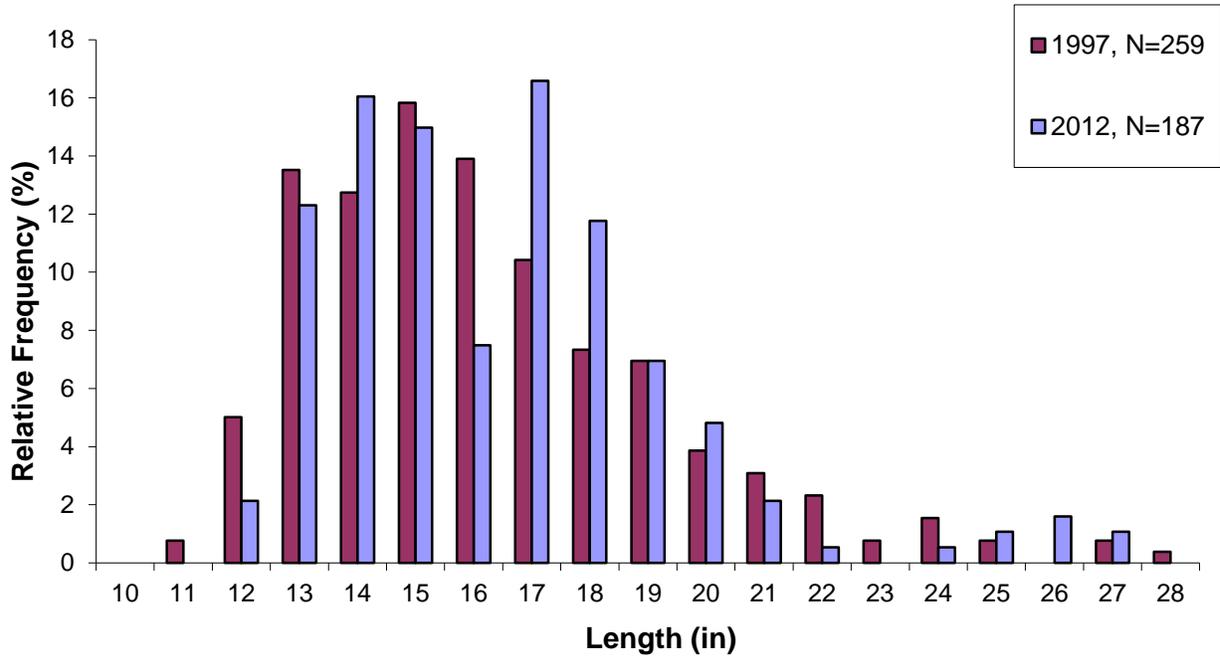


Figure 2. Relative length frequencies of spawning walleyes captured in spring 1997 and 2012 surveys on Clam River Flowage, Burnett County, Wisconsin.

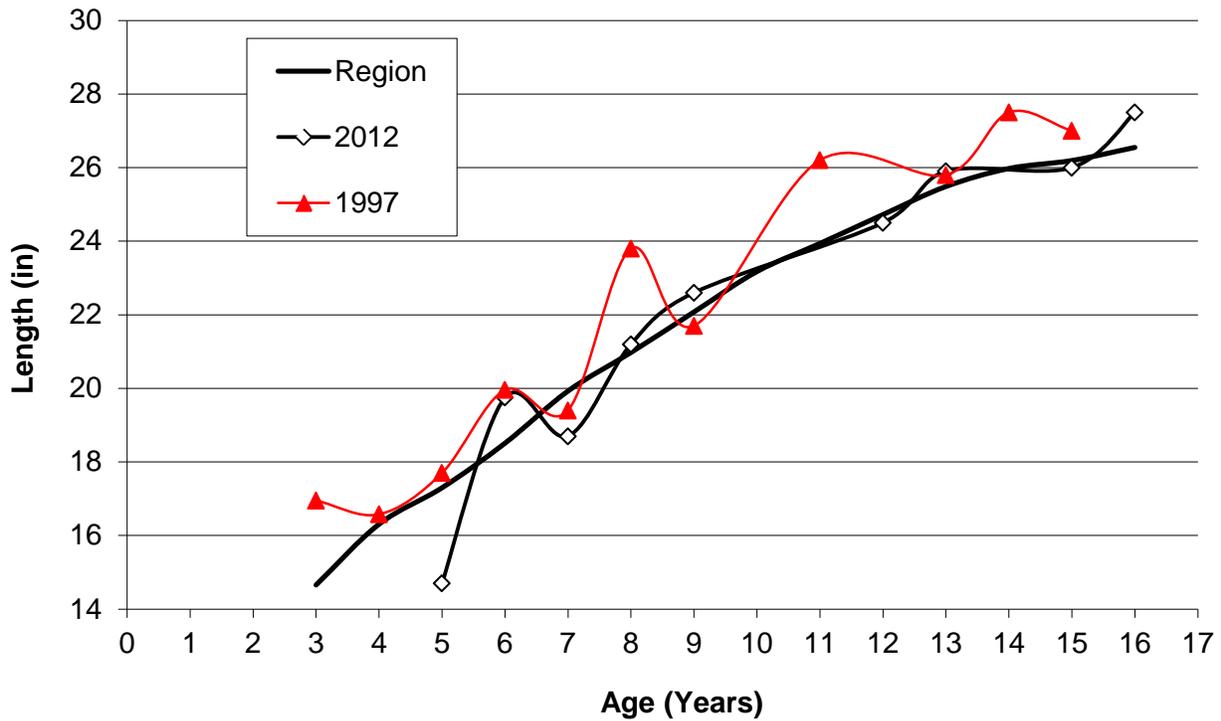


Figure 3. Mean lengths at age for female walleyes captured during spring surveys on Clam River Flowage, Burnett County, Wisconsin. Regional averages are displayed for comparison.

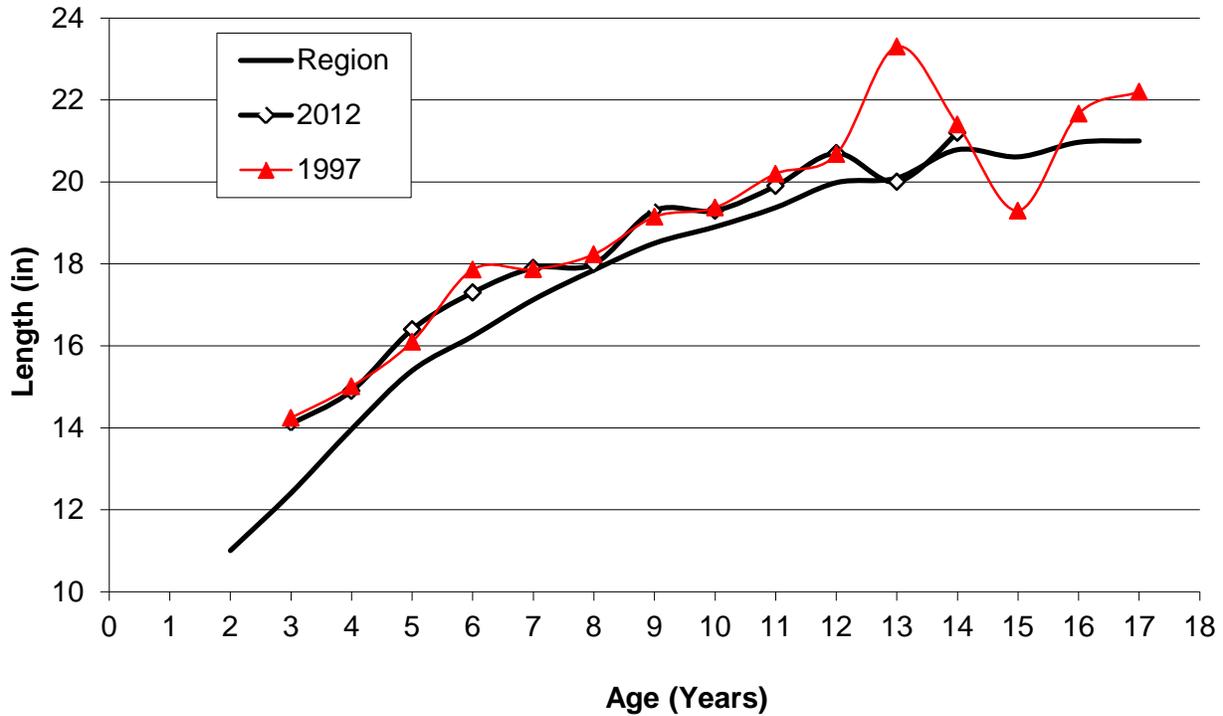


Figure 4. Mean lengths at age for male walleyes captured during spring surveys on Clam River Flowage, Burnett County, Wisconsin. Regional averages are displayed for comparison.

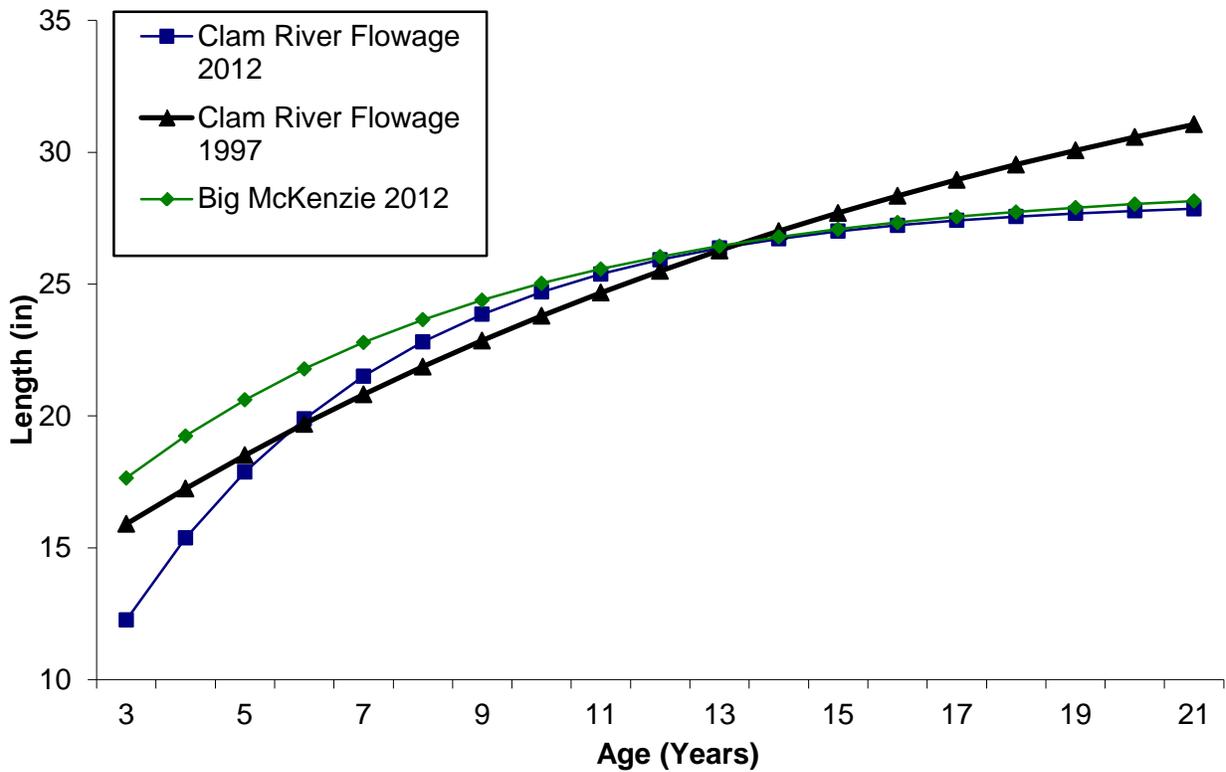


Figure 5. von Bertalanffy growth curves for female walleyes captured during spring surveys on Clam River Flowage, Burnett County, Wisconsin.

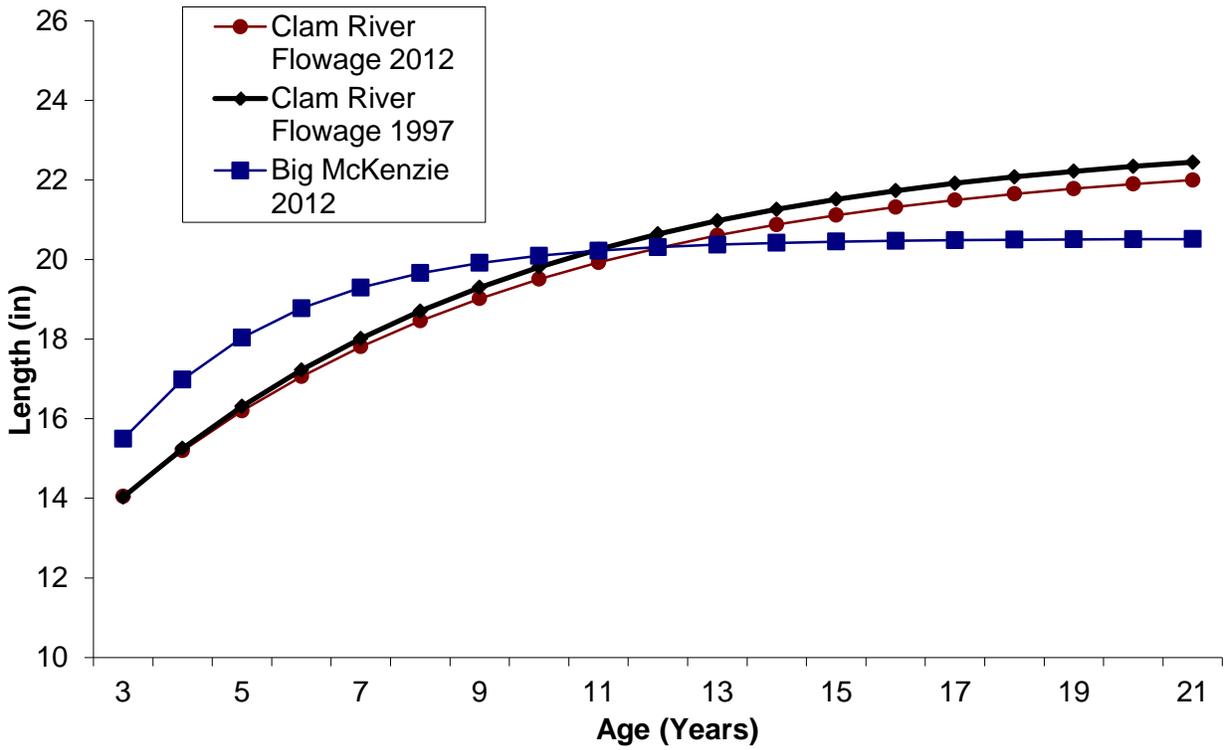


Figure 6. von Bertalanffy growth curves for male walleyes captured during spring surveys on Clam River Flowage, Burnett County, Wisconsin.

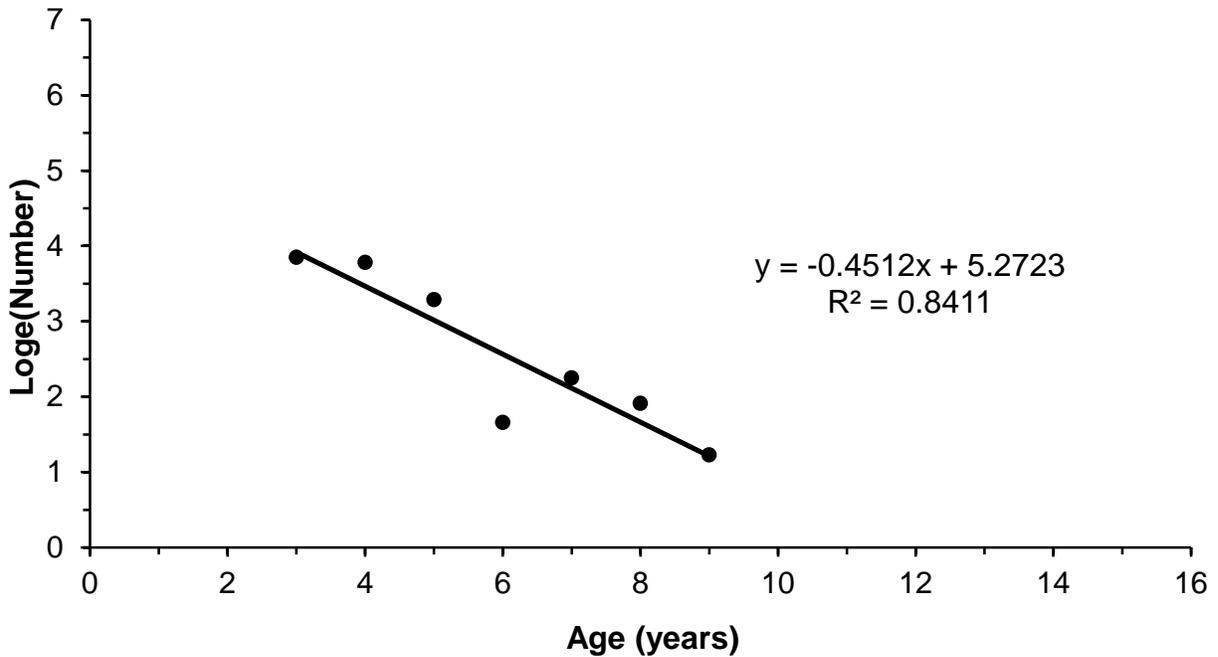


Figure 7. Catch curve for adult walleye between ages three and nine sampled in Clam River Flowage, Burnett County, Wisconsin, in spring 2012.

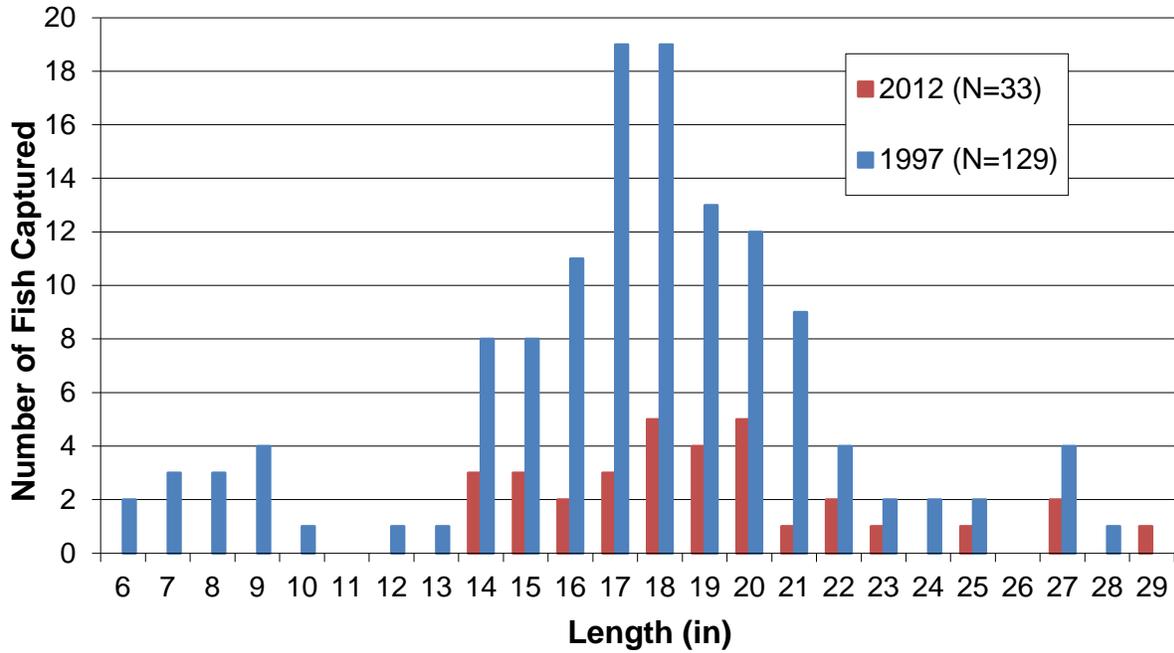


Figure 8. Length frequency of northern pike captured in Clam River Flowage, Burnett County, Wisconsin, in spring 2012 and 1997 surveys.

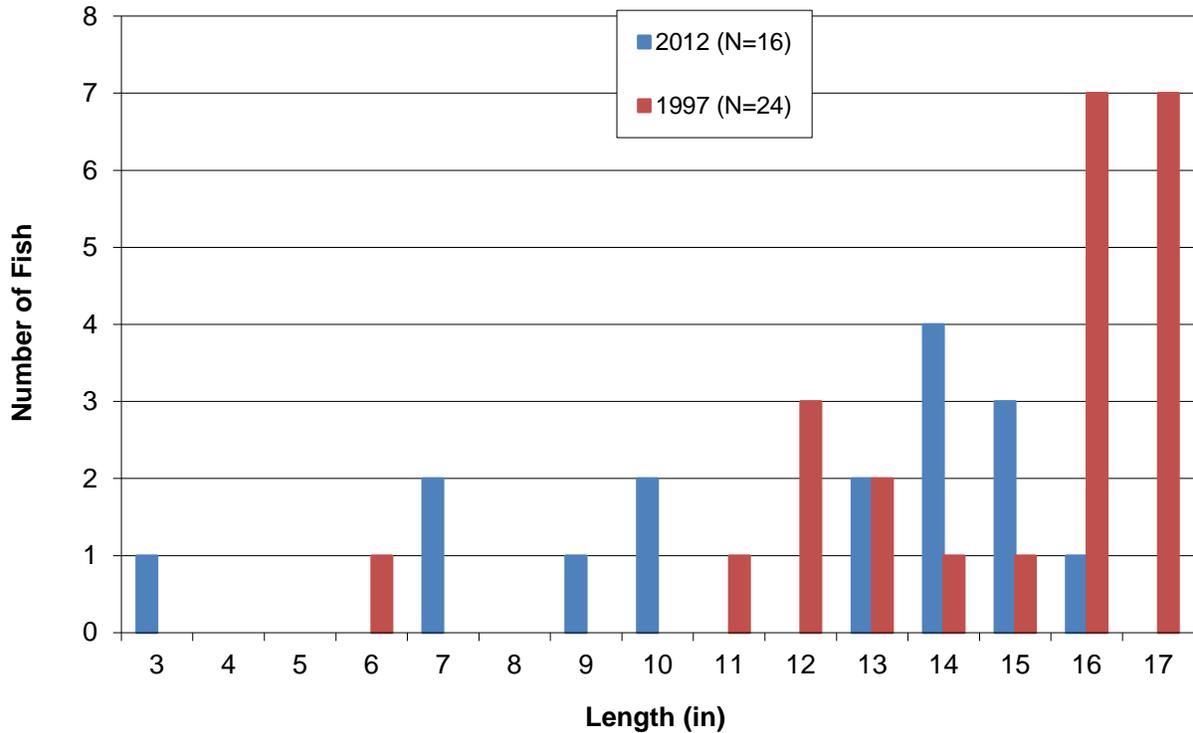


Figure 9. Length frequency of largemouth bass captured in Clam River Flowage, Burnett County, Wisconsin, in spring 2012 and 1997 surveys.

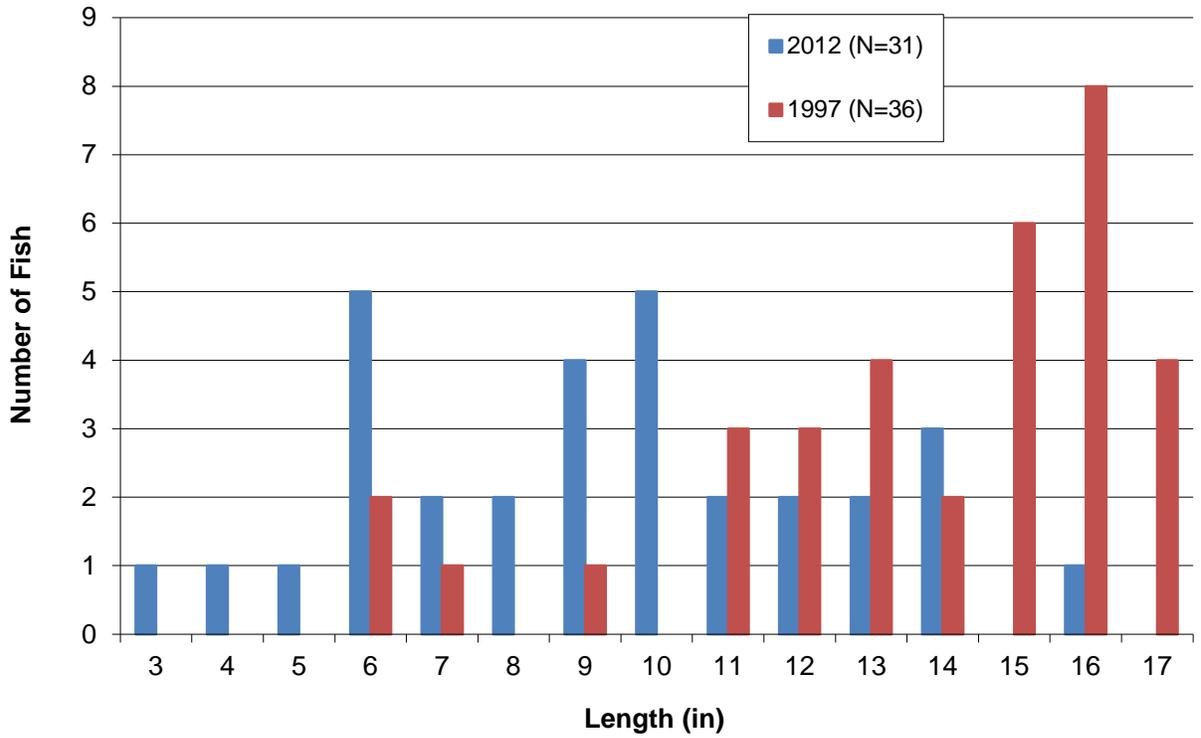


Figure 10. Length frequency of smallmouth bass captured in Clam River Flowage, Burnett County, Wisconsin, in spring 2012 and 1997 surveys.

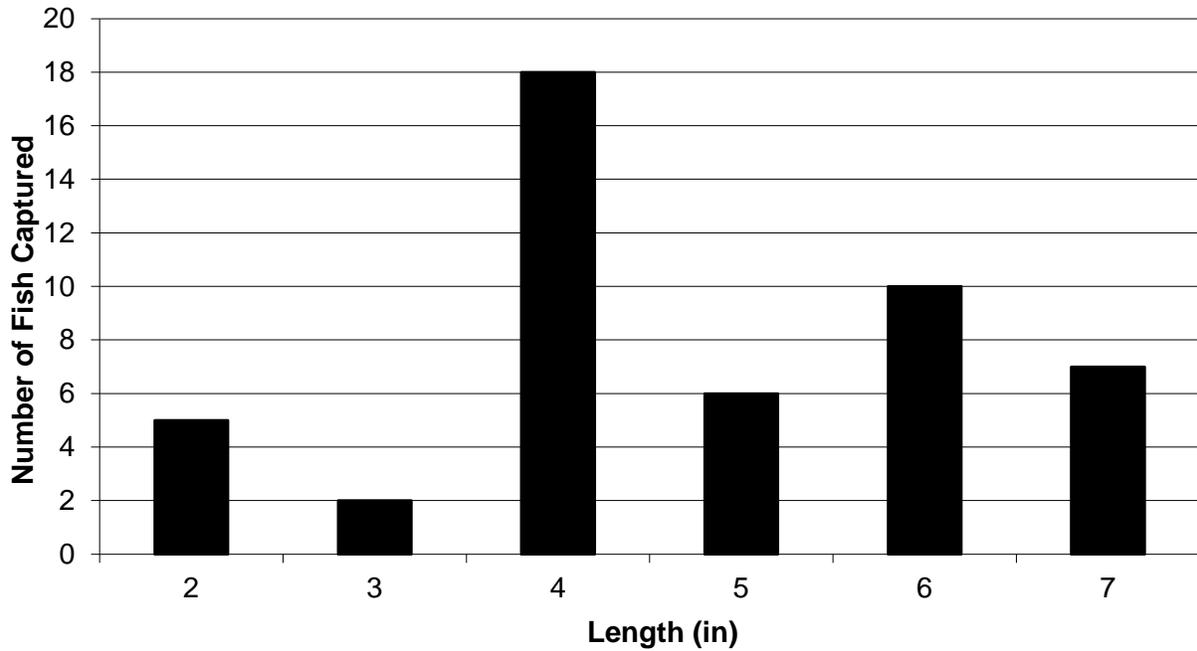


Figure 11. Length frequency of bluegill captured during spring 2012 survey on Clam River Flowage, Burnett County, Wisconsin (N=49).

Appendix Table 1. General Fishing Regulations for Clam River Flowage, Burnett County, Wisconsin, in 2012.

Fish Species	Open Season	Daily Limit	Minimum Length
Walleye	May 05-March 03	5	15"
Largemouth and Smallmouth Bass	May 05-March 03	5	NONE
Muskellunge	May 26-November 30	1	40"
Northern Pike	May 05-March 03	5	NONE
Panfish	Open Season Year Round	25	NONE

Appendix Table 2. Values used in proportional and relative stock density calculations.

Fish Species	Stock Size (in)	Quality Size (in)	Preferred Size (in)
Largemouth Bass	8	12	15
Northern Pike	14	21	28
Smallmouth Bass	7	11	14
Walleye	10	15	20