

**Wapogasset and Bear Trap Lakes  
Treaty Assessment Survey  
Polk County, Wisconsin  
2007-2008  
(MWBIC: 2618000; 2618100)**



**By**

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## **Executive Summary**

Wapogasset and Bear Trap Lakes, located in southern Polk County near Amery, Wisconsin were surveyed in 2007-2008 following the Wisconsin Department of Natural Resources Treaty Assessment protocol. The 2007 adult walleye population for Wapogasset Lake (1.3 fish/acre) was similar to a 1993 estimate of 1.3 fish/acre but 33% lower than a 1987 estimate of 1.9 fish/acre. Largemouth bass ( $\geq 8.0$  in) were present in high density at 8.7 fish/acre. Management recommendations call for changes in walleye and smallmouth bass stocking and careful monitoring of the largemouth bass fishery to ensure a quality bass fishery is present and to prevent a high density stunted bass fishery from developing.

## Introduction

Wapogasset Lake is a 1186-acre drainage lake located in southern Polk County, west of Amery Wisconsin. Bear Trap Lake (241 acres) is connected on the southeast end of Wapogasset Lake via a navigable channel. Combined, 1,427 surface water acres are present between the two waters, making it the third largest lake in Polk County. Fish movement between the two waters is unrestricted. The maximum water depth of Wapogasset and Bear Trap Lakes are 32 feet and 25 feet, respectively. Balsam Branch and Friday Creek enter Wapogasset Lake. The outlet of Wapogasset Lake is named Wapogasset Branch which flows southward to the Apple River. Two public boat landings are present on the west shore of Wapogasset Lake and one public landing is present on the southwest shore of Bear Trap Lake. The two waters have a diverse fishery consisting of walleye Sander vitreus, northern pike Esox lucius, muskellunge Esox masquinongy, largemouth bass Micropterus salmoides, smallmouth bass, Micropterus dolomieu, white bass Morone chrysops, as well as bluegill Lepomis macrochirus, black crappie Pomoxis nigromaculatus, pumpkinseed Lepomis gibbosus, yellow perch Perca flavescens, green sunfish Lepomis cyanellus, warmouth, Lepomis gulosus, white sucker Catostomus commersoni, common carp, Cyprinus carpio, redhorse Moxostoma spp. and bullheads Ameiurus spp.

Walleye stocking in Wapogasset Lake was initiated in 1938. Walleye stocking has consisted of sporadic fry or small fingerling (< 3 in) stockings, however stocking since 1990 has been mostly small fingerlings (Table 1). Bear Trap Lake was stocked with walleye for 3 years in the 1940s and in 1994 and 1996. According to Becker (1983), the two lakes are not within the native range of walleye or muskellunge in Wisconsin. In 2005, muskellunge stocking was initiated at a low level (0.5 fish/acre). This was done in response to decreased stocking of upstream waters (Deer Lake). Historically, emigration of stocked fingerling muskellunge from Deer Lake has allowed some muskellunge to inhabit Wapogasset Lake. The goal of the muskellunge stocking was to maintain a low density fishable population similar to what has been present the past several decades. The objectives of this study were to assess the status of the walleye population as part of the treaty assessment sampling rotation of lakes for the Ceded Territory of Wisconsin. Secondary objectives included assessing the status of other important fish species such as largemouth and smallmouth bass, northern pike, muskellunge and panfish.

## Methods

Wapogasset and Bear Trap Lakes were sampled during 2007-2008 following the Wisconsin Department of Natural Resources treaty assessment protocol (Hennessy 2002). This sampling included spring fyke netting and electroshocking to estimate walleye and largemouth bass abundance, fall electroshocking to estimate year class strength of walleye young-of-the-year (YOY) and gamefish relative abundance as well as a creel survey (both open water and ice). Walleye and largemouth bass abundance was determined for adult fish. Adult walleye were defined as being  $\geq 15$  in or sexable and adult bass were larger than 7.9 inches (Hennessy 2002). Survey data were also collected to estimate abundance and angler catch information on other species such as northern pike, and panfish.

Creel census data were collected in 2007-2008 beginning the first Saturday in May and continuing through the first Sunday in March of the following year (the open season for game fish angling in Wisconsin). No creel survey data were collected during November because thin ice created dangerous fishing conditions. Creel survey methods followed a stratified random design as described by Rasmussen et al. (1998). The minimum length limit for walleye in both lakes was 15 in with a daily bag that fluctuates on an annual basis dependent on annual safe harvest estimates, ranging from two to five fish. The daily bag for walleye during 2007-2008 was 3 fish for Wapogasset Lake and 5 fish for Bear Trap Lake. The minimum length limit for largemouth bass was 14 in with a daily bag of 5 in total. The minimum length limit for muskellunge is 40 in with a daily bag of 1. No minimum length limits are in effect for northern pike or panfish and the bag limits were 5 and 25, respectively. Wapogasset and Bear Trap Lakes are within the Ceded Territory of Wisconsin and subject to tribal spearing. Spear harvest information was provided by the WDNR Spooner Treaty Assessment Unit.

Angler exploitation rate for adult walleye was calculated by dividing the estimated number of marked adult walleye harvested by the total number of marked adult walleye present in the lake (Ricker 1975). Tribal exploitation rate was calculated as the total number of adult walleye harvested divided by the adult population estimate (Ricker 1975). Total adult walleye exploitation rates were calculated by summing angling and tribal exploitation (Hennessy 2002).

Data collected during the 2007-2008 survey were compared with previous survey data on Wapogasset Lake in 1987 and 1993. In addition, northern pike catch and harvest statistics were compared with 55 northern Wisconsin lakes (Margenau et al. 2003). Growth data were compared from the 1993 survey and regional (18 county WDNR Northern Region) means utilizing the WDNR Fisheries and Habitat database.

Age assessment for walleye was determined from both scale samples (< 12 in) and dorsal spine sections ( $\geq$  12.0 in). Juvenile walleye (YOY) electrofishing runs were conducted in 1992, 2000, 2001, 2002, 2003, 2004, 2005 and 2008.

## Results

Angling Effort. Projected angling pressure for all fish species in 2007-2008 for Wapogasset and Bear Trap Lakes were 41.9 and 90.3 hours/acre respectively. Angling effort for specific species varied considerably by lake (Tables 2 and 3). In general, gamefish were more heavily targeted in Wapogasset Lake whereas panfish were more targeted in Bear Trap Lake.

Walleye. The adult walleye population in Wapogasset Lake in 2007 was 1,575 or 1.3 fish/acre (95% C.I. = 1,330-1,819). Adult walleye abundance was similar in 1993 but, lower when compared to 1987 (Figure 1). The adult walleye population in 1993 was 1,507 or 1.3 fish/acre (95% C.I. = 1,293-1,721) and in 1987 was 2,260 or 1.9 fish/acre (95% C.I. = 1,814-2,706). A walleye population estimate could not be generated on Bear Trap Lake. Size structure of walleye was well represented, however the ratio of male to female walleye (5.8:1) was very high (Figure 2). Stronger walleye year classes were present during years in which walleye stocking occurred. Numerical data from age and growth analysis suggests stronger year classes were present during stocked years compared to non-stocked years (Table 4). Regardless, fall YOY estimates of relative abundance indicate general survival of small fingerlings was low (Table 1). Growth of walleye in Wapogasset Lake was above average compared to the regional mean (Table 4).

Angling effort for walleye made up 12.4% of the total directed effort (open water and ice combined) on Wapogasset Lake in 2007-2008. Angler catch was reasonable at 9.7 hrs/fish. Projected angler harvest was 538 walleye. Mean length of walleye harvested in 2007-2008 was 17.2 in (SE = 0.23, N=65). Tribal spear anglers harvested 71 walleye in 2007. Combined angler and tribal exploitation was 23.5%. Directed angling effort for walleye on Bear Trap Lake was low at 2.4%, with a projected harvest of five walleye. No tribal harvest occurred on Bear Trap Lake.

Largemouth Bass. The adult largemouth bass population ( $\geq$  8 in) present in Wapogasset Lake during 2007 was 10,338 or 8.7 fish/acre (95% C.I. = 8,094-12,581). Length frequency analysis suggests a good largemouth bass fishery was present, however only 7 fish larger than 18 inches were sampled (Figure 3). More specifically, PSD and RSD-14 were good at 39, 27 respectively, however RSD-18 was poor at 0 suggesting a fishery dominated by small to mid-range bass and few large bass.

Anglers directed twice the effort towards largemouth bass on Lake Wapogasset in 2007-2008 compared to walleye. A total of 24.0% of the directed angling effort targeted largemouth bass. Angler catch rate was good at 0.7 hrs/fish. Projected angler harvest for largemouth bass in 2007-2008 was 810 fish. Mean length of largemouth bass harvested in 2007-2008 was 15.0 in (SE = 0.09, N = 90). Growth of largemouth bass was slower when compared to the 1993 survey and the northern region mean (Table 5). Angler directed effort for largemouth bass on Bear Trap Lake was slightly lower. A total of 18.0% of the directed angling effort was for largemouth bass. Projected angler harvest for largemouth bass in 2007-2008 was 195 fish. Mean length of largemouth bass harvested in Bear Trap Lake during 2007-2008 was 15.4 in (SE = 0.35, N = 16).

Smallmouth bass. A population estimate of smallmouth bass could not be calculated because of a low number of fish captured. However several age classes of smallmouth bass were present. Growth of smallmouth bass was average in Wapogasset Lake when compared to the northern region mean (Table 6). Projected angler harvest for smallmouth bass in Wapogasset Lake in 2007-2008 was 4 fish. Mean length of smallmouth bass harvested was 16.9 (SE= 2.30, N=2) No projected harvest occurred in Bear Trap Lake.

Muskellunge. Nine muskellunge were netted ranging in length from 20.2-43.3 in during the spring fyke net sampling. Fyke net catch rates were higher in Wapogasset Lake (0.10 fish/net, N=7) compared to Bear Trap Lake (0.05 fish/net, N=2). Anglers pursuing muskellunge accounted for 1.7% and 0.2% of the directed effort on Wapogasset and Bear Trap Lakes, respectively. Projected angler catch for both waters was 372 fish, of which none were harvested.

Northern Pike. Anglers pursuing northern pike in 2007-2008 on Wapogasset Lake represented 9.1% of the directed angling effort. Projected angler harvest of northern pike was 438. Mean length of northern pike harvested in 2007-2008 on Wapogasset Lake was very good at 24.5 in (SE=0.43, N=64). Directed effort was considerably lower on Bear Trap Lake. A total of 6.1% of the directed angling effort was for northern pike. Projected angler harvest of northern pike was 61, with a mean length of 22.9 in (SE = 0.61, N=7).

Panfish. Population abundance was not estimated for panfish during 2007-2008 netting and electroshocking. Anglers pursuing bluegill in 2007-2008 accounted for 29.6 and 42.4 percent of the directed angling effort on Wapogasset and Bear Trap Lakes, respectively. Black crappie accounted for 12.9 and 23.3 percent of the directed angling effort on the two lakes, respectively. Combined, 42.5% and 65.7% of the directed angling effort in 2007-2008 was for black crappie and bluegill on Wapogasset and

Bear Trap Lakes, respectively. The projected number of bluegill harvested in 2007-2008 on each water respectively was 29,643 and 17,160 fish and the projected number of black crappie harvested in 2007-2008 was 5,107 and 4,066 fish. The average length of bluegill and black crappie harvested in 2007-2008 was 8.1 in (SE = 0.02, N= 921) and 8.1 in (SE = 0.03, N = 348), respectively. Yellow perch were a much smaller component of the panfish angling effort. In 2007-2008, only 4.7 and 2.7% of the directed angling effort was for yellow perch on Wapogasset and Bear Trap Lakes, respectively. Mean length of yellow perch harvested approached 10 inches on each water (Table 2 and 3). The remaining fishing effort targeted pumpkinseed, green sunfish, rock bass, white bass and warmouth.

### **Discussion**

Walleye. Adult walleye abundance was lower when compared to 1987 (1.9 fish/acre) but similar between 1993 and 2007 (1.3 fish/acre). This is encouraging considering many local waters in Polk and Barron Counties have shown a dramatic decline in walleye abundance over the same time period (Benike 2005a; Benike 2005b, Benike 2005c, Benike 2006). In addition, walleye small fingerling stocking and possibly some limited natural reproduction appears to have provided some level of recruitment to maintain densities since 1993. However, even though this is positive, the following management action should be undertaken in an effort to maintain the existing walleye density. Wapogasset Lake has been stocked with a high density (mean = 68/acre) of walleye fingerlings over the past decade. In 2006, a new DNR stocking policy reduced walleye stocking to 35 fish/acre unless lake specific data was available to justify higher stocking rates. Considering all of the strong year classes in Wapogasset Lake were created during stocking years, maintaining the historic stocking rates seem appropriate and warranted. Decreasing stocking could potentially reduce walleye abundance, and considering the walleye population is at 1.3 fish/acre any reduction would likely be noticeable by anglers. Secondly, a comprehensive walleye stocking evaluation should be conducted in Bear Trap Lake to determine if stocking of small fingerling walleye may improve walleye abundance in Bear Trap Lake and ultimately Wapogasset Lake. Bear Trap Lake is a larger lake (241 acres) and additional walleye stocking may help improve walleye recruitment into the two lake system and could explain the low number of walleye collected in Bear Trap Lake.

Largemouth Bass. Largemouth bass densities were high (8.7 fish/acre). The size structure of largemouth bass was average, however very few fish larger than 18 inches were captured. Age and growth data from the 2007 survey indicated that largemouth bass growth is considerably slower compared to the

1993 survey. Creel data suggests a moderate amount of largemouth bass are harvested. Projected harvest was 810 fish or 31% of the legal length ( $\geq 14$  in) estimated population. Concern is warranted that a high density stunted largemouth bass fishery may develop. Growth of largemouth bass has slowed since the 1993 survey. Similar issues have been documented on other nearby lakes in Polk County (Benike 2005a; Benike 2005b). Future fish surveys should thoroughly evaluate the status of the largemouth bass fishery.

*Smallmouth Bass.* Smallmouth bass were present in low numbers. Growth of smallmouth bass was average. Polk County only has a handful of lakes with smallmouth bass. Consideration should be given to enhancing this population. A short-term pulse stocking effort to create 3-5 strong year classes of fish is one management option. The goal of this stocking effort would be to establish several strong year classes with hopes that natural reproduction would increase and ultimately increase adult densities. If the effort does not work, smallmouth bass will remain at a very low density and provide minor fishing opportunities.

*Northern Pike.* Mean length of northern pike harvested was very good (24.5 in) and (22.9 in) on Wapogasset and Bear Trap Lakes, respectively. Mean length of northern pike harvested from 55 northern Wisconsin lakes was 21.6 in (Margenau et al. 2003). No management changes are warranted and good northern pike angling opportunities are currently present.

*Panfish.* Bluegill were in the most common fish caught and harvested on both lakes. Mean length of bluegill harvested was excellent (8.1 in) on both waters. Panfish will likely continue to be the most important component of the angling experience on both waters in the future and ample opportunities for large bluegill are currently present.

### **Management Recommendations**

1. In an effort to maintain an adult walleye population between 1.0-2.0 fish/acre in Lake Wapogasset, walleye stocking rates should be maintained at 70 fish/acre. This is similar to the historic stocking rate over the past decade and would ensure walleye recruitment is maintained compared to historic stocking activities.
2. A walleye small fingerling stocking evaluation should be conducted on Bear Trap Lake to determine if additional stocking may increase recruitment and adult densities in this two lake



- system. Stocking rates should follow statewide guidance at 35 fish/acre during the evaluation period.
3. The largemouth bass fishery should be carefully monitored to ensure that a high density slow growth fishery does not develop with a sub-optimal size structure. If growth continues to slow and size structure shifts towards smaller bass, liberalization of bass regulations may be needed to reduce competition and improve bass growth and size structure.
  4. Muskellunge stocking should continue at a rate of 0.5 fish/acre on an alternate year basis. This stocking rate will provide a low level of recruitment of muskellunge into the fishery and maintain the low density population that is currently present. In addition, the muskellunge classification for Wapogasset and Bear Trap Lakes should be upgraded to a Class B, 3 classification. This classification reflects that active management is now occurring for muskellunge (stocking) and the fishable population should be more stable.
  5. A pulse stocking event of smallmouth bass should occur for a 3-5 year period to increase the strength of several year classes in an effort to provide a more abundant smallmouth bass fishery with the intent that natural reproduction would increase and improve adult densities in the future.

#### **Literature Cited**

- Becker, G. C. 1983. Fishes of Wisconsin. University of Wisconsin Press, Madison.
- Benike, H. 2005a. Changes in the Gamefish Community of a Small Northwestern Wisconsin Lake Over a 25-Year Period, Ward Lake, Polk County, Wisconsin. Wisconsin Department of Natural Resources, Internal Fisheries Management Report. Barron Field Office.
- Benike, H. 2005b. Treaty Assessment Survey, Half Moon Lake, Polk County, Wisconsin 2001. Wisconsin Department of Natural Resources, Internal Fisheries Management Report. Barron Field Office.
- Benike, H. 2005c. Treaty Assessment Survey, Big Butternut Lake, Polk County Wisconsin 2003.

- Wisconsin Department of Natural Resources, Internal Fisheries Management Report. Barron Field Office.
- Benike, H. 2006. Treaty Assessment Survey, Lower Turtle Lake, Barron County Wisconsin 2004. Wisconsin Department of Natural Resources, Internal Fisheries Management Report. Barron Field Office.
- Hennessy, J. 2002. 2001-2002 Ceded Territory fishery assessment report. Wisconsin Department of Natural Resources. Administrative Report 55, Madison.
- Margenau, T. L., S. J. Gilbert, and G. R. Hatzenbeler. 2003. Angler catch and harvest of northern pike in northern Wisconsin lakes. *North American Journal of Fisheries Management* 23:307-312.
- Rasmussen, P. W., M. D. Staggs, T. D. Beard, Jr., and S. P. Newman. 1998. Bias and confidence interval coverage of creel survey estimators evaluated by simulation. *Transactions of the American Fisheries Society* 127:469-480.
- Ricker, W.E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. *Bulletin of the Fisheries Research Board of Canada* 191. Department of the Environment, Fisheries, and Marine Science, Ottawa. 382p.

Table 1. Walleye stocking and fall fingerling catch per unit of effort (CPUE) from electrofishing for Wapogasset Lake, Polk County, Wisconsin. Fall fingerling CPUE may also include naturally reproduced walleye.

| Year | Length (in) | Number Stocked | Stocking rate (no/acre) | Fall Electrofishing (no YOY/mile) |
|------|-------------|----------------|-------------------------|-----------------------------------|
| 1990 | < 3.0"      | 61,056         | 51                      | ns                                |
| 1992 | < 3.0"      | 59,300         | 50                      | 2.4                               |
| 1994 | < 3.0"      | 69,326         | 59                      | ns                                |
| 1996 | < 3.0"      | 57,954         | 49                      | ns                                |
| 1997 | < 3.5"      | 17,841         | 15                      | ns                                |
| 1998 | < 3.5"      | 63,446         | 53                      | ns                                |
| 2000 | < 3.5"      | 111,363        | 94                      | 2.7                               |
| 2002 | < 3.0"      | 213,959        | 180                     | 3.2                               |
| 2004 | < 3.0"      | 115,106        | 97                      | 0.4                               |
| 2005 | Fry         | 3,700,000      | 3120                    | 1.0                               |
| 2006 | < 3.0       | 41,485         | 35                      | ns                                |

\* ns indicates no sampling was done.

Table 2. 2007-2008 creel survey data for major game and panfish species, Wapogasset Lake, Polk County, Wisconsin.

| Species         | Directed Effort % | Catch rate (hrs/fish) | Harvest rate (hrs/fish) | Mean len. (in) harvested |
|-----------------|-------------------|-----------------------|-------------------------|--------------------------|
| Walleye         | 12.4              | 9.7                   | 19.7                    | 17.2                     |
| Largemouth bass | 24.0              | 0.7                   | 28.8                    | 15.0                     |
| Northern pike   | 9.1               | 5.5                   | 19.4                    | 24.5                     |
| Bluegill        | 29.6              | 0.3                   | 0.8                     | 8.1                      |
| Black crappie   | 12.9              | 1.0                   | 2.2                     | 9.6                      |
| Yellow perch    | 4.7               | 3.6                   | 6.3                     | 9.9                      |

Table 3. 2007-2008 creel survey data for major game and panfish species, Bear Trap Lake, Polk County, Wisconsin.

| Species         | Directed Effort % | Catch rate (hrs/fish) | Harvest rate (hrs/fish) | Mean len. (in) harvested |
|-----------------|-------------------|-----------------------|-------------------------|--------------------------|
| Walleye         | 2.4               | 32.3                  | 172.0                   | 15.9                     |
| Largemouth bass | 18.0              | 1.0                   | 41.3                    | 15.4                     |
| Northern pike   | 6.1               | 11.7                  | 38.2                    | 22.9                     |
| Bluegill        | 42.4              | 0.4                   | 0.9                     | 8.1                      |
| Black crappie   | 23.3              | 1.1                   | 2.1                     | 9.9                      |
| Yellow perch    | 2.7               | 1.4                   | 2.2                     | 9.8                      |

Table 4. Walleye mean length (in) at age, Wapogasset Lake 2007, and local and regional means, Wisconsin. Local and regional mean length information is from WDNR Fisheries and Habitat database.

| Age | N  | Wapogasset Lake Mean 2007 | N  | Wapogasset Lake Mean 1993 | Northern Region (Regional Mean) |
|-----|----|---------------------------|----|---------------------------|---------------------------------|
| 2   | 1  | 11.0                      | 16 | 7.4                       | 9.6                             |
| 3   | 28 | 13.7                      | 2  | 13.8                      | 11.9                            |
| 4   | 3  | 15.3                      | 4  | 15.6                      | 14.1                            |
| 5   | 38 | 18.6                      | 1  | 16.5                      | 16.1                            |

Table 5. Largemouth bass mean length (in) at age, Wapogasset Lake 2007, and local and regional means, Wisconsin. Local and regional mean length information is from the WDNR Fisheries and Habitat database.

| Age | N  | Wapogasset<br>Lake Mean<br>2007 | N  | Wapogasset<br>Lake Mean<br>1993 | Northern<br>Region<br>(Regional Mean) |
|-----|----|---------------------------------|----|---------------------------------|---------------------------------------|
| 3   | 11 | 8.6                             | 38 | 8.5                             | 9.0                                   |
| 4   | 19 | 10.1                            | 30 | 11.1                            | 11.0                                  |
| 5   | 22 | 12.0                            | 18 | 13.2                            | 12.7                                  |
| 6   | 14 | 13.7                            | 5  | 15.4                            | 14.6                                  |

Table 6. Smallmouth bass mean length (in) at age, Wapogasset Lake 2007, and local and regional means, Wisconsin. Local and regional mean length information is from the WDNR Fisheries and Habitat database.

| Age | N | Wapogasset<br>Lake Mean<br>2007 | Northern<br>Region<br>(Regional Mean) |
|-----|---|---------------------------------|---------------------------------------|
| 2   | 1 | 8.0                             | 7.1                                   |
| 4   | 4 | 11.6                            | 11.1                                  |
| 5   | 7 | 13.6                            | 13.3                                  |
| 6   | 7 | 15.2                            | 15.0                                  |

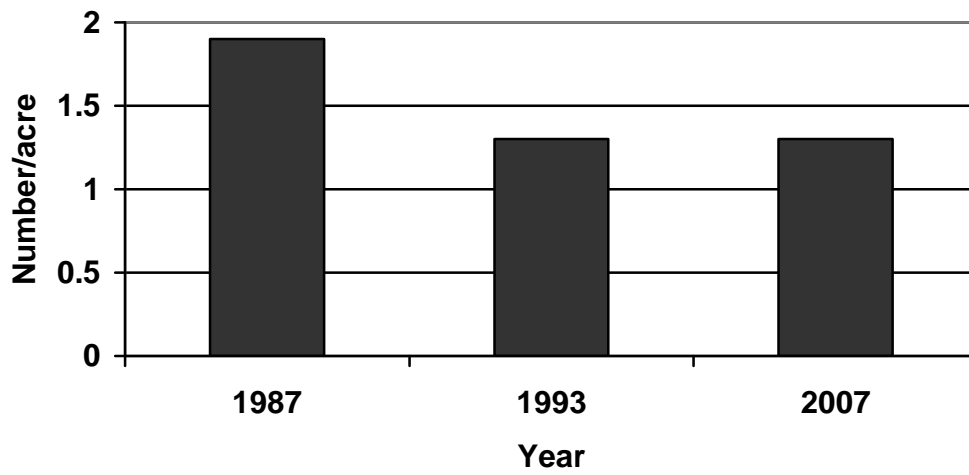


Figure 1. Adult walleye population density (number/acre), Wapogasset Lake, Polk County, Wisconsin.

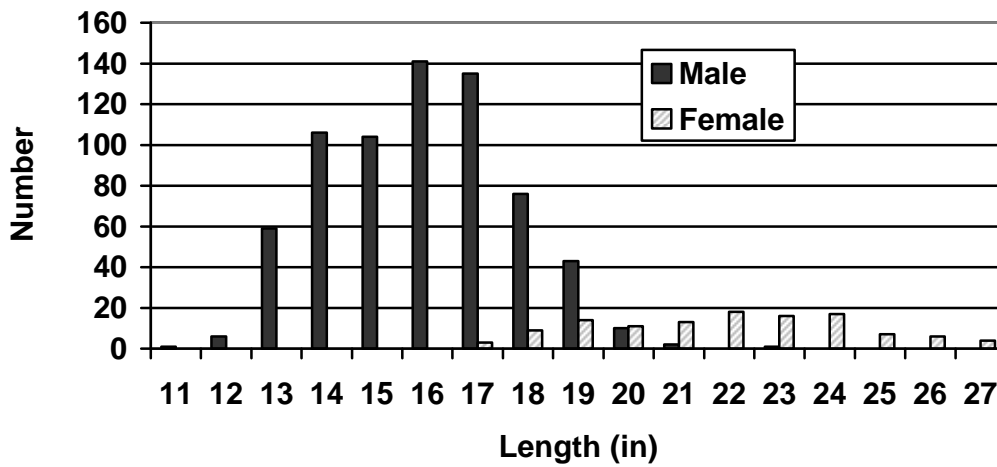


Figure 2. Walleye length frequency by sex, Wapogasset Lake, Polk County, Wisconsin (N=802).

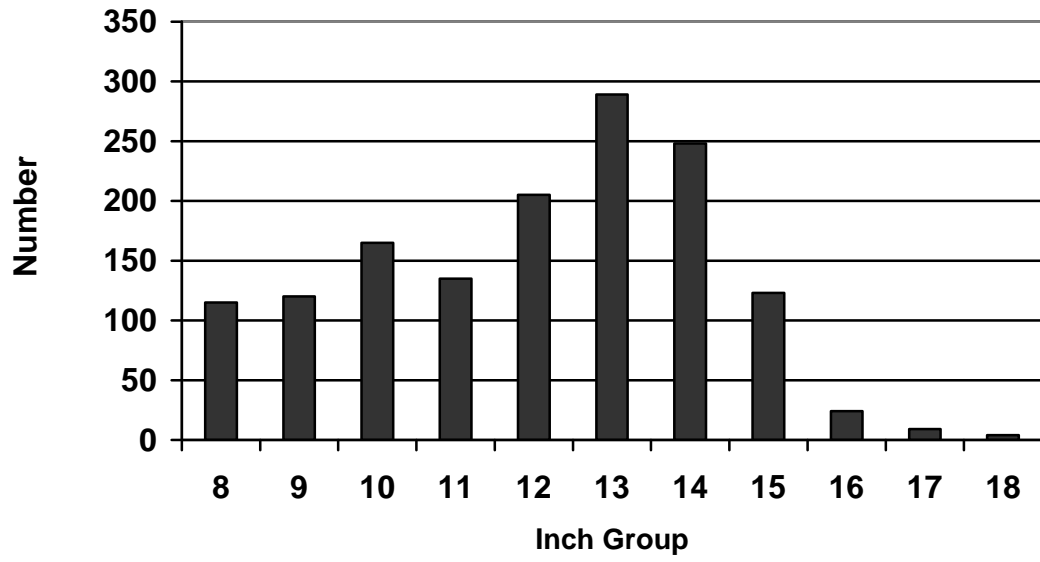


Figure 3. Largemouth bass length frequency (N=1437), Wapogasset Lake, Polk County, Wisconsin 2007.