Beaver Dam Lake
Fisheries Survey
Barron County, Wisconsin
2005-2007
MWBIC: (2081200)

By

Heath Benike and Mason Disrude
Wisconsin Department of Natural Resources
Northern Region-Barron
April, 2008

Executive Summary

Beaver Dam Lake, a 1,112 acre drainage lake located in Cumberland, Wisconsin was surveyed in 2005-2007 following the Wisconsin Department of Natural Resources Treaty Assessment protocol. Projected angler effort for all species of fish was 41.4 hours/acre, of which 83% was during the open water fishery. Largemouth bass were most common gamefish caught by anglers followed by northern pike, smallmouth bass and walleye; but northern pike were the most common gamefish harvested by anglers. The 2006 adult walleye population estimate of 0.7 fish/acre was similar to a past survey of 0.6 fish/acre in 1993. However the adult walleye population was lower than a 1979 estimate of 1.4 fish/acre. Historic data documents a decrease in walleye abundance that roughly coincides with an illegal introduction of rainbow smelt that was believed to have occurred at or near 1980. The introduction of trout along with changes to walleye stocking and regulations are recommended to increase predation on rainbow smelt and improve walleye natural reproduction, stock recruitment and abundance.

Introduction

Beaver Dam Lake is a 1,112 acre lake located in and around Cumberland, Wisconsin in northwest Barron County. Beaver Dam Lake is separated into two primary basins, east and west. The west basin (805 acres, 106 feet deep) is characterized by sharp drop offs and small littoral areas. The east basin (307 acres, 90 feet deep), aside from one deep area, is fairly shallow. The basins are connected by a box culvert at STH 63. The fisheries of the two basins are thought to be discrete, with little fish movement through the box culvert (Cornelius 1995). An intermittent outlet is present on the south end of Beaver Dam Lake and forms the headwaters of the Hay River.

Beaver Dam Lake has 18 miles of shoreline. The lakeshore is developed with dwellings and several parks and boat landings present. Beaver Dam Lake has a diverse fishery consisting of walleye Sander vitreus, northern pike Esox lucius, largemouth bass Micropterus salmoides, smallmouth bass Micropterus dolomieu, bluegill Lepomis macrochirus as well as black crappie Pomoxis nigromaculatus, pumpkinseed L. gibbosus, green sunfish L. cyanellus, yellow perch Perca flavescens, rock bass Ambloplites rupestris, common carp Cyprinus carpio, white sucker Catostomus commersoni, cisco, Coregonus artedii, rainbow smelt Osmerus mordax and bullheads Ameiurus spp.

Walleye stocking in Beaver Dam Lake was initiated in 1933. Walleye stocking from 1933-1978 consisted of sporadic fry and small fingerling (< 3 in) stockings. Regular stocking of small fingerlings, approaching 50 fish/acre, began in 1978 and fingerlings have generally been stocked on an alternate year basis since 1978. In 2005 large fingerling walleye (6-8 in) were stocked at 10 fish/acre in an effort to improve stocking success (Table 1). Although walleye stocking occurred, there also appeared to be some limited amount of natural reproduction occurring during non-stocked years (Table 1). According to Becker (1983), Beaver Dam Lake was not within the native range of walleye in Wisconsin, however Beaver Dam Lake is the headwaters of the Hay River which is a tributary to the Red Cedar River and the headwater region of the Red Cedar River is considered to be within the native range of walleye in Wisconsin. No known natural fish barriers are present in this watershed upstream of the confluence of the Hay River with the Red Cedar River. Hence, it is plausible that walleye may have been native to the Hay River drainage in Barron County and possibly Beaver Dam Lake.

Rainbow smelt were illegally introduced into Beaver Dam Lake in the late 1970s. Lake trout Salvelinus namaycush fingerlings were stocked in the late 1970s, but did not appear to survive. Rainbow trout Oncorhynchus mykiss and brown trout Salmo trutta were stocked for several years in the early 1980s to predate on rainbow smelt, and smelt dip-netting was allowed to help reduced smelt abundance. Trout stocking was then discontinued and smelt netting was closed because it was thought rainbow smelt were no longer a management problem. Trout stocking was reinitiated as a biological control to predate on rainbow smelt in 2006 when rainbow smelt were once again found to be abundant in Beaver Dam Lake. More specifically, 5,080 brown trout and 6,800 rainbow trout averaging (7-9") were stocked in 2006 and 2007, respectively. In addition, 495 brood stock lake trout (23-32 in) and 139 brood stock brown trout (18-22 in) were stocked in 2006 and 2007, respectively.

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 include assessing the status of other important fish species such as largemouth bass, smallmouth bass, northern pike and panfish. We also evaluated walleye stocking in terms of survival of different hatchery products.

Methods

Beaver Dam Lake was sampled during the fall of 2005 as well as 2006-2007. The 2005 sample was a fall walleye stocking evaluation and the 2006-2007 sample followed the Wisconsin Department of Natural Resources treaty assessment protocol (Hennessy 2002).

In the fall of 2005, YOY walleye were sampled using night-time electrofishing to determine the survival/contribution to the year-class from a stocking of large fingerling walleye (6-8 in). Fry and fingerlings were chemically marked with oxytetracycline (OTC) according to Brooks et al. (1994) at the Governor Thompson State Fish Hatchery prior to stocking. Otoliths from subsamples of age-0 walleye sacrificed were viewed for marks (Jennings et al. 2005).

During the period of 2006-2007, sampling included spring fyke netting and electroshocking to estimate walleye abundance, fall electroshocking to estimate year class strength of walleye young-of-year (YOY) and gamefish relative abundance as well as creel survey (both open water and ice). Walleye abundance was determined for adult fish. Adult walleye were defined as being ≥ 15 in or sexable

(Hennessy 2002). Survey data were also collected to estimate abundance and angler catch information on other species such as bass, northern pike and panfish.

Creel census data were collected in 2006-2007 beginning the first Saturday in May and continuing through 1 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 Beaver Dam Lake was 15 in with a daily bag that fluctuates on an annual basis dependent on annual safe harvest estimates. The minimum length limit for bass was 14 in with a daily bag of 5. No minimum length limits are in effect for northern pike or panfish and the bag limits were 5 and 25, respectively.

Angler exploitation rates for adult walleye were 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 rates 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 (Hennessey 2002).

Data collected during the 2005 and 2006-2007 surveys were compared with previous treaty assessment surveys and historic walleye population estimates on Beaver Dam Lake in 1993-1994 and 1979 as well as, historic fall electrofishing surveys from 1970, 1979, 1984, 1988, 1989, 1991, and 1993. Growth data were compared with local (Barron and Polk County) 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 (≥ 12 in).

Results

Angling Effort. Projected angling pressure for all fish species in 2006-2007 was 41.4 hours/acre. Estimated total fishing pressure in 1993-1994 was lower, at 22.2 hour/acre. In 2006-2007 open water angling pressure increased to 34.4 hours/acre when compared to 16.4 hours/acre in 1993-1994. Overall, 83% of the angling pressure in 2006-2007 was during the open water season, whereas in 1993-1994, 74%

was during the open water season. Ice angling remained relatively consistent in 2006-2007 at 7.1 hours/acre compared to 5.8 hours/acre in 1993-1994 (Table 2).

Walleye. The adult walleye population in 2006 was 761 or 0.7 fish/acre (95% C.I. 468-1054). Walleye abundance in 2006 has increased slightly compared to a previous survey in 1993. The total walleye population in 1993 was 690 or 0.6 fish/acre (95% C.I. 583-797). Walleye abundance was higher in 1979 at 1.4 fish/acre (95% C.I. 1110-1922; Figure 1). The size distribution of walleye was excellent in 2006 with a mean length of 21.0 in (N=297, S.D.= 4.6) and 4% (N=13) walleye larger than 28 inches were sampled (Figure 2). In comparison the mean length of walleye in 1993 was 18.9 in (N=365, S.D. = 4.0) and only 1% (N=5) were larger than 28 inches.

Angling effort for walleye made up 7.9% of the total directed effort (open water and ice combined) on Beaver Dam Lake in 2006-2007. This compares to 10.5% of the directed angling effort for walleye in 1993-1994. In addition, walleye catch rate decreased while harvest rate remained consistent. Angler catch/hour during the open water season decreased from 0.034 fish/hour in 1993-1994 to 0.023 fish/hour in 2006-2007 (Table 3).

Angler projected harvest in 2006-2007 was 72 walleye during the open water and ice fishing periods combined. Tribal spear fishers harvested 68 walleye in 2006. Combined tribal and angler exploitation was estimated at 20% of the adult population. In comparison, combined tribal and angler exploitation in 1993-1994 was 10% of the adult population.

Growth of walleye in Beaver Dam Lake was good. Growth rates for walleye ages 3 through 6 remained consistent and growth rates for ages 7, 9 and 11 walleye increased by several inches per age group from previous surveys in 1993 (Table 4). In addition, walleye growth in Beaver Dam Lake was faster than the local and regional means (Table 5).

Stocking large fingerling walleye improved fall year class strength in 2005. The fall electrofishing survey documented that YOY walleye relative abundance was 496% higher when large fingerling walleye were stocked compared to 2003, a year when small fingerling walleye were stocked. More specifically, age-0 walleye relative abundance was 25.3 fish/mile in 2005 compared to 0.5 fish/mile in 2003 (Table 1). Mean relative abundance of YOY walleye from previous surveys averaged 0.8 fish/mile (N=7, SD = 0.6). Most (92%; N=34) of the age-0 walleye collected in 2005 had an OTC mark and the remaining 8% were

likely naturally reproduced. No OTC analysis was done in 2003, however even if all the fish collected were stocked fish, the results would indicate that large fingerling walleye stocking outperformed small fingerling walleye stocking by at least 456%.

Largemouth Bass. Largemouth bass relative abundance has increased since the 1970s. Average CPUE for largemouth bass was 7 fish/hr (N=6, SD= 4.0) prior to our 2006 survey. In comparison, in 2006, largemouth bass CPUE was 22 fish/hour (Table 6).

Directed effort by anglers toward largemouth bass increased in 2006-2007 compared to the 1993-1994 survey. Twenty five percent of the directed angling effort (open water and ice combined) targeted largemouth bass in 2006-2007 compared to 16.9% of the directed angling effort in 1993-1994. As the directed effort increased, angler catch rate for largemouth bass increased from 0.21 fish/hour to 0.60 fish/hour during the open water season in 1993-1994 and 2006-2007, respectively (Table 3). Projected angler harvest for largemouth bass in 2006-2007 was 269 fish during the open water and ice fishing periods combined. Projected angler harvest of largemouth bass in 1993-1994 was 64. Mean length of largemouth bass harvested in 2006-2007 was 15.6 in (N=47, SE=0.2) during the open water and ice fishing seasons. In comparison, mean length of largemouth bass harvested in 1993-1994 during the open water and ice fishing seasons were 15.6 in and 16.4 in respectively.

Smallmouth Bass. Relative abundance of smallmouth bass has been increasing in Beaver Dam Lake. Electrofishing catch has increased from 0 fish/hr in 1970 to 12 fish/hr in 2006 (Table 6). In addition, 21.2% of the directed angling effort in 2006-2007 was for smallmouth bass, compared to 10.4% in 1993-1994. Open water angler catch rates increased from 0.21 fish/hour in 1993-1994 to 0.37 fish/hour in 2006-2007. Projected angler harvest was 172 smallmouth bass during the open water season. Mean length of smallmouth bass harvested in 2006-2007 was 16.4 in (N=8, SE=0.6). Mean length of smallmouth bass harvested in 1993-1994 during the open water season was 15.5 in.

Northern Pike. Fall electrofishing surveys suggest northern pike relative abundance in Beaver Dam Lake has been variable since 1970 (Table 6). Electrofishing catch was 22 fish/hr in 2006. Catch reached a high of 27 fish/hr in 1993 compared to a low of 7 fish/hr in 1970, 1988, and 1989. Only 9% of the northern pike captured in the 2006 survey were greater then 23 in. However, northern pike have been a popular sport fish for anglers. A total of 20% of the directed angling effort was for northern pike in 2006-

2007, compared to 27% in 1993-1994. Much of this effort was during the ice fishing season. Over half of the ice fishing effort during both 1993-1994 and 2006-2007 was directed toward northern pike (Table 3). Open water angler catch rates decreased slightly from 0.41 fish/hour to 0.38 fish/hour and ice angler catch rates increased slightly from 0.30 fish/hour to 0.33 fish/hour in 1993-1994 and 2006-2007, respectively (Table 3). Projected angler harvest was 2,120 northern pike during the open water and ice fishing season of which 57% was open water angler harvest and 43% was ice angler harvest. Mean length of northern pike harvested in 2006-2007 was 20.0 in (N=45, SE=0.4) and 20.3 in (N=133, SE=0.3) during the open water and ice fishing season, respectively. Harvest rates were 0.13 and 0.12 fish/hour during the open water and ice fishing, respectively. Mean length of northern pike harvested in 1993-1994 during the open water and ice fishing seasons were 19.9 in and 21.4 in, respectively.

Panfish. Population abundance was not estimated for panfish during the 2006-2007 netting and electroshocking. Creel survey results indicate 18% of the directed angling effort was for bluegill in 2006-2007, compared to 18.7% in 1993-1994. A total of 5.6% of the directed angling effort was for black crappie in 2006-2007 when compared to 15.8% in 1993-1994. Combined, 23.6% of the directed angling effort in 2006-2007 was for black crappie and bluegill compared to 34.5% in 1993-1994 (Table 3). The projected number of bluegill harvested in 2006-2007 was 16,568 and the projected number of black crappie harvested in 2006-2007 was 1,641. The average length of bluegill and black crappie harvested in 2006-2007 was 6.8 in and 9.2 in, respectively. No yellow perch harvest was documented.

Summary and Discussion

Walleye. Adult walleye abundance was similar from 1993 and 2006. However, when compared to 1979 walleye abundance is 50-57% lower. Even though abundance is low, there is a good opportunity for large trophy walleye in Beaver Dam Lake, and walleye growth is higher than local and regional means.

Low walleye abundance is likely due to poor recruitment (both natural and stocked). Rainbow smelt were illegally introduced to Beaver Dam Lake and have been present since 1980. Predation on early life stages of walleye by rainbow smelt may be affecting year class strength and subsequent adult densities. Walleye recruitment has been shown to decline after rainbow smelt invasion of inland Wisconsin lakes

(Mercado-Silva et al. 2007) The increase in largemouth bass abundance may also have a negative impact on walleye recruitment (see largemouth bass discussion).

Stocking of large fingerling walleye in 2005 resulted in high survival and the highest relative abundance of YOY walleye in any year sampled on Beaver Dam Lake. These large (6-8 in) fingerling are likely in a size refuge where rainbow smelt are not able to utilize them as prey. Continued stocking of large fingerling walleye remains a critical component for the rehabilitation of the Beaver Dam walleye population.

Exploitation of walleye was within acceptable limits. Combined sport and tribal exploitation was 20% during the 2006-2007 survey. Management guidelines for walleye recommend exploitation not to exceed 35% (Staggs et al. 1990). However because the walleye population has become reduced from other biotic factors (above) consideration should be given to providing additional protection to this population during a rehabilitation period. Increasing the minimum length limit for walleye to 18 in would reduce angler harvest by an estimated 66%. During the 2007 annual spring lake district meeting this regulation option was presented to the group and there was unanimous support.

Largemouth bass. Largemouth bass were an important component of the sport fishery on Beaver Dam Lake. However, historic surveys indicate that the largemouth bass relative abundance is now at their highest levels in 25 years (22 fish/hr).

The increase in largemouth bass abundance is likely in direct conflict with recovery efforts of walleye. Increasing largemouth bass abundance has been negatively correlated with walleye abundance in other Barron and Polk County lakes (Benike 2005a; Benike 2005b, Benike 2005c, Benike 2006). Nate et al. (2003) indicated that high largemouth bass and northern pike densities characterized lakes with walleye populations that are maintained by stocking versus natural reproduction. Fayram et al. (2005) documented that largemouth bass interact strongly with walleye populations through predation and limit stocked walleye survival. The authors further suggest that management goals seeking to simultaneously maximize both largemouth bass and walleye populations may be unrealistic. Maintaining a low density largemouth bass population is important if the walleye population is to recover on Beaver Dam Lake.

Smallmouth bass. The relative abundance of smallmouth bass (12 fish/hr) was lower than largemouth bass (22 fish/hr). However, smallmouth bass were an important component of the open water

fishery of Beaver Dam Lake. Directed effort and catch rates increased in 2006-2007 when compared to 1993-1994. Smallmouth bass, along with walleye should be considered the two primary species of management in Beaver Dam Lake. Smallmouth bass are not thought to negatively impact walleye populations in Wisconsin lakes (Fayram et al. 2005). Beaver Dam Lake is one of a handful of lakes in Barron County that has a fishable population of smallmouth bass and that should be maintained and even possibly enhanced.

Northern Pike. Northern pike were an important component of both the open water and ice fishery of Beaver Dam Lake. Northern pike relative abundance was similar to largemouth bass (22 fish/hr). Northern pike harvest (2,120) was the highest of all gamefish, however the average length of harvested fish was lower (20.2 in) when compared to the mean (21.6 in) of other northern Wisconsin lakes (Margenau et al. 2003). Directed effort, catch and harvest rates have remained consistent in 2006-2007 when compared to 1993-1994. Overall, the northern pike fishery is currently considered adequate and should provide consumptive angling opportunities.

Panfish. Bluegill were most heavily harvested panfish in Beaver Dam Lake, however they were not heavily targeted in terms of directed effort compared to gamefish, and ranked 4th behind largemouth, smallmouth and walleye. There was a decrease in panfish angling effort in 2006-2007 which appears to be related to a 10% decrease in black crappie angling effort because bluegill angling effort was similar between 2006-2007 and 1993-1994. It is not uncommon to see black crappie populations fluctuate and it is likely a larger year class of black crappie was present in 1993-1994 when compared to 2006-2007. No yellow perch harvest was documented.

Management Recommendations

1. Adult walleye densities should increase to 2.0 adult fish/acre by 2018. Largemouth bass relative abundance should remain less than 20 fish/hr and smallmouth bass relative abundance should increase to 20 fish/hr. Smallmouth bass should be encouraged as the preferred bass species of importance in Beaver Dam Lake and largemouth bass should be managed as a secondary species. No management changes are recommended at this time, however largemouth bass relative abundance should be carefully monitored in the future.

2. Walleye stocking should be converted from small fingerlings to large fingerlings. Currently, small walleye fingerling stocking is not cost-effective and there has been little contribution of stocked small walleye fingerlings over the past 15 years.
3. Considering the resources invested (stocking brood stock trout, large fingerling walleye) the minimum length limit for walleye should be increased from 15 to 18 inches. This proposed change would reduce angler harvest by 66% as well as increase adult densities from stocked fingerling walleye. In addition, it allows for the protection of female walleye which do not mature until they reach 16-18 inches.
4. The northern pike population seems stable and a quarter of the angling effort is targeted towards this species. No management changes are recommended at this time, however future monitoring should occur during routine baseline monitoring to develop long term trends on northern pike relative abundance and size structure.
5. The existing panfishery appears to be stable. No management changes are recommended at this time.

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.

Brooks, R. C., R. C. Heidinger, and C. C. Kohler. 1994. Mass marking of larval and juvenile walleyes by immersion in oxytetracycline, calcein, and calcein blue. North American Journal of Fisheries Management 14:143–146.

Cornelius, R. 1995. Fish Survey, Beaver Dam Lake, 1993 and 1994. Wisconsin Department of Natural Resources. Internal Fisheries Management Report. Barron Field Office.

Fayram, A. H., Hansen, M.J., and T.J. Ehlinger. 2005. Interactions between Walleyes and Four Fish Species with Implications for Walleye Stocking. North American Journal of Fisheries Management 25:1321-1330.

Hennessy, J. 2002. 2001-2002 Ceded Territory fishery assessment report. Wisconsin Department of Natural Resources. Administrative Report 55, Madison.

Jennings, M. J., J. M. Kampa, and G. R. Hatzenbeler. 2005. Evaluation of supplemental walleye stocking in northern Wisconsin lakes. North American Journal of Fisheries Management 25:1171–1178.

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.

Mercado-Silva, N., G. Sass, B. Roth, S. Gilbert and M. J Vander Zanden. 2007. Impact of rainbow smelt (Osmerus mordax) invasion on walleye (Sander vitreus) recruitment in Wisconsin Lakes. Canadian Journal of Fish and Aquaculture 64:1543-1550.

Nate, N.A., M. A. Bozek, M. J. Hansen, C. W. Ramm, M. T. Bremigan, and S. W. Hewett. 2003. Predicting the occurrence and success of walleye populations from physical and biological factors of northern Wisconsin lakes. North American Journal of Fisheries Management 23:1207-1214.

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.

Staggs, M. D., R. C. Moody, M. J. Hansen, and M, H. Hoff. 1990. Spearing and sport angling for walleye in Wisconsin's ceded territory. Wisconsin Department of Natural Resources Administrative Report 31. Madison.

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

Year	Length (in)	Number Stocked	Fall Electrofishing (no YOY/mile)	Walleye Captured
1983	3	55,470		19
1984	-	0		12
1985	3	60,764		63
1986	-	0		73
1987	1	56,350		36
1988	Fry	1,112,000		49
1989	Fry	1,122,000	1.4	48
1989	3	55,695		*
1990	-	0		11
1991	2	55,776	1.7	13
1992	2	15,613	0.5	10
1993	2	63,000	1.2	11
1993	Fry	260,000		*
1994	2	6,054		*
1995	2	55,638		*
1997	2	55,600		*
1998	6	3,100		*
1999	2	96,198		*
1999	6	6,500		*
2001	2	126,737		*
2001	6	7,000		*
2002	-	0	0.2	2
2003	2	83,211	0.5	*
2004	-	0	0.0	*
2005	7	11,120	25.3	91
2006	-	0	0.1	2

* no walleye sampling.

Table 2. Projected angling pressure 1993-1994 and 2006-2007, Beaver Dam Lake, Barron County, Wisconsin.

Season	Years	Hours/Acre
Open Water	1993-1994	16.4
	2006-2007	34.4
Ice	1993-1994	5.8
	2006-2007	7.1
Total	1993-1994	22.2
	2006-2007	41.4

Table 3. 1993-1994 and 2006-2007 creel survey data by season for major game and panfish species, Beaver Dam Lake, Barron County, Wisconsin.

Species	Season	Year	Directed Effort Percent	Catch rate (fish/hr)	Harvest rate (fish/hr)	Mean len. (in) harvested
Walleye	Open water	1993	9.6	0.0339	0.0110	18.8
		2006	9.0	0.0231	0.0111	17.2
	Ice	1994	13.1	0.0000	0.0000	N/A
		2006	1.8	0.0000	0.0000	N/A
Northern Pike	Open water	1993	16.3	0.4054	0.0462	19.9
		2006	13.2	0.3834	0.1250	20.0
	Ice	1994	57.0	0.3002	0.1466	21.4
		2006	57.4	0.3296	0.1200	20.3
Smallmouth bass	Open water	1993	11.9	0.2082	0.0137	15.5
		2006	25.1	0.3664	0.0074	16.4
	Ice	1994	5.8	0.0000	0.0000	N/A
		2006	0	0.0000	0.0000	N/A
Largemouth bass	Open water	1993	21.4	0.2095	0.0051	15.6
		2006	24.2	0.5961	0.0061	15.6
	Ice	1994	3.2	0.0599	0.0599	16.4
		2006	29.4	0.0568	0.0378	15.6
Bluegill	Open water	1993	21.3	2.8061	1.2788	6.9
		2006	20.6	3.9616	1.0932	6.8
	Ice	1994	10.8	3.5205	1.6760	6.7
		2006	3.8	1.3013	0.4042	6.5
Black crappie	Open water	1993	18.1	0.8566	0.5088	9.2
		2006	5.5	0.6012	0.3862	9.2
	Ice	1994	8.8	0.0147	0.0147	8.8
		2006	5.6	0.0779	0.0564	9.5
Yellow perch	Open water	1993	0.0	*	*	9.4
		2006	0.0	*	*	*
	Ice	1994	1.3	0.1523	0.0000	7.2
		2006	1.9	0.3402	0.0000	*

* not available

Table 4. Walleye mean length (in) at age, 1993 and 2006, Beaver Dam Lake, Barron County, Wisconsin.

Age	N	Beaver Dam Lake Mean 2006	SD	Age	N	Beaver Dam Lake Mean 1993
2	5	11.2	0.33	2	12	10.8
3	4	13.3	1.46	3	9	14.0
4	3	14.8	0.12	4	22	14.7
5	19	18.6	2.11	5	18	17.5
6	2	19.2	1.79	6	18	19.3
7	13	23.4	1.18	7	46	21.9
9	16	24.9	2.17	9	7	22.7
11	12	24.5	3.45	11	9	21.7
13	15	26.7	2.21	--	--	---

Table 5. Walleye mean length (in) at age, Beaver Dam Lake 2006, and local and regional means, Wisconsin. Local and regional mean length information is from WDNR Fisheries and Habitat database.

Age	Beaver Dam Lake Mean 2006	SD	Barron & Polk County (Local Mean)	SD	Northern Region (Regional Mean)	SD
2	11.2	0.33	10.7	2.0	9.6	0.72
3	13.2	1.46	13.4	2.3	11.9	1.60
4	14.8	0.12	15.4	2.1	14.1	0.39
5	18.6	2.11	17.5	1.9	16.1	2.16
6	19.2	1.79	18.8	2.0	17.7	2.29
7	23.4	1.18	20.4	2.5	19.3	1.69
9	24.9	2.17	22.9	2.3	21.8	2.15

Table 6. Fall Electrofishing Catch per Effort of Gamefish (fish/hour), Beaver Dam Lake, Barron County, Wisconsin.

Date	Walleye	Northern Pike	Largemouth Bass	Smallmouth Bass
1970	54	7	9	0
1979	12	16	3	1
1984	67	26	14	4
1988	13	7	6	3
1989	12	7	6	1
1993	6	27	4	6
2006	N/A	22	22	12

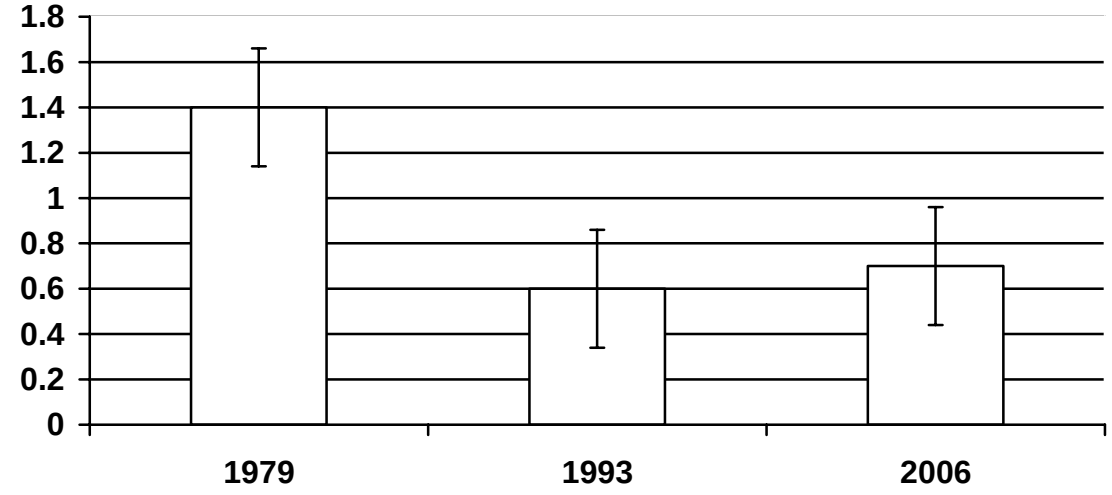

Figure 1. Adult walleye population density, 1979, 1993 and 2006. Beaver Dam Lake, Barron County, Wisconsin. Vertical bars represent 95% confidence intervals.

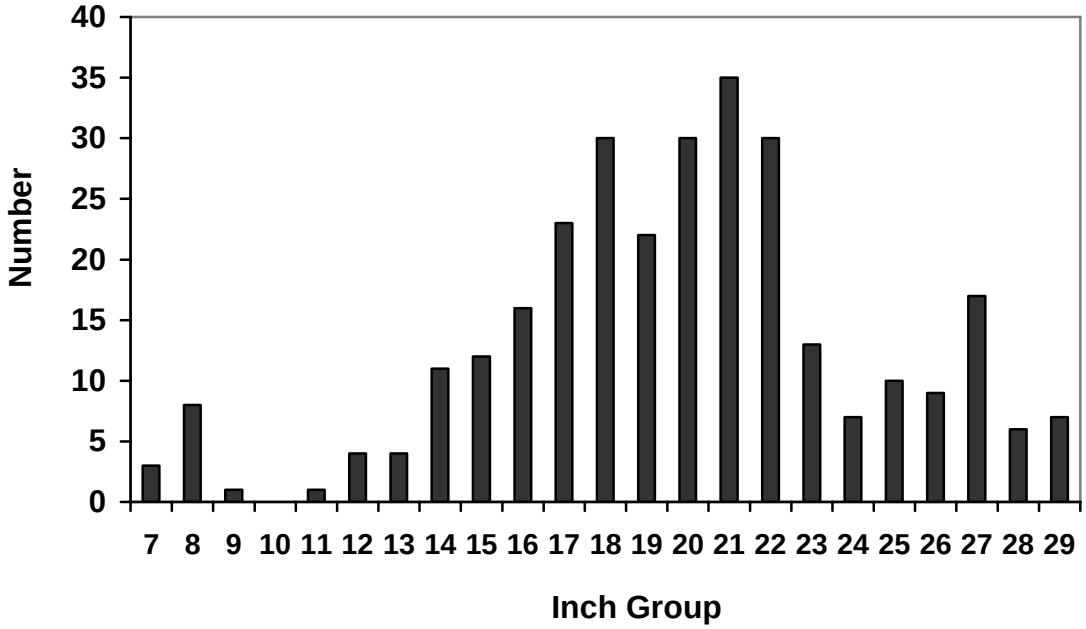

Figure 2: Walleye length frequency distribution, Beaver Dam Lake, Barron County, Wisconsin, 2006 (N=297).