Lower Turtle Lake
Treaty Assessment Survey
Barron County, Wisconsin
2004-2005
MWBIC (2079700)

By

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Executive Summary

Lower Turtle Lake, a 276-acre drainage lake located in western Barron County near Turtle Lake, Wisconsin was surveyed in 2004-2005 following the Wisconsin Department of Natural Resources Treaty Assessment protocol. Projected angler effort for all species of fish was 55.2 hours/acre, of which 76% was directed towards panfish. Largemouth bass were the most common gamefish caught by anglers followed by northern pike and walleye, but northern pike were the most common gamefish harvested by anglers. Largemouth bass relative abundance has increased 440% since 1974. Conversely, the 2004 adult walleye population estimate of 1.1 fish/acre was 21% and 71% lower compared to a past survey of 1.4 fish/acre in 1990 and 3.8 fish/acre in 1992. A relationship exists that suggests a decrease in walleye abundance coinciding with a subsequent increase in largemouth bass abundance. Based on this information, largemouth bass densities should be reduced in an effort to restore a historic natural reproducing walleye population.

Introduction

Lower Turtle Lake is a 276-acre drainage lake located near Turtle Lake, Wisconsin in western Barron County. Turtle Creek which originates from Upper Turtle Lake flows into and exits lower Turtle Lake.

Lower Turtle Lake has 3.8 miles of shoreline and a maximum and mean depth of 24 and 14 feet, respectively. Two public boat landings are present on Lower Turtle Lake. Most of the shoreline has been developed into residential and recreational housing. Lower Turtle Lake has a diverse fishery consisting of walleye Sander vitreus, northern pike Esox lucius, muskellunge Esox masquinongy, largemouth bass Micropterus salmoides, as well as bluegill Lepomis macrochirus, black crappie Pomoxis nigromaculatus, pumpkinseed Lepomis gibbosus, warmouth Lepomis gulosus, yellow perch Perca flavescens, common carp Cyprinus carpio, bowfin Amia calva and bullheads Ameiurus spp.

Walleye stocking in Lower Turtle Lake was initiated in 1933. Walleye stocking from 1933-1969 consisted of sporadic fry or small fingerling (< 3 in) stockings. Walleye stocking was terminated in 1969 because adequate natural reproduction was present to sustain the walleye fishery. In 2000, regular stocking of small fingerling walleye during even numbered years began again because walleye natural reproduction was no longer able to sustain a desirable walleye fishery (Cornelius 2000). According to Becker (1983), Lower Turtle Lake was not within the native range of walleye in Wisconsin. No other fish stocking occurs. 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 bass, northern pike, and panfish.

Methods

Lower Turtle Lake was sampled during 2004-2005 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 the adult population. Adult walleye were defined as being $\geq$ 15 in or sexable and adult bass were defined as $\geq$ 8 in (Hennessy 2002). Survey data were also collected to estimate relative abundance and angler catch information on other important species such as northern pike and panfish.

Creel census data were collected in 2004-2005 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 Lower Turtle 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 in total. No minimum length limits were in effect for northern pike or panfish and the bag limits were 5 and 25, respectively.

Data collected during the 2004-2005 survey were compared with previous survey data on Lower Turtle Lake in 1992 and 1999 and historic fall electrofishing surveys from 1974, 1981, 1989, 1992, 1994, and 1998. Population estimates from the 1992 survey were generated by the Great Lakes Indian and Wildlife Commission (GLIFWC) using spring nighttime electrofishing that consisted of one marking run and one recapture run. Population estimates from 1999 consisted of spring fyke netting followed by nighttime electrofishing (similar to the estimate conducted in 2004). Northern pike relative abundance and size structure was compared to a historic data set from 1987, 1994, 2002 and 2004 using spring fyke netting. Size distribution of northern pike was summarized using proportional (PSD) and relative stock density (RSD) values (Anderson and Neumann 1996). Northern pike harvest statistics were also compared with 55 northern Wisconsin lakes (Margenau et al. 2003). 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 (≥ 12.0 in). Juvenile walleye (YOY) electrofishing runs were conducted in 1975, 1981, 1989, 1994, 2000, 2002 and 2004.

Results

Angling Effort. Projected angling pressure for all species in 2004-2005 was 55.2 hours/acre. Overall, 58% of the angling pressure in 2004-2005 was during the open water season and 42% was during the ice fishing season.

Walleye. The adult walleye population in 2004 was 299 or 1.1 fish/acre (95% C.I. 254-345). Adult walleye abundance was 21% and 71% lower in 2004 compared to 1999 and 1992, respectively (Figure 1).

The adult walleye population in 1999 was 379 (1.4 fish/acre; 95% C.I. 238-520) and in 1992 was 1,038 (3.8 fish/acre; 95% C.I. 784-1,292).

Walleye YOY were present in respectable numbers during the 1975 and 1981 samples (10.5 and 21.5 fish/mile) and again in 1992 (6.8 fish/mile) but were absent during the 1989 and 1994 samples (Table 1). However, since 2000, small walleye year classes have been present during even numbered years, which is also years in which walleye were stocked. Although modest walleye year classes have been created since 2000, likely from supplemental stocking, these year classes are still considerably lower than historic sampling events when walleye natural reproduction was present in adequate numbers to maintain the fishery.

Angling effort for walleye made up 7% of the total directed effort (open water and ice combined) on Lower Turtle Lake in 2004-2005. Angler catch/hr and harvest/hr during the open water season was 0.11 fish/hr and .06 fish/hr respectively (Table 2). Mean length of walleye harvested in 2004-2005 was 17.5 in (SD = 2.4, N = 28). Angler projected harvest was 112 walleye during the open water and ice fishing periods combined. Tribal spear fishers did not harvest any fish in Lower Turtle Lake in 2004. Total adult walleye exploitation was estimated at 10%.

Growth of walleye in Lower Turtle Lake was good. In addition, walleye growth was faster than the local and regional means for age 4 and 8 fish (Table 3).

Largemouth Bass. The adult largemouth bass population ($\geq$ 8in) in 2004 was 1,173 or 4.2 fish/acre (95% C.I. 854-1610). Historic fall electrofishing surveys for largemouth bass suggests largemouth bass relative abundance has increased 440% from 10/hr in 1974 to 54/hr in 2004 (Figure 2).

Only, five percent of the directed angling effort (open water and ice combined) targeted largemouth bass. Although directed effort was low, angler catch rate for largemouth bass was 0.68 fish/hr during the open water season in 2004-2005 (Table 2). Projected angler harvest for largemouth bass in 2004-2005 was only 92 fish during the open water and ice fishing periods combined, suggesting a high degree of catch and release fishing. Mean length of largemouth bass harvested in 2004-2005 was 15.6 in (SD = 1.5, N = 20).

Growth of largemouth bass was good. In addition, largemouth bass growth was faster than the local and regional means for all age classes (Table 4).

Northern Pike. Northern pike abundance was not estimated during the 2004 sampling event (netting, electroshocking). However, 206 pike were captured during the spring netting portion of this survey. In 2004, northern pike CPUE was 7 fish/net lift. In comparison, northern pike CPUE/net lift in 1994 and 2002

was 16 and 11, respectively. The size structure of northern pike has improved since 1994 (Figure 3). Northern pike PSD was considerably higher in 2004 (36) compared to 1994 (8) and 1987 (3). Northern pike RSD-26 and RSD-28 values followed a similar trend (Figure 3).

An estimated 12% of the directed angling effort was for northern pike in 2004-2005. Open water angler catch rates were 0.37 fish/hr and ice angler catch rates were 0.11 fish/hr. Projected angler harvest was 340 northern pike during the openwater and ice fishing seasons of which 43% was open water angler harvest and 57% was ice angler harvest. Mean length of northern pike harvested in 2004-2005 was 23.2 (SD=3.6, N=82)

Muskellunge. Muskellunge abundance was not estimated during the 2004 sampling event, however four muskellunge ranging in length from 10.0-38.0 inches were collected during the survey. In addition, the 2004-2005 creel survey suggested that a few anglers were targeting muskellunge on Lower Turtle Lake, however the effort was less than 1% of the directed effort. Angler catch rate was .06 fish/hr and no muskellunge were harvested.

*Panfish***.** Population abundance was not estimated for panfish during 2004-2005 netting and electroshocking. Anglers targeting black crappie, bluegill, and yellow perch accounted for 76% of the directed effort during 2004-2005 (Table 2). Thirty-one percent of the directed angling effort was for black crappie, 26% for bluegill, and 19% for yellow perch. The projected number of black crappie harvested was 6,853, compared to 7,366 bluegill and 2,821yellow perch. The average length of black crappie harvested was 9.1 in (SD = .62, N = 964), bluegill was 7.0 in (SD = 0.35, N= 1229) and yellow perch 8.5 in (SD = 0.83, N=1,733).

Discussion

*Walleye***.** Adult walleye abundance decreased from 1992-2004. This decrease is likely related to poor year class strength over the past decade (1994-2004). The higher number of walleye prior to 1992 was due to the presence of smaller walleye ($\leq$ 12.0 in) compared to the 2004 population estimate. Fall YOY walleye surveys conducted over the past decade suggest that year class strength has been poor.

Walleye abundance in 2004 remained low. The likely reason that walleye abundance has not increased may be due to two factors. First, walleye natural reproduction appears to be very limited at best in Lower Turtle Lake, whereas historically it appeared natural reproduction was able to sustain the fishery without

stocking. (Cornelius, 2000). Second, walleye fingerling stocking has just recently began in 2000 after several decades with no stocking. It does appear that some survival of stocked walleye is occurring, based on fall electrofishing samples, but it is considerably lower compared to years where walleye natural reproduction was adequate to sustain the fishery. Predation on early life stages of walleye may be affecting year class strength and subsequent adult densities. Brooking et al. (2001) stated that when other top predators such as largemouth bass and northern pike increase in relative abundance in a lake, the likelihood of increased predation on small fingerling walleye is high and likely hinders stocking success. Largemouth bass have also been found to be effective predators on other stocked fish such as esocids (Stein et al. 1981). This study found that largemouth bass predation accounted for up to 45% of stocked hybrid muskellunge (Esox masquinongy x E. lucius) within 40 d of stocking. In addition, 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. Three other studies completed on nearby Ward, Half Moon and Big Butternut Lakes (Benike 2005a; Benike 2005b, Benike 2005c) in Polk County also showed a similar trend of decreasing walleye abundance with an increase in largemouth bass abundance during the same time period. Most recently, (Fayram et al. 2005) documented that largemouth bass interact strongly with walleye populations through predation as well as, limit stocked walleye survivialship. The authors further suggest that management goals seeking to simultaneously maximize both largemouth bass and walleye populations may be unrealistic. Considering the relative abundance of largemouth bass in Lower Turtle Lake has increased 440% since 1974 it's reasonable to assume largemouth bass may be utilizing walleye as prey items.

In the face of a diminishing walleye population that has resulted from recruitment failure (both natural and from stocking), and changes in the fish community, consideration needs to be given if walleye are appropriate to be managed for in Lower Turtle Lake. Currently, the sport fishery is driven by anglers pursuing primarily panfish, with largemouth bass and northern pike providing seasonal opportunities for game fish. However, the decision to terminate walleye management on a lake which had a healthy natural reproducing walleye population for several decades should only be done if all other attempts to restore the fishery are pursued first. One practical alternative that would have little to no cost impact would be to reduce largemouth bass densities on Lower Turtle Lake. One approach would be to remove the current 14-in minimum length limit for largemouth bass, but considering very few anglers are targeting or harvesting largemouth bass, it is unlikely this option will reduce largemouth bass densities. Another option to

consider is mechanical removal of largemouth bass. Considering the current largemouth bass population is near 1,200 adult fish, possibly reducing the number of bass in the lake through removal could be done in a few days using night electrofishing. It is likely several hundred largemouth bass, mainly in the 10-14 in range bass could be removed per day using this technique. The goal of this effort would be to lower largemouth bass densities and recruitment to a point where stocked small fingerling walleye survival would be enhanced. More importantly, if it were successful, adult walleye abundance would hopefully increase and natural reproduction could once again possibly contribute to the fishery.

Largemouth Bass. Largemouth bass were not heavily targeted by anglers even though they were very common. Although no historic population estimates were available for largemouth bass in Lower Turtle Lake, fall electrofishing data indicates largemouth bass have increased substantially since 1974. Reducing largemouth bass densities would not appear to adversely impact any major component of the angling experience on Lower Turtle Lake. In addition, since only sub-legal length bass would be removed, the existing size structure of larger fish will remain and should provide adequate angling opportunities for those anglers who target bass.

Northern Pike. Northern pike were the most common gamefish harvested and are considered an important component of both the open water and ice fishery of Lower Turtle Lake. The 2004-2005 creel indicated that catch rates (0.21 fish/hr) were slightly lower than those noted for 55 northern Wisconsin lakes (0.25 fish/hr, SE=0.02) by Margenau et al. (2003). However in 2004-2005, the harvest rate (0.09 fish/hr) during the open water angling season was higher than (0.07 fish/hr, SE=0.004) reported by Margenau et al (2003). In addition, the overall mean length of fish harvested (23.2 in) was higher than the average (21.6 in, SE=0.23) reported by Margenau et al. (2003). Overall, the northern pike fishery is currently considered adequate and should provide above average angling opportunities.

Muskellunge. Muskellunge were not an important component of the overall fishery in Lower Turtle Lake. However, data indicates that muskellunge were present in Lower Turtle Lake. In addition, the creel census indicates that a few anglers were actually targeting muskellunge. Any muskellunge that were present in Lower Turtle Lake are likely downstream migrants from Big Moon Lake, which is stocked with muskellunge on an alternate year basis. Moon Creek exits Big Moon Lake and enters Turtle Creek a few miles downstream of Lower Turtle Lake. Even though only a handful of muskellunge are likely present in Lower Turtle Lake, the potential to grow larger muskellunge exists because a 40 in minimum length limit is

the standard muskellunge regulation for Barron County waters. In addition, the productivity of Lower Turtle Lake is high and would likely allow for fast growth opportunities.

Panfish. Panfish were most heavily targeted fish in terms of angling effort, catch and harvest on Lower Turtle Lake. Panfish species black crappie, bluegill, and yellow perch provided anglers good species diversity and size structure and will likely continue to be the focus of angling effort into the future.

Management Recommendations

1. It is recommended that largemouth bass densities be reduced to 1-2 fish per acre. Mechanical removal of 600 largemouth bass less than 14 in should occur by May of 2007. The goal of this management action is to reduce largemouth bass densities to a level where stocked walleye survival is increased to at least 10 YOY per mile during stocked years and natural reproduction is once again present during non-stocked years. In addition, largemouth bass fall electrofishing relative abundance should be maintained between 10-20 bass per hour from 2007 to 2012. Additional removal may be needed but will not be implemented unless largemouth bass relative abundance exceeds this threshold. All largemouth bass removed will be re-stocked in an effort to restore bass fisheries into adjacent waters in Barron or Polk County that have recently suffered from fish winterkills.

2. Adult walleye densities should be increased to 2-4 adults per acre. Walleye stocking should continue during even numbered years. If available, extended growth walleye are recommended over small walleye fingerlings in an effort to maximize stock survival and improve walleye abundance.

3. The northern pike population appears to be healthy, however harvest rates were higher than similar waters in northern Wisconsin, but the average size of fish harvested was also larger than similar waters in northern Wisconsin. No changes are recommended at this time.

4. Lower Turtle Lake should be classified as a Class C3 muskullunge water. This designation indicates that a fishable population of muskullunge is present, but is not considered an important component of the overall angling opportunity. No stocking is recommended to enhance the current population at this time.

5. The existing panfishery appears stable and the majority of the angling effort is targeted towards these species. No management changes are recommended at this time.

6. Littoral zone areas should be protected to provide critical spawning, nursery and overwintering habitat for the existing fish community in Lower Turtle Lake. No large-scale chemical treatment of aquatic plants is recommended, unless deemed appropriate at some future point. Minor chemical treatments for navigational purposes should be considered on a case by case basis.

7. Lake shore property owners should maintain or restore at least a 35 foot vegetative buffer to maintain near shore habitat and to protect the water quality of Lower Turtle Lake. Elimination of protective lakeshore buffers will likely lead to an increase in nutrients that will likely contribute to an increase in algae blooms and a decrease in overall water quality and fish habitat.

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Table 1. Walleye stocking and fall fingerling catch per unit of effort (CPUE) from electrofishing for Lower Turtle Lake, Barron 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)
1975				10.5
1981				21.5
1989				0.0
1992				6.8
1994				0.4
1998				0.0
2000	< 3	17,986	65	
2002	< 3	27,450	100	1.6
2003				0.0
2004	> 6	5,506	20	1.6

Table 2. 2004-2005 creel survey data by season for major game and panfish species, Lower Turtle Lake, Barron County, Wisconsin.

Species	Season	Year	Directed Effort %	Catch rate (fish/hr)	Harvest rate (fish/h)	Mean len. (in) harvested
Walleye	Open water	2004	11	0.11	0.06	17.3
	Ice	2005	3	0.01	0.01	20.4
Largemouth bass	Openwater	2004	10	0.68	0.03	15.6
	Ice	2005	1	0.06	0.03	15.6
Northern pike	Openwater	2004	9	0.38	0.10	23.5
	Ice	2005	14	0.11	0.08	23.1
Bluegill	Openwater	2004	24	2.95	1.17	7.1
	Ice	2005	28	2.08	0.71	7.0
Black crappie	Openwater	2004	33	2.22	1.10	9.1
	Ice	2005	29	0.48	0.36	9.2
Yellow Perch	Openwater	2004	12	1.15	0.37	8.7
	Ice	2005	26	1.78	0.41	8.4

Table 3. Walleye mean length (in) at age, Lower Turtle Lake 2004, and local and regional means, Wisconsin. Local and regional mean length information is from WDNR Fisheries and Habitat database.

Age	N	Lower Turtle Lake Mean 2004	SD	Barron & Polk County (Local Mean)	SD	Northern Region (Regional Mean)
4	55	16.2	2.1	15.4	2.3	14.1
6	10	17.9	2.0	18.8	2.0	17.7
8	12	23.0	2.4	21.9	3.0	20.9

Table 4. Largemouth bass mean length (in) at age, Lower Turtle Lake 2004, and local and regional means, Wisconsin. Local and regional mean length information is from the WDNR Fisheries and Habitat database.

Age	N	Lower Turtle Lake Mean 2004	SD	Barron & Polk County (Local Mean)	SD	Northern Region (Regional Mean)
3	24	11.1	1.1	9.3	2.0	9.0
4	14	12.6	0.8	11.7	2.0	11.0
5	7	14.4	0.8	13.2	2.1	12.7
6	7	15.9	0.6	14.9	2.0	14.6
7	9	17.0	0.7	16.6	1.4	16.0

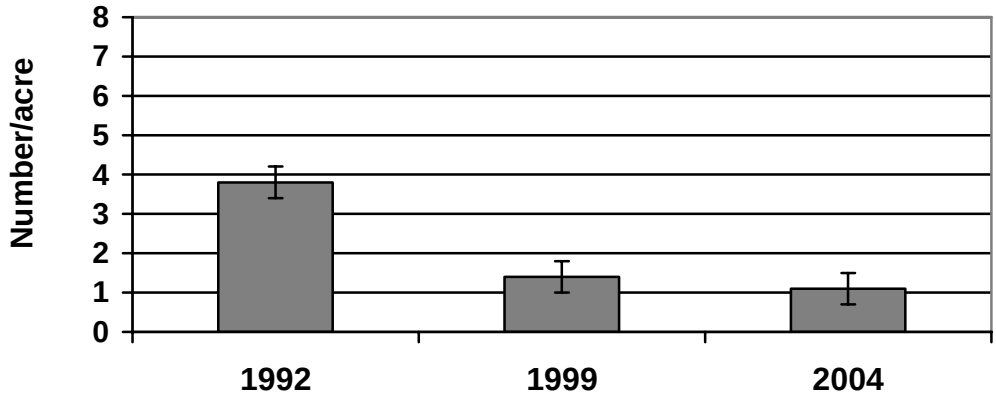

Figure 1: Adult walleye population density, Lower Turtle Lake, Barron County, WI. Error bars represent 95% confidence intervals.

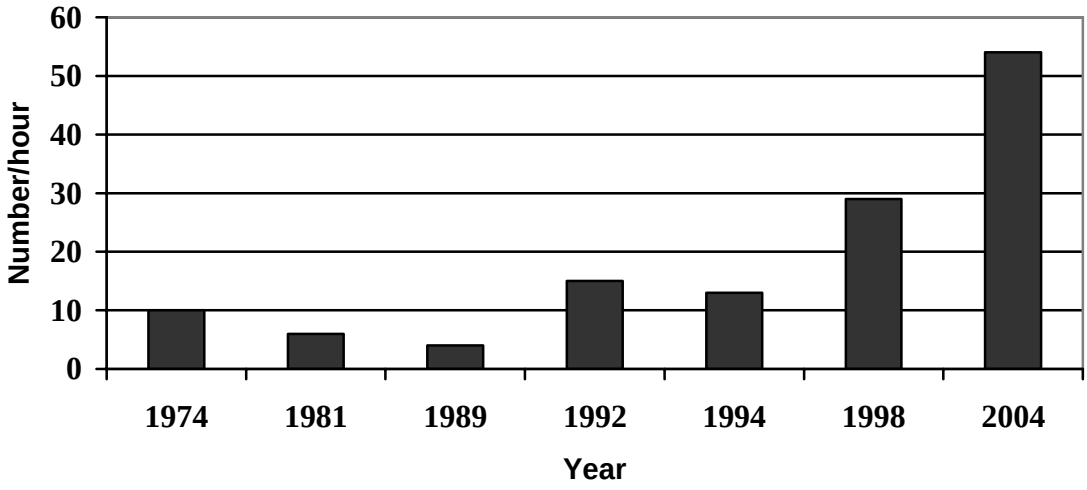

Figure 2: Relative abundance of largemouth bass from fall electrofishing surveys, Lower Turtle Lake, Barron County, Wisconsin.

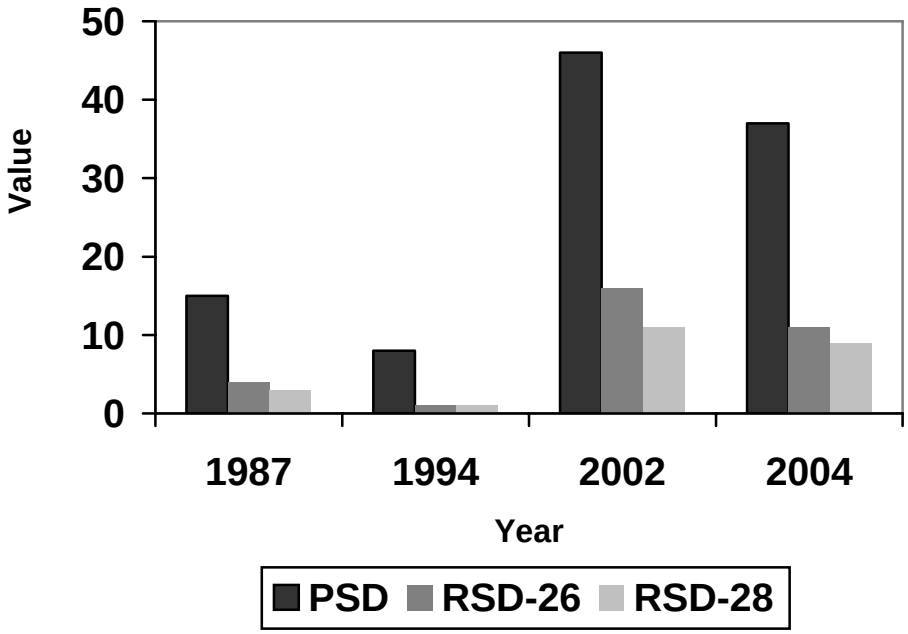

Figure 3: Northern pike PSD, RSD-26 and RSD-28 values for, Lower Turtle Lake, Barron County, Wisconsin.