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MINNESOTA DEPARTMENT OF NATURAL RESOURCES

DIVISION OF FISHERIES AND WILDLIFE

Smallmouth Bass Assessment Report

Spring Smallmouth Bass Assessment on the Mississippi River from Little Falls Dam to Blanchard Dam, May 23 and 27, 2008, River Miles 957 to 966.

By

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ABSTRACT

A special smallmouth bass assessment of the Mississippi River (M-1) from Little Falls Dam to Blanchard Dam was conducted on May 23 and 27, 2008. Population data was gathered to compare to a similar assessment on the river where a special regulation exists from the St. Cloud Dam to the Crow River confluence in the Montrose Fisheries Management Area. Smallmouth bass were targeted although all gamefish encountered during sampling were captured. A total of 119 smallmouth bass were sampled in two boat electrofishing stations. Catch per unit of effort (CPUE) of smallmouth bass was 68.9/hour which was the highest ever recorded on this section of the Mississippi River. Other gamefish species sampled included: black crappie, bluegill, channel catfish, largemouth bass, muskellunge, northern pike and walleye. Catch rates for black crappie, channel catfish, muskellunge, and walleye were also the highest ever recorded while other species catch rates were within the range observed in previous assessments.

STUDY AREA

The Mississippi River from Little Falls Dam to Blanchard Dam covers approximately 9.1 miles. Little Falls and Blanchard Dams are hydroelectric power generating facilities owned by Minnesota Power Company. Little Falls Dam is located within the City of Little Falls and Blanchard Dam is located approximately 3.25 miles northwest of Royalton, Minnesota. This stretch of the river flows primarily through residential and agricultural lands. Public access is available at the Pike Creek Landing (state owned) on the west side of the river approximately 2.1 miles south of Little Falls Dam and immediately upstream of Blanchard Dam on the east side of the river (MP&L). The entire river is accessible by boat with the exception of the first mile of the river below Little Falls Dam. In general, from the Little Falls Dam tailwater downstream one mile, the river is characterized by pool, riffle, and run habitat due to significant gradient. Substrates are typically coarse in this section of the river and granite bedrock is common. The remainder of the river in this section is deeper and reservoir like. Substrates are primarily sand and gravel. The river in the entire study area is important for recreational activities and is used by anglers, campers, canoeists, hunters, recreational boaters, swimmers and wildlife and nature viewers. Residential development within the riparian zone is moderate to heavy on the east bank, especially within the City of Little Falls, and moderate to light on the west bank.

Two major tributaries, Pike Creek and the Swan River, enter the Mississippi River between Little Falls and Blanchard Dams and drain predominately agricultural lands from the west. Soils in the watershed are predominately fine sandy loam and sandy loam types. According to the Ecological Classification System the west portion of the watershed is considered part of the hardwood hills ecoregion, while the east is part of the Anoka sandplain and Mille Lacs uplands ecoregion. Pre-settlement vegetation types were diverse and included aspen-oak land, big woods hardwoods, oak openings and barrens, mixed white and red pine, and aspen-birch.

METHODS

Two daytime electrofish runs were established in known smallmouth bass spawning areas in 1994 (Figure 1). These stations have been replicated in assessments completed from 1994-1997, and in even years from 2000 through 2008. Timing of electrofishing corresponded with smallmouth bass spawning, generally when the river

approached 60° F. Stations were established in tailwater areas where smallmouths commonly spawn at the downstream ends of islands and in channel backwaters where coarse substrates and a lack of current existed. A Coffelt VVP-2E boom shocker boat rigged with a sphere type anode and hull cathode was used to sample fish. An attempt was made to capture all gamefish encountered. Gamefish captured were identified, enumerated and measured, and with the exception of catfish, a scale sample taken for age determination prior to release.

Mississippi River discharge information was obtained from the USGS Water Resources website. Discharge was measured by the USGS at Gaging Station #05267000 located near Royalton, MN.

RESULTS AND DISCUSSION

Gamefish Assessment

A total of eight different gamefish species were sampled in 1.7 hours of electrofishing effort in two stations combined on May 23 and 27, 2008 (Table 1). Species captured included: black crappie, bluegill, channel catfish, largemouth bass, muskellunge, northern pike, smallmouth bass and walleye. Smallmouth bass were the targeted species and were the most abundant species in the catch. A total of 119 smallmouth were sampled in 2008 for a CPUE of 68.9/hour. This represented the highest number and catch rate observed on this stretch of the Mississippi River. Catch rates in prior assessments from 1994 through 1997, and even years from 2000 through 2006 ranged from 13.0/hour (n=12) in 1996 to 67.4/hour (n=95) in 2006 (Table 2). High catch rates observed in 2008 may be attributed to ideal flow conditions, precise timing of sampling during peak spawning season, and a high prevalence of age 2 individuals not observed in previous assessments. Mean total length of smallmouth bass captured in the 2008 assessment was 15.5 inches and individuals ranged from 4.1 to 20.2 inches in total length. Smallmouth bass greater than16.0 inches comprised 61.3% of the catch. Calculated PSD values for bass have historically been very high ranging from 94 in 1994 to 100 in 1995-1997 and 2000 (Figure 4). The PSD value calculated in 2008 was 87, the lowest value calculated for this section of the Mississippi River, and is probably explained by an increased number of age 2 individuals in the sample. PSD values are probably biased high due to sampling during spawning season where mature fish dominate the catch.

Scale samples were taken from a subsample of 84 smallmouth bass for age determination. Fish age 1 through 10 were present in the subsample suggesting that consistent recruitment is characteristic of this stretch of the

river. Length at annulus formation is reported in Table 3. In general, smallmouth exceeded quality and preferred size (11.0 and 13.8 inches) in their third and fourth years and attained memorable size (16.9 inches) by age 7. Trophy individuals exceeding 20.0 inches were typically age 10 or older. Length at annulus formation was similar to that seen on other sections of the Mississippi River and growth is normal to fast when compared to other Midwest smallmouth bass populations.

A total of 63 walleye were captured during the 2008 assessment ranging from 4.5 to 20.6 inches in total length. CPUE for walleye in 2008 sampling was 36.5/hour, which was the highest catch rate ever observed on this stretch of the river. CPUE in previous assessments ranged from 4.6/hour in 1994 to 32.0/hour in 1995. Mean length of walleye sampled was 11.6 inches. A total of 48 walleye were aged with ages 1 through 8, and 12 represented in the sample. Age 2 and 3 individuals were most common comprising 20.8% and 25.0% of the aged sample, respectively. Walleye growth was fast for ages 1 and 2 and slow for ages 4 through 7 when compared to area means.

The northern pike catch rate (CPUE=4.6/hour) was within the range observed in previous assessments. Eight northern pike ranging from 9.9 to 27.1 inches in total length were sampled. Catch rates in past surveys ranged from 4.3/hour in 2006 to 9.8/hour in 1996. Ages 1, 2, 3 and 6 were represented in the catch in 2008 with age 6 most common. Growth was in the normal range when compared to area means.

A total of four channel catfish were captured during 2008 sampling for a catch rate of 2.3/hour. Channel catfish were reported rarely by local anglers and were not sampled during an assessment until 2006. Catfish numbers appear to be increasing in abundance. CPUE in the 2006 assessment was 1.4/hour. Catfish averaged 21.3 inches in total length and ranged from 20.0 inches to 23.5 inches. No aging structures were taken during sampling in 2008.

Catch rates of black crappie were also high when compared to historic catches. Four black crappie were sampled for a catch rate of 2.32/hour. Black crappies were not sampled during spring assessments until 2006 (CPUE=0.7/hour). Black crappie captured averaged 10.5 inches in total length and ranged from 9.3 to 11.1 inches. All crappie sampled were Age 4 (n=2) and 5 (n=2). Growth was fast when compared to area means.

Muskellunge catch rates (CPUE=3.5/hour, n=6) were the highest ever recorded in the 2008 assessment. Muskellunge were sampled in low numbers in 7 of 9 prior assessments with catch rates ranging from 0.0/hour in 1997 and 2004 to 2.2/hour in 1996. Muskellunge captured in 2008 averaged 21.2 inches in total length and ranged

from 15.1 inches to 32.2 inches. Ages 1 through 3 and age 5 were present in the sample with age 2 individuals comprising 50% of the catch. Muskellunge are self-sustaining in the Mississippi River and the presence of several year classes suggest fairly consistent recruitment has occurred in recent years. In the past, angler diaries have proven to be a better assessment tool for muskellunge on the river than active electrofishing sampling methods.

Bluegills have been sampled in three of nine assessments conducted on this stretch of the river. Only one bluegill was sampled in 2008 for a catch rate of 0.6/hour. CPUE observed in 2006 was 9.2/hour, which was the highest catch rate ever recorded.

Two largemouth bass were captured during the 2008 assessment for a catch rate of 1.2/hour. Largemouths caught were 14.3 and 14.7 inches in total length. Largemouth bass have only been observed in the 2006 and 2008 assessments. Catch rates were also low in 2006 (CPUE=1.4/hour, n=2). Habitat in the river is not suited to this species.

Hydrology

Mississippi River discharge information was obtained from the USGS Water Resources website. Daily discharge has been monitored near Royalton, MN since 1924. Flow measured at Royalton ranged from 254 cfs on November 25, 1936 to 38,200 cfs on April 8, 1997. Discharge in 2008 followed historical patterns with high flows observed in April and May, low flows during summer, and a slight increase in fall flow (Figure 5). Discharge was below normal through mid April, above normal from mid April through early July, below normal during summer and near normal in fall. Peak discharge occurred on May 3 (15,300 cfs) while low flows for the year occurred on September 5 and 6 (1080 cfs). Discharge during the assessment was 9,990 cfs on May 23, and 8,650 cfs on May 27.

Table 1. List of species captured, scientific name, and number caught at each electrofishing station, and total number of fish caught on the Mississippi River from Little Falls Dam to Blanchard Dam, May 2008.

		Number Caught		
Species	**Scientific Name**	**EF1**	**EF2**	**Total**
Black crappie	*Pomoxis nigromaculatus*	1	3	4
Bluegill	*Lepomis macrochirus*	1		1
Channel catfish	*Ictalurus punctatus*		4	4
Largemouth bass	*Micropterus salmoides*	2		2
Muskellunge	*Esox masquïnongy*	2	4	6
Northern pike	*Esox lucius*	2	6	8
Smallmouth bass	*Micropterus dolomieu*	43	76	119
Walleye	*Sander vitreus*	15	48	63

Table 2. Gamefish catch per unit effort (CPUE) history on the Mississippi River from Little Falls Dam to Blanchard Dam.

	Catch Per Unit Effort of Gamefish (fish/hour)								
Species	**2008**	**2006**	**2004**	**2002**	**2000**	**1997**	**1996**	**1995**	**1994**
Black crappie	2.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bluegill	0.6	9.2	0.0	0.0	0.0	0.0	0.0	0.0	1.5
Channel catfish	2.3	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Largemouth bass	1.2	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Muskellunge	3.5	0.7	0.0	1.0	1.4	0.0	2.2	2.0	1.5
Northern pike	4.6	4.3	6.5	8.5	8.0	7.6	9.8	9.0	6.1
Smallmouth bass	68.9	67.4	63.2	57.3	39.9	31.1	13.0	29.0	21.4
Walleye	36.5	20.6	31.6	21.1	30.4	12.1	16.3	32.0	4.6
Total Effort (hours)	1.73	1.41	1.55	1.99	1.38	1.32	0.92	1.00	1.31

Table 3. Length at annulus formation for gamefish sampled in May 2008 on the Mississippi River from Little Falls Dam to Blanchard Dam.

		Mean Length at Annulus Formation											
Species	**Age**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Smallmouth bass	Mean length	4.1	8.2	11.3	14	15.7	16.4	17.5	18.2	19	19.7		
	Standard error		0.28	0.79	0.55	0.14	0.23	0.15	0.23	0.15	0.4		
	Sample size	1	14	7	4	12	14	17	9	3	3		
	Minimum length	4.1	5.7	8.9	12.5	14.9	15.1	16.3	17.3	18.8	18.9		
	Maximum length	4.1	10.1	14.2	14.6	16.6	18.4	18.3	19	19.3	20.2		
Walleye	Mean length	8.3	11.8	13.2	15.5	15.2	16.2	17.7	19.1				20.6
	Standard error	0.34	0.4	0.39	0.38	0.15	0.15	0.35					
	Sample size	4	15	12	7	2	2	4	1				1
	Minimum length	7.8	9.2	11.2	14.1	15	16	17	19.1				20.6
	Maximum length	9.3	14.5	15.2	17.3	15.3	16.3	18.3	19.1				20.6
Northern pike	Mean length	12.1	14.7	18.4			24.7						
	Standard error	2.2		0.95			1.44						
	Sample size	2	1	2			3						
	Minimum length	9.9	14.7	17.4			22.1						
	Maximum length	14.3	14.7	19.3			27.1						
Black crappie	Mean length				10.8	10.2							
	Standard error				4.4	4.1							
	Sample size				2	2							
	Minimum length				10.4	9.3							
	Maximum length				11.1	11							

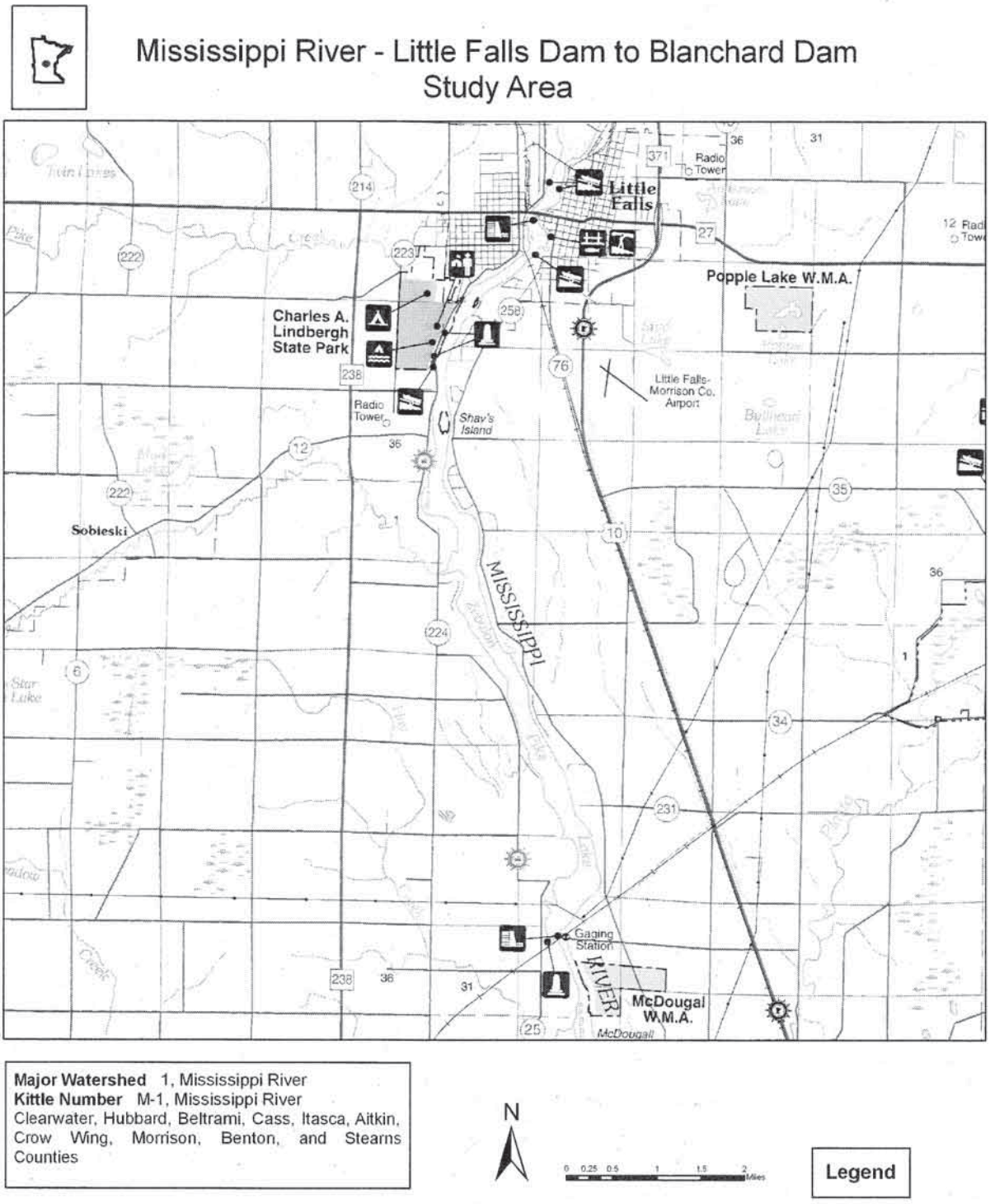

Figure 1. DNR PRIM Map showing the section of the Mississippi River from Blanchard Dam to Sartell Dam.

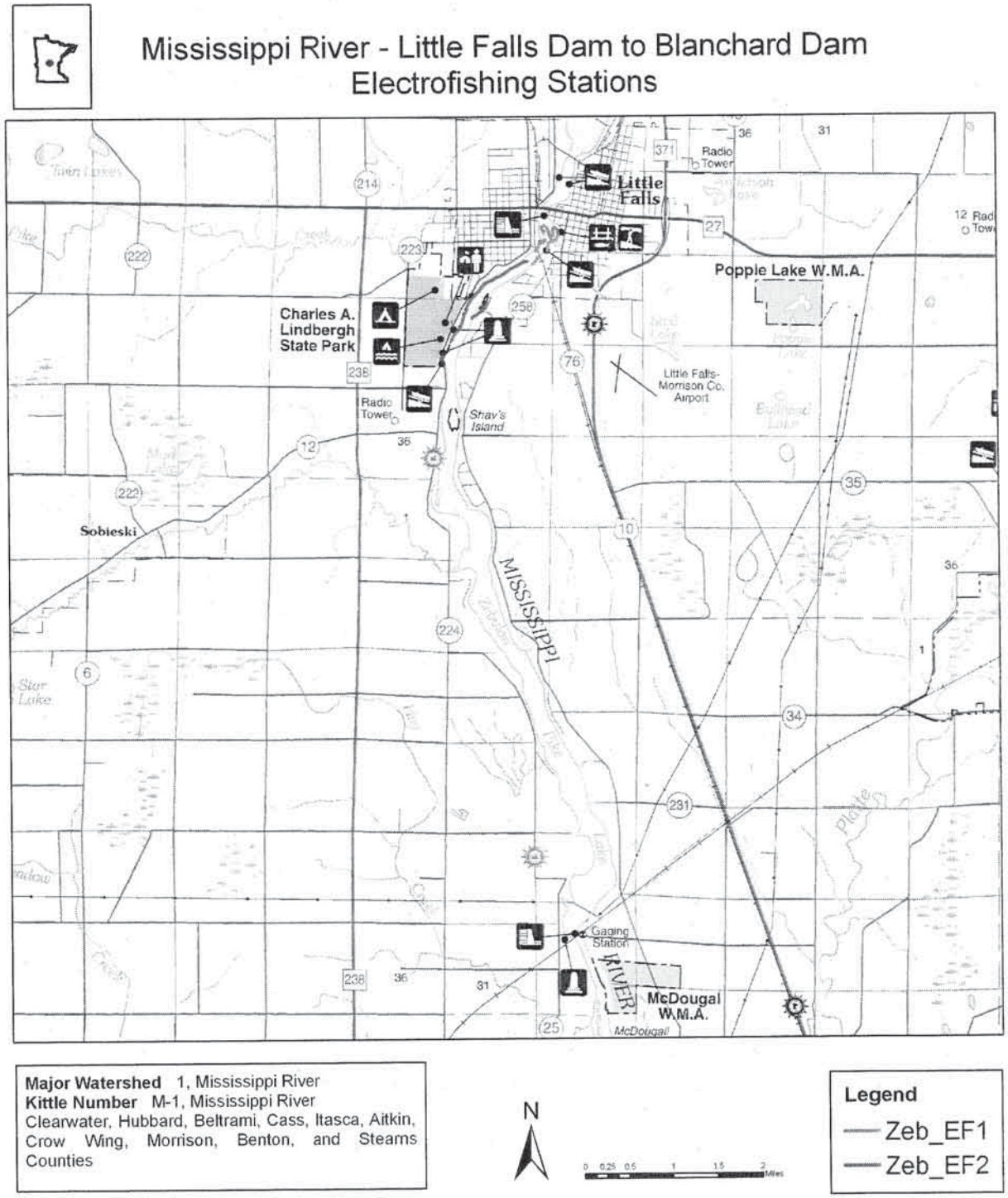

Figure 2. DNR PRIM Map showing electrofishing sampling stations on the Mississippi River from Blanchard Dam to Sartell Dam, May 2008.

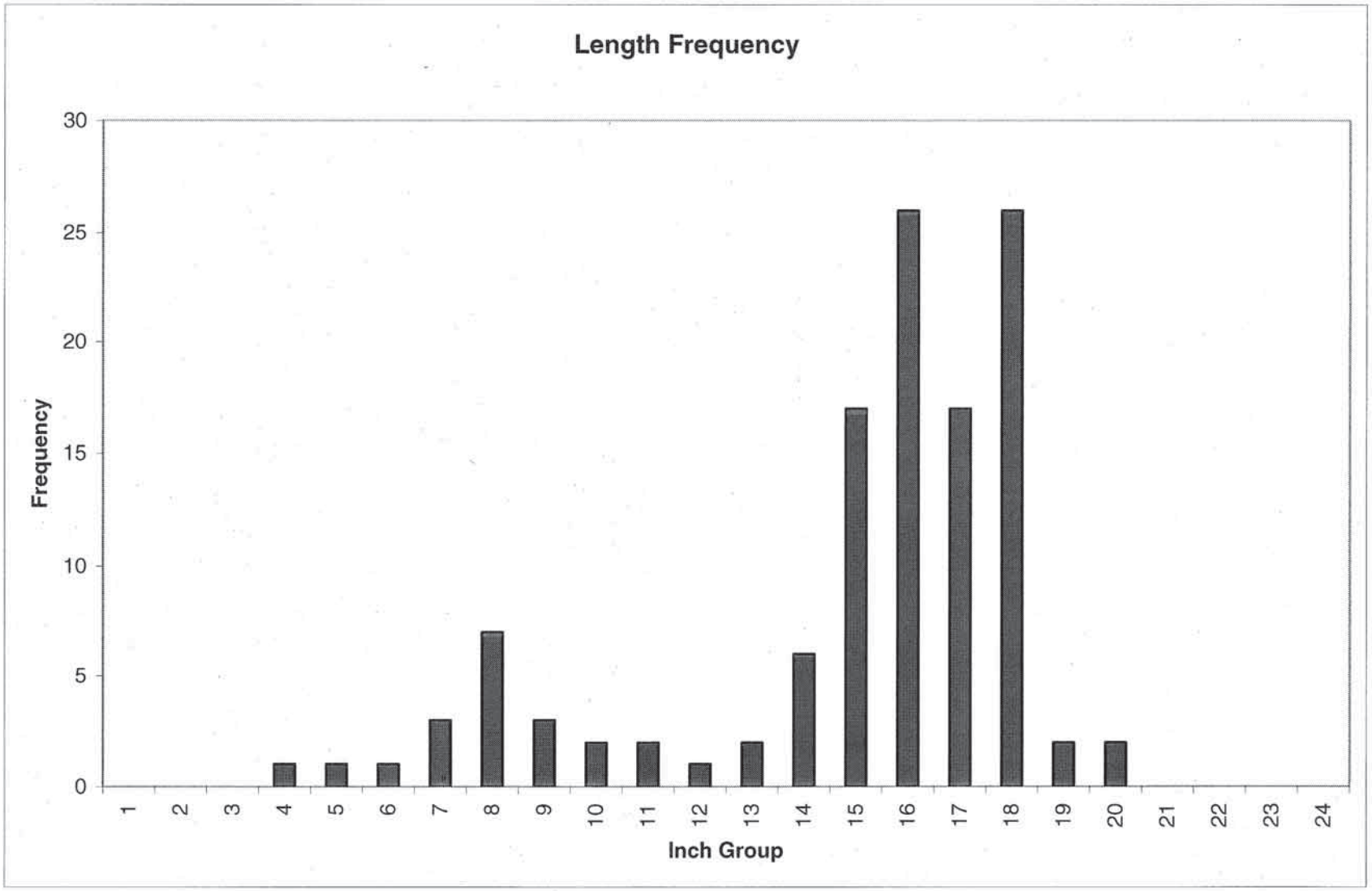

Figure 3. Length frequency distribution of smallmouth bass captured during electrofishing sampling on the Mississippi River from Little Falls Dam to Blanchard Dam, May 2008.

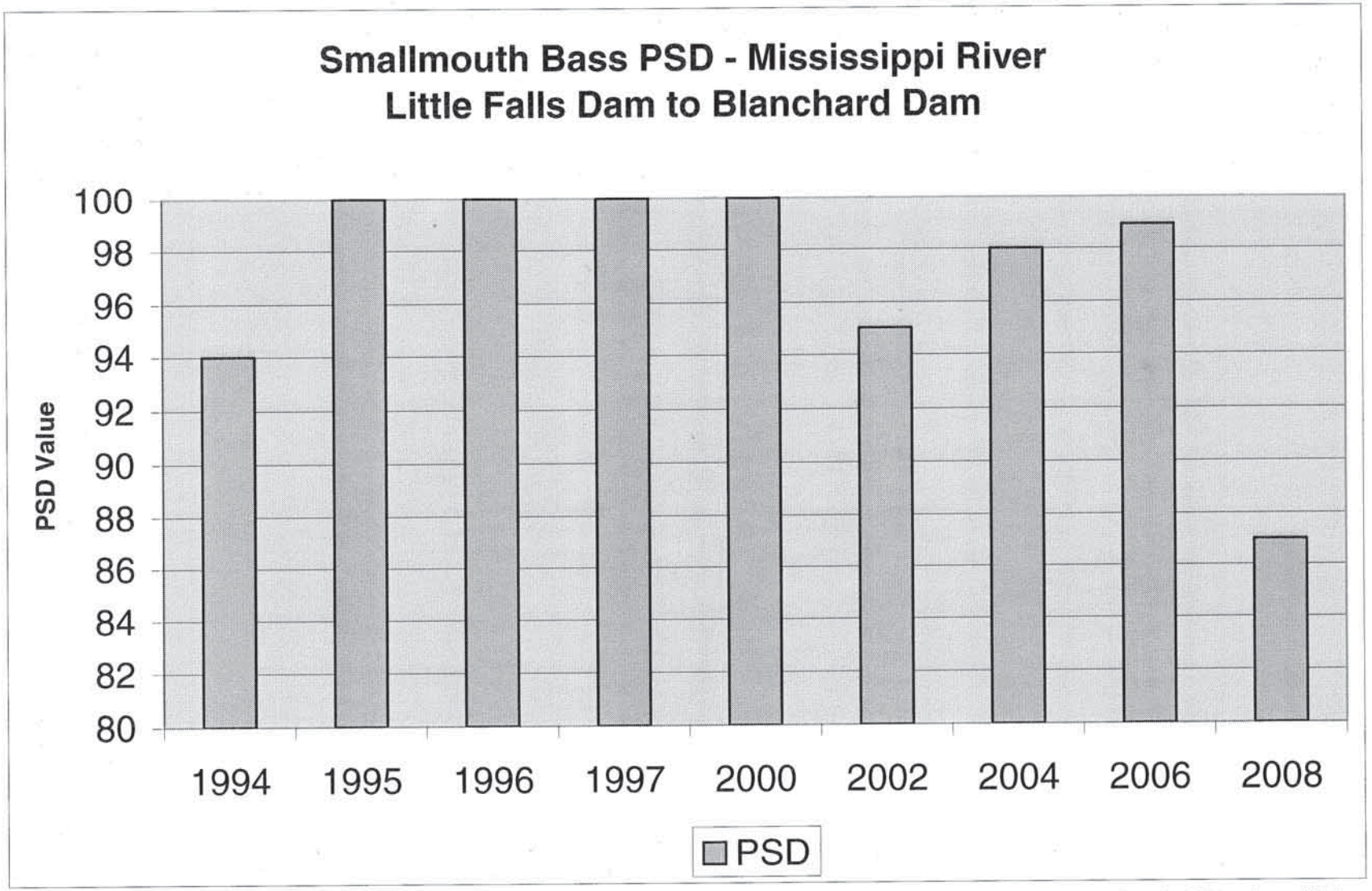

Figure 4. Calculated PSD values from smallmouth bass assessments completed on the Mississippi River from Little Falls Dam to Blanchard Dam from 1994 through 2008.

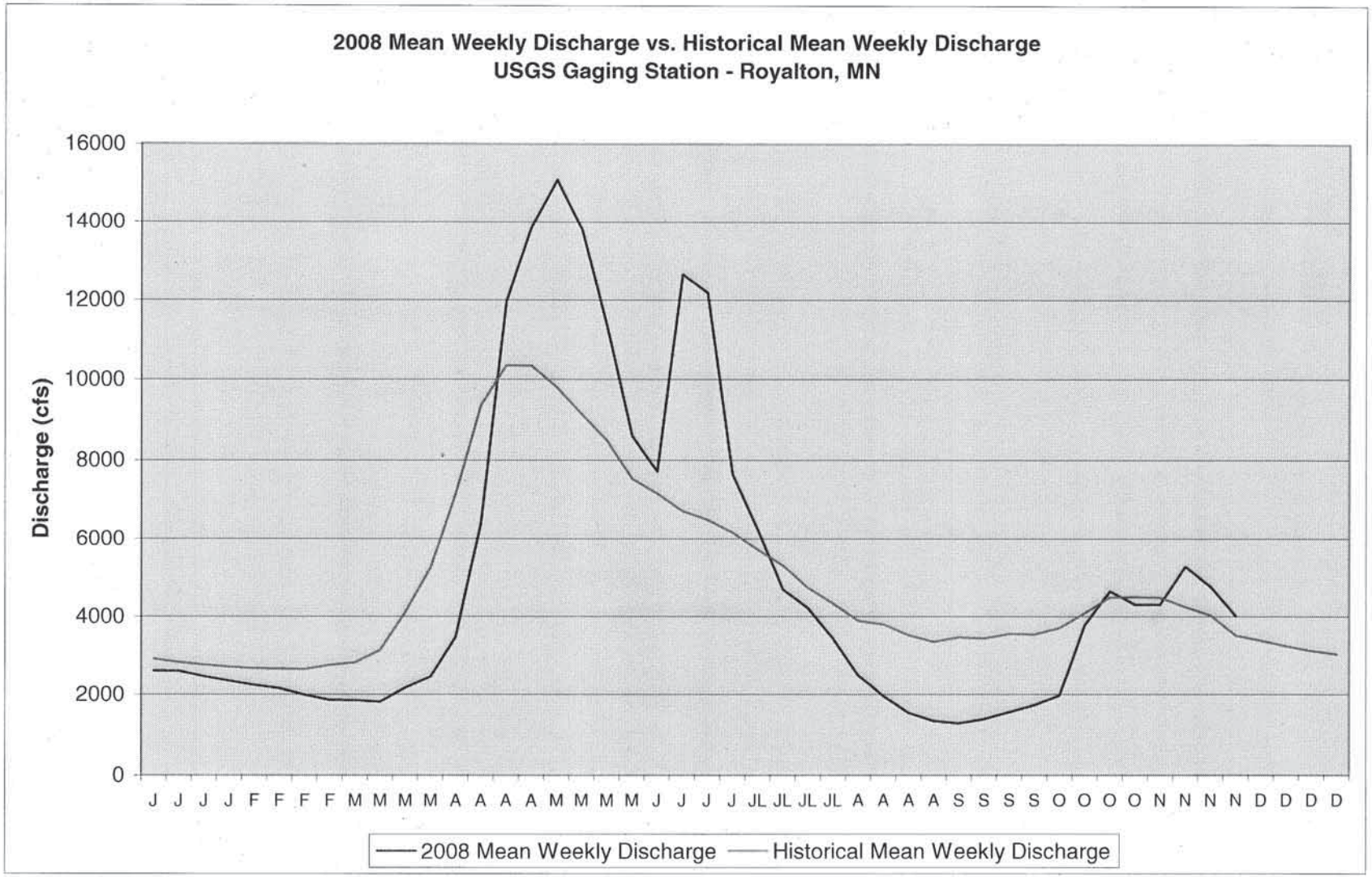

Figure 5. Mean weekly discharge on the Mississippi River in 2008 vs. historical mean weekly discharge recorded at the USGS gaging station at Royalton, MN.