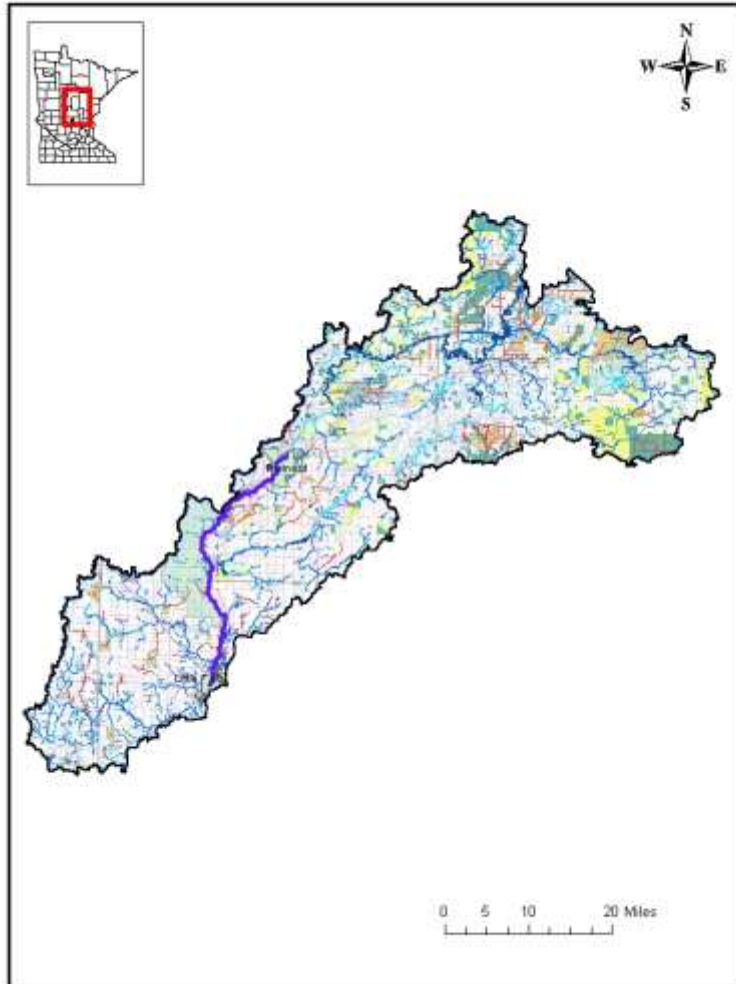


MINNESOTA DEPARTMENT OF NATURAL RESOURCES



Gamefish Assessment Report

Spring Gamefish Assessment on the Mississippi River from Little Falls to Brainerd, MN

May 31 through June 4, 2013

River Miles 966 to 1006

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Little Falls Area Fisheries

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ABSTRACT

A special gamefish assessment of the Mississippi River (M-1) from Little Falls, MN to Brainerd, MN was conducted May 31, June 3 and June 4, 2013. Population data was gathered to compare to prior surveys and for purposes of monitoring Smallmouth Bass and other gamefish populations. An attempt was made to capture all gamefish encountered during sampling. A total of 256 Smallmouth Bass were sampled in eight electrofishing stations. Catch per unit of effort (CPUE) of Smallmouth Bass was 53.78/hour which was above the long term mean catch rate of 36.51/hour and within the range of catch rates (19.10/hour to 58.93/hour) observed in prior assessments. Other gamefish species sampled included Black Crappie (n=1), Bluegill (n=23), Largemouth Bass (n=6), Northern Pike (n=23) and Walleye (n=23). Catch rates of other species were within the ranges observed during previous assessments.

STUDY AREA

The Mississippi River from Little Falls, MN to Brainerd, MN covered approximately 40.0 miles and is entirely within the Mississippi River-Brainerd major watershed (Figure 1). The river in this section is also highly influenced by the Crow Wing major watershed. Little Falls Dam is at the downstream boundary of this river section and is a hydroelectric power generating facility owned by Minnesota Power Company located in downtown Little Falls near Highway 27. Brainerd Dam at the upstream end of the study area is a hydroelectric power generating facility owned by Wausau Paper Corporation located in the City of Brainerd, MN. In general, this section of the river contains pool, riffle and run type habitat with coarse substrate types from Brainerd Dam downstream to near the reservoir in Little Falls where sand substrates began to dominate. Stream banks were fairly steep along this stretch and adjacent lands had predominately sandy-loam soils.

This section of the Mississippi River is fairly remote and has limited accessibility due to the presence of many shallow riffle/rapid areas. On the west bank, development is moderate from Little Falls upstream to Camp Ripley Military Reservation. Little development exists for 19 miles along Camp Ripley on the west bank. From the confluence with the Crow Wing River upstream to Brainerd, residential development increases. On the east bank, residential development was moderate from Little Falls north to near Highway 115. From Hwy 115 upstream to Brainerd, residential development was light. Five miles of undeveloped east bank exists within the boundaries of Crow Wing State Park. Scenic quality is very high on this stretch of the river. Camp Ripley Military Reservation has been attempting to establish an ACUB (Army Compatible Use Buffer) where lands within three miles of their boundary are purchased, or an easement obtained, preventing future development that could interfere with Camp's function and purpose. Several tracts have been enlisted in the ACUB program and many more are under consideration. This program has provided opportunities for resource managers to protect riparian lands along the Mississippi and Crow Wing Rivers adjacent to Camp Ripley. Cover types along this stretch of the river were primarily upland and bottomland forest types. Bottomland forest consisted of ash and silver maple while upland forest was primarily bur oak, aspen and white pine.

Smallmouth Bass spawning and summer habitats are located many miles from winter habitats in this section of the Mississippi River. As a result, Smallmouths in this section of the Mississippi River are mobile and move long distances in spring and fall. A Bass tagging study completed in 1993 identified that spawning habitats were found in island complexes and backwaters adjacent to current areas with gravel and boulder substrates. Primary spawning areas in this stretch of the river included areas below Brainerd Dam, island complexes from river mile 978 to 981, and island areas above Belle Prairie County Park. Substrate types in these

areas were made up of sand, gravel, cobble and boulder. The 1993 study also suggested that deep water areas downstream of Brainerd Dam and upstream of Little Falls Dam were utilized as wintering areas. Stream geomorphology measurements obtained in 2008 identified the stream as having F4 or F3 channel types in this stretch of the river. Sampling during this assessment was directed in known spawning areas.

Major tributaries entering the Mississippi River in this stretch include the Little Elk River from the west immediately upstream of Little Falls, MN and Fletcher Creek from the east near Camp Ripley Junction. The Nokassippi River also enters from the east near Fort Ripley, MN, and the Crow Wing River enters from the west near river mile 992. The Little Elk River drains a mix of forest land, cultivated cropland and pasture land. Fletcher Creek drains mainly irrigated croplands and pastured lands while all other tributaries drain predominately forested lands.

Land cover was analyzed for all minor watersheds that were adjacent to the Mississippi River between Little Falls and Brainerd (Figure 2). Dominant land cover types were deciduous forest (32.72%), pasture/hay (17.62%), cultivated crops (13.25%), emergent herbaceous wetlands (10.59%) and woody wetlands (9.72%) (Table 1). Irrigated cropland was prevalent on sandy soils adjacent to the river, especially in the southern half of the study area. Municipal development was significant at both ends of the study area in the cities of Little Falls and Brainerd.

According to the Ecological Classification System (ECS), adjacent minor watersheds to the Mississippi River were within two ECS Provinces, Laurentian Mixed Forest Province and Eastern Broadleaf Forest Province. ECS Sub-sections within adjacent minor watersheds to the Mississippi River included pine moraines and outwash plains, Mille Lacs uplands, Anoka sand plain and hardwood hills. Pre-settlement vegetation types were oak woodland and brushland, jackpine forest, Great Lakes pine forest, upland prairie, boreal hardwood-conifer forest and northern hardwood forest.

METHODS

Eight daytime electrofishing runs were established in known Smallmouth Bass spawning areas in 1994 (Figure 3). These stations have been replicated in assessments completed from 1994 through 1998, and odd years from 2001 through 2009. Timing of electrofishing corresponded with Smallmouth Bass spawning, generally when the river approached 60° F. Stations were established in tailwater, island and backwater areas where Smallmouths commonly spawn. 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 a bony structure removed for age determination prior to release.

Mississippi River discharge information was obtained for the Brainerd Gaging Station #05242300 from the USGS Water Resources website.

RESULTS AND DISCUSSION

Gamefish Assessment

A total of six different gamefish species were sampled in 4.55 hours of electrofishing effort at eight stations combined on May 31, June 3 and June 4, 2013 (Table 2). Species captured included Black Crappie, Bluegill, Largemouth Bass, Smallmouth Bass, Northern Pike, and Walleye. Smallmouth Bass were the targeted species and were the most abundant species in the catch. A total of 256 Smallmouth were sampled in 2013 for a CPUE of 53.78/hour (Table 3) which was above the long term mean catch rate of 38.40/hour observed on this stretch of the river. Catch rates in prior assessments from 1994 through 2009 ranged from 19.10/hour (n=68) in 2001 to 58.93/hour (n=198) in 1995. Mean total length of Smallmouth Bass captured in the 2013 assessment was 16.0 inches and individuals ranged from 3.3 inches to 20.8 inches (Table 4). Smallmouth greater than 16 inches in length comprised 57.4% of the catch. Calculated PSD values for Bass have historically been very high ranging from 93 in 1996 to 100 in 1994 (Figure 4). The PSD value calculated in 2013 was 94.0. 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 120 Smallmouth Bass for age determination. Fish ages 2 through 11 were present in the subsample suggesting that consistent recruitment has been occurring on this stretch of the river. Length at age is reported in Table 5. 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 6. Trophy individuals exceeding 20.0 inches were typically older than age 10. 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 23 Walleye were captured during the 2013 assessment for a catch rate of 4.8/hour which was the third highest catch rate recorded (Table 3) and above the long term average (3.69/hour). CPUE from previous surveys ranged from 1.4/hour in 1997 to 9.0/hour in 2001. Walleye caught ranged from 12.8 inches to 21.7 inches and averaged 15.9 inches (Table 4). Walleye ages 3 through 5 and 9 were present in the catch (Table 5). Growth was normal for all ages when compared to area means.

The Northern Pike catch rate (4.8/hour) was within the range observed in previous assessments (Table 3). Catch rates in prior surveys ranged from 1.1/hour to 14.5/hour and averaged 6.17/hour. Twenty-three Northern Pike ranging from 11.1 inches to 30.5 inches were captured during the 2013 survey (Table 4). Ages 1 through 7 were present in the catch (Table 5). Growth was in the normal range when compared to area means.

The Bluegill catch rate (CPUE=4.8/hour, n=23) in 2013 was within the range (0/hour to 6.3/hour, mean=2.48/hour) observed in previous assessments (Table 3). Bluegill captured ranged from 4.6 inches to 8.7 inches and averaged 6.8 inches (Table 4). Six Largemouth Bass from 11.3 inches to 16.7 inches were sampled during the 2013 assessment. Largemouth Bass are infrequently caught in the Mississippi River and are probably immigrants from connected lakes or upstream reservoirs. Habitat in the river is not suited to this species.

One Black Crappie measuring 6.5 inches was sampled during the 2013 assessment. Catch rates for Black Crappies are typically low on this stretch of the Mississippi River. Black Crappies have only been sampled in three previous surveys.

Other gamefish present on this stretch of the Mississippi River that are occasionally sampled include Muskellunge and Channel Catfish. No individuals from these species were captured during this assessment.

Brainerd Area Fisheries initiated a Muskellunge study on the section of the Mississippi River from Crow Wing State Park to Brainerd Dam (river miles 991 to 1006) in 2013. Specific objectives of the study were to: 1. Set up a sampling protocol to evaluate the population; 2. Develop techniques for assessing riverine populations of Muskellunge; 3. Evaluate side imaging sonar for habitat characterization; 4. Create habitat maps of the river to identify critical habitat; and 5. Evaluate angler participation in mark-recapture population estimate methods. Fisheries personnel and anglers tagged a total of 71 Muskellunge on the river and estimated the population in the study area to be approximately 226 fish (95% CI 150 to 374).

Hydrology

Mississippi River discharge information was obtained from the USGS Water Resources website. Daily discharge has been monitored in Brainerd, MN at Station #05242300 since 1987. Historical low and high flows measured at Brainerd were 348 cfs on July 30, 1988 and 17,500 on April 30, 2001 respectively. Discharge in 2013 followed typical patterns with high flows in spring, low flows during summer and increased flows during fall. Peak flows during spring were higher than average while summer and fall flows were below average (Figure 5). Peak discharge was 9,830 cfs and occurred on May 9, 2013. Annual minimum flow was 640 cfs on

October 1, 2013. Discharge during the assessment ranged from 8,320 cfs on May 31, 2013 to 8,170 cfs on June 4, 2013.

Table 1. NLCD 2006 Land Cover type composition in minor watersheds adjacent to the Mississippi River from Little Falls to Brainerd, MN.

Land Cover Type	Total Acres	Percent
Developed, Open Space	16,933.30	4.9
Developed, Low Intensity	2,446.38	0.71
Developed, Medium Intensity	270.23	0.08
Developed, High Intensity	150.51	0.04
Barren Land (Rock/Sand/Clay)	58.69	0.02
Deciduous Forest	113,061.49	32.72
Evergreen Forest	4,558.57	1.32
Mixed Forest	194.85	0.06
Shrub/Scrub	10,709.10	3.10
Grassland/Herbaceous	20,334.03	5.88
Pasture/Hay	60,901.48	17.62
Cultivated Crops	45,775.09	13.25
Woody Wetlands	33,578.07	9.72
Emergent Herbaceous Wetlands	36,587.12	10.59

Table 2. Electrofishing catch by station on the Mississippi River from Little Falls to Brainerd, MN, 2013.

Species	River Mile Effort	Station								Total
		EF1	EF2	EF3	EF4	EF5	EF6	EF7	EF8	
		967 0.40 hour	972 0.41 hour	975 0.77 hour	978 0.98 hour	979 0.51 hour	980 0.37 hour	994 0.57 hour	1006 0.75 hour	
Northern pike			1		8	3	1	3	7	23
Bluegill					2	2	1	2	16	23
Smallmouth bass	21	24	31	58	69	20	9	24	256	
Largemouth bass							1	2	3	6
Black crappie			1							1
Walleye			7	7	3	6				23

Table 3. Gamefish catch per effort (CPUE) history on the Mississippi River from Little Falls to Brainerd, MN, 2013.

Species	Catch Per Unit Effort (fish/hour)											
	2013	2009	2007	2005	2003	2001	1998	1997	1996	1995	1994	Mean
Northern pike	4.8	9.5	11.1	5.6	5.8	1.7	6.6	14.5	3.8	3.3	1.1	6.17
Muskellunge	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.06
Bluegill	4.8	3.1	6.0	6.3	0.0	1.7	0.0	3.4	2.0	0.0	0.0	2.48
Smallmouth bass	53.8	40.2	43.6	23.9	34.5	19.1	30.3	32.4	43.5	58.9	42.2	38.40
Largemouth bass	1.3	0.7	2.8	0.0	0.3	0.0	0.0	0.3	0.0	0.3	0.0	0.51
Black crappie	0.2	0.7	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.14
Walleye	4.8	1.8	2.8	6.0	2.0	9.0	3.7	1.4	4.0	2.4	2.7	3.69
Total Effort (hours)	4.76	4.55	4.70	4.47	3.94	3.56	2.74	2.96	3.47	3.36	3.67	3.74

Table 4. Length frequency distribution of gamefish species sampled on the Mississippi River from Little Falls to Brainerd, MN, 2013.

Length Group (inches)	Species					
	NOP	BLG	SMB	LMB	BLC	WAE
<3						
3			1			
4		2				
5		4	1			
6		7	2		1	
7		6	4			
8		4	1			
9			5			
10			5			
11	1		2	1		
12			3			1
13			12			2
14			41	2		3
15			32	1		7
16	1		38	2		3
17			39			4
18	2		44			2
19	2		22			
20	1		4			
21	3					1
22	3					
23	2					
24	3					
25						
26	3					
27	1					
28						
29						
30	1					
Total	23	23	256	6	1	23

Table 5. Mean length at age of capture for smallmouth bass, northern pike, bluegill and walleye from the Mississippi River between Little Falls, MN and Brainerd, MN, 2013.

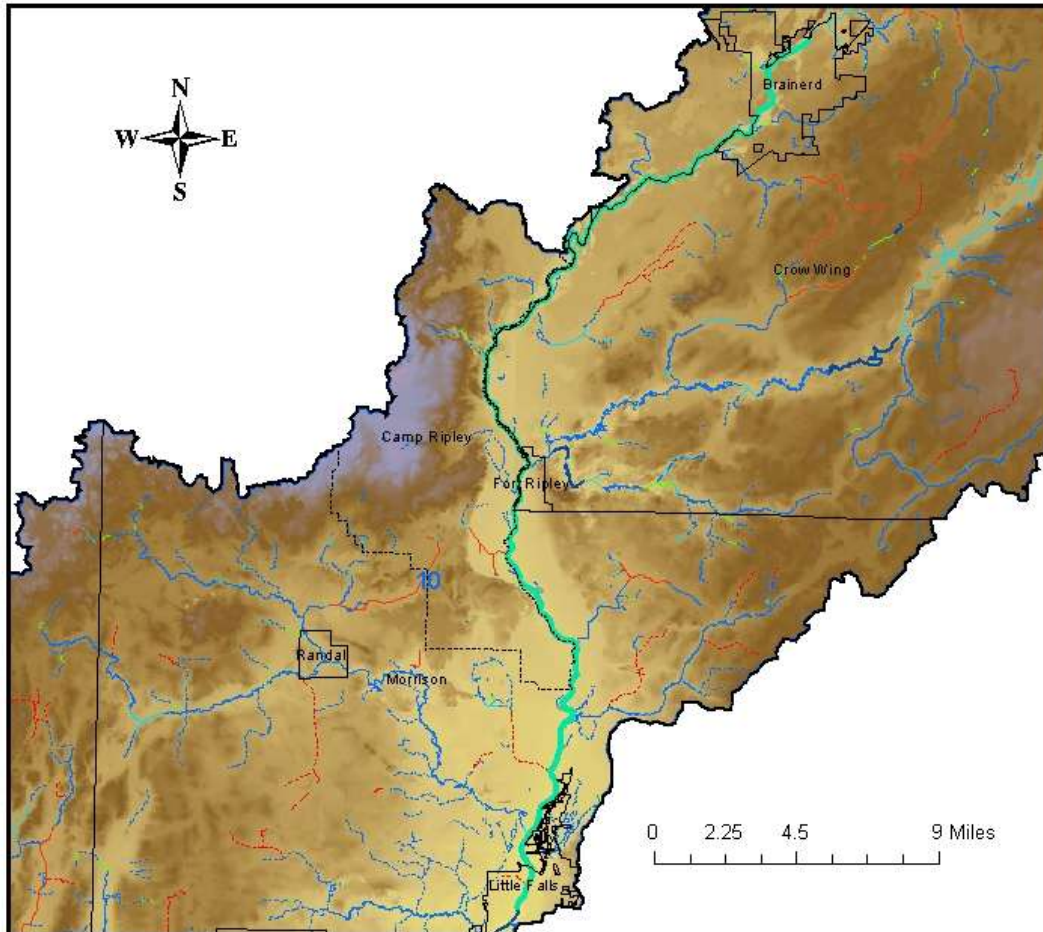
Smallmouth bass												
	Year Class											
	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	1997
	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11	Age 12
Mean Ln		6.9	10.6	14.3	15.6	17.3	18.0	18.2	19.3	19.5	19.2	
N=		6	17	30	19	18	14	6	3	5	2	

Northern pike							
	Year Class						
	2012	2011	2010	2009	2008	2007	2006
	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7
Mean Ln		11.1	19.1	20.9	23.7	27.0	26.9
N=		1	3	7	9	3	1

Walleye									
	Year Class								
	2012	2011	2010	2009	2008	2007	2006	2005	2004
	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9
Mean Ln			13.0	15.2	17.1				21.7
N=			2	12	8				1



Mississippi River - Brainerd to Little Falls Study Area - 2013



Major Watershed: 10, Mississippi River - Brainerd
 Kittle Number: M-1, Mississippi River
 Crow Wing, Morrison Counties

Legend

- City Boundaries
- Military Bases in Minnesota
- County Boundaries
- Miss_R_Brd_LF

30 Meter Digital Elevation Model

Value

- High : 2300
- Low: 590

Figure 1. Mississippi-Brainerd Major watershed showing 30 meter digital elevation model, 24K streams and the Mississippi River study area.

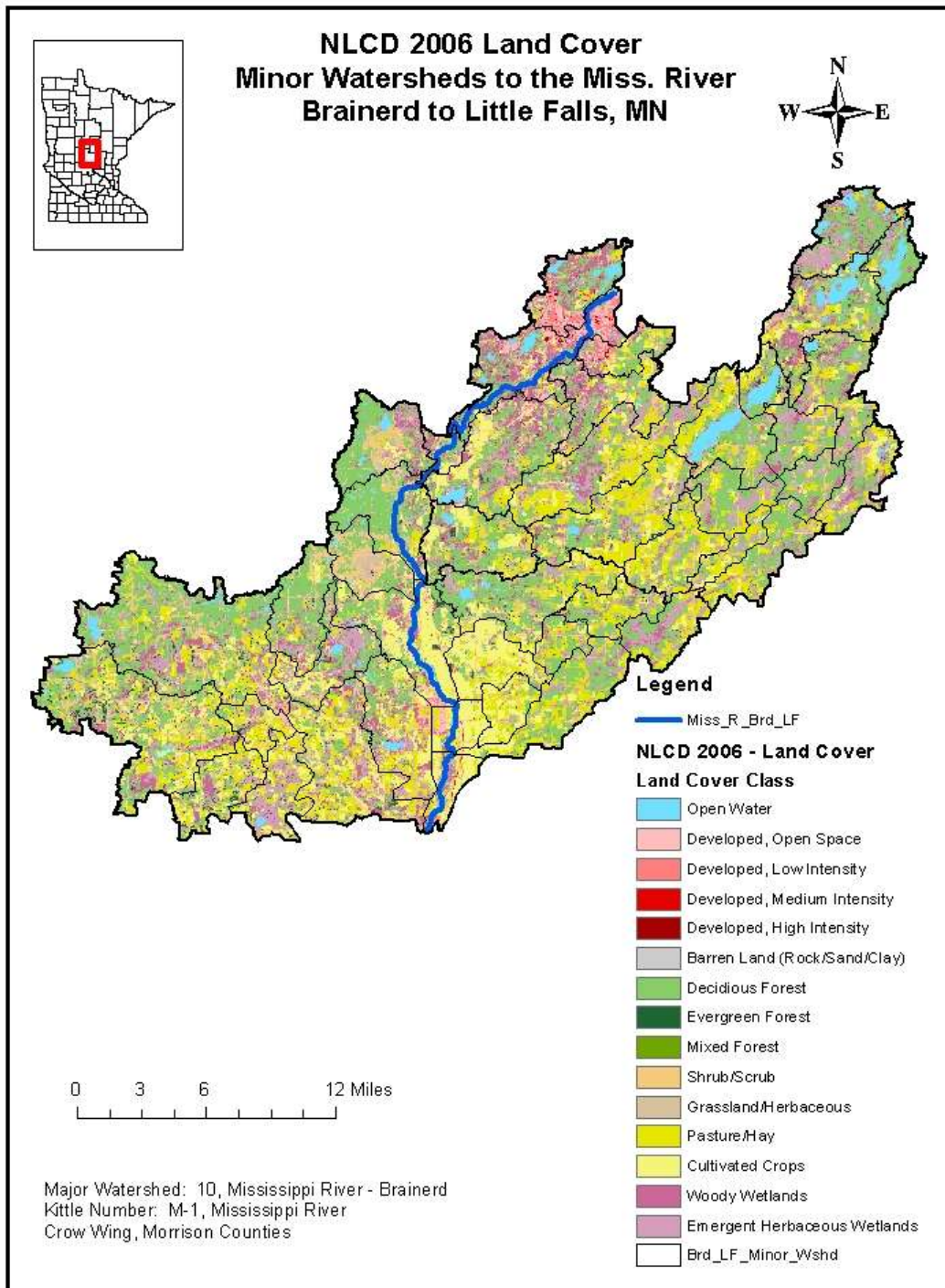
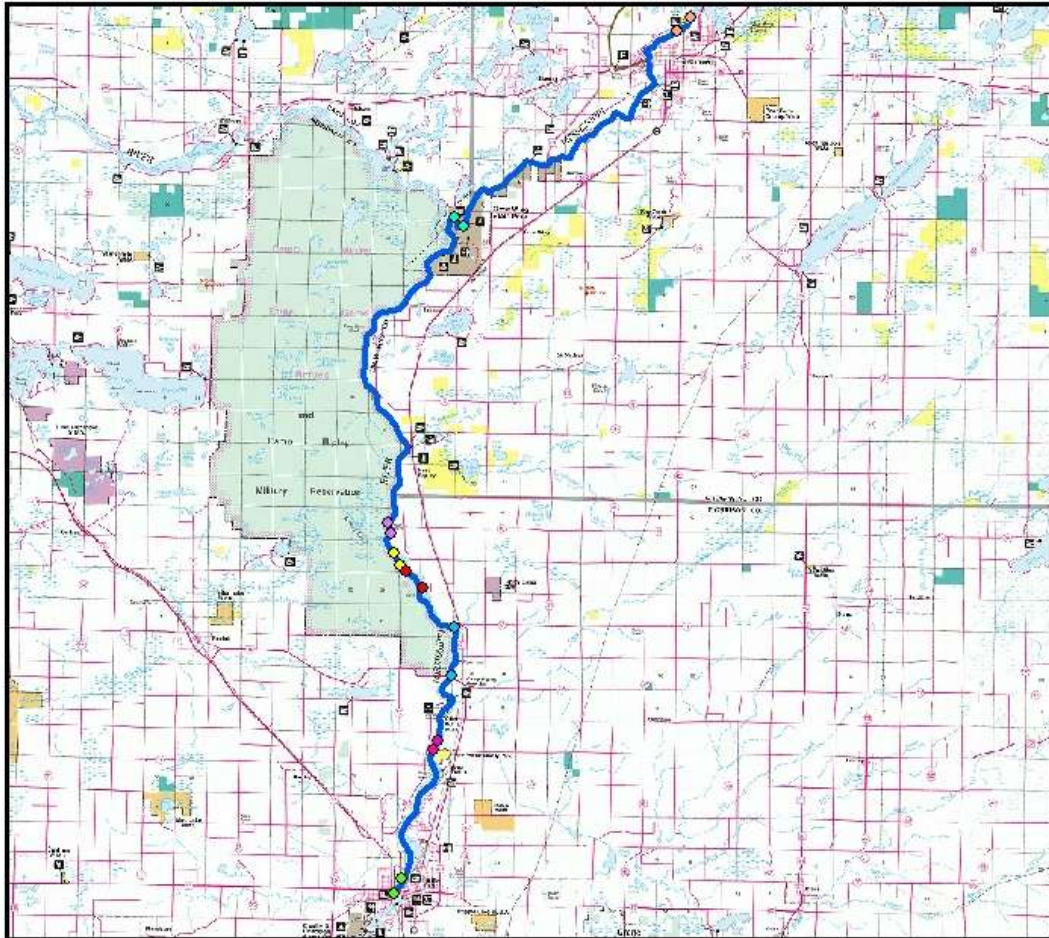


Figure 2. Mississippi River and adjacent minor watersheds from Little Falls, MN to Brainerd, MN showing NLCD 2006 Land Cover.



Mississippi River - Brainerd to Little Falls Electrofishing Stations - 2013



0 2.25 4.5 9 Miles

Major Watershed: 10, Mississippi River - Brainerd
Kittle Number: M-1, Mississippi River
Crow Wing, Morrison Counties

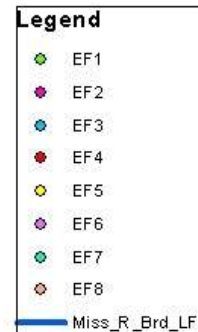


Figure 3. Historical scanned PRIM Map overlaid with electrofishing stations used during the 2013 gamefish assessment.

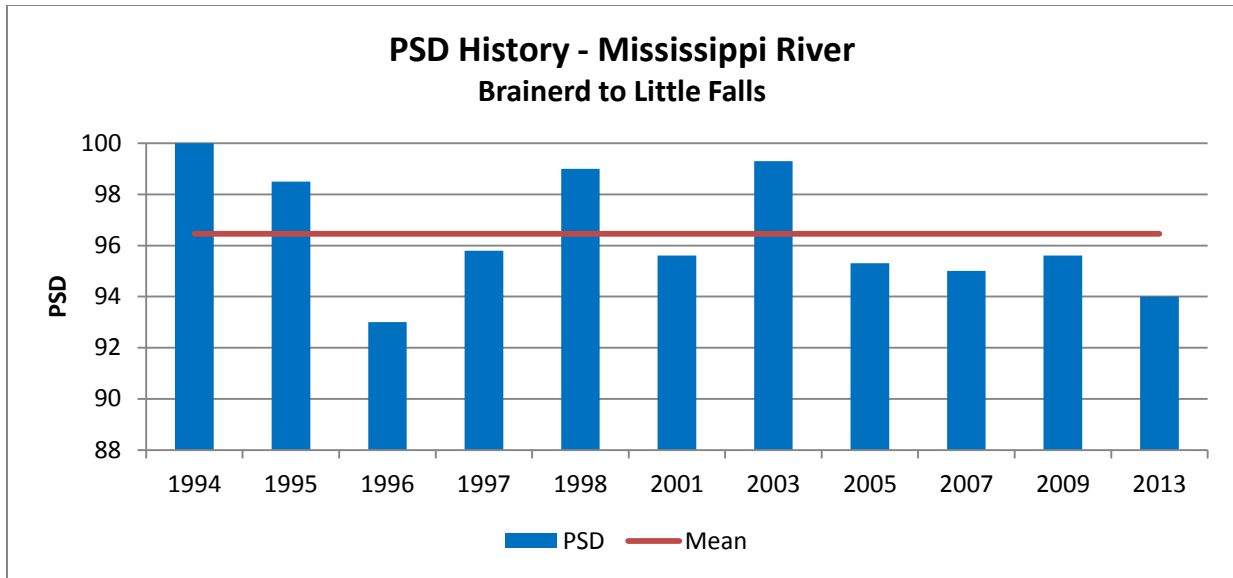


Figure 4. Smallmouth bass PSD history for the Mississippi River from Little Falls, MN to Brainerd, MN from 1994 through 2013.

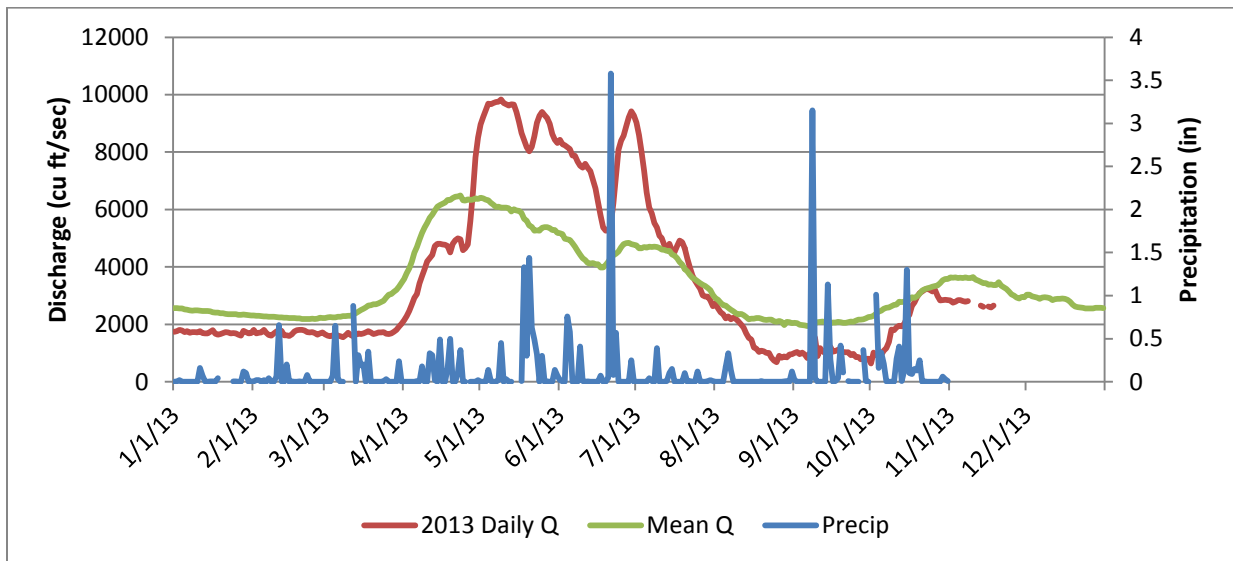


Figure 5. Mean daily discharge in 2013, historical mean daily discharge (1988 through 2013), and 2013 precipitation on the Mississippi River at Brainerd, MN USGS Gage Station #05242300.