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Survey Report

**Sauk River Population Assessment
1998**

by

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ABSTRACT

A population assessment of the Sauk River (M - 74) was conducted during the summer of 1998. Twenty-nine species were sampled using four sampling methods: boat electrofishing for all species encountered at eight stations, and for smallmouth bass only, at five stations, seine hauls at 11 stations and hoop nets set at 11 stations. Game species sampled included: black crappie, channel catfish, smallmouth bass, northern pike, rock bass, walleye, and yellow perch. Species richness from electrofishing appeared to peak near Rockville and was lowest at Cold Spring. Differences in overall electrofishing catch rates between 1987 and 1998 were evident; however, they were not significant $\alpha=.05$ ($P= 0.076$) Overall species richness across all sampling methods used in 1998 (31) was similar to 1987 species richness (27).

STUDY AREA

The Sauk River flows through Stearns County, Minnesota, and is a significant tributary to the Mississippi River. It represents one of Minnesota's unique recreational opportunities close to the Minneapolis - St. Paul Metropolitan area, and has the potential for use by canoeists, anglers, hunters and non-game wildlife viewers. The Sauk River headwater is located at the outlet of Sauk Lake in Stearns County, and flows approximately 89 miles through the Horseshoe Chain of Lakes, to its confluence with the Mississippi River near St. Cloud, Minnesota (Figure 1). The river has 46 potential tributaries along its length, a gradient of 2.7 feet per mile, with a sinuosity of 2.4. Mean flow recorded at St. Cloud during the sampling period in 1998 was 544 ft³/sec, with a maximum flow during July (951 ft³/sec) and a minimum flow during August (208 ft³/sec) (Figure 9). The watershed includes approximately 658,413 acres with 61.30% of land use as agricultural, 16.32% grassland, 9.78% deciduous forest, 4.58% water, and the remainder in 11 other categories (Table 1, Figure 2). An initial survey of the Sauk River was conducted in June 1987, which compiled extensive information on physical and chemical characteristics and initial aquatic species composition and abundance. During 1998 a population assessment of the Sauk River was completed to update fisheries and access information.

METHODS

The Sauk River was divided into five reaches during the initial survey in 1987; three of the original reaches were sampled during the summer of 1998. Sampling methods included: boat electrofishing during daylight hours for all species encountered (8 stations), boat electrofishing during daylight hours for smallmouth bass only (5 stations near the St. Cloud area), hoop nets set overnight (11 stations throughout 89-mile stretch), and seine hauls (11 stations throughout 89-mile stretch) (Table 14, Figures 3-8). Access to sampling areas was obtained through public rights-of-way, public landing or park sites and limited private access sites. All fish sampled were identified and counted; individuals collected from electrofishing and hoop netting were measured and weighed to the nearest millimeter or gram. Scales were collected from game species encountered. Access to selected portions of the river was limited by private property restrictions and lack of sufficient boat launching facilities. Comparisons to the initial survey were made by selecting the eight electrofishing stations used in 1987 nearest to the eight electrofishing stations used in

1998 . Catch data were combined across sampling stations for both years.

RESULTS AND DISCUSSION

Four different sampling techniques used in 1998 revealed a total of 31 species of fish (Table 2).

Electrofishing surveys sampled 15 fish species with shorthead redhorse as the most abundant species (Table 3). Seine haul surveys produced 24 fish species with golden shiner representing the most abundant species (Table 7). Hoop nets revealed 9 species with yellow bullhead as the most abundant species (Table 8). Species richness over the entire length of the river sampled by electrofishing was highest at station 3, near Rockville, MN (Figure 8).

Electrofishing revealed 15 species over 8 stations, with 6 game species and 9 non-game species.

Channel catfish, smallmouth bass, northern pike, walleye and yellow perch were all sampled in electrofishing survey sites with moderate to low abundance. Three channel catfish were sampled which ranged in length from 17 to 21 inches (Table 4). Northern pike were sampled in stations 3, 9 and 14 at catch rates of 25.93, 4.56 and 4.00/hour on-time, respectively (Table 3). Northern pike ranged in length from 11 to 26 inches with 9 individuals sampled (Table 4), abundance was less than 1987, when 21 individuals were sampled. Growth was below average as individuals reached 10.47, 11.77, 16.94, 20.87, 25.43 and 26.37 inches by Age II through VII, respectively (Table 10) . Smallmouth bass were sampled in stations 2, 3, and 8 with catch rates of 22.22, 7.41 and 6.25/hour, respectively (Table 3). A total of 9 individuals were sampled which ranged in length from 5 to 16 inches (Table 4). Growth was below the statewide average as Age II through Age VI individuals reached 5.85, 7.65, 11.96, 13.81 and 16.02 inches, respectively (Table 11). A total of 20 walleye were sampled which ranged in length from 7 to 17 inches (Table 4). Growth was below average as Age II through VI individuals reached 7.54, 9.57, 10.71, 14.96 and 16.2 inches, respectively (Table 12). Only three yellow perch and one rock bass were sampled by electrofishing. Shorthead redhorse were the most common non-game species encountered during electrofishing, with 153 individuals sampled between 4 and 26 inches (Table 4), and a mean length of 13.6 inches. Common carp, which were reported as abundant in the 1987 survey, were not as numerous in 1998, with only 20 individuals sampled between 13 and 31 inches (Table 4). White sucker, which were sampled throughout the electrofishing sites, ranged in length from 4 to 20 inches (Table 4) with 140

individuals sampled.

Daytime electrofishing for smallmouth bass in stations 1-5 resulted in catch rates of 7.56, 24.85, 16.23, 20.81 and 3.81 fish per hour on-time, respectively (Table 5). A total of 21 smallmouth bass were sampled between 2 and 16 inches (Table 6), with a mean length of 9.11 inches. PSD for smallmouth bass was 83, and RSD-P was 33. Growth was below the statewide average as Age II through Age VI individuals reached 5.85, 7.65, 11.96, 13.81 and 16.02 inches, respectively (Table 11).

Seine hauls sampled 24 species (Table 7), with golden shiner representing the most abundant species, however, golden shiners were limited to 3 of the 11 stations sampled. Common shiner were found in 7 of the 11 stations with moderate abundance (638 individuals overall). Hoop nets sampled 5 game species: bluegill, black crappie, channel catfish, northern pike and rock bass, and three non-game species: black bullhead, shorthead redhorse, white sucker and yellow bullhead (Table 8). Eight channel catfish were sampled which ranged in length from 21 to 27 inches. Northern pike ranged from 10 to 19 inches, with 4 individuals sampled (Table 9). Rock bass sampled by all methods produced a total of 5 individuals. Growth was below average as Age VI, VIII and X individuals reached 8.34, 10.15 and 10.70 inches, respectively (Table 13).

Catch per unit of effort (all species combined) increased from 1987, although, this increase was not significant ($\alpha=0.05$, $P=0.072$). CPUE from electrofishing for the 13 species sampled in both years appeared to decrease from 1987 (Mean CPUE = 245.00) to 1998 (Mean CPUE = 200.76); however, CPUE was not significantly lower ($P=0.52$). Although carp were sampled less overall in 1998, the difference from 1987 was not significant ($P=0.14$). Similarly, white sucker CPUE was lower in 1998 than 1987 but not significantly ($P=0.25$). Shorthead redhorse CPUE increased in 1998; however, the increase was not significant. ($P=0.21$). Species richness was similar for both sampling efforts with 27 in 1987, and 31 in 1998.

Of the game species sampled in 1998, the recreational fisheries potential appears to be highest for

smallmouth bass (total CPUE =14.95), walleye (total CPUE =10.58), and northern pike (total CPUE =4.76). Smallmouth bass were most abundant near St. Cloud and Richmond, northern pike were most abundant near St. Cloud, while walleye were most abundant near St. Cloud and Sauk Centre. The increased catch rate of smallmouth bass by electrofishing from 1987 (0.50/hour), to 1998 (4.67/hour), may indicate an increase in population abundance. In addition, improvements in water quality in the future, may allow for continued improvement in population abundance and structure for smallmouth bass. Similarly, the lack of channel catfish in the 1987 sampling effort and the presence of channel catfish above and below the Sauk River Chain of Lakes in 1998 (1.59/hour), indicates expansion from their original stocking location. Based on the 1998 population assessment of the Sauk River from Sauk Centre to St. Cloud, quality recreational fisheries potential appears to be highest at the headwater and mouth of the river, with potential for increased angler catch of channel catfish above and below the Sauk River Chain of Lakes.

Table 1. Sauk River (M-74) major watershed land use by acres and percent.

Land Use	Acreage	Percent
Cultivated land	403612.07	61.30%
Grassland	107457.96	16.32%
Deciduous forest	64381.54	9.78%
Water	30183.04	4.58%
Wetlands	15790.96	2.40%
Farmsteads and rural	11262.15	1.71%
Grassland-shrub-tree (deciduous)	10162.71	1.54%
Urban and industrial	8943.38	1.36%
Rural residential development	2546.16	0.39%
Transitional agricultural	1153.68	0.18%
Other rural developments	974.57	0.15%
Gravel pits	862.31	0.13%
Unclassified	750.48	0.11%
Coniferous forest	264.97	0.04%
Exposed soil, sandbars, dunes	42.18	0.01%
Grassland-shrub-tree (coniferous)	25.72	0.00%
Total	658413.87	100%

Table 2. Sauk River (M-74) species composition by sampling method, Summer 1998.

Species	Electrofishing	Hoop Net	Seine	Smallmouth bass Electrofishing	Sum by Species
Black bullhead		4			4
Black crappie		1	3		4
Blacknose dace	1		23		24
Blacknose shiner			90		90
Blacksided darter			4		4
Bluegill		3	21		24
Bluntnose minnow	4		34		38
Brook silverside			43		43
Bullhead			2		2
Channel catfish	3	8			11
Common carp	20				20
Common shiner	24		638		662
Creek chub	2		1		3
Fathead minnow			13		13
Golden shiner			1102		1102
Green sunfish			1		1
Hornyhead chub			3		3
Johnny darter			55		55
Largemouth bass			1		1
Logperch			2		2
Northern pike	9	4	2		15
Rock bass	1	4			5
Shorthead redhorse	153	6	3		162

Species	Electrofishing	Hoop Net	Seine	Smallmouth bass Electrofishing	Sum by Species
Smallmouth bass	9		4	21	34
Spotfin shiner	21				21
Spottail shiner			36		36
Tadpole madtom			1		1
Walleye	20			1	21
White sucker	140	1	160		301
Yellow bullhead	1	11			12
Yellow perch	3		5		8
Sum by station	411	42	2247	22	2722

Table 3. Sauk River (M-74) electrofishing CPUE by station and species, Summer 1998.

Station	2	3	4	8	9	11	12	14	Total
Effort (Sec)	980	986	995	565	801	662	900	900	6789
Effort (Hour)	0.27	0.27	0.28	0.16	0.22	0.18	0.25	0.25	1.89
CPUE/Station	137.04	277.78	189.29	356.25	190.91	161.11	132.00	348.00	
Species				CPUE					
Blacknose dace					4.55				0.53
Bluntnose minnow							4.00	12.00	1.06
Common carp	25.93	14.81		25.00	9.09	11.11	4.00		10.58
Channel catfish		3.70		12.50					1.59
Creek chub			3.57				16.00		1.06
Common shiner		3.70		6.25				88.00	1.59
Northern pike		25.93			4.55			4.00	4.76
Rock bass					4.55				0.53
Spotfin shiner		62.96		12.50		5.56			2.12
Shorthead redhorse	11.11	11.11	17.86	206.25	145.45	116.67	96.00	128.00	80.95
Smallmouth bass	22.22	7.41		6.25					4.76
Walleye	7.41	29.63	3.57	6.25	13.64			20.00	10.58
White sucker	70.37	107.41	164.29	81.25	9.09	22.22	12.00	96.00	74.07
Yellow bullhead						5.56			0.53
Yellow perch		11.11							1.59

Table 4. Sauk River (M-74) length frequency from Summer electrofishing all stations, 1998.

Inch	Common carp	Channel catfish	Creek chub	North ern pike	Rock bass	Short head redhorse	Small mouth bass	Walleye	White sucker	Yellow bullhead	Yellow perch
4						2			2		
5			1			3	3		4		2
6									4		1
7						3		3	1		
8						12		2	2		
9						4		3	5		
10					1	6	1	5	9		
11				1		9			4	1	
12						12	1		9		
13	1					9	1	1	10		
14						31	2	2	14		
15						20		2	36		
16				1		11	1	1	23		
17		1				7		1	13		
18	1					10			3		
19		1		1		4					
20				1		5			1		
21	1	1		2		2					
22	2					1					
23	2					1					
24	1										
25	3			1							
26	4			2		1					
27	1										
28											
29	1										
30	2										
31	1										
Total	20	3	1	9	1	153	9	20	140	1	3

Table 5. Sauk River (M-74) smallmouth bass electrofishing stations catch per hour (CPUE) Summer, 1998.

	Station	1	2	3	4	5	Total
	Effort	953	1014	1109	1038	944	5058
	Effort	0.26	0.28	0.31	0.29	0.26	1.41
Smallmouth bass	N	2	7	5	6	1	21
	CPUE	7.56	24.85	16.23	20.81	3.81	14.95
Walleye	N					1	1
	CPUE					3.81	0.71

Table 6. Sauk River (M-74) length frequency distribution from all smallmouth bass electrofishing stations Summer, 1998.

Inch	Smallmouth bass	Walleye
2	3	
3		
4		
5	3	
6	4	
7		
8		
9	1	
10	1	
11		
12	4	
13	2	
14	3	
15		
16		1
Grand Total	21	1

Table 7. Sauk River (M-74) Seine haul species composition by site Summer, 1998.

Species	1	3	4	5	6	7	8	9	10	11	12	Total
Black crappie				2						1		3
Blacknose Dace					3		20					23
Blacknose shiner		10		4	21		50	5				90
Blacksided darter		2	2									4
Bluegill				1	12					5	3	21
Bluntnose minnow					6				2	19	7	34
Brook silverside			8	3	29		3					43
Bullhead					2							2
Common shiner	25	2			50	2	500	45			14	638
Creek chub				1								1
Fathead minnow								10		3		13
Golden shiner					1100				1		1	1102
Green sunfish					1							1
Hornyhead chub				3								3
Johnny darter	1		1		2		35	2		14		55
Largemouth bass										1		1
Logperch								2				2
Northern pike	1						1					2
Shorthead redhorse		3										3
Smallmouth bass	2	2										4
Spottail shiner					20			1		13	2	36
Tadpole madtom									1			1
White sucker					3		150			2	5	160
Yellow perch				1							4	5
Total	29	19	11	15	1249	2	759	65	4	58	36	2247

Table 8. Sauk River (M-74) species composition from hoop net samples by station, Summer, 1998.

Species	HN1	HN10	HN11	HN12	HN4	HN5	HN6	HN8	HN9	Total
Black bullhead		4								4
Black crappie					1					1
Bluegill				1			2			3
Channel catfish					2	4			2	8
Northern pike		1	1	1			1			4
Painted turtle			2							2
Rock bass	1							3		4
Shorthead redhorse		4		2						6
Snapping turtle			1							1
White sucker						1				1
Yellow bullhead		10				1				11
Total	1	19	4	4	3	6	3	3	2	45

Table 9. Sauk River (M-74) length frequency distribution from hoop net samples, all stations, Summer, 1998.

Inch	Black bullhead	Black crappie	Bluegill	Channel catfish	Northern pike	Painted turtle	Rock bass	Shorthead redhorse	Snapping turtle	White sucker	Yellow bullhead
4							1				
5		1									
6	1		1			2					1
7	2		1								3
8	1		1				1				
9								1			2
10					1		2	1			3
11											1
12									1		1
13											
14								1			
15					1			2		1	
18					1						
19					1			1			
20											
21				2							
22				3							
23											
24				1							
25				1							
26											
27				1							
Total	4	1	3	8	4	2	4	6	1	1	11

Table 10. Length at capture, back-calculated lengths and standard errors for northern pike, Sauk River, Summer 1998.

Length at Capture in 1998									
Year	Class	Age	N	Standard Error					
				Average	Maximum	Minimum			
1996	2	1	266.00	266.00	266.00	0.000			
1995	3	1	299.00	299.00	299.00	0.000			
1994	4	3	430.33	487.00	387.00	29.627			
1993	5	4	530.25	551.00	504.00	11.280			
1992	6	1	646.00	646.00	646.00	0.000			
1991	7	1	670.00	670.00	670.00	0.000			

Average Back-calculated Lengths for Each Age Class										
Year	Class	Age	N	Back-calculation Age						
				1	2	3	4	5	6	7
1997	1	0	0.00							
1996	2	1	200.39	266.00						
1995	3	1	200.19	278.16	299.00					
1994	4	3	188.03	317.52	400.29	430.33				
1993	5	4	236.14	358.90	438.12	503.72	530.25			
1992	6	1	264.77	444.69	514.81	577.85	625.62	646.00		
1991	7	1	245.05	337.69	417.57	520.88	573.08	628.46	670.00	
All Classes			219.91	337.70	418.47	489.40	553.28	637.23	670.00	
N			11	11	11	10	9	6	2	1

Standard Error of Average Back-calculated Length For Each Age Class										
1997	1	0	0.000							
1996	2	1	0.000	0.000						
1995	3	1	0.000	0.000	0.000					
1994	4	3	16.540	45.171	29.619	29.627				
1993	5	4	13.287	2.741	6.464	12.712	11.280			
1992	6	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
1991	7	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
All Classes	11		10.125	17.961	18.814	19.475	17.581	8.769	0.000	

Table 11. Length at capture, back-calculated lengths and standard errors for smallmouth bass, Sauk River, Summer 1998.

Length at Capture in 1998						
Year			Standard Error			
Class	Age	N	Average	Maximum	Minimum	
1996	2	8	148.63	166.00	140.00	2.909
1995	3	3	194.33	251.00	158.00	28.707
1994	4	6	303.83	342.00	260.00	12.153
1993	5	9	350.67	376.00	319.00	7.014
1992	6	1	407.00	407.00	407.00	0.000

Average Back-calculated Lengths for Each Age Class

Year	Class	Age	N	Back-calculation Age						
				1	2	3	4	5	6	
1997	1	0	0.00							
1996	2	8	101.15	148.63						
1995	3	3	89.32	140.41	194.33					
1994	4	6	105.25	196.48	267.28	303.83				
1993	5	9	93.38	189.06	267.17	321.87	350.67			
1992	6	1	88.51	172.85	260.96	340.27	388.10	407.00		
All Classes			97.69	172.72	255.38	316.26	354.41	407.00		
N			27	27	19	16	10	1		

Standard Error of Average Back-calculated Length For Each Age Class

Year	Class	Age	N	Back-calculation Age						
				1	2	3	4	5	6	
1997	1	0	0.000							
1996	2	8	3.727	2.909						
1995	3	3	9.087	19.537	28.707					
1994	4	6	4.340	10.631	13.305	12.153				
1993	5	9	3.609	8.135	8.681	7.334	7.014			
1992	6	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
All Classes			27	2.288	5.906	9.207	6.484	7.306	0.000	

Table 12. Length at capture, back-calculated lengths and standard errors for walleye, Sauk River, Summer 1998.

Length at Capture in 1998							
Year			Standard				
Class	Age	N	Average	Maximum	Minimum	Error	
1996	2	3	191.67	195.00	187.00	2.404	
1995	3	8	243.25	264.00	208.00	6.568	
1994	4	1	272.00	272.00	272.00	0.000	
1993	5	5	380.00	414.00	354.00	10.373	
1992	6	2	411.50	441.00	382.00	29.500	

Average Back-calculated Lengths for Each Age Class

Year	Class	Age	N	Back-calculation Age						
				1	2	3	4	5	6	
1997	1	0	0.00							
1996	2	3	151.55	191.67						
1995	3	8	142.42	201.62	243.25					
1994	4	1	142.88	196.36	244.49	272.00				
1993	5	5	173.08	266.85	326.50	361.24	380.00			
1992	6	2	197.24	271.20	326.44	374.99	398.05	411.50		
All Classes			157.73	224.26	279.74	353.52	385.16	411.50		
N			19	19	16	8	7	2		

Standard Error of Average Back-calculated Length For Each Age Class

Year	Class	Age	N	Back-calculation Age							
				1	2	3	4	5	6		
1997	1	0	0.000								
1996	2	3	12.810	2.404							
1995	3	8	4.567	4.550	6.568						
1994	4	1	0.000	0.000	0.000	0.000					
1993	5	5	6.748	13.114	12.737	10.868	10.373				
1992	6	2	31.891	40.431	39.781	35.239	30.359	29.500			
All Classes			19	5.825	9.279	12.250	15.066	10.305	29.500		

Table 13. Length at capture, back-calculated lengths and standard errors for rock bass, Sauk River, Summer 1998.

Length at Capture in 1998						
Year	Class	Age	N	Average	Standard Maximum	Standard Minimum Error
1992	6	1	212.00	212.00	212.00	0.000
1991	7	0	0.00	0.00	0.00	0.000
1990	8	1	258.00	258.00	258.00	0.000
1989	9	0	0.00	0.00	0.00	0.000
1988	10	1	272.00	272.00	272.00	0.000

Average Back-calculated Lengths for Each Age Class

Year	Class	Age	N	Back-calculation Age																
				1	2	3	4	5	6	7	8	9	10							
1997	1	0	0.00																	
1996	2	0	0.00	0.00																
1995	3	0	0.00	0.00	0.00															
1994	4	0	0.00	0.00	0.00	0.00														
1993	5	0	0.00	0.00	0.00	0.00	0.00													
1992	6	1	59.75	104.56	138.49	165.96	191.40	212.00												
1991	7	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00											
1990	8	1	37.21	89.08	126.96	167.86	209.99	234.41	250.41	258.00										
1989	9	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
1988	10	1	66.27	93.91	123.22	160.22	193.39	223.14	243.52	256.31	265.62	272.00								
All Classes				54.41	95.85	129.56	164.68	198.26	223.18	246.97	257.15	265.62	272.00							
N				3	3	3	3	3	3	2	2	1	1							

Standard Error of Average Back-calculated Length For Each Age Class

Year	Class	Age	N	Back-calculation Age																
				1	2	3	4	5	6	7	8	9	10							
1997	1	0	0.000																	
1996	2	0	0.000	0.000																
1995	3	0	0.000	0.000	0.000															
1994	4	0	0.000	0.000	0.000	0.000														
1993	5	0	0.000	0.000	0.000	0.000	0.000													
1992	6	1	0.000	0.000	0.000	0.000	0.000	0.000												
1991	7	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000											
1990	8	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000										
1989	9	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000									
1988	10	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000								
All Classes				3	8.802	4.573	4.595	2.294	5.893	6.471	3.445	0.847	0.000	0.000						

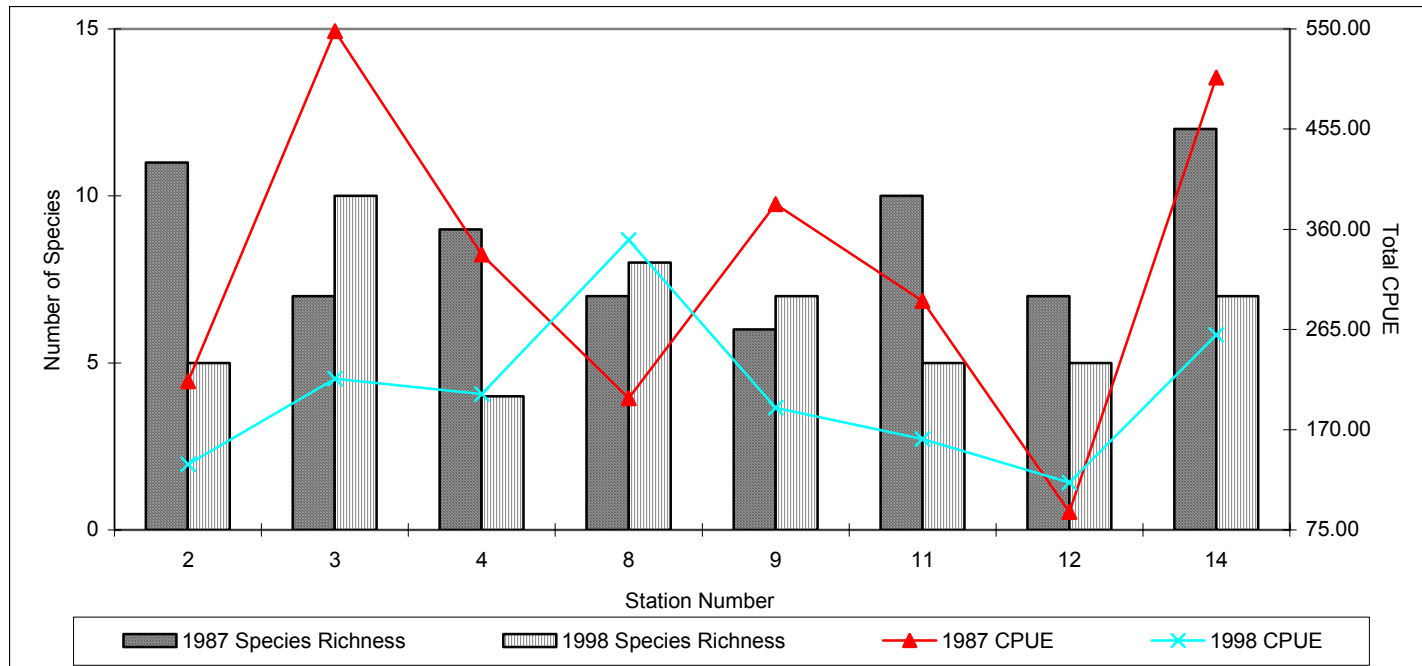
Table 14. Sauk River (M-74) index of river miles, Summer 1998.

River Mile	Feature
0.0	Mississippi River
0.0	Access, Sauk Canoe launch
0.1	Station ¹ 1
1.1	Station 2
2.2	Station 3
2.7	SMB ² 5
3.3	SMB 4
4.9	SMB 3
6.2	SMB 2
6.9	Access, Millers Landing
6.9	Station 4
6.9	SMB 1
6.9	EF ³ 2
14.5	EF 3
14.7	Station 5
15.5	Access, CR 139 Bridge
19.4	EF 4
19.8	Station 6
20.7	Access, Cold Spring Park
20.9	Cold Spring Dam
21.0	Horseshoe Chain of Lakes
45.2	Station 7
51.8	Station 8
52.1	EF 8
52.2	Access, Boecker's
71.8	EF 9
72.2	Station 9
72.8	Access, Melrose Park
72.9	Melrose Dam
73.5	Access, Public
74.8	Station 10
74.9	EF 11
76.1	EF 12
77.1	Station 11
89.1	EF 14
89.3	Station 12
89.5	Sauk Centre Dam

1 Hoop net and seine haul sites

2 Electrofishing for smallmouth bass only sites

3 Electrofishing for all species encountered sites



Station	2	3	4	8	9	11	12	14
1987 Species Richness	11	7	9	7	6	10	7	12
1998 Species Richness	5	10	4	8	7	5	5	7
1987 CPUE	216.00	548.00	336.00	200.00	384.00	292.00	92.00	504.00
1998 CPUE	137.04	218.52	203.85	350.00	190.91	161.11	120.00	260.00

Figure 9. Sauk River (M-74) species richness and catch per unit effort (CPUE) from electrofishing similar stations 1987 and 1998.

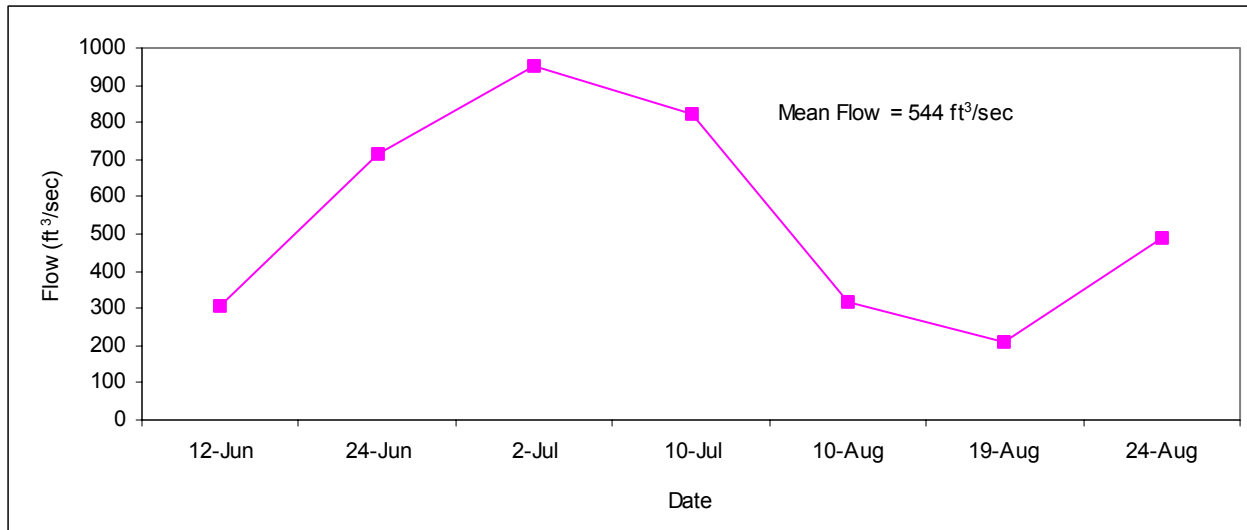


Figure 10. Sauk River (M-74) flow measurements at St. Cloud during the 1998 sampling period.

REFERENCES

Sauk River Survey. 1987. Minnesota Department of Natural Resources, Division of Fish and Wildlife, Section of Fisheries, St Paul.

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_____ Author	_____ Date
_____ Area Fisheries Supervisor	_____ Date
_____ Regional Fisheries Supervisor	_____ Date

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Sauk River Access Locations 1998

At St. Cloud	Through grass at Whitney park
Up stream of St. Cloud	Miller's Access, off CR 138 S. of Hwy 75
Near Rockville	Off CR 139 Bridge
Near Cold Spring	PA at Cold Spring park
Near St. Martin	Through private property off 325 th Ave, Section 13, Jim Boeckers, (29,959 Co Rd 12, Melrose, MN 56352)
Near Melrose	PA Melrose City Park
Above Melrose Dam	PA Melrose City Park
Sauk Centre	Through Sauk Centre City Park