

Results of Lake Assessment in the Black River Channel Lake Unit, Navigation Pool 8 of the upper Mississippi River, Fall 2014

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Purpose

The purpose of this work is to document the results of fall 2014 fish population monitoring including length frequency and catch per unit effort of game fishes in the approximately 1687 acre Black River Channel Lake Unit, located in Navigation Pool 8 of the upper Mississippi River. Length and size distributions of other fishes are also included in the analysis.

Introduction

The Wisconsin Department of Natural Resources' Mississippi River Fisheries Team (MRFT) conducts annual fall fish surveys using electro fishing. The river bordering Wisconsin was divided into 34 "lake units", which included all waters except the main channel (Figure 1). Each fall, at least three lake units are sampled, and the highest priority lake units are sampled approximately every four years. During 2014, Black River Channel was one of the Lake Units sampled.

Methods

Sampling was done using an 18 foot-long welded aluminum flat-bottomed maxi-boom electro fishing boat using a two-anode-one-cathode system with a Wisconsin Control Box. Two booms extended 8 feet from the bow. Each boom was terminated with an anode which consisted of two stainless steel rings, 1m in diameter, equipped with eight 15cm by 1.6cm dropper cables. We used pulsed direct current at 16 amps while volts varied from 190 to 390.

A total of 43 randomly selected ~10 minute day-time electro fishing runs were done during 7.163 hours along 7.29 miles (Figure 2 and Table 1) between September 23-26, 29, 30, 2014. Starting points of random runs were selected using an ArcView GIS 3.3® software random point generating script and the Long Term Resource Monitoring Program (http://www.umesc.usgs.gov/data_library.html) 1998 bathymetric data (Rogala, 1997). Runs were randomly chosen from available aquatic locations that were between 0.6 and 2.5m deep. Once in the field, randomly selected runs that were too shallow or too deep or otherwise adverse to electro fishing were not done and replaced with another randomly selected run, or done within 50m of the initial run where there were suitable conditions.

In addition to randomly selected runs, we electro fished 12 spatially fixed ~10 minute day-time runs done over 2.151 hours and 1.79 miles during the same dates. Spatially fixed stations were chosen in a biased manner where we had an interest in fish populations or fish habitat. Spatially fixed stations are periodically re-sampled among years. All fish were counted, identified to species, measured by total length and returned to the river.

Comparisons were made between the 2014 Black River Channel sample results and those from 2010 (Wisconsin Department of Natural Resources, 2010). During 2010, sampling was done in a similar fashion, except no randomly selected runs were conducted, but spatially fixed were. All 2010 spatially fixed runs were repeated in 2014.

We calculated Proportional Size Structures (Guy, et al., 2006; Gabelhouse, 1984; Anderson and Gutreuter, 1983) for quality (PSS_Q) and preferred (PSS_P) selected game fishes as well as catch per effort for these size categories. PSS is a measure, expressed as percentage, of the proportion of the number of fish greater than or equal to a "quality" or "preferred" length divided by the number of fish greater than or equal to the stock length. "Quality" and "preferred" lengths vary by species, and are determined by what most anglers consider quality or preferred fish sizes. Stock lengths also vary by species and are determined by recommendations in the literature. Using formulas presented in Miranda (1993), for each of PSS_Q and PSS_P we calculated the estimated number of stock-sized fish needed in subsequent sampling to detect a 20% change where α (probability of a type I error) was 0.05 and β (probability of a type II error) was 0.2. PSS comparisons were made only for those species that had adequate numbers of stock-sized fish (see Miranda, 1993).

Statistical tests were done using SAS® (2002-2003) software for Windows version 9.3's General linear models (ANOVA) and were done at the $\alpha=0.05$ level. For catch per effort calculations, tests were done on geometric means.

Findings

During the 2014 sampling, daily mean water temperature ranged from 17.8 to 20.0°C. The mean water temperature was 18.6°C and generally increased over the six days of sampling. Water surface elevation measured at the Lock and Dam 7 tailwater gage ranged from 632.3 to 633.39ft (average 632.87ft), changed as much as 1.09ft, and generally decreased over the sampling period (Table 2). This elevation was 0.67ft higher than the mean for this month and days during the period of record from 1934 through 2014 (632.20 ft). The mean daily flow in cfs (cubic feet per second) taken from Dam 8 was 39,419 and ranged from 34,300 to 47,400 (Table 2). Flow fluctuated as much as 13,100 cfs. This 2014 mean daily flow was more than the mean flow on these months and days (30,795 cfs) for the period of record of 1959 through 2014.

Electro Fishing Catch per Effort

A total of at least 33 species was recorded from 929 fish captured during the 43 random electro fishing runs (Table 3). The three most common species were gizzard shad, largemouth bass and yellow perch. Mean catch rates for these three species was 50.2, 15.4, and 13.2 fish per hour, respectively. Emerald shiner was the fourth most common species captured, with a mean catch rate of 9.9. The mean catch rates for the remaining 29 species ranged 0.1 to 7.6 per hour. The mean catch per hour for all species combined was 129.4 (standard deviation = 170.7).

A total of at least 27 species were recorded from 785 fish captured during the 12 fixed electro fishing runs (Table 4). Unlike random runs, the four most common species were bluegill, largemouth bass, yellow perch and spotted sucker. Mean catch rates for these four species were 148.4, 75.0, 29.3 and 13.6 fish per hour, respectively. The catch rates for the remaining 23 taxa ranged from 0.3 to 8.4. The mean catch per hour for all species combined was 317.1 (standard deviation = 183.2).

We tested for differences in catch rates for common game fishes between random and fixed samples. Fixed samples were significantly higher for bluegill, largemouth bass, and yellow perch. This is not surprising since the bias in fixed stations was toward locations that are known to have more game fish.

Length Distribution

We tested the difference in mean lengths of the most common game fishes between random and fixed sampling runs. There was no difference ($p=0.05$) for yellow perch, walleye, smallmouth bass, and sauger. Three fishes were significantly larger from random runs. This included bluegill (1.7 inches larger), black crappie (3.6 inches), and largemouth bass (1.6 inches). Therefore, we combined summaries of mean lengths and length distributions from both sampling methods for yellow perch, walleye, smallmouth bass and sauger but kept them separate for bluegill, black crappie and largemouth bass.

The mean lengths of selected game fishes where there were more than 30 individuals are given in Table 5. A total of 5.9 percent of bluegill from fixed samples and 20.0 percent from random samples was greater than 7 inches. A total of 11.2 percent of largemouth bass from fixed samples and 15.2 percent from random samples was greater than 14 inches. A total of 26.3 percent of yellow perch from all samples was larger than 7 inches and 18.0 percent were larger than 8 inches, respectively. The frequency distribution for total length in inches for the most common game fishes (bluegill, largemouth bass, and yellow perch), are given in Figures 3 through 7.

Total length values for quality, preferred and stock sizes used to calculate Proportional Size Structures (PSS) are given in Table 6. The PSS_Q and PSS_P by species and sample type are presented in Table 7. In 2014, bluegill PSS_Q was 20 from fixed samples which was below the “acceptable” range; and was 52 from random samples which was within the “acceptable” range. Also, bluegill (1 for fixed, 2 for random) was below the acceptable PSS_P standard. The “acceptable” value of PSS_Q for bluegill is 40 to 60 and the “acceptable value of PSS_P is a minimum of 5 (Wisconsin Department of Natural Resources, 2010). For bluegill captured at fixed sampling sites, PSS_Q increased since 2010 from 15 to 20 suggesting a greater proportion of larger fish.

Yellow perch 2014 PSS_Q was 24, below the “acceptable” range. Yellow perch (= 7) met the acceptable PSS_P standard. The “acceptable” value of PSS_Q for yellow perch is 40 and the “acceptable value of PSS_P is a minimum of 5 (Wisconsin Department of Natural Resources, 2010). Like bluegill, PSS_Q increased since 2010 from 15 to 24 suggesting a greater proportion of larger fish.

No guidance is provided for other fishes where we calculated PSS_Q and PSS_P . The PSS_Q and PSS_P for largemouth bass was 55 and 11, respectively, from fixed runs, and 69 and 16 from random runs were relatively high. From 2010 to 2014 at fixed locations, the largemouth bass PSS_Q increased from 45 to 55 while the PSS_P decreased from 20 to 11.

Although PSS_Q generally increased through time for these three species, comparisons of mean total lengths suggest that the proportion of larger fish remained the same. We tested the mean size of fish greater than or equal to the stock size among the years 2010 and 2014. Bluegill from fixed samples was the same size in 2014 as 2010 (4.5 and 4.4, respectively) as were largemouth bass (12.3 & 11.9) and yellow perch (6.8 & 6.5). This suggests that size of all three fishes may not have changed since 2010.

Comparisons of Random Electro Fishing Runs with Other Lake Units

Catch per effort data collected from randomly selected fall electro fishing runs are available for the years 2011 through 2014, from a total of twenty-three lake units. Six lake units were sampled in 2011, three were sampled in 2012, eight were sampled in 2013 and six were sampled in 2014. Catch per hour for all target fishes combined (bluegill, black crappie, largemouth bass, northern pike, smallmouth bass, pumpkinseed, rock bass, white crappie and yellow perch) in Black River Channel (39.2) ranked in the lower tier amongst values for all other units (Table 8). This lake unit had a greater catch per hour than one lake unit and was less than 7 others. It

was the same as 14 other lake units. This suggests that there is a relatively low population density of target fishes in Black River Channel.

We also tested mean catch per hour for selected individual species among nine 2011 through 2014 lake units (Table 9). Black River Channel Lake Unit black crappie catch rate (1.0) was the same as 21 other lake units, and less than the remaining one. Bluegill catch rate (7.6) was the same as fifteen lake units, lower than seven other lake units, and higher than none. The catch rate for largemouth bass (15.4) was lower than six other lake units, higher than none and the same as sixteen. Yellow perch (13.2) was the same as fourteen other lake units, and lower than four and greater than four.

We did a similar test of mean catch per hour for selected individual species among the seventeen 2011 through 2014 lake units except we excluded any presumed young-of-the-year fish (i.e., age zero). Ranks of catch per effort were identical or similar to those found using all sizes. This suggests that excluding putative age zero fish from this catch per effort analysis did not have a significant effect on comparisons.

We compared mean total length of selected individual species caught with electro fishing among 2011 through 2014 lake units (Table 10). Black River Channel bluegill from fixed samples (3.40 inches) was smaller than eleven lake units and larger than none. Bluegill from random samples (5.05 inches) was smaller than one lake unit and larger than eight. Largemouth bass from fixed samples (7.07 inches) was smaller than ten lake units and larger than none. Largemouth bass from random samples (8.68 inches) was smaller than seven lake units and larger than eight. Yellow perch from both fixed and random samples (7.71 inches) were smaller than nine lake units and larger than four. Assuming random samples better represent populations, 2014 Black River Channel bluegill were relatively large (by about ¼ inch from average); largemouth bass were average, and yellow perch were slightly smaller than average.

We compared PSS from fixed electro fishing runs among lake units sampled from 2007 through 2014 where the number of stock sized game fish was greater than 99 (Table 11). Black River Channel 2014 bluegill ranked low – 22nd of 31 comparisons for quality fish and 5th in preferred sized fish in 6 comparisons.

Comparisons of Electro Fishing Runs among Years

We compared mean total length among years within the Black River Channel lake unit using fixed runs only. Mean total length of 2010 bluegill greater than 2.7 inches (non young-of-the-year) was 4.1 inches and was the different than 2014 (4.7 inches) ($p < 0.0001$). In 2010, Largemouth bass mean length for those greater than 5.1 inches was 8.5 inches, and was significantly different from 2014 (11.9 inches) ($p < 0.0001$). Non young-of-the-year yellow perch from fixed runs (> 4.3 inches) had a mean of 6.9 inches in 2010 and 6.5 inches in 2014. These were the same. ($p = 0.11$).

Comparisons using Fixed Electro Fishing Runs, 2010 and 2014

Spatially fixed electro fishing runs were done in the Black River Channel lake unit each year during 2010 and 2014. Mean daily water temperatures were higher in 2014 (18.3°C) compared to 2010 (13.2°C), discharge was higher in 2010 (63,422 cfs) than in 2014 (42,667 cfs) and water surface elevations were higher in 2010 (634.77ft) compared to 2014 (633.10ft). A total of 32 kinds of fishes were caught among both years totaling 3103 fish (Table 12). Bluegill was the most common followed by largemouth bass, yellow perch and emerald shiner.

Catch per hour for all target fishes combined (bluegill, black crappie, largemouth bass, northern pike, smallmouth bass, pumpkinseed, rock bass, white crappie and yellow perch) in Black River Channel was 224.9 in 2014 and 820.4 in 2010. These means differed statistically ($p < 0.0001$). In addition, when all game and non-game fish were combined, these means between years differed as well ($p < 0.0001$). This suggests that catch rates were significantly lower in 2014 than 2010.

River wide Young-of-the-Year Fish Trends

We analyzed the fall abundance of young-of-the-year (YOY) bluegill (fish less than or equal to 2.7 inches) from 2007 through 2014 in the Mississippi River bordering Wisconsin. This data came from mostly Lake Unit Sampling from Navigation Pools 11 through 4 and used only random samples. This analysis, although river wide, may inform any observed trends in the Black River Channel Lake Unit.

A decreasing trend in YOY bluegill abundance is evident (Figure 8). Abundances, as measured by the number of fish caught per hour of electro fishing, declined from 42 in 2007 to 3 in 2014. A similar recent trend for bluegill of all sizes is also evident in Long Term Resource Monitoring Program data from pool 8 (http://www.umesc.usgs.gov/data_library/fisheries/graphical/fish_front.html). This suggests that for unknown reasons, bluegill numbers may have recently declined in the Mississippi River bordering Wisconsin.

Conclusions

Mean sizes of Black River Channel common game fishes captured in 2014 were relatively average compared to other lake units. Largemouth bass and yellow perch were about average while bluegill were relatively larger, but only by ¼ inch. “Quality” sized bluegill met the acceptable State of Wisconsin standard, while yellow perch fell short. Both fishes along with largemouth bass experienced an increase in a measurement of “quality” sized fish since 2010.

Although 2014 size of fishes appears adequate in Black River Channel, abundance appears to be relatively low. Game fish catch rates suggest a low abundance compared to twenty-two other lake units. In addition to having relatively lower catch rates on a spatial scale, fish abundance may be lower through time. Combined game fish catch rates were significantly lower in 2014 than in 2010 within Black River Channel.

In general, our samples suggest that Black River Channel has a relatively low abundance of game fish that are relatively average in size.

In Navigation Pool 8 of the Mississippi River bordering Minnesota, Wisconsin fishing regulations limit harvest to 25 each of yellow perch, rock bass and crappie, with no size limit. Bluegill and pumpkinseed are limited to 25 in total with no size limit. White bass and yellow bass are limited to 25 in total with no size limit. Largemouth bass and smallmouth bass are limited to 5 in total with a 14 inch minimum size limit. Northern pike have a bag limit of 5 and no size limit. All these fish species have continuous open seasons.

Recommendations

1. Continue to monitoring backwater fish in Pool 8 and other pools to determine any trends.
2. Using additional data explore any longitudinal trends in mean total length or catch per effort along the Mississippi River bordering Wisconsin.
3. Continue to monitoring YOY recruitment, particularly of bluegill.

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FIGURE 1. LOCATION OF 34 WDNR LAKE UNITS, UPPER MISSISSIPPI RIVER.
 (based on 1989 Long Term Resource Monitoring Program Land/Water and Aquatic Area Coverage)

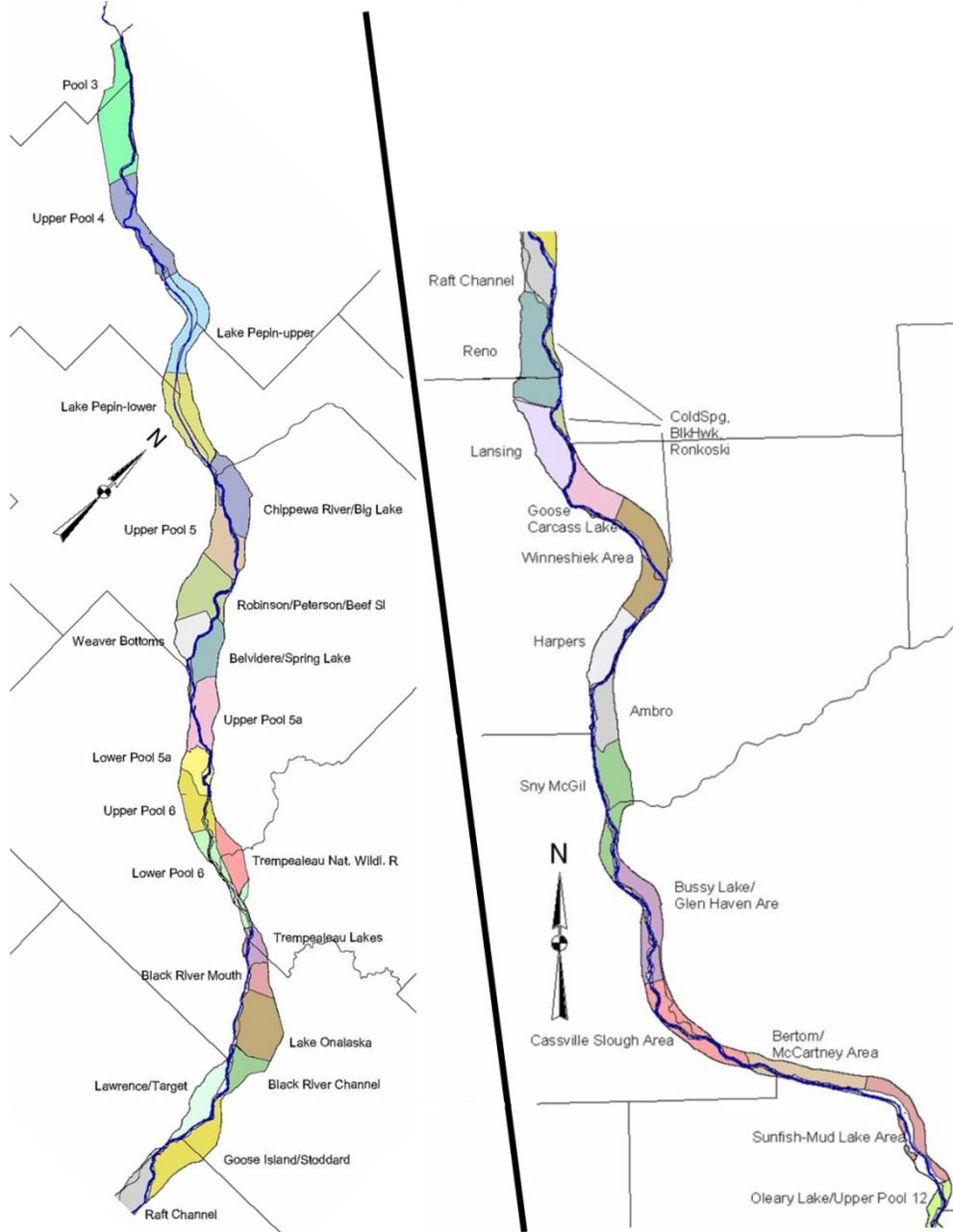


FIGURE 2. LOCATIONS OF FALL 2014 ELECTRO FISHING RUNS, THE BLACK RIVER CHANNEL LAKE UNIT. 2013 NAIP photo.

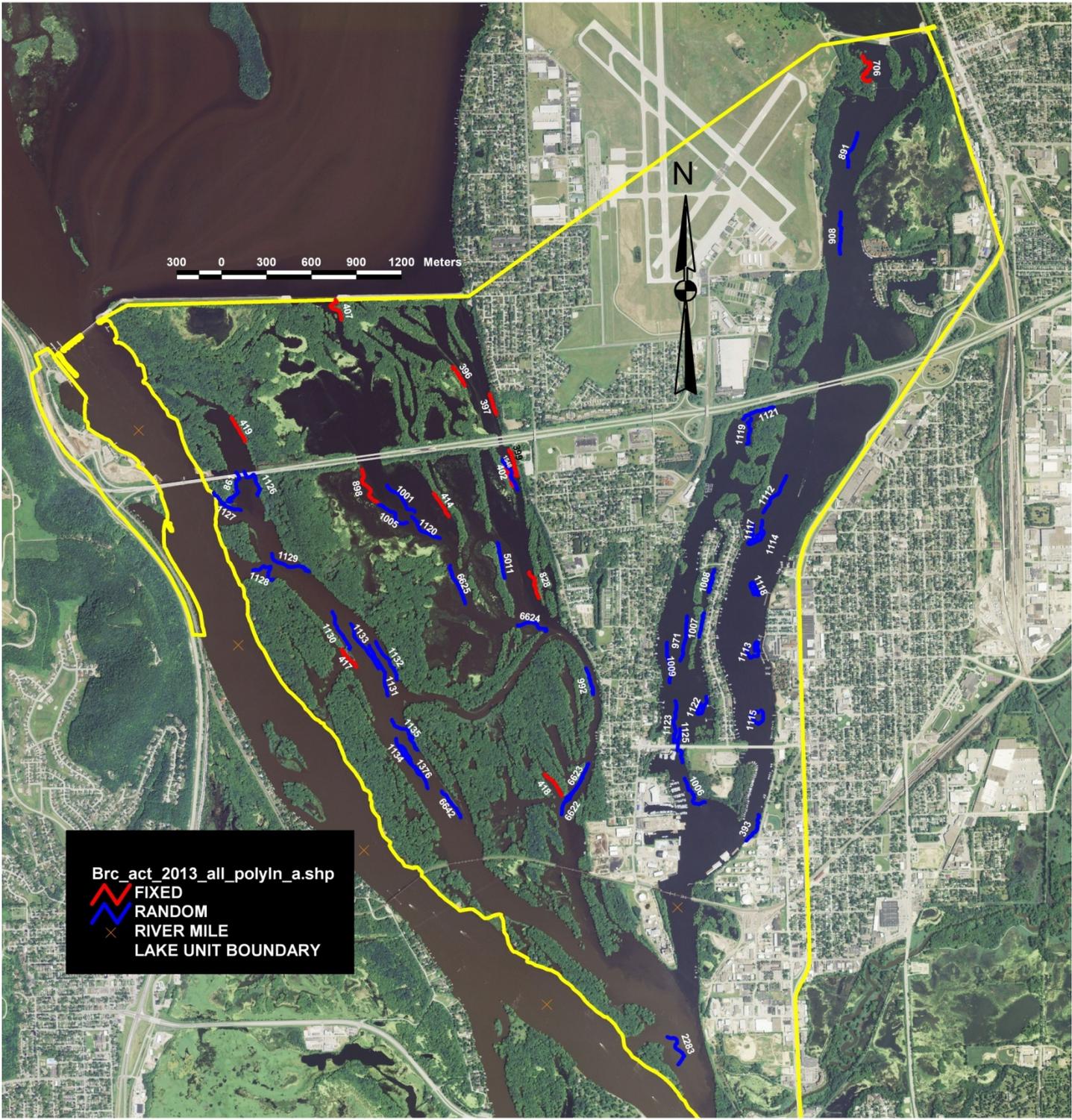


TABLE 1. LOCATIONS OF FALL 2014 ELECTRO FISHING RUNS, THE BLACK RIVER CHANNEL LAKE UNIT INCLUDING STATION LENGTHS IN METERS AND STARTING AND ENDING COORDINATES (Z15N UTM NAD83.)

STATION	STATION LENGTH (M)	UTM_START_X	UTM_START_Y	UTM_END_X	UTM_END_Y	RANDOM OR FIXED
393	220	640535	4855276	640452	4855102	RANDOM
396	211	638496	4858266	638579	4858141	FIXED
397	183	638743	4858085	638788	4857950	FIXED
399	270	638872	4857710	638930	4857539	FIXED
402	286	638843	4857622	638902	4857471	FIXED
407	208	637714	4858717	637753	4858582	FIXED
414	189	638470	4857267	638370	4857422	FIXED
417	210	637853	4856261	637756	4856378	FIXED
418	196	639223	4855403	639113	4855548	FIXED
419	191	637022	4857928	637112	4857767	FIXED
706	393	641283	4860180	641228	4860340	FIXED
828	258	639007	4856896	639072	4856721	FIXED
861	286	637053	4857562	637023	4857369	RANDOM
891	253	641197	4859829	641133	4859600	RANDOM
898	291	637892	4857582	637999	4857360	FIXED
908	295	641083	4859300	641081	4859020	RANDOM
971	308	640061	4856603	640014	4856305	RANDOM
992	216	639386	4856253	639433	4856080	RANDOM
1001	278	638061	4857475	638244	4857298	RANDOM
1005	260	638005	4857346	638192	4857225	RANDOM
1006	279	640043	4855518	640179	4855359	RANDOM
1007	174	640170	4856621	640140	4856463	RANDOM
1008	214	640201	4856764	640241	4856911	RANDOM
1009	276	639926	4856426	639943	4856158	RANDOM
1112	301	640723	4857538	640567	4857293	RANDOM
1113	290	640461	4856383	640511	4856370	RANDOM
1114	239	640560	4857240	640492	4857175	RANDOM
1115	250	640553	4855973	640533	4855958	RANDOM
1117	289	640500	4857209	640567	4857171	RANDOM
1118	258	640528	4856781	640512	4856798	RANDOM
1119	212	640486	4857921	640457	4857752	RANDOM
1120	256	638225	4857266	638412	4857124	RANDOM
1121	239	640637	4857996	640433	4857916	RANDOM
1122	225	640149	4856018	640187	4856064	RANDOM
1123	291	639980	4856036	639970	4855761	RANDOM
1125	266	640013	4855850	640028	4855624	RANDOM
1126	275	637106	4857568	637197	4857408	RANDOM
1127	249	636903	4857426	637084	4857309	RANDOM
1128	256	637165	4856908	637300	4856847	RANDOM
1129	323	637291	4857020	637535	4856899	RANDOM
1130	295	637693	4856632	637808	4856381	RANDOM
1131	372	637940	4856405	638064	4856070	RANDOM
1132	305	637984	4856431	638125	4856177	RANDOM
1133	361	637818	4856550	638002	4856251	RANDOM
1134	305	638120	4855784	638288	4855542	RANDOM
1135	342	638091	4855911	638262	4855709	RANDOM
1376	355	638147	4855734	638329	4855452	RANDOM
1548	245	638829	4857646	638931	4857445	RANDOM
2283	287	639928	4853792	639999	4853608	RANDOM
5011	245	638796	4857091	638843	4856855	RANDOM
6622	295	639364	4855523	639222	4855278	RANDOM
6623	298	639401	4855615	639252	4855368	RANDOM
6624	240	638929	4856541	639116	4856499	RANDOM
6625	281	638480	4856940	638580	4856686	RANDOM
6642	229	638422	4855433	638549	4855257	RANDOM

TABLE 2. MEAN WATER TEMPERATURE, WATER SURFACE ELEVATION AND FLOW DURING FALL 2014 BLACK RIVER CHANNEL LAKE UNIT SAMPLING.

DATE	MEAN DAILY TEMPERATURE °C	WATER SURFACE ELEVATION (ft), DAM 7-TAIL	FLOW (cfs) DAM 8
9/23/2014	17.9	633.39	47400
9/24/2014	17.8	633.17	41600
9/25/2014	18.1	632.97	39500
9/26/2014	19.6	633.04	40000
9/29/2014	20.0	632.51	34600
9/30/2014	17.8	632.30	34300
MEAN (by date, station)	18.6	632.87	39419

TABLE 3. RELATIVE ABUNDANCE, MEAN CATCH PER HR, ELECTRO FISHING, FALL 2014, BLACK RIVER CHANNEL LAKE UNIT. RANDOM RUNS.

	SPECIES	FREQ.	PERCENT	MEAN NUMBER PER HR (PER MILE)	STANDARD DEV.	MIN.	MAX.	NO. OF RUNS	TOTAL HRS
1	black crappie	7	0.75	0.99 (1.2)	2.93	0	11.98	43	7.163
2	blue sucker	1	0.11	0.14 (0.1)	0.91	0	5.99	43	7.163
3	bluegill	55	5.92	7.63 (8.4)	13.18	0	53.89	43	7.163
4	bowfin	14	1.51	1.98 (2.2)	6.15	0	29.94	43	7.163
5	channel catfish	2	0.22	0.28 (0.3)	1.28	0	5.99	43	7.163
6	chestnut lamprey	1	0.11	0.14 (0.2)	0.91	0	5.99	43	7.163
7	common carp	6	0.65	0.84 (1.0)	3.83	0	23.95	43	7.163
8	common shiner	1	0.11	0.14 (0.2)	0.91	0	5.99	43	7.163
9	emerald shiner	70	7.54	9.86 (10.7)	15.32	0	53.89	43	7.163
10	freshwater drum	29	3.12	4.03 (4.1)	7.34	0	35.93	43	7.163
11	gizzard shad	360	38.75	50.15 (59.5)	151.89	0	790.42	43	7.163
12	golden redhorse	20	2.15	2.80 (3.0)	8.61	0	53.89	43	7.163
13	golden shiner	1	0.11	0.14 (0.2)	0.91	0	5.99	43	7.163
14	largemouth bass	112	12.06	15.41 (16.8)	29.31	0	163.93	43	7.163
15	logperch	1	0.11	0.14 (0.1)	0.91	0	5.99	43	7.163
16	longnose gar	5	0.54	0.70 (0.7)	2.34	0	11.98	43	7.163
17	mooneye	4	0.43	0.56 (0.4)	1.76	0	5.99	43	7.163
18	northern pike	4	0.43	0.56 (0.6)	1.76	0	5.99	43	7.163
19	pirate perch	1	0.11	0.14 (0.2)	0.91	0	5.99	43	7.163
20	quillback	10	1.08	1.46 (1.6)	4.07	0	17.96	43	7.163
21	river redhorse	1	0.11	0.14 (0.1)	0.91	0	5.99	43	7.163
22	sauger	6	0.65	0.84 (0.8)	3.83	0	23.95	43	7.163
23	shiners m20-29 m31-33 m35-40	15	1.62	2.09 (2.3)	6.39	0	29.94	43	7.163
24	shorthead redhorse	23	2.48	3.20 (3.1)	7.66	0	41.92	43	7.163
25	silver redhorse	30	3.23	4.21 (4.2)	5.21	0	23.95	43	7.163
26	smallmouth bass	10	1.08	1.38 (1.5)	4.48	0	23.95	43	7.163
27	smallmouth buffalo	2	0.22	0.28 (0.3)	1.28	0	5.99	43	7.163
28	spottail shiner	4	0.43	0.56 (0.6)	2.87	0	17.96	43	7.163
29	spotted sucker	11	1.18	1.56 (1.6)	6.06	0	35.93	43	7.163
30	walleye	15	1.62	2.10 (2.2)	4.67	0	17.96	43	7.163
31	white bass	7	0.75	0.98 (0.9)	2.90	0	11.98	43	7.163
32	yellow bass	6	0.65	0.82 (0.8)	2.78	0	11.98	43	7.163
33	yellow perch	95	10.23	13.22 (13.9)	26.41	0	113.77	43	7.163
	ALL SPECIES	929	100.00	129.44 (143.7)	170.69	0	904.19	43	7.163

TABLE 4. RELATIVE ABUNDANCE, MEAN CATCH PER HR, ELECTRO FISHING, FALL 2014, BLACK RIVER CHANNEL LAKE UNIT. FIXED RUNS.

	SPECIES	FREQ.	PERCENT	MEAN NUMBER PER HR (PER MILE)	STANDARD DEV.	MIN.	MAX.	NO. OF RUNS	TOTAL HRS
1	bigmouth buffalo	1	0.13	0.63 (0.7)	2.17	0	7.52	12	2.151
2	black crappie	12	1.53	4.73 (5.7)	10.20	0	30.08	12	2.151
3	bluegill	408	51.98	148.39 (190.9)	160.92	11.98	596.22	12	2.151
4	bowfin	13	1.66	5.64 (7.1)	7.68	0	23.04	12	2.151
5	brook silverside	2	0.26	1.11 (1.5)	3.85	0	13.33	12	2.151
6	channel catfish	1	0.13	0.30 (0.5)	1.02	0	3.53	12	2.151
7	common carp	8	1.02	3.03 (4.1)	5.96	0	17.67	12	2.151
8	common shiner	3	0.38	0.88 (1.4)	3.06	0	10.60	12	2.151
9	emerald shiner	17	2.17	8.43 (9.4)	9.08	0	26.67	12	2.151
10	freshwater drum	2	0.26	0.94 (1.2)	2.24	0	6.67	12	2.151
11	golden redhorse	5	0.64	3.02 (3.0)	7.42	0	25.64	12	2.151
12	golden shiner	1	0.13	0.26 (0.3)	0.91	0	3.16	12	2.151
13	green sunfish	1	0.13	0.38 (0.5)	1.33	0	4.61	12	2.151
14	largemouth bass	169	21.53	74.97 (91.3)	29.93	23.95	132.49	12	2.151
15	northern pike	5	0.64	2.00 (2.5)	3.09	0	7.52	12	2.151
16	pumpkinseed x bluegill	2	0.26	0.94 (1.2)	2.24	0	6.67	12	2.151
17	rock bass	1	0.13	0.38 (0.5)	1.33	0	4.61	12	2.151
18	sauger	4	0.51	2.36 (2.7)	5.53	0	15.04	12	2.151
19	shiners m20-29 m31-33 m35-40	16	2.04	6.55 (7.8)	16.42	0	53.33	12	2.151
20	shorthead redhorse	2	0.26	1.13 (1.2)	2.65	0	7.52	12	2.151
21	silver redhorse	1	0.13	0.50 (0.5)	1.73	0	5.99	12	2.151
22	smallmouth bass	6	0.76	3.73 (3.7)	9.81	0	34.19	12	2.151
23	spottail shiner	3	0.38	1.63 (2.0)	3.91	0	11.98	12	2.151
24	spotted sucker	36	4.59	13.63 (18.4)	19.81	0	74.21	12	2.151
25	tadpole madtom	1	0.13	0.30 (0.5)	1.02	0	3.53	12	2.151
26	walleye	4	0.51	2.00 (2.4)	5.32	0	17.96	12	2.151
27	yellow perch	61	7.77	29.29 (34.0)	29.10	0	86.67	12	2.151
	ALL SPECIES	785	100	317.14 (394.9)	183.17	143.71	826.50	12	2.151

TABLE 6. LIST OF STOCK SIZE, QUALITY SIZE (PSS_Q) AND PREFERRED SIZE (PSS_P) IN INCHES FOR SELECTED FISH SPECIES.

FISH SPECIES	PSS SOURCE	STOCK	QUALITY	PREFERRED
bluegill	Gabelhouse (1984)	3.0	6.0	8.0
largemouth bass	Gabelhouse (1984)	8.0	12.0	15.0
yellow perch	Gabelhouse (1984)	5.0	8.0	10.0

TABLE 7. COMPARISON OF PSS FOR SELECTED SPECIES IN BLACK RIVER CHANNEL LAKE UNIT. ELECTRO FISHING, FALL 2010 AND 2014 (random samples were not done in 2010). N2=number of stock needed in 2014 for statistically valid comparison. N3=number of stock needed post 2014 for statistically valid comparison (“-“ =no number of samples could meet the detection difference).

SPECIES AND SAMPLING METHOD	2010					2014				
	# OF STOCK	PSS_Q	PSS_P	N2 Quality	N2 Preferred	# OF STOCK	PSS_Q	PSS_P	N3 Quality	N3 Preferred
bluegill (fixed)	587	15	0.2	42	-	241	20	0.8	54	-
bluegill (random)						46	52	2	-	-
largemouth bass (fixed)	304	45	20	62	23	65	55	11	175	-
largemouth bass (random)						58	69	16	94	18
yellow perch (fixed & random)	185	15	2	51	-	127	24	7	74	-

TABLE 8. COMPARISON OF MEAN CATCH PER HOUR FROM ELECTRO FISHING AT RANDOMLY SELECTED LOCATIONS FOR ALL TARGET SPECIES* COMBINED AMONG TWENTY-THREE FALL 2011 THROUGH 2014 LAKE UNITS.

MEAN	STD. DEV.	N	LAKE UNIT	DIFFERENT (means with the same letter are not Sign. Different)					
189.2	150.0	86	2011 GOOSE ISLAND/STODDARD						A
132.3	85.7	45	2014 ROBINSON/PETERSON/BEE		B				A
228.5	215.7	32	2012 UPPER POOL 5		B			A	C
151.2	142.4	63	2011 COLD SPRG/BLKHWK/RONK		B			A	C
124.8	114.1	30	2011 CHIPPEWA RIVER/BIG LK		B			A	C
129.4	121.9	63	2011 AMBRO		B	D		A	C
85.1	95.7	42	2011 HARPERS		B	D		A	C
85.0	91.5	40	2013 LAWRENCE/TARGET	E	B	D		A	C
86.7	109.4	44	2013 UPPER POOL 5A	E	B	D			C
48.7	49.3	39	2012 GOOSE CARCASS LAKE	E		D			C
70.3	70.6	30	2013 UPPER POOL 6	E		D			C
71.0	86.9	60	2014 BELVIDERE/SPRING LAKE	E		D	F		C
39.1	39.0	30	2011 WEAVER BOTTOMS	E		D	F		C
73.1	116.6	52	2013 SNY MCGIL	E	G	D	F		
22.5	20.7	47	2014 BLACK RIVER MOUTH	E	G	D	F	H	
39.2	54.3	43	2014 BLACK RIVER CHANNEL	E	G		F	H	
33.3	76.0	53	2013 BERTOM/MCCARTNEY AREA		G	I	F	H	
22.0	30.6	60	2012 LAKE ONALASKA		G	I		H	
16.0	18.8	34	2013 TREMPEALEAU LAKES		G	I		H	
43.5	169.1	35	2014 CASSVILLE SLOUGH AREA			I		H	
12.8	20.5	29	2013 RENO			I		H	
19.4	44.4	56	2014 BUSSY LAKE/GLEN HAVEN			I		H	
3.9	6.5	37	2013 WINNESHIEK AREA			I			
80.5	116.5	1050	ALL						

- Target species include: bluegill, black crappie, largemouth bass, northern pike, smallmouth bass, pumpkinseed, rock bass, white crappie and yellow perch.

TABLE 9. COMPARISON OF MEAN CATCH PER HOUR FROM ELECTRO SHOCKED RANDOMLY SELECTED STATIONS FOR SELECTED INDIVIDUAL SPECIES, AMONG TWENTY-THREE FALL 2011 THROUGH 2014 LAKE UNITS. ALL FISH SIZES.

SPECIES	MEAN	STD. DEV.	N	LAKE UNIT	DIFFERENT (means with the same letter are not Sign. Different)				
black crappie	10.3	19.4	32	2012 UPPER POOL 5					A
	4.0	6.4	30	2011 CHIPPEWA RIVER/BIG LK		B			A
	5.7	11.6	63	2011 AMBRO		B		A	C
	3.0	4.2	42	2011 HARPERS		B	D	A	C
	4.2	8.4	40	2013 LAWRENCE/TARGET	E	B	D	A	C
	4.8	15.8	35	2014 CASSVILLE SLOUGH AREA	E	B	D	F	C
	2.2	4.6	52	2013 SNY MCGIL	E	B	D	F	C
	3.0	12.8	44	2013 UPPER POOL 5A	E	B	D	F	C
	1.9	5.7	47	2014 BLACK RIVER MOUTH	E	B	D	F	C
	1.3	2.9	86	2011 GOOSE ISLAND/STODDARD	E	B	D	F	C
	1.2	3.4	39	2012 GOOSE CARCASS LAKE	E	B	D	F	C
	1.1	3.0	63	2011 COLD SPRG/BLKHWK/RONK	E	B	D	F	C
	1.0	2.9	43	2014 BLACK RIVER CHANNEL	E	B	D	F	C
	0.8	2.4	53	2013 BERTOM/MCCARTNEY AREA	E		D	F	C
	0.7	2.5	34	2013 TREMPEALEAU LAKES	E		D	F	
	0.6	2.1	60	2012 LAKE ONALASKA	E			F	
	0.4	1.5	30	2013 UPPER POOL 6				F	
	0.4	1.5	30	2011 WEAVER BOTTOMS				F	
	0.4	2.5	56	2014 BUSSY LAKE/GLEN HAVEN				F	
	0	0	29	2013 RENO				F	
	0	0	37	2013 WINNESHIEK AREA				F	
	0	0	60	2014 BELVIDERE/SPRING LAKE				F	
	0	0	45	2014 ROBINSON/PETERSON/BEE				F	
	1.9	7.0	1050	ALL					
bluegill	125.2	140.9	32	2012 UPPER POOL 5					A
	74.7	93.5	42	2011 HARPERS		B			A
	66.4	74.9	63	2011 COLD SPRG/BLKHWK/RONK		B			A
	76.5	88.7	63	2011 AMBRO		B		A	C
	44.9	68.5	86	2011 GOOSE ISLAND/STODDARD		B	D	A	C
	42.5	54.2	40	2013 LAWRENCE/TARGET		B	D	A	C
	28.7	41.3	30	2011 CHIPPEWA RIVER/BIG LK		B	D	A	C
	43.7	81.9	44	2013 UPPER POOL 5A		B	D	E	C
	47.3	93.5	52	2013 SNY MCGIL		B	D	E	C
	30.7	49.7	30	2013 UPPER POOL 6		F	D	E	C
	17.8	26.3	45	2014 ROBINSON/PETERSON/BEE		F	D	E	
	15.4	25.1	60	2014 BELVIDERE/SPRING LAKE		F	D	E	G
	7.3	9.9	39	2012 GOOSE CARCASS LAKE		F		E	G
	9.2	20.9	30	2011 WEAVER BOTTOMS		F		E	G
	7.6	13.2	43	2014 BLACK RIVER CHANNEL		F		E	G
	19.7	63.3	53	2013 BERTOM/MCCARTNEY AREA		F			G
	30.1	143.3	35	2014 CASSVILLE SLOUGH AREA		F			G
	6.2	16.3	29	2013 RENO		F			G
	3.7	6.9	34	2013 TREMPEALEAU LAKES		F			G
	4.2	8.5	60	2012 LAKE ONALASKA		F			G
	2.4	5.8	47	2014 BLACK RIVER MOUTH					G

SPECIES	MEAN	STD. DEV.	N	LAKE UNIT	DIFFERENT (means with the same letter are not Sign. Different)						
largemouth bass	5.2	18.5	56	2014 BUSSY LAKE/GLEN HAVEN	G						
	1.3	2.5	37	2013 WINNESHIEK AREA	G						
	32.0	69.8	1050	ALL							
	99.8	108.7	86	2011 GOOSE ISLAND/STODDARD	A						
	59.1	66.2	32	2012 UPPER POOL 5	B	A					
	32.2	31.3	45	2014 ROBINSON/PETERSON/BEE	B	A	C				
	52.2	66.1	63	2011 COLD SPRG/BLKHWK/RONK	B	A	C				
	37.9	45.1	30	2011 CHIPPEWA RIVER/BIG LK	B	A	C				
	32.7	41.4	39	2012 GOOSE CARCASS LAKE	B	A	C				
	33.5	46.9	63	2011 AMBRO	B	D	C				
	22.2	21.3	30	2011 WEAVER BOTTOMS	B	D	C				
	25.5	30.4	30	2013 UPPER POOL 6	B	D	C				
	31.3	41.4	44	2013 UPPER POOL 5A	B	E	D	C			
	22.0	26.5	40	2013 LAWRENCE/TARGET	F	B	E	D	C		
	18.4	25.1	52	2013 SNY MCGIL	F	B	E	D	C	G	
	24.8	45.4	60	2014 BELVIDERE/SPRING LAKE	F	E	D	C		G	
	15.4	29.3	43	2014 BLACK RIVER CHANNEL	F	H	E	D	G		
	11.3	19.2	60	2012 LAKE ONALASKA	F	H	E	D	G		
	8.5	16.9	53	2013 BERTOM/MCCARTNEY AREA	F	H	E	G			
	4.5	7.4	29	2013 RENO	F	H	G				
	7.6	21.5	56	2014 BUSSY LAKE/GLEN HAVEN	H					G	
	5.6	10.0	35	2014 CASSVILLE SLOUGH AREA	H					G	
	4.1	6.8	42	2011 HARPERS	H					G	
	4.2	8.3	34	2013 TREMPLEALEAU LAKES	H					G	
	1.8	3.5	47	2014 BLACK RIVER MOUTH	H						
	1.1	2.8	37	2013 WINNESHIEK AREA	H						
	27.5	52.1	1050	ALL							
yellow perch	50.2	53.4	45	2014 ROBINSON/PETERSON/BEE	A						
	43.3	39.4	30	2011 CHIPPEWA RIVER/BIG LK	A						
	31.2	40.7	32	2012 UPPER POOL 5	B	A	C				
	28.5	45.1	86	2011 GOOSE ISLAND/STODDARD	B	A					
	15.6	23.2	60	2014 BELVIDERE/SPRING LAKE	B	D			C		
	13.8	26.8	40	2013 LAWRENCE/TARGET	F	G	E	D	C		
	13.2	26.4	43	2014 BLACK RIVER CHANNEL	F	G	E	D	C		
	11.3	28.0	63	2011 COLD SPRG/BLKHWK/RONK	F	G	E	D	CH	H	
	11.1	14.9	47	2014 BLACK RIVER MOUTH	B	E	D	C			
	10.2	13.8	63	2011 AMBRO	F	B	E	D	C		
	5.4	10.7	39	2012 GOOSE CARCASS LAKE	F	G	E	D	I	H	
	5.0	12.4	30	2013 UPPER POOL 6	F	G	E	I		H	
	4.4	7.2	30	2011 WEAVER BOTTOMS	F	G	E	D	I	H	
	4.4	8.1	60	2012 LAKE ONALASKA	F	G	E	D	I	H	
	3.9	7.4	34	2013 TREMPLEALEAU LAKES	F	G	E	I		H	
	3.5	13.4	56	2014 BUSSY LAKE/GLEN HAVEN	G					I	H
	3.3	8.9	44	2013 UPPER POOL 5A	F	G	I			H	
	1.9	3.6	42	2011 HARPERS	G					I	H
	1.3	4.3	37	2013 WINNESHIEK AREA						I	H
	1.2	3.2	53	2013 BERTOM/MCCARTNEY AREA	G	I				H	

SPECIES	MEAN	STD. DEV.	N	LAKE UNIT	DIFFERENT (means with the same letter are not Sign. Different)	
	0.9	3.2	52	2013 SNY MCGIL	I	
	0.8	2.1	29	2013 RENO	I	H
	0.2	1.0	35	2014 CASSVILLE SLOUGH AREA	I	
	11.8	27.0	1050	ALL		

TABLE 10. COMPARISON OF MEAN TOTAL LENGTH FOR SELECTED INDIVIDUAL SPECIES, AMONG 2011-2014 LAKE UNITS, ELECTRO FISHING, FALL. RANDOM AND FIXED STATIONS WHERE THE NUMBER OF FISH IS GREATER THAN OR EQUAL TO 30.

SPECIES	MEAN	STD. DEV.	N	LAKE UNIT	DIFFERENT (means with the same letter are not Sign. Different)		
bluegill	6.21	1.26	65	2013 UPPER POOL 5A		A	
(fixed)	6.08	1.12	124	2013 SNY MCGIL		A	
	5.54	1.47	229	2013 UPPER POOL 6	B	A	
	5.11	1.69	290	2011 CHIPPEWA RIVER/BIG LK	B	C	
	5.04	1.96	449	2013 BERTOM/MCCARTNEY AREA	B	C	
	5.03	1.33	45	2011 COLD SPRG/BLKHWK/RONK	B	C	
	5.03	2.16	200	2013 TREMPLEALEAU LAKES	B	C	
	4.94	1.77	359	2014 ROBINSON/PETERSON/BEE	B	C	
	4.62	1.58	471	2011 WEAVER BOTTOMS	D	C	
	4.52	1.57	245	2012 UPPER POOL 5	D	C	E
	4.19	1.99	127	2013 LAWRENCE/TARGET	D		E
	3.98	1.82	123	2012 GOOSE CARCASS LAKE	D	F	E
	3.90	1.80	112	2014 BUSSY LAKE/GLEN HAVEN		F	E
	3.40	1.68	408	2014 BLACK RIVER CHANNEL	G	F	
	3.20	1.72	172	2014 BELVIDERE/SPRING LAKE	G		
	2.91	1.64	368	2012 LAKE ONALASKA	G		
	4.47	1.92	3787	ALL			
bluegill	5.84	1.50	411	2013 SNY MCGIL		A	
(random)	5.80	1.60	154	2013 UPPER POOL 6	B	A	
	5.57	1.63	30	2013 RENO	B	A	
	5.56	1.03	697	2011 COLD SPRG/BLKHWK/RONK	B	A	
	5.50	1.49	321	2013 UPPER POOL 5A	B	A	
	5.43	1.70	176	2014 CASSVILLE SLOUGH AREA	B	A	
	5.36	1.32	805	2011 AMBRO	B	A	
	5.09	1.25	524	2011 HARPERS	B	A	C
	5.05	2.01	55	2014 BLACK RIVER CHANNEL	B		C
	4.58	1.45	669	2012 UPPER POOL 5		D	C
	4.05	1.66	49	2014 BUSSY LAKE/GLEN HAVEN	E	D	
	3.93	2.24	174	2013 BERTOM/MCCARTNEY AREA	E	D	F
	3.77	2.06	154	2014 BELVIDERE/SPRING LAKE	E		F
	3.58	2.06	144	2011 CHIPPEWA RIVER/BIG LK	E	G	F
	3.53	1.70	138	2014 ROBINSON/PETERSON/BEE	E	G	F
	3.45	1.85	285	2013 LAWRENCE/TARGET	E	G	F
	3.44	1.72	643	2011 GOOSE ISLAND/STODDARD	E	G	F
	3.25	1.83	47	2012 GOOSE CARCASS LAKE	H	G	F
	2.85	1.59	42	2012 LAKE ONALASKA	H	G	
	2.57	1.62	46	2011 WEAVER BOTTOMS	H		
	4.75	1.78	5564	ALL			
largemouth bass	12.78	3.01	44	2013 UPPER POOL 5A		A	
(fixed)	12.53	2.37	51	2014 CASSVILLE SLOUGH AREA	B	A	
	12.09	3.16	79	2013 SNY MCGIL	B	A	C

SPECIES	MEAN	STD. DEV.	N	LAKE UNIT	DIFFERENT (means with the same letter are not Sign. Different)		
	12.06	3.20	129	2013 UPPER POOL 6	B	A	C
	11.09	3.23	130	2012 UPPER POOL 5	B	D	A C
	10.71	3.77	175	2012 GOOSE CARCASS LAKE	B	D	E C
	10.43	2.94	49	2011 COLD SPRG/BLKHWK/RONK		D	E C
	9.96	2.79	229	2013 BERTOM/MCCARTNEY AREA		D	E
	9.44	4.08	81	2013 TREMPEALEAU LAKES	F	D	E
	9.06	5.09	143	2014 ROBINSON/PETERSON/BEE	F		E
	8.87	4.33	302	2011 WEAVER BOTTOMS	F		E G
	8.03	4.24	81	2014 BUSSY LAKE/GLEN HAVEN	F		H G
	7.07	4.43	169	2014 BLACK RIVER CHANNEL	I		H G
	6.88	4.67	76	2014 BELVIDERE/SPRING LAKE	I		H
	6.77	3.76	319	2012 LAKE ONALASKA	I		H
	5.89	4.18	102	2013 LAWRENCE/TARGET	I		
	5.56	3.53	483	2011 CHIPPEWA RIVER/BIG LK	I		
	8.47	4.41	2642	ALL			
largemouth bass (random)	12.89	3.10	230	2013 UPPER POOL 5A		A	
	12.39	3.14	33	2014 CASSVILLE SLOUGH AREA	B	A	
	11.17	4.18	128	2013 UPPER POOL 6	B	C	
	11.12	3.49	352	2011 AMBRO	B	C	
	10.98	3.18	160	2013 SNY MCGIL	B	C	
	10.61	2.88	75	2013 BERTOM/MCCARTNEY AREA		C	
	10.29	2.55	546	2011 COLD SPRG/BLKHWK/RONK	D	C	
	9.05	4.66	71	2014 BUSSY LAKE/GLEN HAVEN	D	E	
	8.68	4.94	112	2014 BLACK RIVER CHANNEL	F	E	
	7.39	5.13	248	2014 ROBINSON/PETERSON/BEE	F	G	
	6.36	3.53	113	2012 LAKE ONALASKA	H	G	
	6.00	3.20	212	2012 GOOSE CARCASS LAKE	H	G	
	5.75	4.11	249	2014 BELVIDERE/SPRING LAKE	H	I	
	5.55	3.97	316	2012 UPPER POOL 5	H	I	
	5.17	3.49	148	2013 LAWRENCE/TARGET	H	I	J
	4.53	2.32	190	2011 CHIPPEWA RIVER/BIG LK		I	J
	4.36	2.94	1434	2011 GOOSE ISLAND/STODDARD		I	J
	3.98	1.33	111	2011 WEAVER BOTTOMS			J
	7.15	4.48	4728	ALL			
yellow perch (fixed & random)	12.87	3.08	274	2013 UPPER POOL 5A		A	
	12.47	2.68	84	2014 CASSVILLE SLOUGH AREA	B	A	
	11.90	3.46	32	2013 RENO	B	A	C
	11.62	3.74	257	2013 UPPER POOL 6	B	D	A C
	11.35	3.21	239	2013 SNY MCGIL	B	D	E C
	11.12	3.49	352	2011 AMBRO		D	E C
	10.30	2.58	595	2011 COLD SPRG/BLKHWK/RONK	F	D	E
	10.12	2.82	304	2013 BERTOM/MCCARTNEY AREA	F		E
	9.46	3.98	105	2013 TREMPEALEAU LAKES	F		G
	8.51	4.46	152	2014 BUSSY LAKE/GLEN HAVEN	H		G
	8.13	4.19	387	2012 GOOSE CARCASS LAKE	H		I

SPECIES	MEAN	STD. DEV.	N	LAKE UNIT	DIFFERENT (means with the same letter are not Sign. Different)		
					H	I	J
	8.00	5.18	391	2014 ROBINSON/PETERSON/BEE	H	I	
	7.71	4.70	281	2014 BLACK RIVER CHANNEL	H	I	J
	7.56	4.35	413	2011 WEAVER BOTTOMS	H	I	J
	7.17	4.53	446	2012 UPPER POOL 5	K	I	J
	6.66	3.71	432	2012 LAKE ONALASKA	K	L	J
	6.01	4.27	325	2014 BELVIDERE/SPRING LAKE	K	L	M
	5.46	3.80	250	2013 LAWRENCE/TARGET	N	L	M
	5.27	3.27	673	2011 CHIPPEWA RIVER/BIG LK	N		M
	4.36	2.94	1434	2011 GOOSE ISLAND/STODDARD	N		
	7.65	4.50	7426	ALL			

TABLE 11. COMPARISON OF QUALITY AND PREFERRED PSS FOR SELECTED SPECIES FROM 2007-2014 LAKE UNITS WHERE COUNT OF STOCK WAS GREATER THAN OR EQUAL TO 100 AND OCCURRED IN THE 2014 BLACK RIVER CHANNEL LAKE UNIT. FALL ELECTRO FISHING. FIXED STATIONS.

Common Name	Lake Unit	Number of Stock	PSS q	PSS p
bluegill	2013 SNY MCGIL	124	60	2
bluegill	2013 TREMPLEAU LAKES	157	54	6
bluegill	2007 UPPER POOL 5	171	51	2
bluegill	2013 BERTOM/MCCARTNEY AREA	361	49	1
bluegill	2009 UPPER POOL 6	201	42	3
bluegill	2013 UPPER POOL 6	227	42	4
bluegill	2007 AMBRO	337	40	1
bluegill	2007 UPPER POOL 5A	383	40	2
bluegill	2011 CHIPPEWA RIVER/BIG LK	243	39	2
bluegill	2014 ROBINSON/PETERSON/BEE	312	36	2
bluegill	2008 SNY MCGIL	152	32	0
bluegill	2010 BUSSY LAKE/GLEN HAVEN	291	31	0
bluegill	2010 LOWER POOL 5A	264	31	2
bluegill	2008 TREMPLEAU LAKES	587	29	0
bluegill	2009 LAWRENCE/TARGET	303	28	2
bluegill	2011 WEAVER BOTTOMS	405	25	2
bluegill	2012 LAKE ONALASKA	116	24	1
bluegill	2012 UPPER POOL 5	210	24	2
bluegill	2007 COLD SPRG/BLKHWK/RONK	388	21	2
bluegill	2008 GOOSE CARCASS LAKE	243	21	2
bluegill	2010 CASSVILLE SLOUGH AREA	131	21	1
bluegill	2014 BLACK RIVER CHANNEL	241	20	1
bluegill	2008 ROBINSON/PETERSON/BEE	322	19	0
bluegill	2009 LANSING	181	19	1
bluegill	2007 GOOSE ISLAND/STODDARD	679	17	0
bluegill	2009 BERTOM/MCCARTNEY AREA	269	17	0
bluegill	2008 BELVIDERE/SPRING LAKE	166	16	1
bluegill	2008 LAKE ONALASKA	286	15	0
bluegill	2007 HARPERS	266	14	2
bluegill	2010 BLACK RIVER CHANNEL	587	14	0

TABLE 12. RELATIVE ABUNDANCE, MEAN CATCH PER HR, ELECTRO FISHING, FALL 2014 AND 2010, BLACK RIVER CHANNEL LAKE UNIT. FOR FIXED RUNS DONE BOTH IN 2010 AND 2014.

	SPECIES	2014						2010					
		FREQ.	PERCENT	MEAN PER HR	STND. DEV.	NO. OF RUNS	TOTAL HRS	FREQ.	PERCENT	MEAN PER HR	STND. DEV.	NO. OF RUNS	TOTAL HRS
1	bigmouth buffalo	1	0.1	0.8	2.5	9	1.450						
2	black crappie	5	0.3	3.3	10.0	9	1.450	1	0.1	0.7	2.0	9	1.503
3	bluegill	986	55.7	116.5	83.6	9	1.450	796	59.7	529.6	408.4	9	1.503
4	bowfin	13	0.7	3.9	6.3	9	1.450	7	0.5	4.7	11.9	9	1.503
5	brook silverside	5	0.3	1.5	4.4	9	1.450	3	0.2	2.0	6.0	9	1.503
6	channel catfish	1	0.1	0.4	1.2	9	1.450						
7	common carp	14	0.8	4.0	6.6	9	1.450	6	0.5	4.0	7.9	9	1.503
8	common shiner	7	0.4	1.2	3.5	9	1.450	4	0.3	2.7	6.1	9	1.503
9	emerald shiner	39	2.2	8.5	9.6	9	1.450	27	2.0	18.0	34.5	9	1.503
10	freshwater drum	1	0.1	0.7	2.2	9	1.450						
11	golden redhorse	4	0.2	3.5	8.5	9	1.450						
12	green sunfish	1	0.1					1	0.1	0.7	2.0	9	1.503
13	green sunfish x bluegill	1	0.1					1	0.1	0.7	2.0	9	1.503
14	largemouth bass	470	26.6	72.3	21.2	9	1.450	367	27.5	244.2	155.5	9	1.503
15	minnows & cyprinidae carps unsp.	5	0.3					5	0.4	3.3	6.1	9	1.503
16	northern pike	13	0.7	2.0	3.1	9	1.450	10	0.8	6.7	7.6	9	1.503
17	orangespotted sunfish	1	0.1					1	0.1	0.7	2.0	9	1.503
18	pirate perch	2	0.1					2	0.2	1.3	4.0	9	1.503
19	pumpkinseed	10	0.6					10	0.8	6.7	8.7	9	1.503
20	pumpkinseed x bluegill	1	0.1	0.7	2.2	9	1.450						
21	rock bass	3	0.2					3	0.2	2.0	3.0	9	1.503
22	sauger	5	0.3	3.2	6.3	9	1.450	1	0.1	0.7	2.0	9	1.503
23	shiners m20-29 m31-33 m35-40	35	2.0	5.9	17.8	9	1.450	27	2.0	18.0	45.1	9	1.503
24	shorthead redhorse	3	0.2	1.5	3.0	9	1.450	1	0.1	0.7	2.0	9	1.503
25	shortnose gar	1	0.1					1	0.1	0.7	2.0	9	1.503
26	silver redhorse	1	0.1	0.7	2.0	9	1.450						
27	smallmouth bass	6	0.3	4.5	11.3	9	1.450	1	0.1	0.7	2.0	9	1.503
28	spottail shiner	6	0.3	2.2	4.4	9	1.450	3	0.2	2.0	3.0	9	1.503
29	spotted sucker	38	2.1	15.5	22.8	9	1.450	7	0.5	4.7	7.2	9	1.503
30	tadpole madtom	5	0.3	0.4	1.2	9	1.450	4	0.3	2.7	8.0	9	1.503
31	walleye	4	0.2	2.7	6.1	9	1.450						
32	yellow perch	82	4.6	26.4	30.0	9	1.450	45	3.4	29.9	57.2	9	1.503
	ALL SPECIES	1769	100.0	282.3	92.3	9	1.450	1334	100.0	887.6	429.3	9	1.503

FIGURE 8. MEAN ANNUAL YOUNG-OF-THE-YEAR BLUEGILL CATCH PER HOUR FROM RANDOMLY SELECTED ELECTRO FISHING RUNS, FOR THE MISSISSIPPI RIVER BORDERING WISCONSIN, FALLS 2007-2014 (numbers are number of runs).

