

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-47

Name: Pudwell Lake

County (ies): Corson

Legal Description: T23N-R23W-Sec. 27 & 28

GPS: 45°55'18.18"N 101°15'58.01"W

Location from nearest town: 4 miles east of McIntosh

Date of present survey: June 4-6, 2013 (netting); October 16, 2013 (electrofishing); September 17, 2014 (electrofishing)

Date of last survey: July 6-8, 2010 (netting); September 28, 2010 (electrofishing)

Most recent lake management plan: F-21-R-40 (January 1, 2008 to December 31, 2012)

Management classification: Warmwater Semi-permanent

Primary Game Species	Secondary and Other Species
Largemouth Bass	Walleye
Black Crappie	Yellow Perch
	Northern Pike
	Black Bullhead

PHYSICAL DATA

Surface Area: 65 acres

Watershed: 5,760 acres

Maximum Depth: 17 feet

Mean Depth: 10 feet

Lake elevation at time of survey (field observations): 3 feet low

Contour map: No

Date: NA

Ownership of lake and adjacent lakeshore properties:

Pudwell Lake was created in 1938 with the construction of an earth-fill dam on Iron Dog Creek by the Works Progress Administration (WPA). Pudwell Lake is located on private land, but to allow for the building of the dam grade and creation of the lake, easement contracts to the State of South Dakota were signed allowing for the lake and a strip of land 12 feet above the high water contour for public use. These easements are recorded in the office of the Corson County Register of Deeds.

Watershed condition with percentages of land use types:

The watershed of Pudwell Lake is approximately 5,760 acres or 9 square miles mainly located to the north and west of the dam and is comprised of privately owned agricultural land and grassland. Land use in the watershed is estimated as 60% pasture, hay land or land enrolled in the conservation reserve program (CRP). The remaining 40% is cultivated farm ground, residences, roads and shelterbelts. The immediate shoreline is native grassland utilized as livestock pasture and a residence with a livestock feeding area.

Fishing access:

Shore fishing is allowed around the entire shoreline through an access easement to a strip of land 12 feet above the high water contour. There is also a boat ramp for water access.

Condition of all structures (i.e. spillway, boat ramps, level regulators, etc.):

There are no public use facilities found at Pudwell Lake. The dam grade is in good shape. The boat ramp was replaced in 2012. Most of the spillway is in good shape except for one wing wall where part of it has collapsed.

Field observations of aquatic vegetation condition:

Emergent vegetation, consisting mostly of rushes and cattails, surround the entire shoreline except for the dam grade. Submergent vegetation is found to a water depth of around 5 feet around most of the shoreline during the summer months and consists of a mixture of several different species of pondweeds.

CHEMICAL DATA**Field observations of water quality and pollution problems:**

No pollution problems were evident at the time of the survey. Water clarity is good with a secchi disc reading of 4 feet. Other water quality characteristics were measured in the field on June 4, 2013, using a HACH water quality kit and a Hanna multiparameter meter. Results are found in Table 1.

Presence of a thermocline and depth from surface: No

Station for water chemistry located on attached map: Yes

Table 1. Water chemistry results from Pudwell Lake, Corson County, June 4, 2013.

Station	Depth (ft)	Temp (F)	DO (ppm)	CO2 (ppm)	ALK (mg/L)	HRD (mg/L)	pH	Cond. (µS/cm)	TDS (ppm)	Sal.	ORP	Secchi (ft)
A	Surface	58.5	5.1	66.2	209	192	8.66	571	286	0.28	-260	4
A	16.0	60.0	5.0	68.4	264	174	9.02	591	296	0.29	-283	

BIOLOGICAL DATA

Methods:

Pudwell Lake was sampled on June 4-6, 2013, using ten overnight trap net sets. The trap nets have 3ft x 5ft frames, 60ft leads, and 3/4 inch knotted mesh. Two experimental gill nets were also set. The gill nets are 150ft x 6ft with 25ft panels of 1/2, 3/4, 1, 1-1/4, 1-1/2, and 2-inch monofilament mesh. On the evening of October 16, 2013, Pudwell Lake was electrofished for 40 minutes (4-ten minute transects) to sample the largemouth bass and walleye populations. The boat was set at 120 pulses per second of DC current at 340 volts and around 11 amps to electrofish the lake that had a conductivity of 512 $\mu\text{S}/\text{cm}$ with a water temperature of 44.9°F. No fish were sampled for the electrofishing survey part as the water temperatures were too cold to effectively sample as an early fall blizzard affected the area. On the evening of September 17, 2014, Pudwell Lake was electrofished for 60 minutes (6-ten minute transects) to sample the largemouth bass and walleye populations. The boat was set at 120 pulses per second DC current at 340 volts with around 12 amps to electrofish the lake that had a conductivity of 428 $\mu\text{S}/\text{cm}$ with a water temperature of 59.0°F. Fish indices and statistics were completed using Winfin.

Results and Discussion:

Gill net catch

Table 2. Total catch of two, 150ft experimental gill nets at Pudwell Lake, Corson County, June 4-6, 2013.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Northern Pike	6	75.0	3.0	± 3.1	1.0	100	33	83
Walleye	1	12.5	0.5	± 1.5	10.3	--	--	99
Yellow Perch	1	12.5	0.5	± 1.5	29.3	--	--	103

* Six year mean since the partial winterkill in 1993 (1996, 1998, 2001, 2004, 2007, 2010)

Trap Net Catch

Table 3. Total catch of ten, overnight ¾-inch frame nets at Pudwell Lake, Corson County, June 4-6, 2013.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	34	59.6	3.4	± 1.4	8.8	100	100	97
Bluegill	10	17.5	1.0	± 0.4	1.4**	100	100	117
Northern Pike	6	10.5	0.6	± 0.4	0.4	83	33	84
Walleye	3	5.3	0.3	± 0.2	3.3	--	--	80
Black Bullhead	2	3.5	0.2	± 0.2	1.7	--	--	106
Largemouth Bass	1	1.8	0.1	± 0.1	0.2	--	--	95
Smallmouth Bass	1	1.8	0.1	± 0.1	0.0***	--	--	93

* Six year mean since the partial winterkill in 1993 (1996, 1998, 2001, 2004, 2007, 2010)

** Two year mean from first sampling (2007, 2010)

*** First year sampled

Electrofishing Catch

Table 4. Total catch from six, ten-minute runs of fall nighttime electrofishing on Pudwell Lake, Corson County, September 17, 2014.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Largemouth Bass	43	63.2	43.0	± 36.0	41.2	65	59	119
Walleye	25	36.8	25.0	± 15.6	15.9	60	24	90

* Eight year mean (1986, 1990, 1996, 1998, 2001, 2004, 2007, 2010)

Largemouth Bass

Pudwell Lake continues to contain a quality largemouth bass population, although the size structure is on the small side. This electrofishing survey was done as a supplemental to the no data survey from the 2013 normal survey due to the very early fall blizzard that dropped water temperatures. The CPUE of 43.0 fish per hour was above the 37.0 from the 2010 survey (Table 11), but right on with the eight year mean of 41.2 (Table 4). Growth for this population continues to be good with means right on to slightly above statewide, regional and SLI means (Table 5). Figures 1 through 6 illustrate the length frequency histograms for the fish sampled from the last six surveys. The biggest downfall to this survey is the size structure is on the small side with the high number of fish at or below stock size compared to the adult population. The thought was that the adult population was under sampled due to the water levels being higher than normal and a lot of vegetation was flooded making it very difficult to get at the fish. Condition is good with a mean Wr of 119. No concerns are present with this population at this time and Pudwell Lake continues to be ranked as one of the top largemouth bass fisheries in management Region II.

Table 5. Average back-calculated lengths (mm) for each age class of largemouth bass sampled from Pudwell Lake, Corson County, 2014.

Year Class	Age	N	Back-calculated Age														
			1	2	3	4	5	6	7	8	9	10	11				
2013	1	26	93														
2012	2	2	91	144													
2011	3	1	127	231	303												
2007	7	5	122	228	311	360	387	404	425								
2006	8	1	169	265	344	392	411	420	431	436							
2005	9	3	117	183	277	319	356	379	404	427	437						
2003	11	1	76	195	263	320	365	388	419	429	445	461	470				
All Sizes		39	114	208	300	348	380	398	419	431	441	461	470				
Statewide Mean			96	182	250	305	342										
Region II Mean			105	183	246	296	328										
SLI* Mean			99	183	246	299	332										

*Small Lakes and Impoundments

Figure 1. Length frequency histogram for largemouth bass sampled from Pudwell Lake, Corson County, 2014.

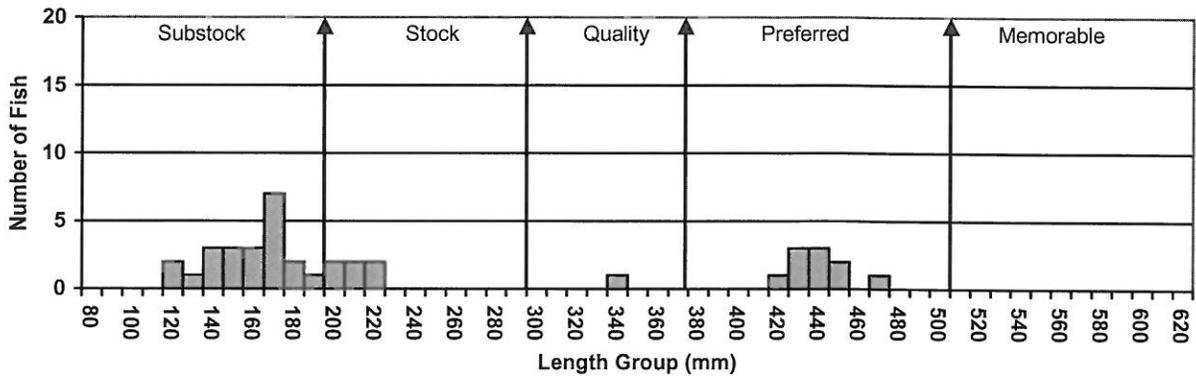


Figure 2. Length frequency histogram for largemouth bass sampled from Pudwell Lake, Corson County, 2010.

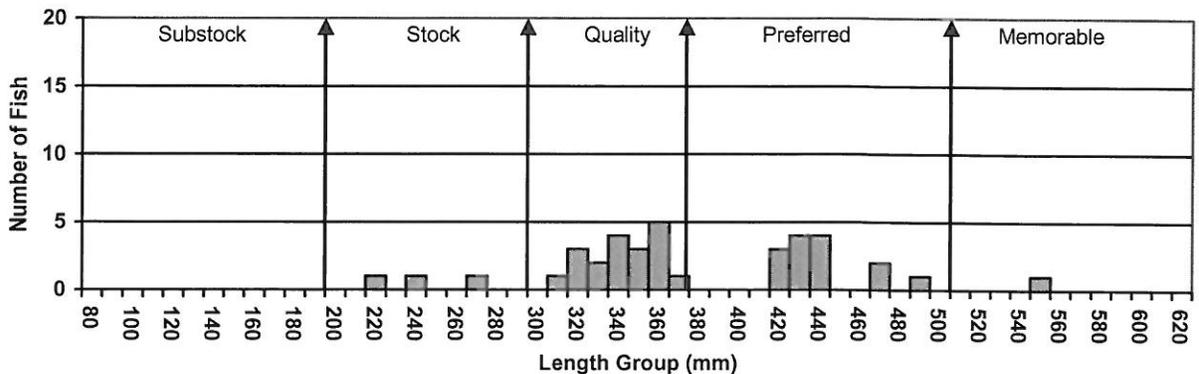


Figure 3. Length frequency histogram for largemouth bass sampled from Pudwell Lake, Corson County, 2007.

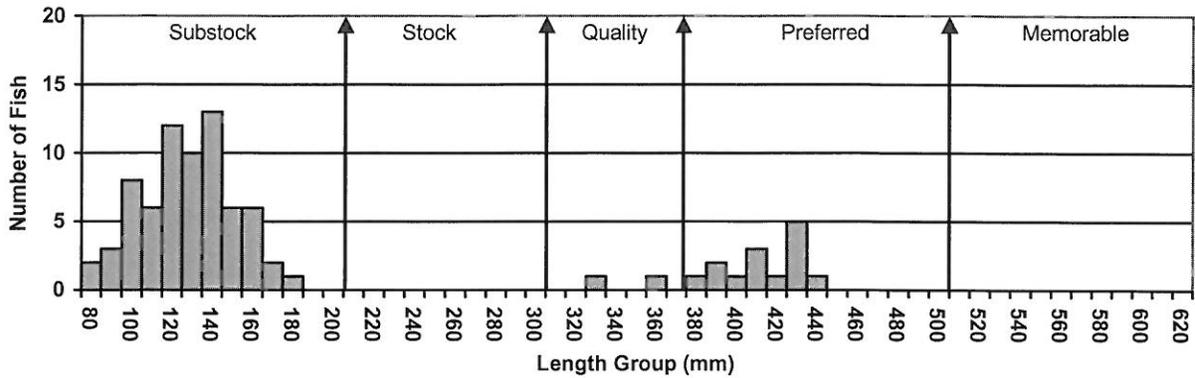


Figure 4. Length frequency histogram for largemouth bass sampled from Pudwell Lake, Corson County, 2004.

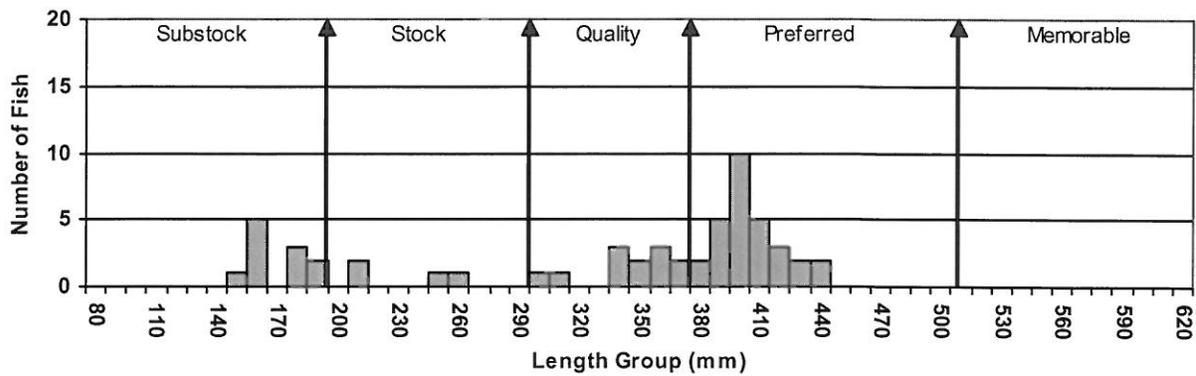


Figure 5. Length frequency histogram for largemouth bass sampled from Pudwell Lake, Corson County, 2001.

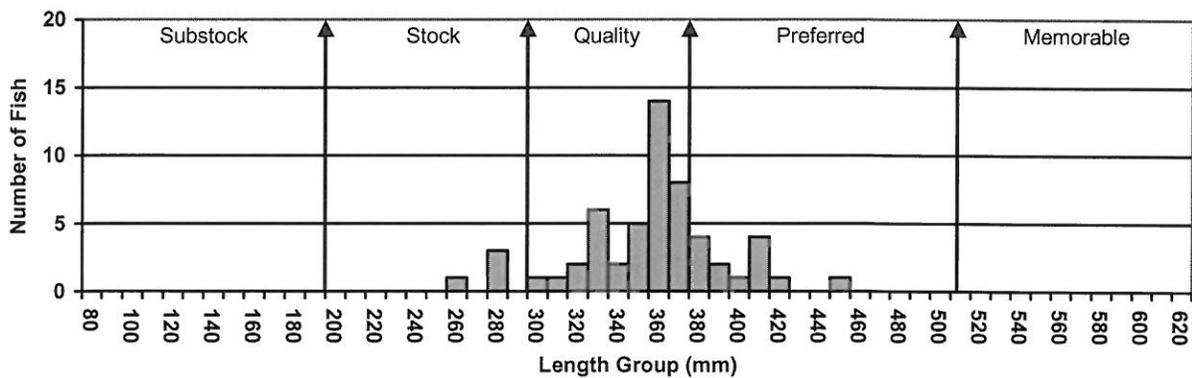
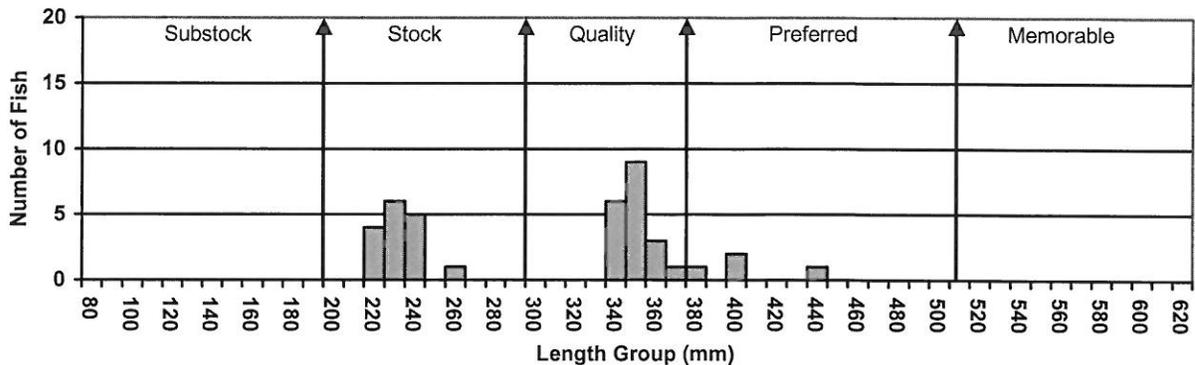


Figure 6. Length frequency histogram for largemouth bass sampled from Pudwell Lake, Corson County, 1998



Walleye

Pudwell Lake continues to contain a quality walleye population although the density in this survey was down. The gill net CPUE of 0.5 is below the 7.0 from the 2010 survey (Table 11) as well as the 10.3 six year mean (Table 2). The trap net CPUE of 0.3 is also below the 1.5 from the 2010 survey (Table 11) as well as the 3.3 six year mean (Table 3). The biggest reason for this decrease is more than likely to the cold water temperatures at the time of all the surveys. The fish were probably not in their normal summer patterns yet. Figures 7 through 12 illustrate the length frequency histograms for the fish sampled from the last six surveys. The main difference is the lack of numbers to compare this survey to the others. Growth is good with means right on with statewide, regional and SLI means (Table 6). Condition is good with a mean W_r of 90. Every other year stockings should continue to keep this popular fishery going.

Supplemental walleye data was collected during the fall electrofishing sampling that was done in 2014 to monitor the largemouth bass population as we were not totally confident on the numbers that were sampled in 2013 due to the off year for weather during the sampling periods. The CPUE for fall nighttime electrofishing was 25.0 fish per hour, which is slightly lower than the 34.0 from the 2010 survey (Table 11), but slightly above the 15.9 eight year mean (Table 4). Growth continues to be good with means right around statewide, regional and SLI means (Table 7). Condition is also good with a mean W_r of 90. Figure 6 illustrates the length frequency histogram for the fish sampled this fall and it can be compared to the fish sampled the six surveys prior by comparing it to Figures 7 through 12. Very minimal natural recruitment is occurring so the every other year stockings should continue to keep this very popular fishery going.

Table 6. Average back-calculated lengths (mm) for each age class of walleye sampled from Pudwell Lake, Corson County, 2013.

Year Class	Age	N	Back-calculated Age										
			1	2	3	4	5	6	7	8	9	10	
2011	2	1	170	276									
2005	8	2	182	309	380	444	479	511	526	540			
2003	10	1	201	338	433	467	489	545	574	599	610	615	
All Classes			184	308	407	456	484	528	550	570	610	615	
Statewide Mean			168	279	360	425	490						
Region II Mean			169	282	346	408	455						
SLI* Mean			176	271	384	431	483						

* Small Lakes and Impoundments

Table 7. Average back-calculated lengths (mm) for each age class of walleye sampled from Pudwell Lake, Corson County, 2014.

Year Class	Age	N	Back-calculated Age										
			1	2	3	4	5	6	7	8	9	10	
2013	1	10	218										
2011	3	9	182	307	419								
2008	6	1	185	324	425	449	483	517					
2006	8	3	198	297	385	451	491	516	553	576			
2004	10	2	186	313	395	421	448	469	492	503	517	525	
All Classes		25	194	310	406	441	474	501	522	540	517	525	
Statewide Mean			168	279	360	425	490						
Region II Mean			169	282	346	408	455						
SLI* Mean			176	271	384	431	483						

* Small Lakes and Impoundments

Figure 6. Length frequency histogram for walleye sampled from Pudwell Lake, Corson County, 2014.

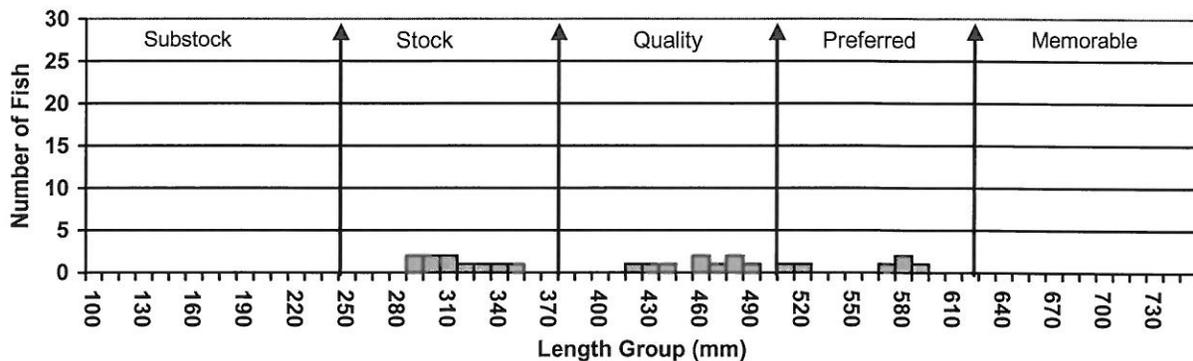


Figure 7. Length frequency histogram for walleye sampled from Pudwell Lake, Corson County, 2013.

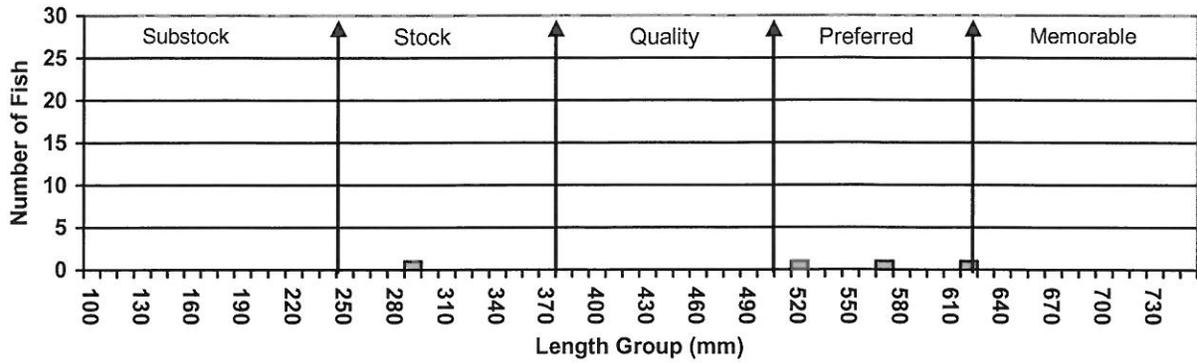


Figure 8. Length frequency histogram for walleye sampled from Pudwell Lake, Corson County, 2010.

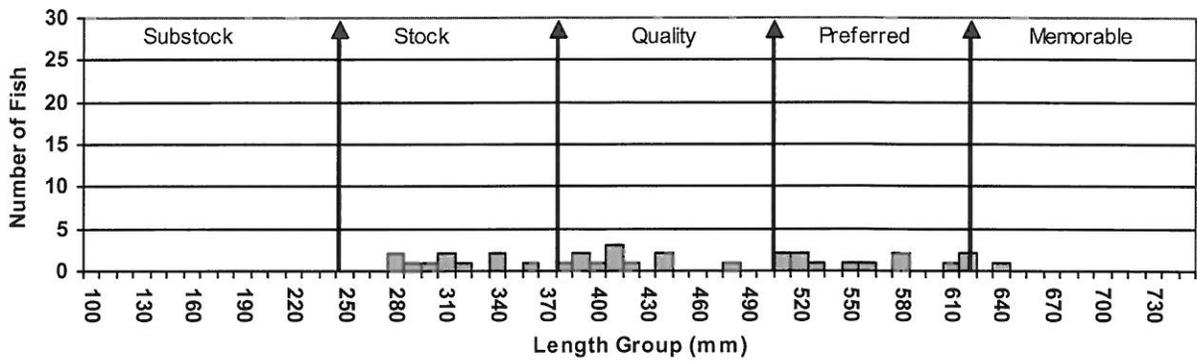


Figure 9. Length frequency histogram for walleye sampled from Pudwell Lake, Corson County, 2007.

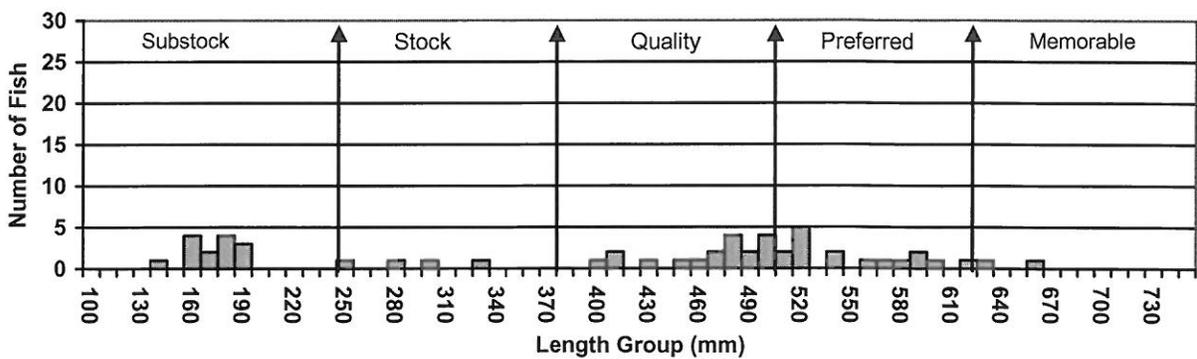


Figure 10. Length frequency histogram for walleye sampled from Pudwell Lake, Corson County, 2004.

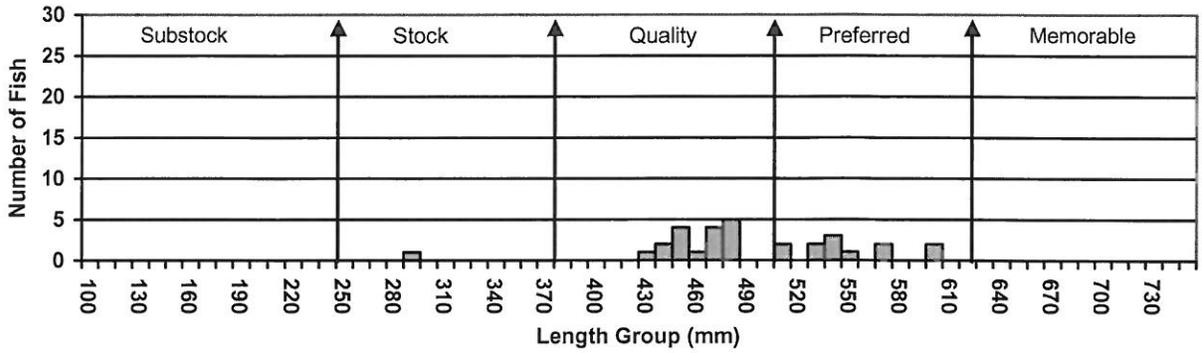


Figure 11. Length frequency histogram for walleye sampled from Pudwell Lake, Corson County, 2001.

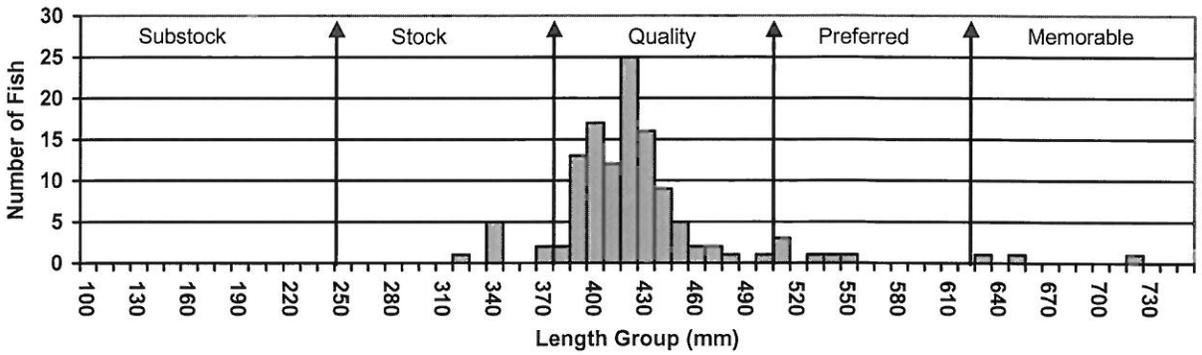
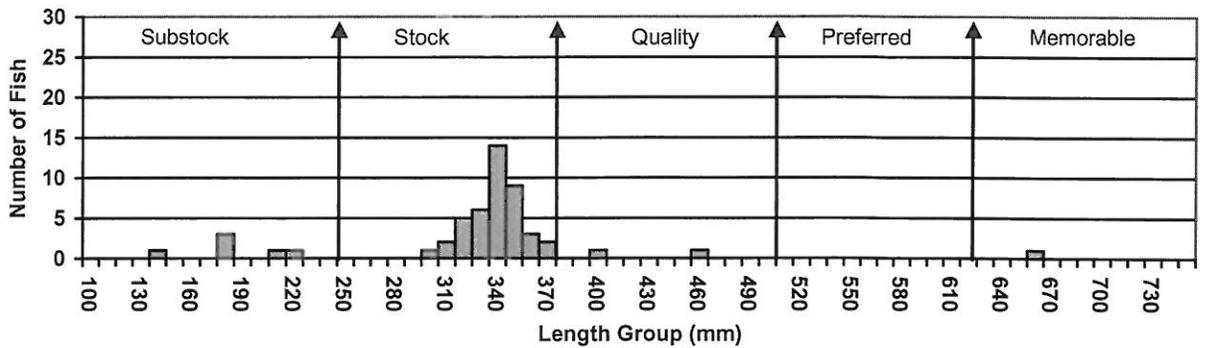


Figure 12. Length frequency histogram for walleye sampled from Pudwell Lake, Corson County, 1998.



Black Crappie

Pudwell Lake continues to contain a quality black crappie population. The trap net CPUE of 3.4 fish per net night is below the 13.5 from the 2010 survey (Table 11) as well as the 8.8 six year mean (Table 3). Figures 13 through 18 illustrate the length frequency histograms for the last six year of surveys. These figures show that the population does change size structures over time, but generally always contains fish of a desirable size to anglers. Growth is good with means right on with statewide, regional and SLI means (Table 8). Condition is also good with a mean Wr of 97. The actually density for this population might also be on the low side as water temperatures were low, which it is believed to cause catch rates to be lower than they actually were.

Table 8. Average back-calculated lengths (mm) for each age class of black crappie sampled from Pudwell Lake, Corson County, 2013.

Year Class	Age	N	Back-calculated Age											
			1	2	3	4	5	6	7	8	9	10	11	
2008	5	8	75	127	184	238	263							
2007	6	14	77	130	180	221	249	268						
2006	7	2	94	157	198	240	272	283	294					
2005	8	3	89	141	199	236	256	273	285	295				
2004	9	5	86	139	197	223	254	275	290	304	313			
2003	10	1	75	137	164	186	220	239	259	272	289	297		
2002	11	1	65	113	149	178	219	254	273	291	304	315	318	
All Classes		34	80	135	182	217	248	265	280	291	302	306	318	
Statewide Mean			83	147	195	229	249							
Region II Mean			75	132	177	209	235							
SLI* Mean			78	134	180	209	226							

* Small Lakes and Impoundments

Figure 13. Length frequency histogram for black crappie sampled from Pudwell Lake, Corson County, 2013.

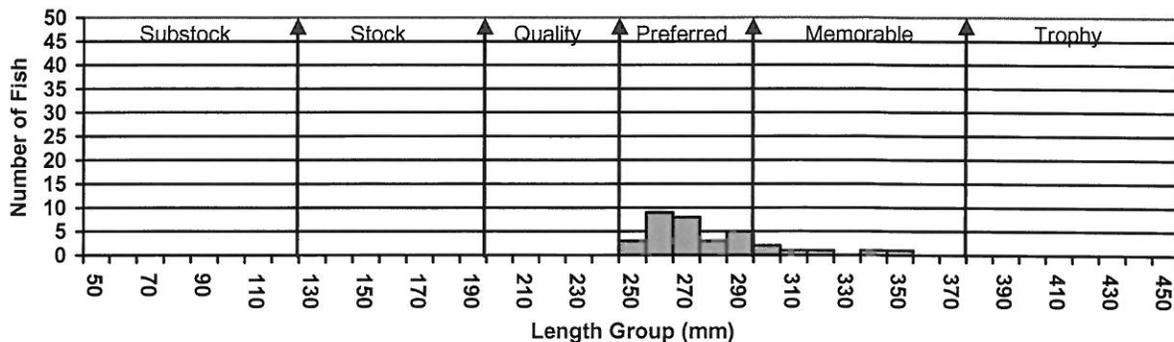


Figure 14. Length frequency histogram for black crappie sampled from Pudwell Lake, Corson County, 2010.

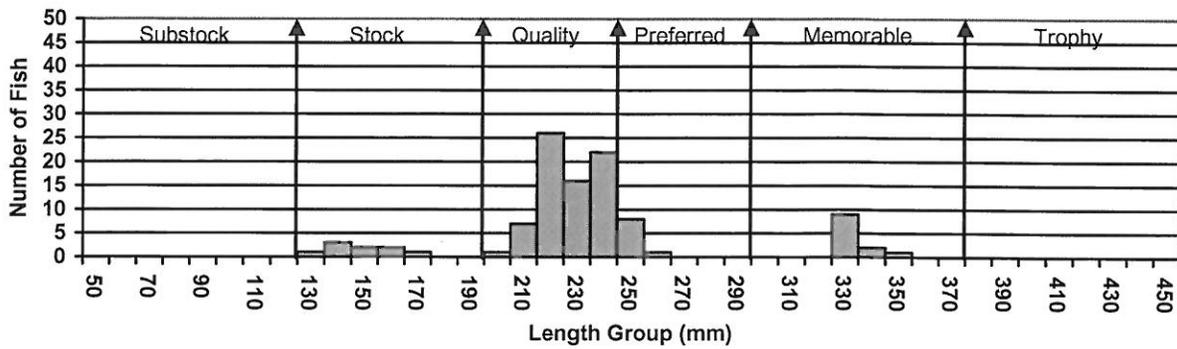


Figure 15. Length frequency histogram for black crappie sampled from Pudwell Lake, Corson County, 2007.

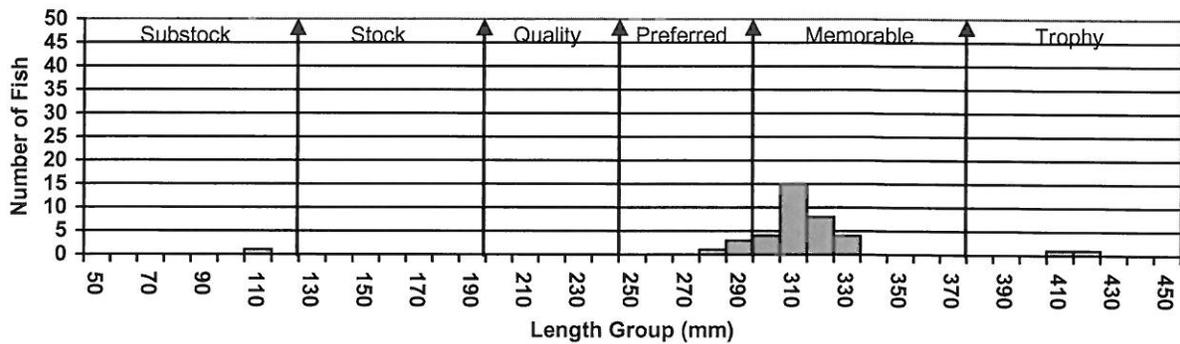


Figure 16. Length frequency histogram for black crappie sampled from Pudwell Lake, Corson County, 2004.

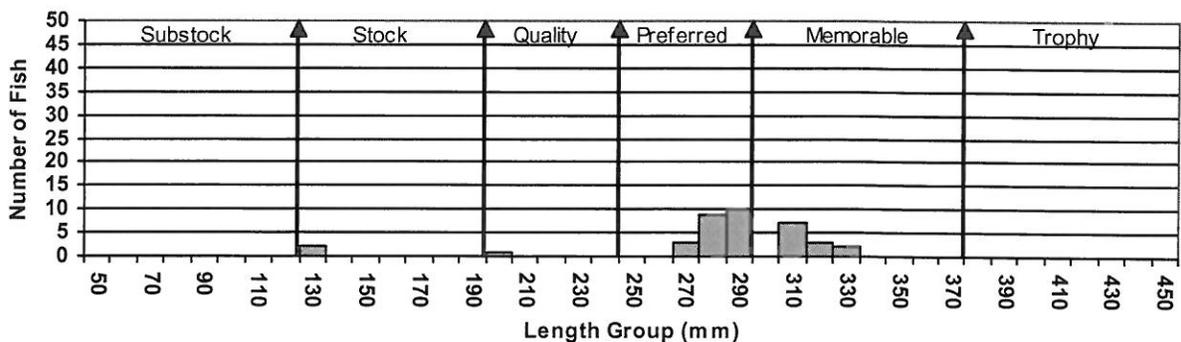


Figure 17. Length frequency histogram for black crappie sampled from Pudwell Lake, Corson County, 2001.

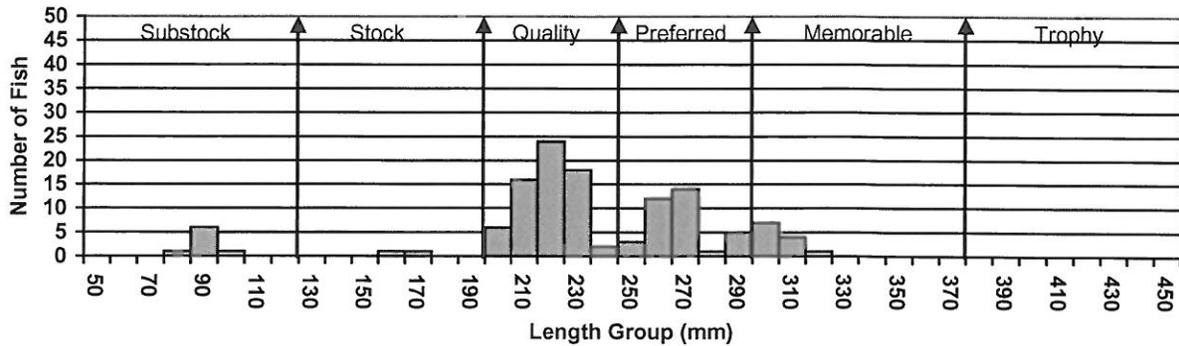
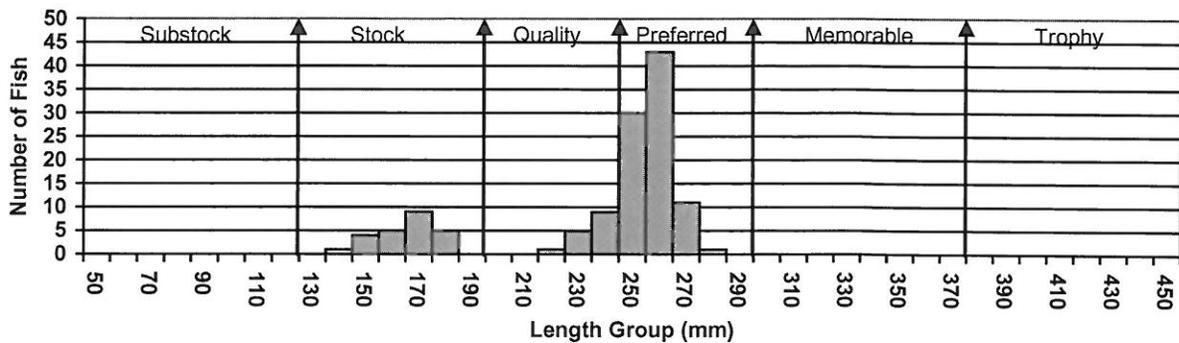


Figure 18. Length frequency histogram for black crappie sampled from Pudwell Lake, Corson County, 1998.



Bluegill

Bluegills are starting to become a dominant panfish species present in Pudwell Lake. The survey of 2007 was the first recorded sampling (Table 11). The current trap net CPUE was 1.0 fish per net night, which is slightly below the 2.3 from the 2010 survey (Table 11) and the 1.4 two year mean (Table 3). Here again the colder than normal water temperatures for the time of year probably influenced the catches to be lower than should be. Figures 19 and 20 illustrate the length frequency histograms for the past two surveys. The size structure has increased, but no young fish were sampled to show that this population may become self-sustaining. Growth is good with means at or above statewide, regional and SLI means (Table 9). Condition is good with a mean Wr of 117.

Table 9. Average back-calculated lengths (mm) for each age class of bluegill sampled from Pudwell Lake, Corson County, 2013.

Year Class	Age	N	Back-calculated Age							
			1	2	3	4	5	6	7	
2009	4	1	45	101	188	237				
2008	5	5	50	116	188	227	248			
2007	6	2	56	113	142	203	242	258		
2006	7	3	54	109	183	228	258	272	280	
All Classes		11	51	110	175	224	249	265	280	
Statewide Mean			55	103	141	166	180			
Region II Mean			52	97	134	164	180			
SLI* Mean			53	101	138	163	180			

* Small Lakes and Impoundments

Figure 19. Length frequency histogram for bluegill sampled from Pudwell Lake, Corson County, 2013.

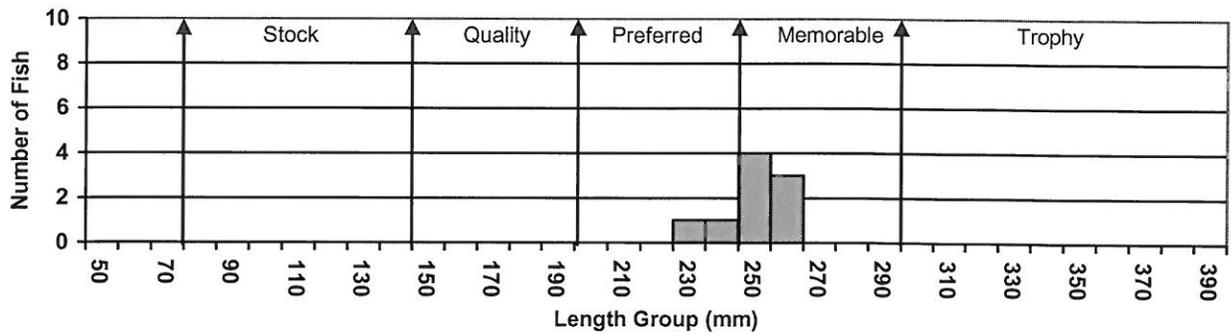
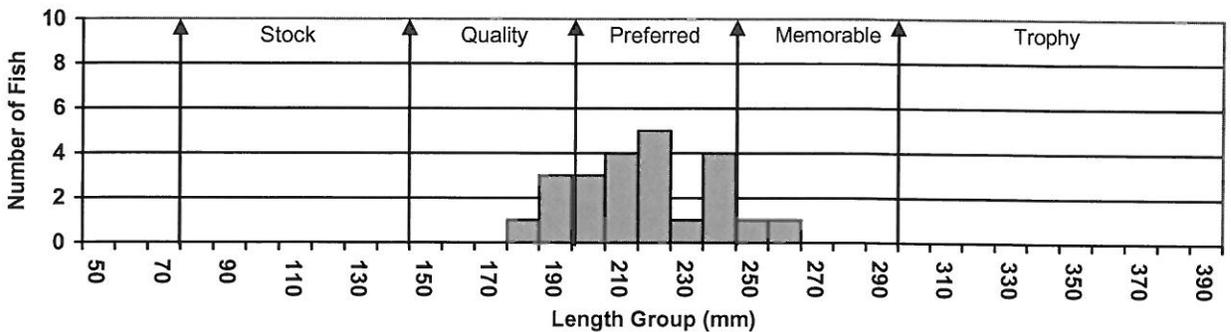


Figure 20. Length frequency histogram for bluegill sampled from Pudwell Lake, Corson County, 2010.



Other species

Northern pike, yellow perch, black bullhead, and smallmouth bass were the only other species sampled this survey period. They were all in too low of densities to really make any inferences about their populations. The biggest concern was the drastic decline in the yellow perch population. The gill net CPUE was only 0.5 compared to the 38.0 from the 2010 survey (Table 11) as well as the 29.3 six year mean (Table 2). Northern pike catches are about right on from past years.

All species were sampled that had been in years past (Table 11).

RECOMMENDATIONS

1. Resurvey in 2016 to continue to monitor the fish population.
2. Continue to stock walleye fingerlings every other to every third year to bolster the current walleye population.

Table 10. Stocking records for Pudwell Lake, Corson County, 1986 to current.

Year	Number	Species	Size
1986	5,600	Walleye	Fingerling
1987	20,000	Fathead Minnow	Adult
1988	5,600	Walleye	Fingerling
1989	4,000	Largemouth Bass	Fingerling
1990	2,000	Largemouth Bass	Fingerling
1991	4,000	Largemouth Bass	Fingerling
1993	110	Black Crappie	Adult
1993	10,000	Largemouth Bass	Fingerling
1994	6,500	Largemouth Bass	Fingerling
1995	302	Black Crappie	Adult
1995	3,250	Largemouth Bass	Fingerling
1997	1,625	Walleye	Fingerling
1999	1,625	Walleye	Fingerling
2004	2,790	Walleye	Fingerling
2006	1,710	Walleye	Large Fingerling
2008	1,300	Walleye	Large Fingerling
2013	920	Walleye	Large Fingerling

Table 11. Gill net (GN), trap net (TN), and electrofishing (EF) CPUE for all fish species sampled in Pudwell Lake since records can be found.

Species	1980	1985	1986	1990	1993	1996	1998	2001	2004	2007	2010	2013	2014
BLB (GN)	--	--	--	--	--	1.0	--	--	--	--	--	--	--
BLB (TN)	0.1	--	--	--	0.1	2.1	1.8	1.9	3.8	0.6	--	0.2	--
BLC (GN)	1.0	--	3.0	--	--	4.0	1.0	2.0	1.5	--	12.0	--	--
BLC (TN)	23.9	10.9	16.3	8.4	0.1	81.9	15.5	12.0	3.7	3.8	13.5	3.4	--
YEP (GN)	3.0	3.0	5.2	--	1.0	36.0	87.0	9.5	4.5	1.0	38.0	0.5	--
YEP (TN)	0.1	1.4	6.9	0.1	0.4	8.3	6.0	8.5	0.3	0.3	0.9	--	--
LMB (EF)	--	--	4.0	1.3	--	17.0	61.0	67.2	57.0	85.0	37.0	--	43.0
LMB (GN)	--	--	--	--	--	1.0	2.0	0.5	0.5	--	0.5	--	--
LMB (TN)	--	--	--	--	--	0.5	0.4	--	--	0.2	--	0.1	--
NOP (GN)	--	3.0	16.6	--	--	--	--	--	3.5	--	2.5	3.0	--
NOP (TN)	2.3	--	0.9	0.4	0.3	--	--	0.4	0.7	0.1	0.9	0.6	--
WAE (EF)	--	--	3.0	0.7	--	16.0	15.6	--	30.0	28.0	34.0	--	25.0
WAE (GN)	2.0	--	17.3	--	--	3.0	32.0	7.0	3.0	9.5	7.0	0.5	--
WAE (TN)	3.1	0.6	0.8	0.3	0.1	0.5	2.4	12.2	0.7	2.6	1.5	0.3	--
BLG (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--
BLG (TN)	--	--	--	--	--	--	--	--	--	0.4	2.3	1.0	--
SMB (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--
SMB (TN)	--	--	--	--	--	--	--	--	--	--	--	0.1	--

BLB – Black Bullhead, BLC – Black Crappie, YEP – Yellow Perch, LMB – Largemouth Bass, NOP – Northern Pike, WAE – Walleye, BLG – Bluegill, SMB – Smallmouth Bass