

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

## 2102-F-21-R-46

**Name:** Cottonwood Lake **County(ies):** Sully

**Legal Description:** T119N-R75W-Sec. 19, 20, 29, 30

**GPS:** 44°49'51.39"N 99°55'04.07"W

**Location from nearest town:** 8.5 miles east of Agar

**Date of present survey:** June 24-26, 2013 (netting)

**Date of last survey:** July 25-27, 2011 (netting)

**Most recent lake management plan:** F-21-R-41 (January 1, 2009 to December 31, 2013)

**Management classification:** Warmwater Semi-permanent

Primary Game Species	Secondary and Other Species
Walleye	Largemouth Bass
Yellow Perch	Black Bullhead
Northern Pike	Common Carp
Black Crappie	Bluegill
	Fathead Minnow

### PHYSICAL DATA

**Surface Area:** 454 acres

**Watershed:** 46,720 acres

**Maximum Depth:** 18 feet

**Mean Depth:** 9 feet

**Lake elevation at time of survey (field observations):** 1.5 feet low

**Contour map:** Yes

**Date:** 1973

### **Ownership of lake and adjacent lakeshore properties:**

Cottonwood Lake is one of a few natural bodies of water that provide a fishery in north central South Dakota. The 454-acre lake is located eight and one half miles east of the town of Agar in northeastern Sully County. The State of South Dakota, Department of Game, Fish and Parks owns 160 acres on the northwest corner of the lake that is managed as a Game Production Area.

### **Watershed condition with percentages of land use types:**

The Cottonwood Lake watershed consists of approximately 47,000 acres or seventy-three and one half square miles and is located primarily north and east of the lake. Okobojo Creek comprises sixty percent of the watershed and the remaining forty percent is composed of small unnamed tributaries. The immediate shoreline at Cottonwood Lake is native grasses, a road grade, a narrow row of trees with cultivated agricultural land, and marsh areas. The remainder of the watershed is composed of approximately 60% cultivated cropland, 38% native grasses utilized as pasture and hayland, and 2% tree belts and wintering areas for cattle.

**Fishing access:**

There is good access to the water via a new boat ramp. There is also ample shoreline access for shore anglers. Vegetation is usually not a problem on Cottonwood Lake.

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

The boat ramp was just replaced in 2006. The dock is in good condition. There is also a unisex toilet located at the boat ramp site, which is in good condition.

**Field observations of aquatic vegetation condition:**

There was very little submergent vegetation found in the lake. It was confined to the marshy areas on the east and west ends of the lake. The marshy areas are also the main location for the emergent vegetation around the shoreline. The emergents are mainly composed of cattails and bulrushes.

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

No pollution problems were evident at the time of the survey, although bluegreen algae frequently invades the lake during the summer months. Water clarity is good with a secchi disc reading of 3.0 feet. Other water quality characteristics were measured in the field on June 24, 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 Cottonwood Lake, Sully County, June 24, 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	72.4	3.89	64.2	350	--	8.55	3002	1501	1.57	-222.2	3.0
A	14.5	72.8	3.33	63.8	330	--	8.56	2995	1496	1.56	-223.6	

**BIOLOGICAL DATA****Methods:**

Cottonwood Lake was sampled on June 24-26, 2013, with twelve overnight trap net sets. The trap nets have 3ft x 5ft frames, 60ft leads, and ¾ inch knotted mesh. Four experimental gill nets were also set. The gill nets are 150ft x 6ft with 25ft panels of ½, ¾, 1, 1-1/4, 1-1/2, and 2 inch monofilament mesh. No electrofishing was completed this survey. Fish indices and statistics were completed using Winfin.

## Results and Discussion:

### Gill net catch

**Table 2.** Total catch of four, 150ft experimental gill nets at Cottonwood Lake, Sully County, June 24-26, 2013.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Common Carp	69	37.1	17.3	± 3.6	4.7	9	2	96
Black Bullhead	45	24.2	11.3	± 6.5	12.2	2	0	88
Walleye	33	17.7	8.3	± 2.2	10.6	45	0	76
Yellow Perch	31	16.7	7.8	± 2.7	10.8	94	6	94
Northern Pike	8	4.3	2.0	± 1.2	0.7	88	0	82

\* Nineteen year mean (1980, 1983, 1985, 1991-2001, 2003, 2004, 2007, 2010, 2011)

### Trap Net Catch

**Table 3.** Total catch of twelve, overnight ¾-inch frame nets at Cottonwood Lake, Sully County, June 24-26, 2013.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	416	57.2	41.6	± 8.4	137.6	15	2	78
Walleye	134	18.4	13.4	± 2.4	3.8	28	0	73
Black Crappie	66	9.1	6.6	± 1.5	32.0	45	14	105
Common Carp	50	6.9	5.0	± 2.2	7.1	35	4	93
Yellow Perch	30	4.1	3.0	± 0.9	12.0	100	20	92
Northern Pike	18	2.5	1.8	± 0.4	0.5	83	6	85
Smallmouth Bass	11	1.5	1.1	± 0.5	0.2**	18	0	86
White Sucker	2	0.3	0.2	± 0.2	0.3	--	--	98

\* Twenty-nine year mean (1959, 1962-1963, 1965, 1968, 1970-1971, 1974, 1977, 1980, 1983, 1985, 1988, 1991-2001, 2003, 2004, 2007, 2010, 2011)

\*\* Three year mean (2007, 2010, 2011; first stocked in 2005)

### Walleye

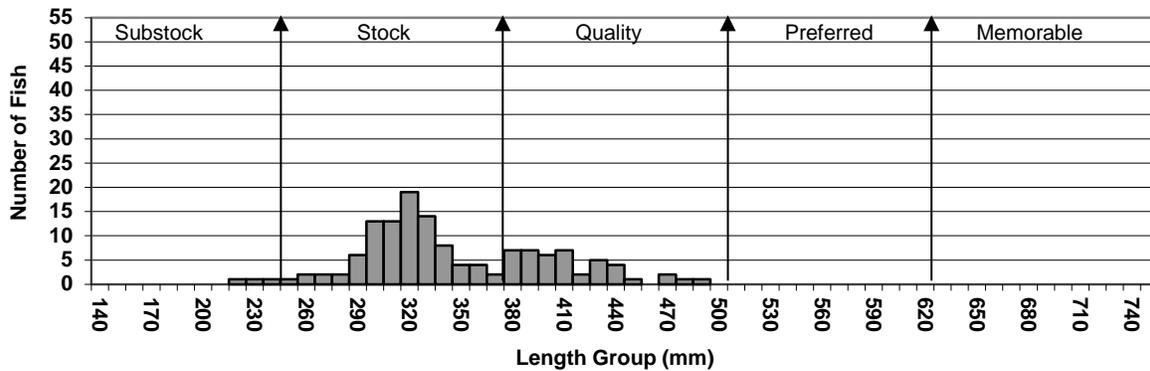
Cottonwood Lake continues to contain a quality walleye population. The gill net CPUE of 8.3 fish per net night is below the 44.3 from the 2011 survey (Table 10) as well as the 10.6 nineteen year mean (Table 2). The trap net CPUE of 13.4 is also below the 17.0 from the 2011 survey (Table 10), but is above the 3.8 twenty-nine year mean (Table 3). Fishing pressure has been high the last couple years, which more than likely accounts for the reduced catches. Figures 1 through 9 illustrate the length frequency histograms for the last nine surveys. Size structure has remained relatively similar with a PSD of 32 compared to the PSD of 30 in 2011. Growth is good with means right around statewide, regional and SLI means (Table 4). Condition is fair with a mean Wr of 75.

**Table 4.** Average back-calculated lengths (mm) for each age class of walleye sampled from Cottonwood Lake, Sully County, 2013.

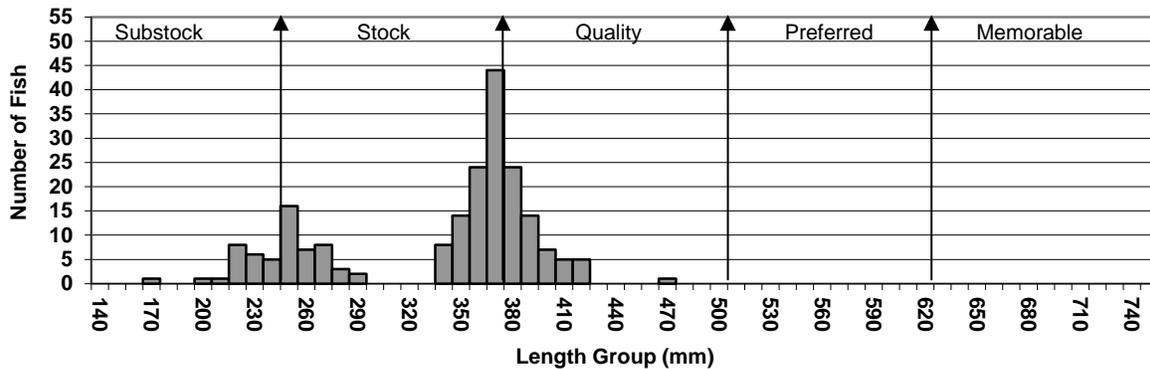
Year Class	Age	N	Back-calculated Age			
			1	2	3	4
2011	2	91	172	297		
2010	3	24	177	327	382	
2009	4	20	185	343	392	429
<b>All Classes</b>		<b>135</b>	<b>178</b>	<b>322</b>	<b>387</b>	<b>429</b>
Statewide Mean			168	279	360	425
Region II Mean			169	282	346	408
SLI* Mean			176	271	384	431

\* Small Lakes and Impoundments

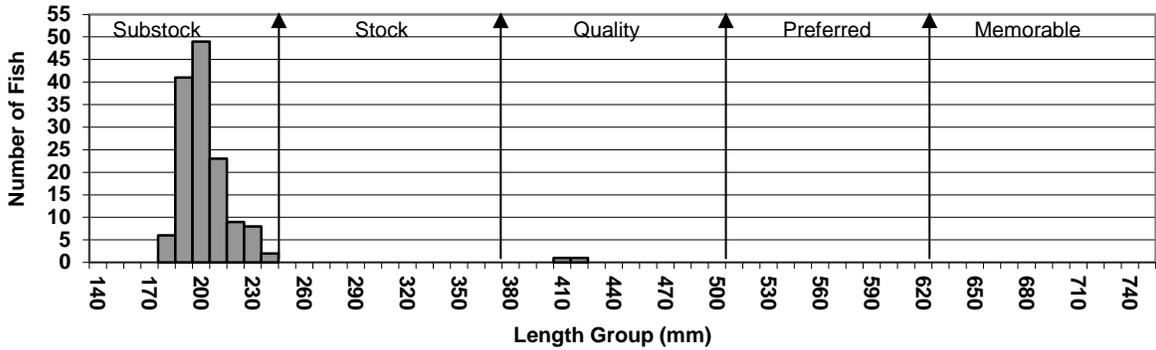
**Figure 1.** Length frequency histogram for walleye sampled from Cottonwood Lake, Sully County, 2013.



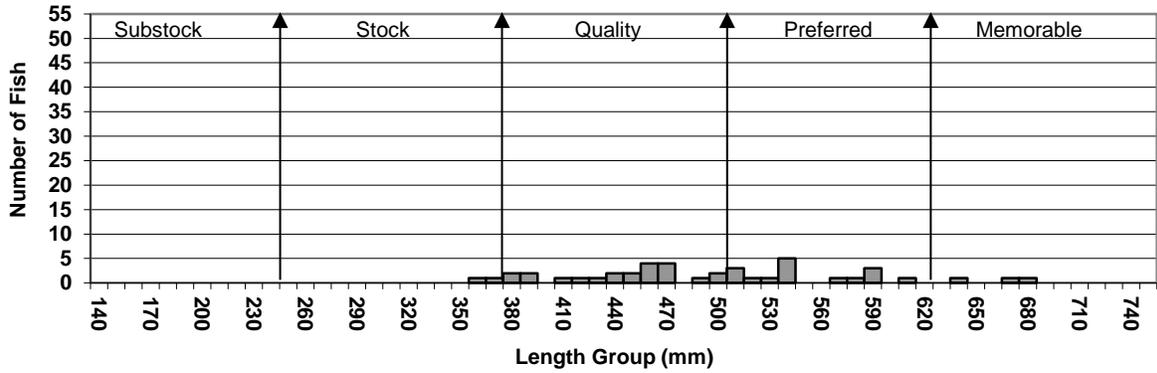
**Figure 2.** Length frequency histogram for walleye sampled from Cottonwood Lake, Sully County, 2011.



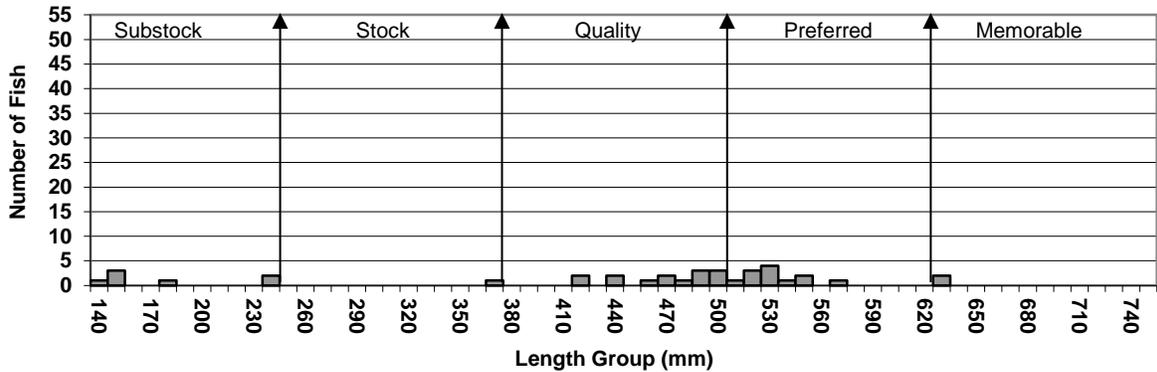
**Figure 3.** Length frequency histogram for walleye sampled from Cottonwood Lake, Sully County, 2010.



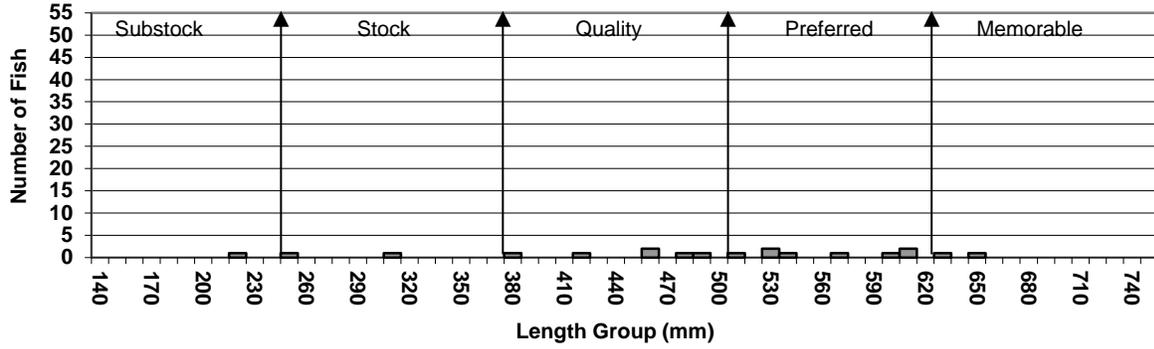
**Figure 4.** Length frequency histogram for walleye sampled from Cottonwood Lake, Sully County, 2007.



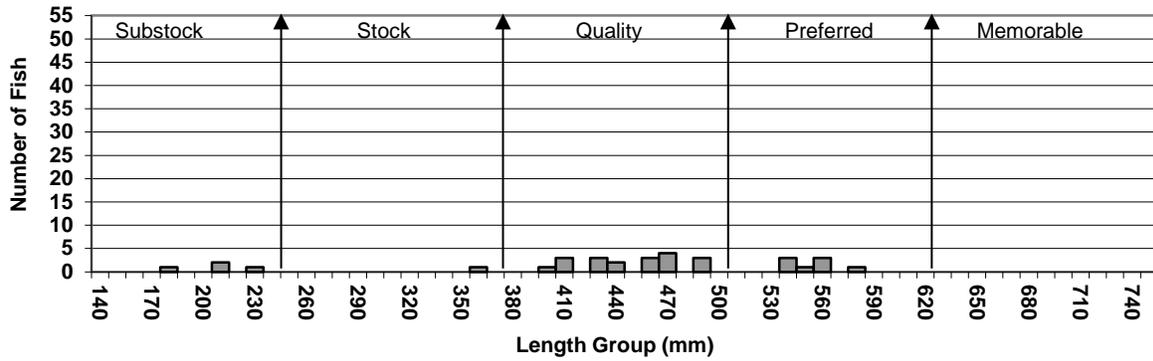
**Figure 5.** Length frequency histogram for walleye sampled from Cottonwood Lake, Sully County, 2004.



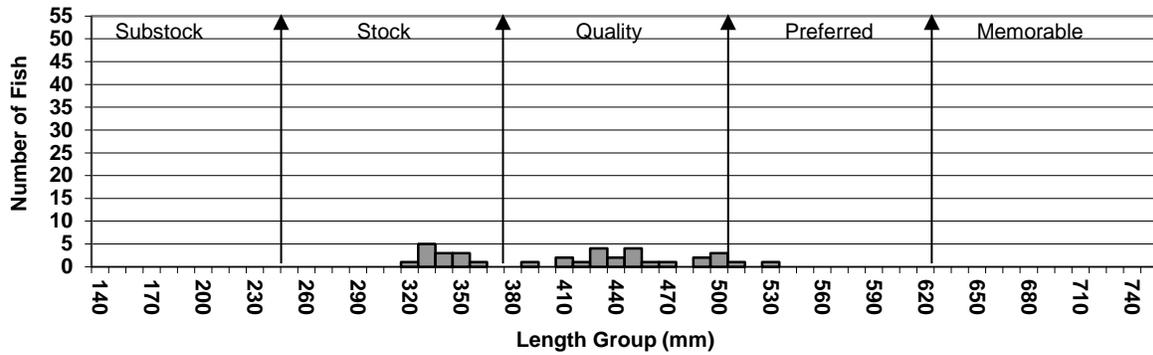
**Figure 6.** Length frequency histogram for walleye sampled from Cottonwood Lake, Sully County, 2003.



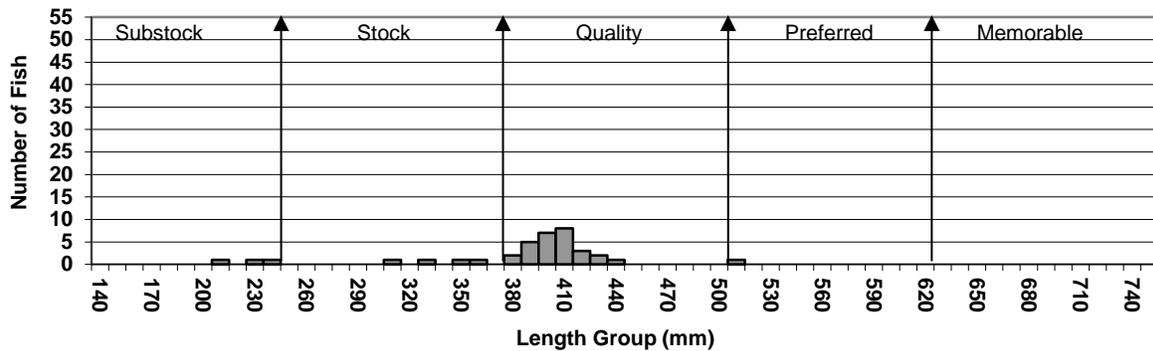
**Figure 7.** Length frequency histogram for walleye sampled from Cottonwood Lake, Sully County, 2000.



**Figure 8.** Length frequency histogram for walleye sampled from Cottonwood Lake, Sully County, 1999.



**Figure 9.** Length frequency histogram for walleye sampled from Cottonwood Lake, Sully County, 1998.



### **Yellow Perch**

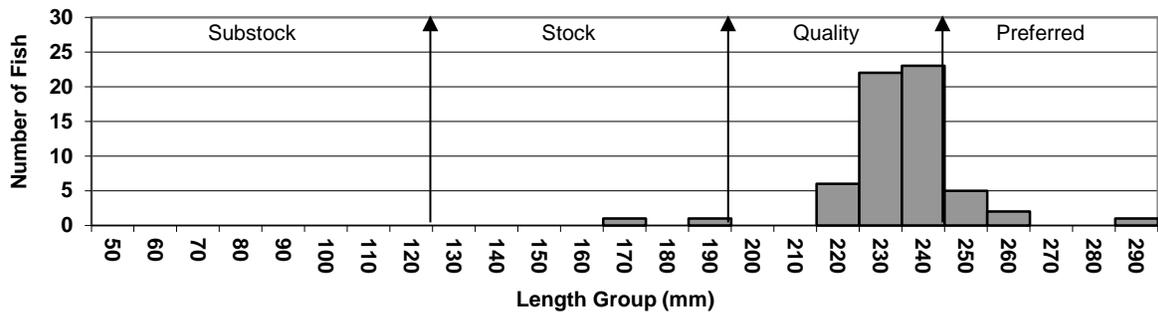
Cottonwood Lake continues to contain a good yellow perch population. The gill net CPUE of 7.8 is above the 6.0 from the 2011 survey (Table 10) but below the 10.8 nineteen year mean (Table 2). The trap net CPUE of 3.0 is below the 12.5 from the 2011 survey (Table 3) as well as the 12.0 twenty-nine year mean (Table 3). Figures 10 through 12 illustrate the length frequency histograms for the last three surveys. Size structure has improved with a PSD of 97 compared to the PSD of 15 from the 2011 survey. Growth is good with means right on with statewide, regional and SLI means (Table 5). Condition is good with a mean Wr of 93.

**Table 5.** Average back-calculated lengths (mm) for each age class of yellow perch sampled from Cottonwood Lake, Sully County, 2013.

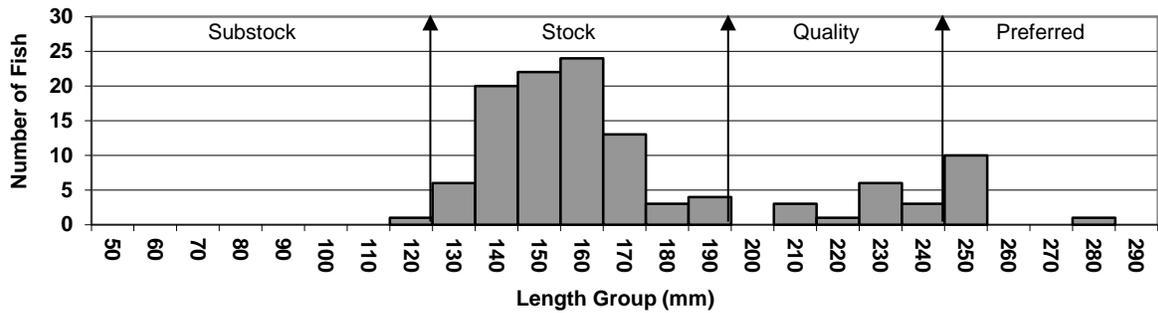
Year Class	Age	N	Back-calculated Age					
			1	2	3	4	5	6
2011	2	2	99	153				
2010	3	57	104	195	232			
2008	5	1	104	136	203	265	184	
2007	6	1	75	109	144	196	228	247
<b>All Classes</b>			<b>96</b>	<b>148</b>	<b>193</b>	<b>231</b>	<b>206</b>	<b>247</b>
Statewide Mean			86	145	190	220	242	
Region II Mean			91	152	196	219	242	
SLI* Mean			87	142	185	205	219	

\* Small Lakes and Impoundments

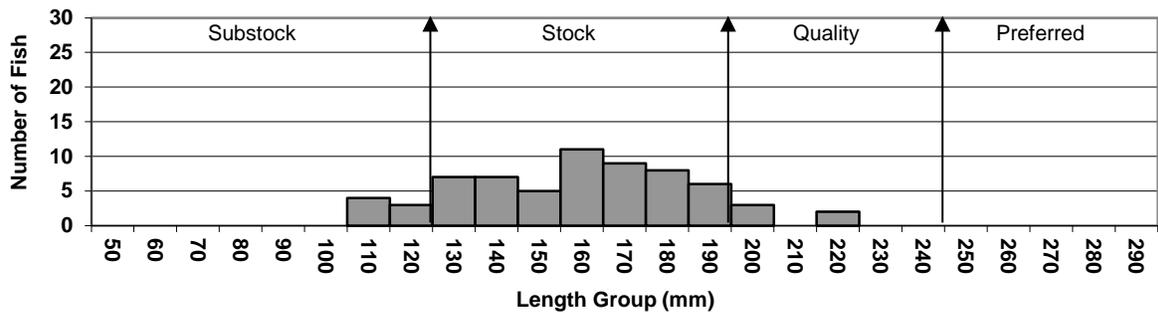
**Figure 10.** Length frequency histogram for yellow perch sampled from Cottonwood Lake, Sully County, 2013.



**Figure 11.** Length frequency histogram for yellow perch sampled from Cottonwood Lake, Sully County, 2011.



**Figure 12.** Length frequency histogram for yellow perch sampled from Cottonwood Lake, Sully County, 2010.



## Black Crappie

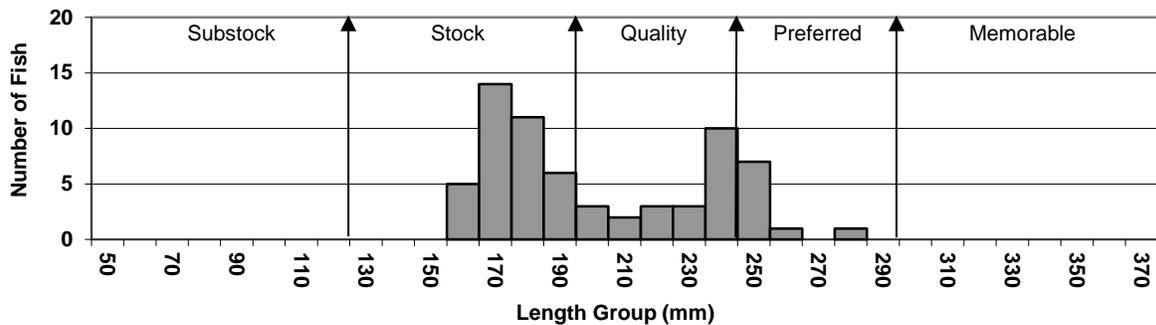
Black crappies are once again making a fishable presence in Cottonwood Lake. The trap net CPUE of 6.6 fish per net night is above the 0.3 from the 2011 survey (Table 10), but still well below the 32.0 twenty-nine year mean (Table 3). Figure 13 illustrates the length frequency histogram for the fish sampled from this survey. Some fish are reaching the size that is desirable to anglers. Growth is good with mean right on with statewide, regional and SLI means (Table 6). Condition is good with a mean Wr of 105.

**Table 6.** Average back-calculated lengths (mm) for each age class of black crappie sampled from Cottonwood Lake, Sully County, 2013.

Year Class	Age	N	Back-calculated Age					
			1	2	3	4	5	6
2011	2	26	84	170				
2010	3	18	85	136	187			
2009	4	12	92	141	207	236		
2008	5	8	85	130	180	222	246	
2007	6	2	94	148	193	227	239	253
<b>All Classes</b>		<b>66</b>	<b>88</b>	<b>145</b>	<b>192</b>	<b>228</b>	<b>243</b>	<b>253</b>
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 Cottonwood Lake, Sully County, 2013.



## Other Species

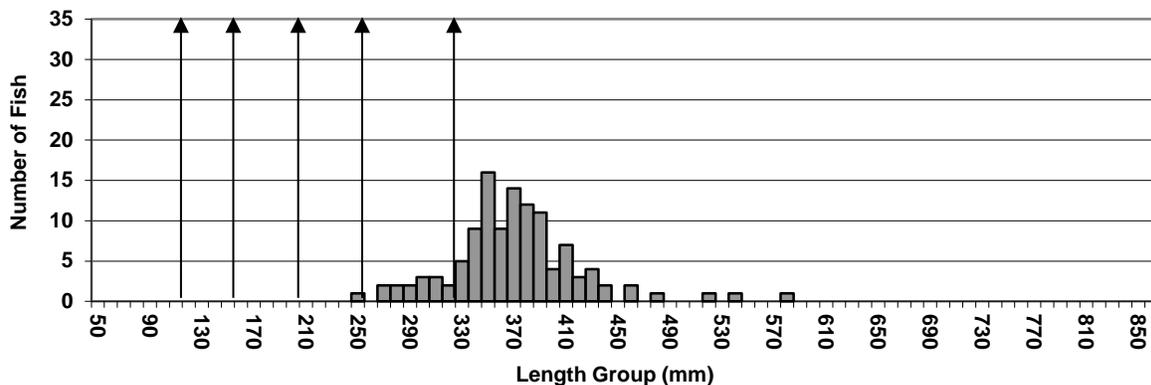
Common carp, black bullhead, northern pike, smallmouth bass, and white sucker were the only other species sampled this survey. Largemouth bass, channel catfish, bluegill, green sunfish, orangespotted sunfish, and hybrid sunfish were the species not sampled this survey that had been in surveys past (Tables 9 and 10).

Common carp were the dominant species sampled in the gill nets this survey. The gill net CPUE of 17.3 was about right on with the 16 from the 2011 survey (Table 10) but above the 4.7 nineteen year mean (Table 2). The trap net CPUE of 5.0 was well below the 62.3 from the 2011 survey (Table 10) but pretty close to the 7.1 twenty-nine year mean (Table 3). Figures 14 through 16 illustrate the length frequency histogram for the fish sampled that past three surveys. Size structure continues to increase with most of the fish in the trophy category. Condition is good with a mean  $W_r$  of 95.

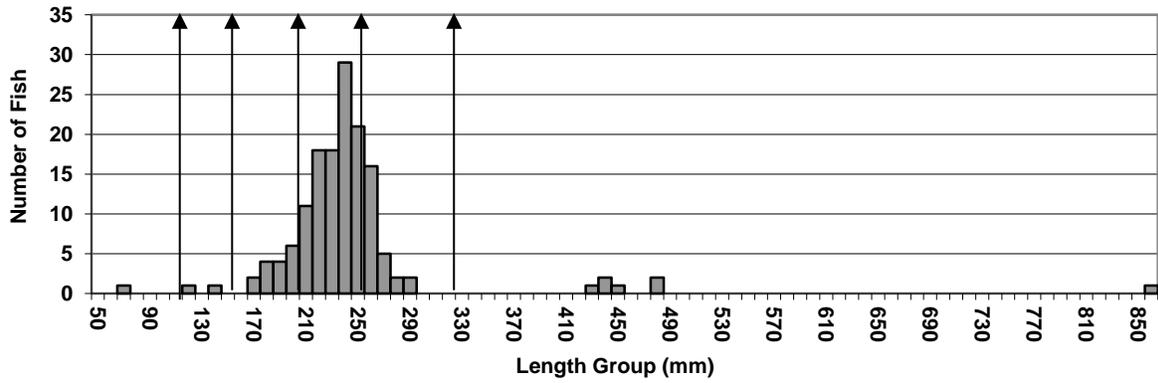
Black bullheads were the dominant species sampled this survey. The trap net CPUE of 41.6 is well above the 4.8 from the 2011 survey (Table 10) but still well below the 137.6 twenty-nine year mean (Table 3). The gill net CPUE of 11.3 is also above the 8.0 from the 2011 survey (Table 10) but about right on with 12.2 nineteen year mean (Table 2). Figures 17 through 19 illustrate the length frequency histograms for the last three surveys with size structure remaining relatively similar the last couple years. Condition is fine with a mean  $W_r$  of 83.

Smallmouth bass were the only others species sampled this survey that were worth noting. The trap net CPUE of 1.1 fish per net night is up from the 0.0 from the 2011 survey (Table 10) as well as the 0.2 three year mean. This population is small yet as it is in the building phase as they were first stocked in 2005. Most of the initial stocking did not survive due to drought conditions, but another stocking was made in 2007 and 2012 to try to build this population. It will be interesting to see what happens over the next couple surveys. Figure 20 illustrates the length frequency histogram for the fish sampled this survey. Growth is good with means right around statewide, regional and SLI means (Table 7). Condition is good with a mean  $W_r$  of 86.

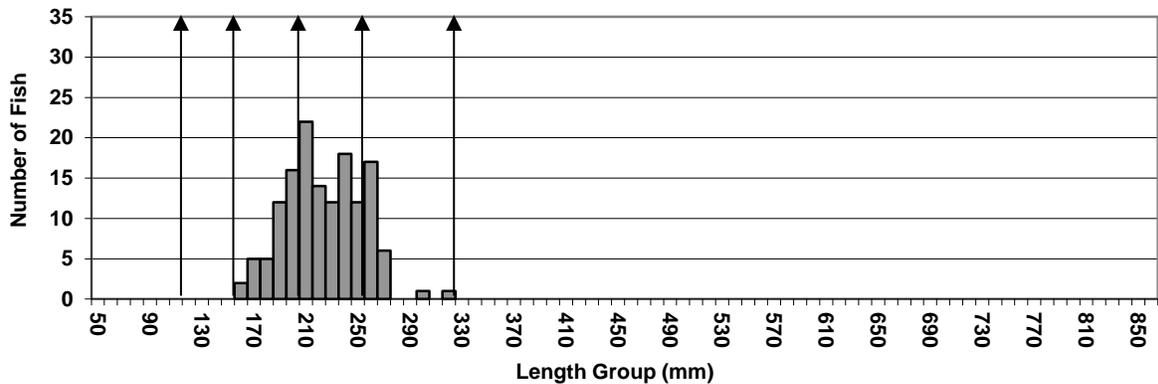
**Figure 14.** Length frequency histogram for common carp sampled from Cottonwood Lake, Sully County, 2013.



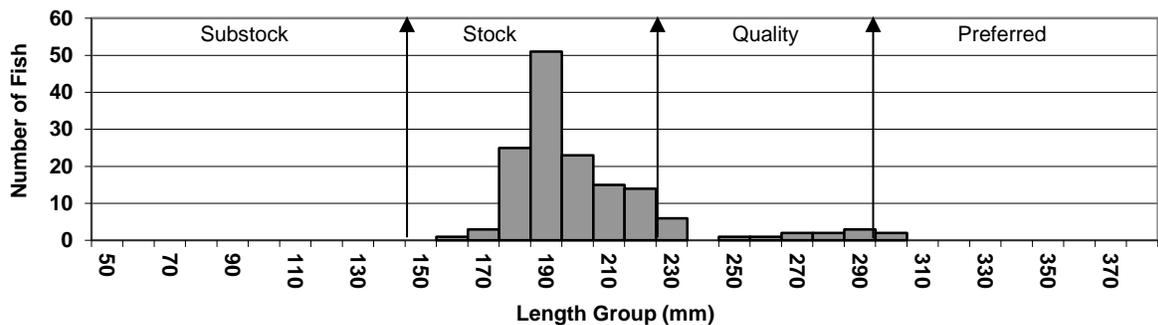
**Figure 15.** Length frequency histogram for common carp sampled from Cottonwood Lake, Sully County, 2011.



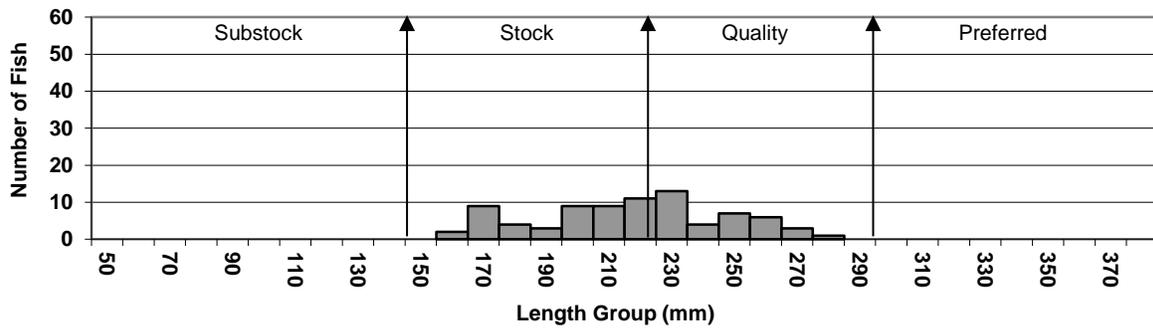
**Figure 16.** Length frequency histogram for common carp sampled from Cottonwood Lake, Sully County, 2010.



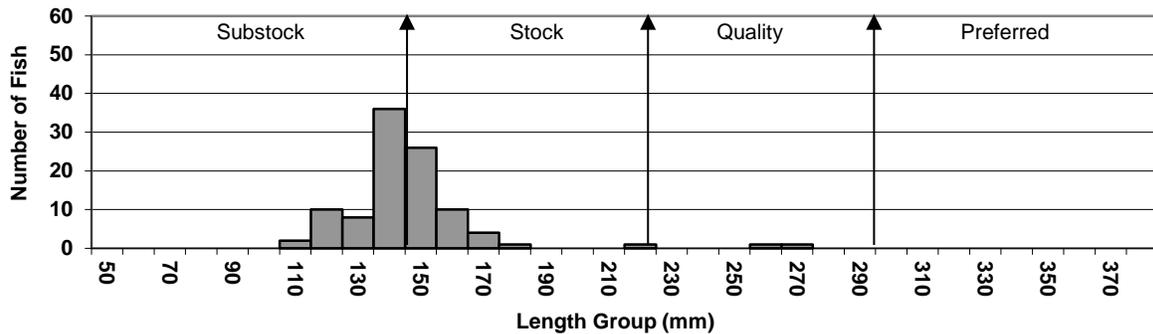
**Figure 17.** Length frequency histogram for black bullhead sampled from Cottonwood Lake, Sully County, 2013.



**Figure 18.** Length frequency histogram for black bullhead sampled from Cottonwood Lake, Sully County, 2011.



**Figure 19.** Length frequency histogram for black bullhead sampled from Cottonwood Lake, Sully County, 2010.

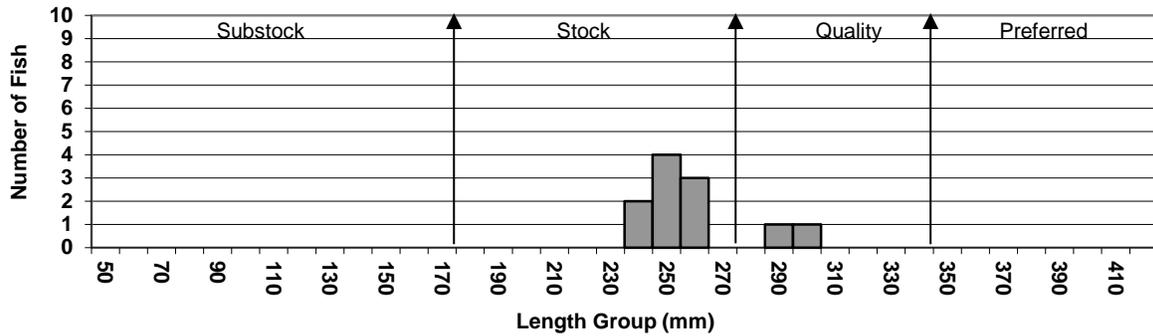


**Table 7.** Average back-calculated lengths (mm) for each age class of smallmouth bass sampled from Cottonwood Lake, Sully County, 2013.

Year Class	Age	N	Back-calculated Age		
			1	2	3
2011	2	10	100	161	
2010	3	1	91	221	284
<b>All Classes</b>			<b>96</b>	<b>191</b>	<b>284</b>
Statewide Mean			91	171	242
Region II Mean			88	171	246
SLI* Mean			98	180	241

\* Small Lakes and Impoundments

**Figure 20.** Length frequency histogram for smallmouth bass sampled from Cottonwood Lake, Sully County, 2013.



**Table 8.** Stocking records for the last ten years for Cottonwood Lake, Sully County.

Year	Number	Species	Size
2003	1,346	Black Crappie	Adult
2003	324	Yellow Perch	Juvenile
2003	640	Yellow Perch	Adult
2004	100	Largemouth Bass	Juvenile
2004	45,500	Walleye	Fingerling
2005	1,500	Smallmouth Bass	Fingerling
2005	120	Yellow Perch	Adult
2006	10,349	Yellow Perch	Juvenile
2007	61,600	Walleye	Small Fingerling
2007	20	Smallmouth Bass	Juvenile
2008	75	Yellow Perch	Juvenile
2009	45,750	Walleye	Small Fingerling
2010	45,260	Walleye	Small Fingerling
2011	736	Yellow Perch	Adult
2011	44,660	Walleye	Small Fingerling
2012	250	Smallmouth Bass	Juvenile

### RECOMMENDATIONS

1. Resurvey with trap nets, gill nets and fall nighttime electrofishing in 2016.
2. Stock walleye to supplement the current population that appears to be controlling the bullhead and carp populations.

**Table 9.** Gill net (GN), trap net (TN), and electrofishing (EF) CPUE for all fish species sampled in Cottonwood Lake, Sully County since surveys began.

Species	1959	1962	1963	1965	1968	1970	1971	1974	1977	1980	1983	1985	1988	1991	1992	1993	1994	1995
BLB (GN)	--	--	--	--	--	--	--	--	--	1.0	6.0	38.0	--	10.0	--	3.0	2.0	2.0
BLB (TN)	394.0	413.7	106.3	113.0	1140.0	94.1	9.3	342.0	12.9	5.1	263.7	138.1	86.1	22.6	291.7	64.2	2.4	7.8
BLC (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BLC (TN)	7.1	122.6	212.7	1.3	2.5	0.1	0.6	--	--	--	--	--	535.5	--	0.08	--	0.1	2.8
YEP (GN)	--	--	--	--	--	--	--	--	--	13.0	22.0	7.0	--	21.0	16.0	7.5	15.5	63.5
YEP (TN)	22.6	199.8	58.5	0.5	5.3	3.7	13.1	1.4	0.8	--	0.3	2.4	12.1	--	2.0	0.5	0.9	3.8
LMB (EF)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LMB (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LMB (TN)	--	--	--	--	--	--	--	--	--	0.07	--	--	0.8	--	--	--	--	--
NOP (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5
NOP (TN)	--	0.1	1.3	--	--	0.4	0.3	0.4	--	0.2	0.4	0.1	0.1	--	0.08	--	--	0.9
CCF (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CCF (TN)	0.3	--	0.1	--	2.0	0.4	0.07	0.3	--	--	--	0.1	0.1	--	--	0.08	--	0.08
WHS (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WHS (TN)	0.1	0.1	--	--	--	0.4	0.3	--	0.1	0.07	0.3	0.8	0.1	0.1	0.2	0.3	--	--
WAE (EF)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WAE (GN)	--	--	--	--	--	--	--	--	--	1.0	2.0	7.0	--	12.5	1.0	0.5	5.0	34.5
WAE (TN)	0.1	1.2	6.5	4.5	1.0	4.6	3.5	2.4	1.4	6.3	1.2	8.8	1.6	--	0.2	0.7	0.4	6.8
COC (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	1.5	--	--	11.5	12.5
COC (TN)	--	--	--	--	--	--	--	--	--	--	--	--	--	0.8	0.8	1.4	6.3	28.8
BLG (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5	--	--	--	--
BLG (TN)	1.6	0.4	0.7	--	--	--	--	--	--	2.5	--	0.4	12.5	--	0.08	0.3	--	0.08
GSF (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GSF (TN)	--	--	--	--	--	--	--	--	--	0.2	--	--	--	--	--	--	--	--
OSF (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
OSF (TN)	--	--	--	--	--	--	2.6	--	--	--	--	--	--	--	--	--	--	--
HYB (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HYB (TN)	--	--	--	--	--	--	--	--	--	3.3	--	--	--	--	--	--	--	--
SMB (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SMB (TN)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

BLB – Black Bullhead, BLC – Black Crappie, YEP – Yellow Perch, LMB – Largemouth Bass, NOP – Northern Pike, CCF – Channel Catfish, WHS – White Sucker, WAE – Walleye, COC – Common Carp, BLG – Bluegill, GSF – Green Sunfish, OSF – Orangespotted Sunfish, HYB – Hybrid Sunfish, SMB – Smallmouth Bass

**Table 10.** Gill net (GN), trap net (TN), and electrofishing (EF) CPUE for all fish species sampled in Cottonwood Lake, Sully County since surveys began.

Species	1996	1997	1998	1999	2000	2001	2003	2004	2007	2010	2011	2013
BLB (GN)	23.0	2.5	18.5	64.5	52.5	1.0	--	--	--	--	8.0	11.3
BLB (TN)	56.5	3.2	73.7	158.2	154.1	2.9	0.3	0.3	0.1	31.4	4.8	41.6
BLC (GN)	--	--	2.5	--	1.0	--	--	1.5	0.5	--	--	--
BLC (TN)	1.0	1.5	0.6	2.8	23.4	2.8	5.7	1.8	2.1	0.3	0.3	6.6
YEP (GN)	7.0	1.5	10.5	--	1.0	0.5	1.0	0.5	1.0	9.8	6.0	7.8
YEP (TN)	0.9	0.4	1.4	--	0.4	0.3	--	1.0	--	2.2	12.5	3.0
LMB (EF)	5.5	11.7	16.4	0.9	19.2	19.0	25.0	3.0	--	--	--	--
LMB (GN)	--	--	--	--	--	--	--	--	--	--	--	--
LMB (TN)	--	0.1	--	--	--	--	--	0.08	--	--	--	--
NOP (GN)	1.5	0.5	4.0	2.0	0.5	1.0	2.0	1.8	0.5	--	--	2.0
NOP (TN)	2.4	0.5	0.6	1.3	1.1	1.4	0.5	0.1	1.3	--	--	1.8
CCF (GN)	--	--	--	--	--	0.5	--	--	2.0	--	--	--
CCF (TN)	--	--	--	--	--	0.1	0.3	--	1.3	--	--	--
WHS (GN)	--	--	--	--	--	--	--	--	--	--	--	--
WHS (TN)	--	0.3	--	0.8	0.5	1.3	--	0.8	2.6	--	--	0.2
WAE (EF)	197.8	1.7	10.9	37.8	116.4	37.0	4.0	6.0	--	--	--	--
WAE (GN)	37.0	10.0	5.0	3.5	5.0	2.0	2.5	6.3	3.5	18.0	44.3	8.3
WAE (TN)	23.3	5.4	2.4	2.4	1.8	0.8	0.6	0.1	3.6	5.7	17.0	13.4
COC (GN)	8.5	0.5	1.5	6.0	10.0	0.5	2.0	3.5	5.0	10.8	16.0	17.3
COC (TN)	34.1	3.9	3.9	4.5	15.8	3.4	0.9	0.1	0.4	39.4	62.3	5.0
BLG (GN)	--	--	--	--	--	--	0.3	--	--	--	--	--
BLG (TN)	0.2	--	0.3	0.1	0.2	0.8	0.4	0.08	--	--	--	--
GSF (GN)	--	--	--	--	--	--	--	--	--	--	--	--
GSF (TN)	--	--	--	--	--	--	--	--	--	--	--	--
OSF (GN)	--	--	--	--	--	--	--	--	--	--	--	--
OSF (TN)	--	--	--	--	--	--	--	--	--	--	--	--
HYB (GN)	--	--	--	--	--	--	--	--	--	--	--	--
HYB (TN)	--	--	--	--	--	--	--	--	--	--	--	--
SMB (GN)	--	--	--	--	--	--	--	--	--	--	--	--
SMB (TN)	--	--	--	--	--	--	--	--	0.7	--	--	1.1

BLB – Black Bullhead, BLC – Black Crappie, YEP – Yellow Perch, LMB – Largemouth Bass, NOP – Northern Pike, CCF – Channel Catfish, WHS – White Sucker, WAE – Walleye, COC – Common Carp, BLG – Bluegill, GSF – Green Sunfish, OSF – Orangespotted Sunfish, HYB – Hybrid Sunfish, SMB – Smallmouth Bass