SOUTH DAKOTA FISHERIES

ANNUAL FISH POPULATION AND ANGLER USE, HARVEST, AND PREFERENCE SURVEYS ON LAKE SHARPE, SOUTH DAKOTA, 2012

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ANNUAL FISH POPULATION
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ON
LAKE SHARPE, SOUTH DAKOTA, 2012

By

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PREFACE

Information collected during 2012 is summarized in this report. Copies of this report and references to the data can be made with permission from the authors or the Director of the Division of Wildlife, South Dakota Department of Game, Fish and Parks, 523 E. Capitol, Pierre, SD 57501.

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EXECUTIVE SUMMARY

In 2011, the Missouri River system experienced a flood event of unprecedented magnitude and the system may take many years to recover. The extreme high flows of 2011 altered instream habitat, water chemistry, channel morphology, etc.; therefore, standard sampling, creel results and trends should be interpreted with care. This report includes annual fish population data and angler use, harvest, and preference data collected in 2012, for Lake Sharpe, South Dakota. Fish population data and angler use and harvest survey data from previous years are referenced in this report. Results of these surveys are used to evaluate progress towards strategic plan objectives as outlined in the Missouri River Fisheries Program Strategic Plan.

Mean catch per unit effort (CPUE) of walleye in gillnets during 2012 was the highest observed in the last five years (23.2 fish/net-night). We collected walleye ranging from 110- to 650-mm during the August 2012 gill net survey. About 27% of walleye in the 2012 gill net sample were ≥ 381-mm (15-in minimum length), 4% were ≥ 457-mm (18-in) and less than 1% were ≥ 508-mm (20-in). About 73% of the walleye sampled during the August gill net survey in 2012 were below the September-June minimum harvest length limit.

Sixteen species of age-0 and/or small-bodied prey fishes were collected by shoreline seining in 2012. All species have been previously collected in Lake Sharpe. Average gizzard shad CPUE of 1,351 fish/haul represents the second highest gizzard shad catch rate observed in the shoreline seine survey. This is particularly noteworthy considering 1,800 pre-spawn adult gizzard shad were removed from Hipple Lake for a stocking program on Lake Oahe.

An estimated 104,814 angler days were spent on the reservoir during the April-September 2012 daylight period, an increase from 49,378 in 2011. This meets the Lake Sharpe strategic plan goal of 100,000 angler days outlined in the Missouri River Strategic Plan. This increased use likely contributed to an estimated walleye harvest of 173,931 which exceeds the strategic plan goal of 100,000 walleye.

Estimated hourly harvest rate for all species combined for the April-September 2012 daylight period (0.64 fish/angler-h) was higher than the strategic plan objective (0.35 fish/angler-h). The walleye catch, harvest, and release rates for 2012 (1.66, 0.53, 1.13 fish/angler-h, respectively) were the highest on record for Lake Sharpe. The smallmouth bass catch rate was 0.21 fish/angler-h in 2012. The white bass catch rate in 2012 (0.05 fish/angler-h) was similar to 2011 but substantially lower than previous years on Lake Sharpe (Longhenry et al 2010; Fincel et al. 2012).

About 87% of angling parties interviewed in 2012 indicated some degree of satisfaction with their fishing trip which surpasses the Lake Sharpe strategic plan objective of 70%. Fishing on Lake Sharpe contributed about $8.3 million to the local and regional economy during the April-September 2012 daylight period (104,814 trips; $79 per trip).

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INTRODUCTION

Anglers spent over 2.4 million hours fishing the Missouri River system in South Dakota in 2008 (Longhenry et al. 2009; Sorenson and Knecht 2009; Bouska and Longhenry 2009). About 48% of South Dakota resident anglers fished the Missouri River system in 2003 and 35% of those anglers fished Lake Sharpe (Gigliotti 2004). About 33% of angler days in South Dakota in 2003 were spent on the Missouri River system (Gigliotti 2004). The South Dakota Department of Game, Fish and Parks (SDGFP) recognized the importance of the Missouri River fisheries program and developed the Missouri River strategic plan to effectively guide management of the resource and direct future research (SDGFP 1994).

Lake Sharpe has supported between 61,000 and 126,000 angler trips during the April-September daylight period in recent years. Lake Sharpe is an important resource in South Dakota and its habitat and fish community must be managed to enhance its value to various user groups. The importance of Lake Sharpe to Missouri River fisheries is documented in the goals, objectives and strategies developed for management of this system (SDGFP 1994). Information gathered during standardized creel and fish population surveys is used to evaluate objectives and strategies and to identify future management strategies. The trends and fish population data discussed in this report provide valuable information for evaluation of walleye regulations implemented in 1990 and modified in 1999, 2004, and 2006. This report includes data collected from Lake Sharpe in 2012, as well as comparisons of 2012 data to previous years. A list of common and scientific names for fish and emergent vegetation mentioned in this report are presented in Appendix 1 and 2, respectively.

STUDY AREA

Lake Sharpe is located in central South Dakota (Figure 1) and extends from Oahe Dam to Big Bend Dam. Lake Sharpe is a 128-km long mainstem Missouri River flow-through reservoir and has a surface area of 24,686 ha (Table 1). The reservoir has been divided into three zones for survey purposes. The upper zone extends from Oahe Dam to the downstream end of LaFramboise Island, the middle zone extends from the downstream end of LaFramboise Island to DeGrey lakeside use area, and the lower zone extends from DeGrey to Big Bend Dam. Standard gill netting and seining locations have historically included Farm Island, DeGrey/Fort George lakeside use area, Joe Creek lakeside use area, and North Shore lakeside use area. Additionally, frame-nets were used to sample panfish communities in Hipple Lake and LaFramboise back-water areas.

Hipple Lake and LaFramboise Bay are large backwaters located on upper Lake Sharpe. These embayments are generally warmer compared to the main lake (Longhenry et al. 2010). Emergent vegetation, including curly leaf pondweed, Eurasian water milfoil, fan leafed crowfoot, American elodea, and sago pondweed is prevalent in both embayments. Cattail and round stem bulrush stands are more common in Hipple Lake, but can also be found in LaFramboise.

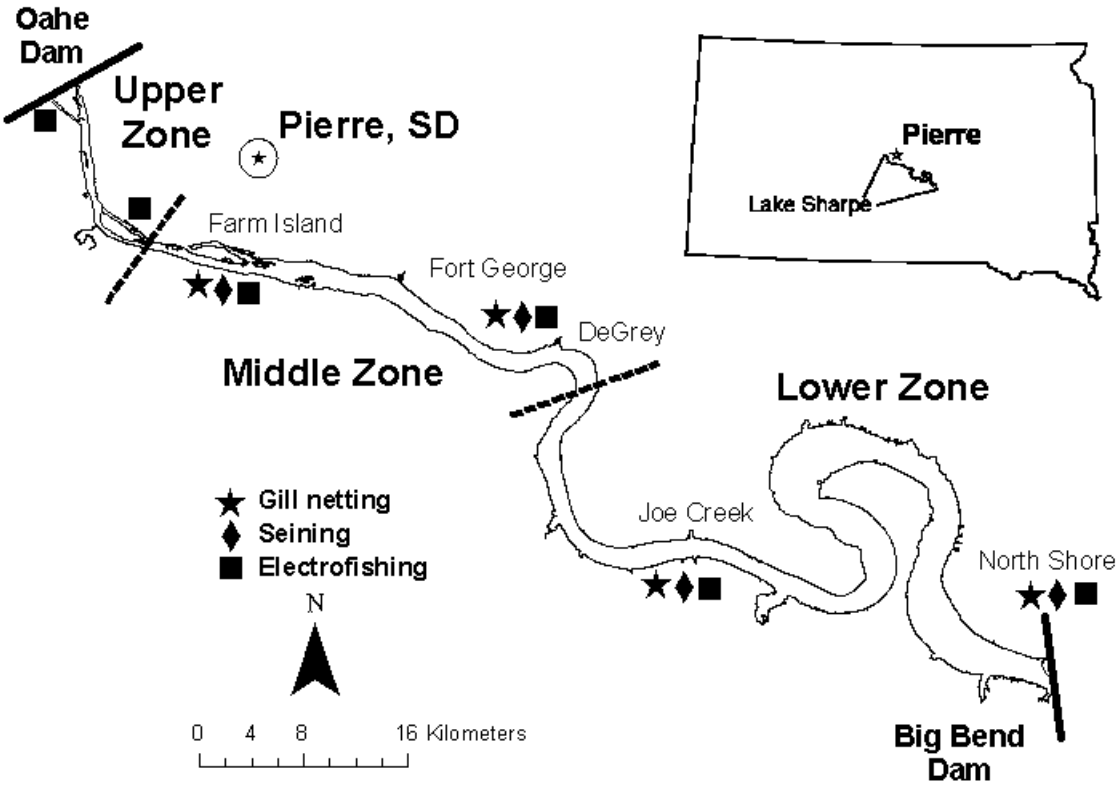

Figure 1. Gill net and seine locations on Lake Sharpe, South Dakota, 2012.

Table 1. Physical characteristics at normal pool elevation, management classification and sampling times and depths for annual fish population surveys on Lake Sharpe, South Dakota.

Characteristic:	Description
Location:	From Oahe Dam to Big Bend Dam
Surface area (X 1000 ha):	25
Depth (m)-maximum:	23.5
-mean:	9.5
Bottom substrate:	Sand, gravel, shale and silt
Water source:	Missouri River and tributaries
Management classification:	Cool and warm water permanent
Gill net depths: (m)	0 - 9.1 9.1 - 18.3
Number of gill nets:	24
Gill netting survey months	August & September
Number of seine hauls:	16
Seining survey month	August
Pan fish frame-net survey:	May

REGULATION HISTORY

Fish population and angler use and harvest survey data is essential when evaluating special management regulations. Walleye harvest regulations for Lake Sharpe have differed from standard statewide regulations since 1990 when an April through June 356-mm (14-in) minimum length limit was placed on Lake Sharpe (Table 2). In 1999, the minimum length was increased to 381-mm (15-in) during all months except July and August and a stipulation that, at most, one fish in the daily limit could be 457-mm (18-in) or longer was added to the walleye regulation package. These changes were made to reduce harvest during a period of high angler use and increase the abundance of walleye longer than 457-mm (18-in) in the population to increase the quality of the fishery. The daily walleye limit was reduced to three fish for 2004 and 2005 to reduce harvest during a period of low walleye abundance. In 2006, the daily limit was returned to the statewide daily limit of four and the one walleye over 457-mm (18-in) stipulation was increased to 508-mm (20-in).

Experimental regulations for smallmouth bass were implemented in 2003 and evaluated through 2011 for their effectiveness at increasing the size structure of the smallmouth bass population in Lake Sharpe (Table 2). Special regulations for smallmouth bass from 2003 through 2007 included a 306- to 457-mm (12- to 18-inch) protected slot length limit with at most one fish 457-mm (18-in) or longer in the daily limit. In 2008, the smallmouth bass regulations on Lake Sharpe were altered to include a 355- to 457-mm (14- to 18-in) protected slot length limit with at most one fish 457-mm (18-in) or longer in the daily limit. The regulation change was implemented to increase harvest of smaller smallmouth bass. This regulation was removed at the end of calendar year 2011 after no increase in growth or size structure could be attributed to the regulation. The slot limit regulation for smallmouth bass was determined unsuccessful in improving the size structure of Lake Sharpe smallmouth bass.

Table 2. History of special harvest regulations for walleye and smallmouth bass on Lake Sharpe South Dakota, 1968 through 2012.

Species	Period	Daily limit	Possession limit	Length restrictions
Walleye/ sauger in combination	1968-1983	8	16	None
	1984-1989	6	12	None
	1990-1998	4	8	• April-June 14 inch minimum length
	1999-2003	4	8	• Sept.-June 15 inch minimum length • At most one equal to or longer than 18 inches
	2004-2005	3	8	• Sept.-June 15 inch minimum length • At most one equal to or longer than 18 inches
	2006-present	4	8	• Sept.-June 15 inch minimum length • At most one equal to or longer than 20 inches
Smallmouth bass	2003-2007	5	10	• Only fish shorter than 12 inches or 18 inches and longer may be kept and at most one fish in the daily limit may be 18 inches or longer.
	2008-2011	5	10	• Only fish shorter than 14 inches or 18 inches and longer may be kept and at most one fish in the daily limit may be 18 inches or longer.

SAMPLING METHODS

FISH POPULATION SURVEYS

Data Collection

In 2012, experimental-mesh gill nets (August), seines (July), larval trawls (May through July), and frame nets (May) were used to sample fish populations in Lake Sharpe (Figure 1). Four locations on Lake Sharpe were sampled with six, 91.4-m multifilament gill nets submerged overnight (about 20 h). Three nets were placed ≤ 9-m depth and three were placed in > 9.1-m; where possible (Figure 1). Bar mesh dimensions included 13-, 19-, 25-, 32-, 38-, and 51-mm. All fish collected were identified and enumerated. The first 50 individuals of each species were measured (TL; mm) and weighed (g) at each sampling location. All walleye and sauger were measured, weighed and otoliths were removed for age-estimation (10 per 2.5-cm length group per sampling location).

Nylon seines were used to collect age-0 fish and small-bodied littoral species. A quarter-arc seine haul was accomplished by methods described in Martin et al. (1981). Four seine hauls were made at each of the four sampling locations. All fish were placed on ice, identified and enumerated.

In May, five 19-mm (0.75-in) bar mesh frame nets with 1 x 1.5-m frames and 18-m leads were set in each LaFramboise Bay and Hipple Lake. Nets fished about 20 h and were re-set in the embayment each day for a total sample effort of ten net-nights per water body. All species were counted, measured for total length and weighed. Scales were removed from bluegill, white bass, and crappie for age-estimation.

In early July in the West Bend region, 107-m long and 2.4-m high monofilament gillnets (25-, 32-, 38-, 45-, 51-, 57-, and 64- mm bar mesh) were fished on the bottom in water less than 9-m deep. Length of set ranged from two to five h for a total of 18 independent nets. All live fish were counted and released, except for smallmouth bass which were measured, weighed and kept for otolith removal to estimate age.

Larval gizzard shad were collected every 10-14 days from May through August using a 1-m diameter ichthyoplankton trawl with 1,000-µm bar mesh. Trawl duration was about 10 min and a flowmeter was mounted in the mouth of the trawl to estimate water volume filtered.

Data Analysis

Larval trawl locations were selected using a stratified random approach with each reservoir divided into zones (see Graeb 2006 for more information) and each zone sampled with equal effort. Additionally, Hipple Lake was sampled separately during each sampling period. Larval densities were calculated as number per 100-m^3 of water filtered. Relative abundance of fish species was expressed as mean CPUE for gill net (No./net night and No./h), frame net (No./net night), and seine (No./haul) catches. Age and growth analyses were conducted using hole otoliths that were submersed in water and viewed under a compound microscope. We cracked otoliths in half at the focus and charred them for age-estimation of fish greater than 350-mm (DeVries and Frie 1996; Isermann et al. 2003). Back-calculations for scale samples were made with the computer program WinFin Analysis (Francis 2000). Proportional size distribution (PSD; Appendix 2; Anderson 1980, Gablehouse 1984, Guy et al 2007) was calculated for walleye, sauger, smallmouth bass, channel catfish, white bass, and yellow perch.

Relative weight (W_r; Appendix 3; Anderson 1980) was calculated using standard weight (W_s) equations developed for smallmouth bass (Kolander et al. 1993), walleye (Murphy et al. 1990) and channel catfish (Brown et al. 1995)

RESULTS AND DISCUSSION

AUGUST GILL NET POPULATION ASSESSMENT

Species Composition and Relative Abundance

Walleye comprised 52% and channel catfish comprised 16% of the gill net catch in 2012 (Table 3). Other species commonly caught during the 2012 survey included gizzard shad, yellow perch and common carp. Catch per unit effort has been used as an index of population abundance or density (Hubert 1996). Both walleye and channel catfish CPUE (23.2 fish/net-night and 7.3 fish/net-night, respectively) in 2012 were above the five year average (Table 4)

Population Characteristics of Walleye

Multiple walleye year classes were present in 2012 with many walleye between stock and quality length (Figure 2). Approximately 27% of walleye in the 2012 gill net sample were ≥ 381-mm (15-in), 4% were ≥ 457-mm (18-in), and 1% were ≥ 508-mm (20-in). Proportional size distribution and PSD – preferred were similar to values observed in the past three years for walleye (41 and 1, respectively) and sauger (95 and 48, respectively; Table 5).

Historically, walleye W_r for Lakes Sharpe, Francis Case, and Lewis and Clark are generally between 80 and 90 (Fincel et al. 2012). Relative weight of walleye in Lake Sharpe in 2012 was 85, which is within the normal range (Table 6). Variability in W_r in Lake Sharpe likely occurs due to the seasonal availability of gizzard shad and entrainment of rainbow smelt through Oahe Dam.

Walleye growth in Lake Sharpe is generally considered good and walleye typically surpass the 381-mm (15-in) minimum length limit during their fourth growing season (Table 7; Table 8). Age-3 walleye (i.e., produced in 2009) composed the largest percent of the 2012 gill net sample. Twenty-three age-0 walleye were captured during the gill net survey in 2012 which is the highest observed over the last five years (Table 9).

Population Characteristics of Sauger

Twenty-one sauger were collected during the gill net survey in August/September 2012, for a mean CPUE of 0.9 fish/net night (Table 4; Figure 4). Although sauger abundance is not as high as walleye abundance (Table 4), PSD for sauger is generally high in Lake Sharpe with a PSD-P in 2012 of 48 (Table 5). Sauger up to age-6 were collected in the 2012 standard survey, ranging in total length from 281- to 495-mm (Table 10; Figure 4). No age-0 or age-1 sauger were collected with gill nets in 2012 (Table 11).

Population Characteristics of Channel Catfish

Channel catfish PSD decreased while W_r remained similar during the 2008-2012 period (Table 12). Catch per unit effort of channel catfish during 2012 (7.3 fish/net night) was higher than the five year average of 5.0 (7.3 fish/net night; Table 4; Figure 5). Most channel catfish were in the stock to quality range for 2012 (Figure 5). Channel catfish appear long lived but grow slowly which may explain the limited changes in population indices over time (Elrod 1974).

Population Characteristics of Smallmouth Bass

Relative abundance of smallmouth bass, as indexed by CPUE, decreased compared to previous years (0.99 fish/h in 2012; Table 13). Size structure also declined compared to previous years (PSD=58; PSD-P=31; PSD-M=0; Table 13; Figure 6); however; condition increased. Growth has remained constant over the past five years, as most smallmouth bass require at least five years to surpass 356-mm (14-in; Table 14).

Table 3. Relative species composition as percent of total catch, of fish collected during the standard August gill net survey on Lake Sharpe, South Dakota, 2008-2012. Trace (T) indicates values < 0.5%.

Species	**Year**				
	2008	**2009**	**2010**	**2011**	**2012**
Walleye	52	52	48	60	52
Channel catfish	14	16	12	9	16
Yellow perch	3	7	9	9	4
Common carp	7	6	4	6	4
Sauger	7	7	2	5	2
White bass	2	1	1	1	T
Gizzard shad	3	4	14	1	13
Freshwater drum	3	T	1	1	1
Smallmouth bass	1	1	3	1	1
*Others	6	6	5	7	6

*Others includes: bigmouth buffalo, black bullhead, black crappie, goldeye, northern pike, rainbow trout, rainbow smelt, river carpsucker, shorthead redhorse, shortnose gar, shovelnose sturgeon, smallmouth buffalo, spottail shiner, white crappie, and white sucker.

Table 4. Mean catch per unit effort (CPUE; No./net-night) and standard error (SE) for fish species collected with standard coolwater gill net sets in Lake Sharpe, South Dakota, 2008-2012. Trace (T) indicates a value <0.05.

Species	**2008**	**2009**	**2010**	**2011**	**2012**
Bigmouth buffalo	0.1 (0.1)	0	0	0	0
Black bullhead	0.1 (0.1)	0	0	0.2 (0.1)	0.1 (0.1)
Black crappie	T	0	0.1 (0.1)	0.1 (0.1)	T
Channel catfish	5.5 (1.0)	5.4 (0.9)	5.6 (1.7)	3.0 (0.6)	7.3 (1.6)
Common carp	2.5 (0.7)	1.9 (0.5)	1.7 (0.5)	1.9 (0.5)	1.9 (0.5)
Freshwater drum	1.1 (0.4)	0.1 (0.1)	0.6 (0.2)	0.2 (0.1)	0.5 (0.2)
Gizzard shad	1.2 (0.7)	1.3 (1.1)	7.0 (3.9)	0.4 (0.4)	5.6 (3.1)
Goldeye	0	T	0.2 (0.1)	0	0.6 (0.3)
Northern pike	0	0	T	0.1 (0.1)	T
Rainbow smelt	0	T	0	0	0
Rainbow trout	T	0	0	0	T
River carpsucker	0.1 (0.1)	0.5 (0.3)	1.1 (0.6)	0.6 (0.4)	0.3 (0.2)
Sauger	2.6 (0.5)	2.5 (0.6)	1.1 (0.3)	1.8 (0.6)	0.9 (0.3)
Shorthead redhorse	0.1 (0.1)	0.1 (0.1)	T	0.7 (0.5)	0.8 (0.4)
Shortnose gar	0.1 (0.1)	0	T	0.2 (0.1)	0.3 (0.2)
Shovelnose sturgeon	1.5 (0.6)	1.3 (1.2)	0.4 (0.3)	0.1 (0.1)	0.4 (0.2)
Smallmouth bass	0.2 (0.1)	0.4 (0.3)	1.4 (1.2)	0.3 (0.2)	0.3 (0.2)
Smallmouth buffalo	0	T	T	0	0
Spottail shiner	0	0	0.1 (0.1)	0.1 (0.1)	0
Walleye	19.3 (3.2)	17.8 (4.3)	22.2 (4.3)	20.1 (3.1)	23.2 (4.5)
White bass	1.5 (0.9)	0.5 (0.3)	0.6 (0.4)	0.4 (0.2)	0.1 (0.1)
White crappie	T	0	0.1 (0.1)	0.1 (0.1)	T
White sucker	0	T	T	0.3 (0.2)	0
Yellow perch	1.0 (0.3)	2.3 (0.9)	4.0 (1.5)	3.1 (0.9)	1.9 (0.7)

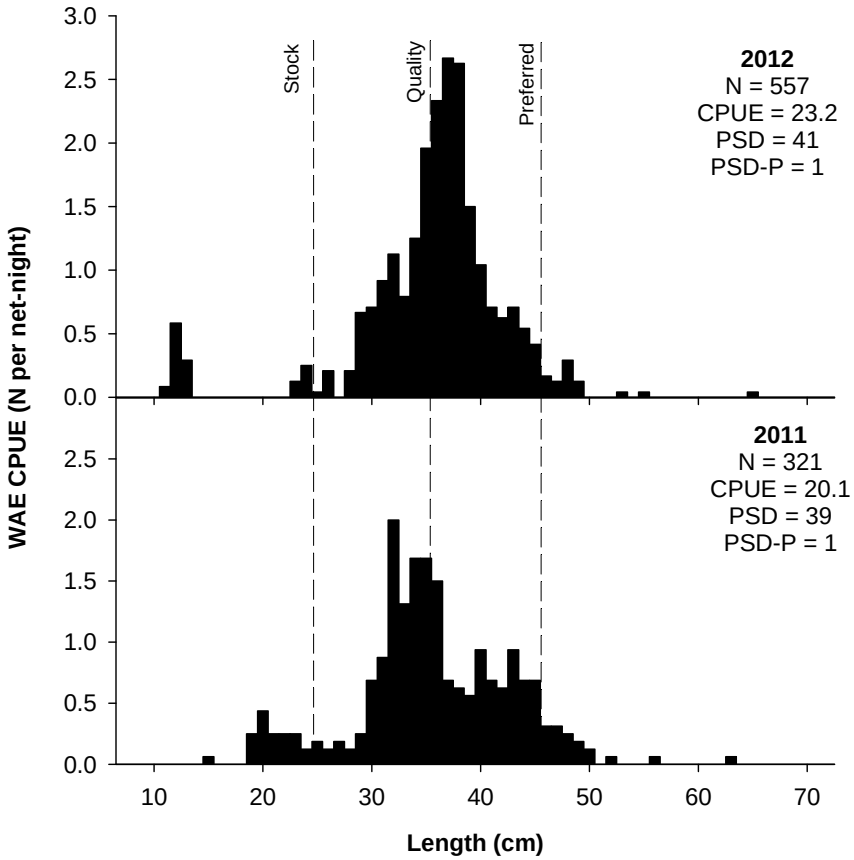

Figure 2. Length-frequency of walleye collected in standard gill-net sets in Lake Sharpe, South Dakota, in August 2011 and 2012.

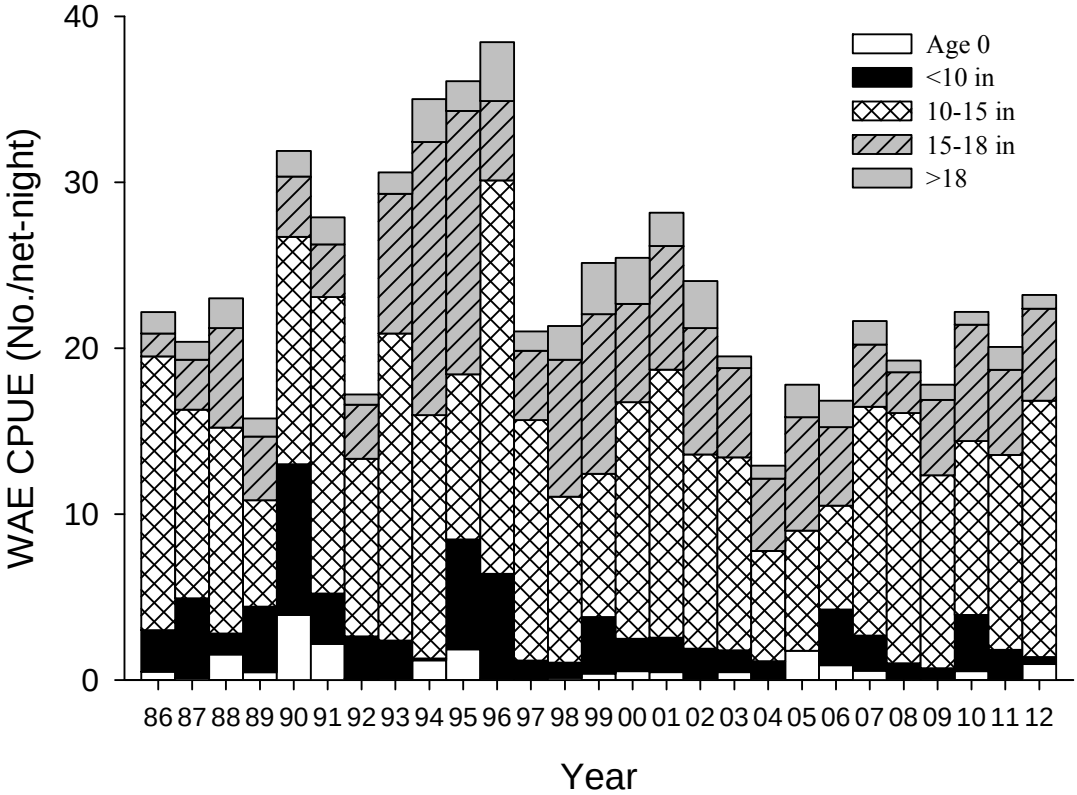

Figure 3. Size structure and relative abundance (CPUE) of walleye collected in the standard gill net survey in Lake Sharpe, South Dakota, in August, 1986-2012.

Table 5. Walleye and sauger proportional size distrubtion (PSD), PSD of preferred (PSD-P) and memorable length (PSD-M) fish collected in the standard gill net survey on Lake Sharpe, South Dakota, 2008-2012.

Year	Walleye				Sauger			
	PSD	**PSD-P**	**PSD-M**	**N**	**PSD**	**PSD-P**	**PSD-M**	**N**
2008	27	4	0	472	96	34	0	100
2009	40	1	0	412	100	48	0	61
2010	47	1	0	478	65	58	0	26
2011	39	1	0	295	86	43	0	28
2012	41	1	0	525	95	48	0	21

Table 6. Mean walleye relative weight (W_r) by length group and number of specified length fish in a length group (N) for Lake Sharpe, South Dakota, 2008-2012.

Year	Length group							
	Stock-quality		Quality-preferred		Preferred-trophy		>Stock length	
	W_r	N	W_r	N	W_r	N	W_r	N
2008	86	345	81	98	78	3	84	446
2009	83	246	79	163	61	3	82	411
2010	88	254	85	221	75	3	87	478
2011	82	180	84	111	80	3	83	294
2012	85	308	79	213	70	3	82	524

Table 7. Mean length-at-age-at-capture (mm), number (N) and standard error (SE) for walleye collected in the standard August gill net survey on Lake Sharpe, South Dakota, 2008-2012.

Year		Length at age at capture (mm)								
		1	2	3	4	5	6	7	8	9
2008	**Mean**	253	326	379	393	435	406	461	477	-
	N	51	108	117	4	14	3	7	3	-
	SE	4.3	2.7	2.3	10.1	12.6	6.8	13.0	30.7	-
2009	**Mean**	240	331	368	399	400	451	421	450	454
	N	19	84	92	97	4	10	2	9	9
	SE	16.5	18.5	2.2	3.1	6	9.8	9	15.5	11.1
2010	**Mean**	263	348	394	414	417	414	448	433	460
	N	119	85	89	55	54	3	8	1	2
	SE	1.7	1.9	2.4	3.3	3.6	33.2	5.8	-	1.5
2011	**Mean**	232	340	388	435	436	463	403	504	-
	N	34	163	45	29	25	12	1	3	-
	SE	5.7	1.9	5.6	4.4	5.8	8.3	-	31.6	-
2012	**Mean**	248	311	362	396	422	448	459	-	478
	N	13	63	95	23	20	20	15	-	7
	SE	3.2	2.4	2.8	6.5	5.7	10.5	8.2	-	29.9
Mean of means		247	331	378	407	422	436	438	466	464

Table 8. Mean annual growth (mm/y) increment estimates for walleye collected in the standard coolwater gill net survey on Lake Sharpe, South Dakota, for the 2007-2008, 2008-2009, 2009-2010, 2010-2011, and 2011-2012 periods.

Year	Growth increment added during period (mm)							
	1-2	**2-3**	**3-4**	**4-5**	**5-6**	**6-7**	**7-8**	**8-9**
2007-2008	75	43	1	16	--	27	26	--
2008-2009	78	42	20	7	16	15	--	--
2009-2010	108	63	46	18	14	--	12	10
2010-2011	77	40	41	22	45	--	56	--
2011-2012	79	22	8	--	12	--	--	--

Table 9. Age distribution of walleye collected from Lake Sharpe, South Dakota, 2008-2012, with standard gill net sets as determined by age-estimation from otoliths.

Year	Age												
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
2008	1	51	108	117	4	13	3	7	3	2	0	0	0
2009	0	19	99	134	129	5	10	2	9	9	3	3	0
2010	12	172	99	106	63	60	3	8	1	2	1	2	3
2011	1	34	163	45	29	25	12	1	3	0	1	3	2
2012	23	13	88	268	65	39	28	18	0	9	0	1	0

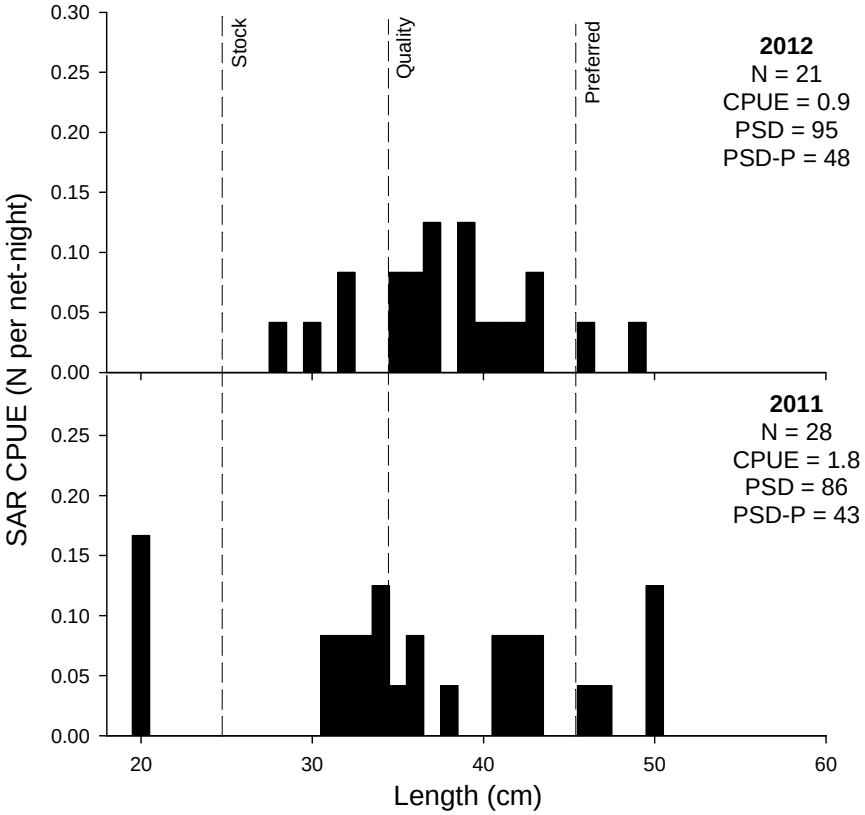

Figure 4. Length-frequency of sauger collected in the standard gill net survey in August 2011 and 2012 on Lake Sharpe, South Dakota.

Table 10. Mean length-at-age-at-capture (mm) for sauger collected in the standard August coolwater gill net survey, 2008-2012, on Lake Sharpe, South Dakota.

Year		Length at age at capture (mm)								
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
2008	**Mean**	--	340	379	426	--	--	--	--	--
	N	--	24	19	1	--	--	--	--	--
	SE	--	4.9	6.6	--	--	--	--	--	--
2009	**Mean**	--	--	372	389	425	389	--	--	397
	N	--	--	26	30	2	2	--	--	1
	SE	--	--	4.4	4.7	5.0	47.0	--	--	--
2010	**Mean**	253	324	--	419	406	--	--	--	--
	N	9	1	--	7	8	--	--	--	--
	SE	5.1	--	--	15.8	7.1	--	--	--	--
2011	**Mean**	204	341	414	504	456	464	--	--	--
	N	4	12	4	1	5	2	--	--	--
	SE	1.9	6.3	16.9	--	16.7	39.0	--	--	--
2012	**Mean**	--	308	380	--	--	429	442	--	--
	N	--	4	11	--	--	3	3	--	--
	SE	--	10.7	6.2	--	--	37.8	9.6	--	--
Mean of means		229	328	386	435	429	427	442	--	397

Table 11. Age distributions of sauger collected in standard gill net survey from Lake Sharpe, South Dakota, 2008-2012.

	Age										
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2008	0	0	24	19	1	0	0	0	0	0	0
2009	0	0	0	26	30	2	2	0	0	1	0
2010	0	9	1	0	7	9	0	0	0	0	0
2011	0	4	12	4	1	5	2	0	0	0	0
2012	0	0	4	11	0	0	3	3	0	0	0

Table 12. Proportional size distribution (PSD), proportional size distribution of preferred and memorable-length (PSD-P and PSD-M) channel catfish, and relative weight (W_r) for 2008-2012, from Lake Sharpe, South Dakota. Mean W_r values are for stock-length fish and greater.

Year	PSD	PSD-P	PSD-M	W_r	N
2008	60	2	0	83	132
2009	79	1	0	93	127
2010	74	1	0	88	118
2011	82	2	0	89	45
2012	53	5	1	90	158

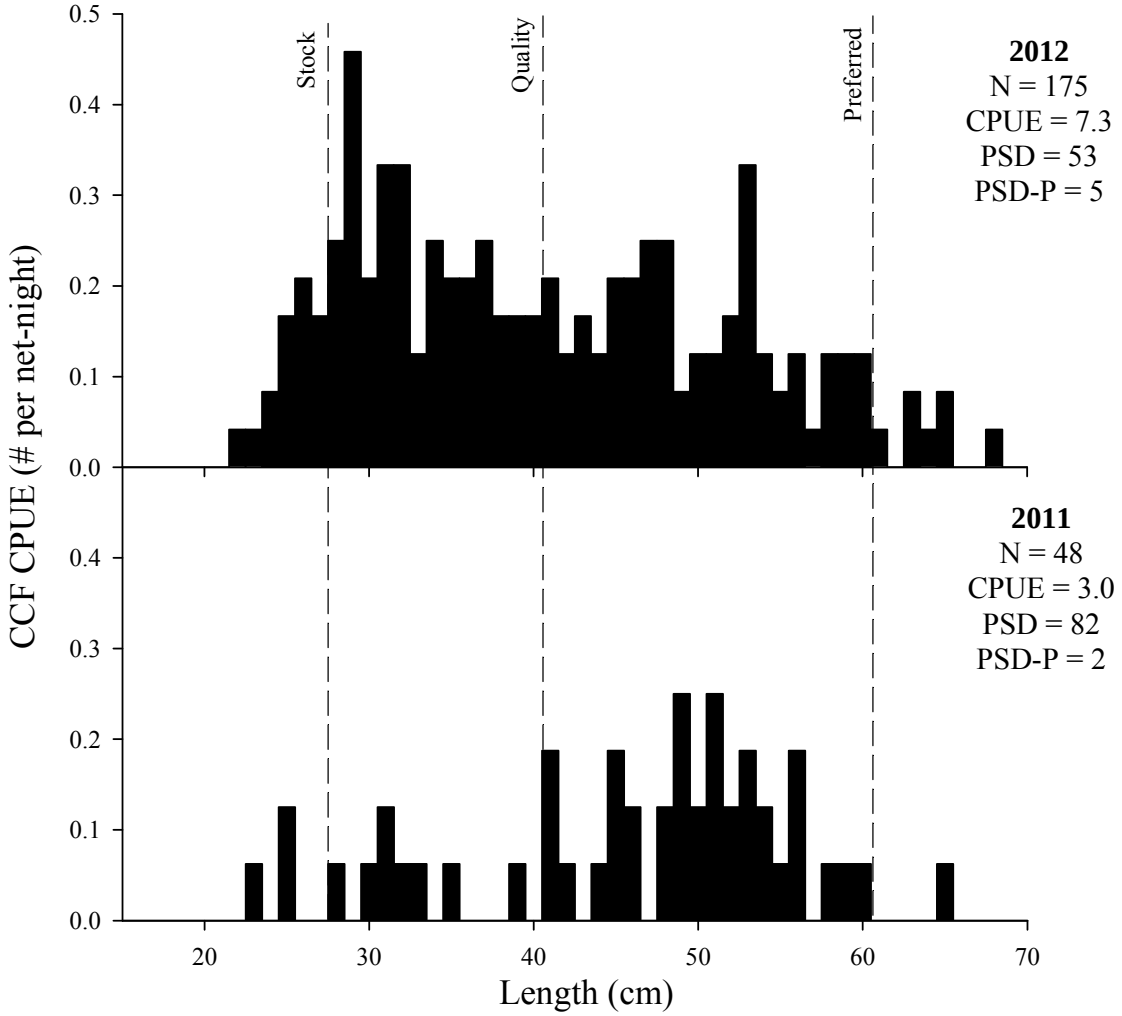

Figure 5. Length-frequency of channel catfish collected in the standard gill net survey in August 2011 and 2012, on Lake Sharpe, South Dakota.

Table 13. Mean catch per unit effort (CPUE; No./h) of smallmouth bass, standard error (SE), hours of netting effort, PSD, PSD-P, PSD-M, condition (*Wr),* and sample size (N) at West Bend in Lake Sharpe.

Year	CPUE (fish/hr)	SE	Effort (hrs)	PSD	PSD-P	PSD-M	W_r	N
2008	2.11	0.30	46.2	82	51	5	85	99
2009	2.66	0.75	55.3	80	67	8	91	153
2010	2.05	0.35	54.3	88	68	8	91	117
2011	1.09	0.22	78.3	89	68	21	88	86
2012	0.99	0.28	65.3	58	31	0	107	57

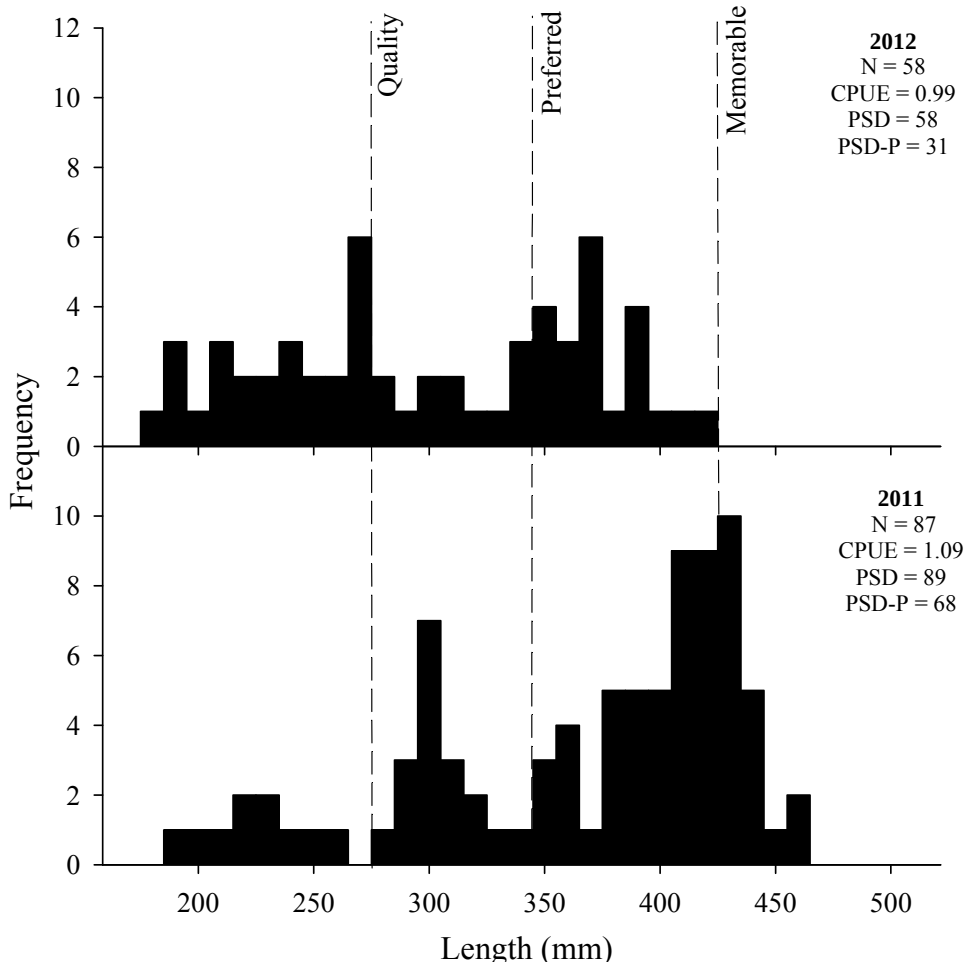

Figure 6. Length-frequency of smallmouth bass collected in July 2011 and 2012 at West Bend on Lake Sharpe, South Dakota.

Table 14. Mean length-at-age (mm), number (N) and standard error (SE) for smallmouth bass collected in July 2008-2012 at West Bend on Lake Sharpe, South Dakota.

Year		Length at age at capture (mm)								
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
2008	**Mean**	--	253	310	357	381	399	406	426	425
	N	0	18	33	25	30	17	15	7	3
	SE	--	4.1	4.1	4.1	3	3.3	5.6	7.5	13.9
2009	**Mean**	233	247	313	359	379	401	406	420	422
	N	1	32	34	53	20	28	18	21	8
	SE	--	2.9	4.7	2.8	3.2	2.5	3.9	3.4	4.6
2010	**Mean**	--	251	301	360	385	408	429	429	430
	N	0	11	19	20	29	11	3	9	7
	SE	--	6.1	6.0	4.4	2.5	5.1	14.6	4.1	6.9
2011	**Mean**	--	255	309	358	397	409	427	431	449
	N	0	11	17	5	11	15	13	2	1
	SE	--	13.1	6.0	3.5	3.8	4.5	2.4	1.5	--
2012	**Mean**	--	199	265	303	361	379	399	406	441
	N	0	5	21	9	7	6	6	2	1
	SE	--	19.3	9.9	10.1	3.3	4.0	6.7	1.0	--
Mean of means		233	241	300	347	381	399	413	422	433

SMALLMOUTH BASS TOURAMENT DATA

On 18-July, 2010, 24-September, 2011 and 15-September 2012, South Dakota Bass Anglers Sportsmen Society (SD BASS) Federation held a trail tournament and state championship on Lake Sharpe. Biologists from the Ft. Pierre District and Chamberlain Regional Offices were present to collect smallmouth bass data following the event. We recorded length and weight and removed dorsal spines for age-estimation. Mean length was 403-mm in 2010, 430-mm in 2011 and 403-mm in 2012 (Figure 7). Mean weight was 931-g in 2010, 991-g in 2011 and 1,101-g in 2012. In 2012, mean length-at-age-at-capture was greater than in 2011 for smallmouth bass age-3 and age-8 and older (Table 15).

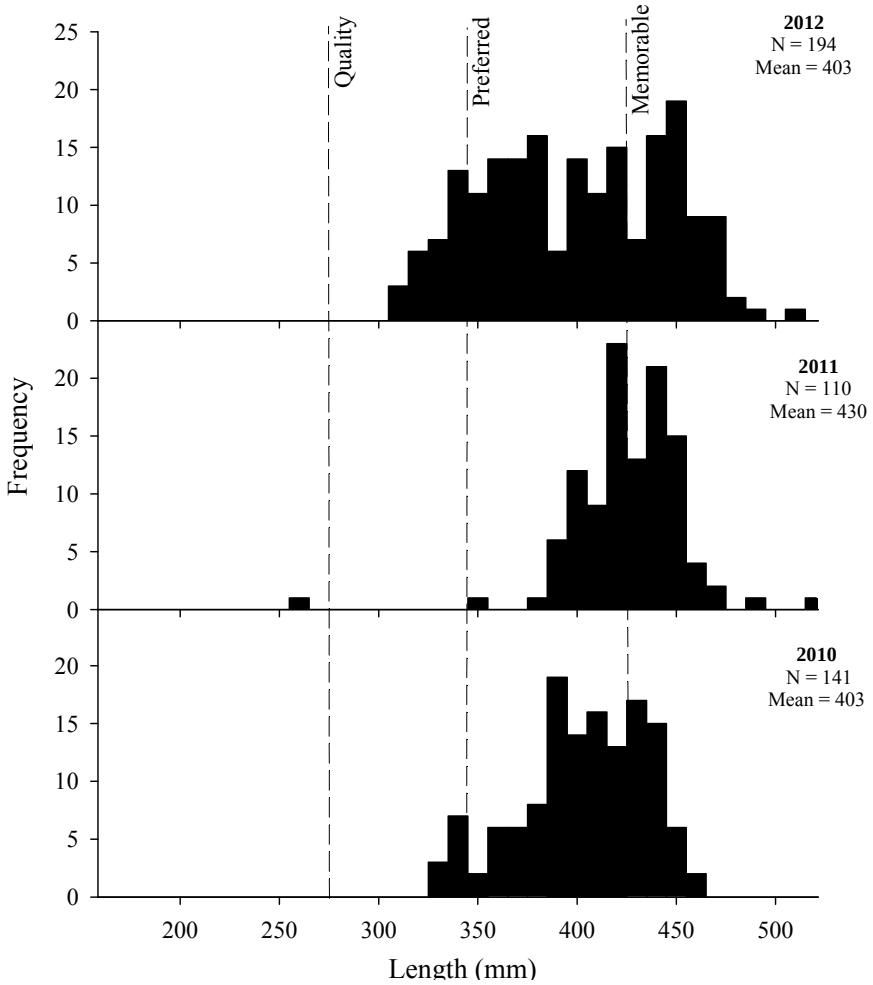

Figure 7. Length-frequency of tournament-caught smallmouth bass during 18-July, 2010, 24-September, 2011, and 15-September, 2012 of Lake Sharpe, South Dakota.

Table 15. Mean length-at-age (mm) for tournament-caught smallmouth bass on 24-September, 2011, and 15-September, 2012, on Lake Sharpe, South Dakota. Ages were estimated from dorsal spines.

		Length at age at capture (mm)								
		3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
2011	**Mean**	264	398	421	424	439	452	439	460	444
	N	1	8	10	31	20	19	9	1	1
	SE	--	7.1	6.4	3.1	3.7	5.5	5.0	--	--
2012	**Mean**	344	364	397	416	435	458	466	482	450
	N	12	36	14	13	12	5	8	4	1
	SE	3.6	4.5	11.8	7.4	5.4	7.5	3.2	10.1	--

SHORELINE SEINING SURVEY

Seventeen species of small-bodied littoral fishes were collected by shoreline seining in 2012 (Table 16). All species had previously been collected in Lake Sharpe. The overall catch rate for all species combined was 1,420 fish/seine haul in 2012, which is nearly double the long term mean of 658 fish per pull. Age-0 walleye CPUE for shoreline seining was 3.4 fish/seine haul; lower than the long term average of 4.2 fish/seine haul. Caution should be used when making inferences based on seining catch data. Highly variable catch rates are an inherent bias of the gear and values may not represent true relative abundance (Lyons 1986, Parsley et al. 1989).

Table 16. Mean catch per unit effort (CPUE; No./haul) and standard error (SE) values for fish species collected in the standard August seine survey on Lake Sharpe, South Dakota, 2008-2012. Catches are for age-0 fishes except where noted. Asterisk (*) indicates both age-0 and adult fish included in CPUE.

Species	2008	2009	2010	2011	2012
Black crappie	0	0	1.5 (1.1)	0.1 (0.1)	0
Bluegill	0	0	0	0.2 (0.3)	1.0 (0.7)
Bluntnose minnow	3.9 (1.8)	1.1 (0.6)	8.9 (6.5)	0.3 (0.2)	3.0 (1.3)
Brassy minnow*	0	0.3 (0.2)	0	0.1 (0.1)	0
Channel catfish	0.1 (0.1)	0.1 (0.1)	0.8 (0.7)	0.1 (0.1)	0
Common carp	0.2 (0.1)	0	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)
Emerald shiner*	28.6 (7.6)	21.9 (7.6)	32.3 (13.2)	8.3 (6.8)	13.2 (4.5)
Freshwater drum	21.6 (8.0)	4.8 (2.4)	7.7 (2.6)	0	5.1 (1.8)
Fathead minnow	0	0.1 (0.1)	0.1 (0.1)	0.7 (0.7)	0
Gizzard shad	1,619.6 (640.8)	492.9 (178.7)	593.9 (194.4)	13.3 (8.0)	1,350.9 (508.9)
Goldeye	7.4 (3.5)	0	0.9 (0.2)	0	0
Johnny darter*	0.8 (0.5)	5.0 (3.0)	1.1 (0.4)	1.5 (0.8)	0.5 (0.3)
Largemouth bass	0.8 (0.3)	0.1 (0.1)	0	0.1 (0.1)	0.1 (0.1)
Red shiner	0	0	0.1 (0.1)	0	0
River carpsucker	16.1 (9.0)	0.3 (0.2)	8.5 (7.8)	0.3 (0.2)	3.8 (1.9)
Sand shiner	0	0	0.9 (0.6)	0.2 (0.1)	0
Sauger	0	0	0	0	0
Smallmouth bass	8.2 (1.7)	4.0 (1.4)	11.5 (3.5)	1.6 (0.9)	4.3 (1.3)
Spottail shiner*	5.4 (1.2)	16.3 (10.5)	39.1 (23.1)	3.8 (1.9)	5.5 (4.1)
Walleye	1.8 (0.7)	1.1 (0.3)	0.8 (0.4)	0.8 (0.5)	3.4 (1.5)
White bass	74.8 (50.5)	2.2 (0.8)	6.8 (2.6)	6.9 (5.0)	2.1 (1.0)
White crappie	0.3 (0.2)	8.8 (3.9)	8.1 (5.0)	0.1 (0.1)	3.3 (1.8)
White sucker	0.1 (0.1)	0.3 (0.3)	0.8 (0.4)	0.2 (0.1)	0.1 (0.1)
Yellow perch	10.2 (4.5)	24.9 (9.5)	48.8 (44.6)	1.8 (1.3)	23.4 (10.5)

LAFRAMBOISE AND HIPPLE LAKE BACKWATER PANFISH POPULATION ASSESSMENT

Species Composition and Relative Abundance

In 2012, black crappie, channel catfish, shortnose gar and white bass were the most abundant species collected in Hipple Lake (Table 17) and common carp, smallmouth bass, walleye and shortnose gar were the most abundant in LaFramboise (Table 18). This survey was intended to target panfish communities; however, many centrarchids were collected in low abundance. Lake Sharpe, especially Hipple Lake and LaFramboise Bay, provides a very diverse fishery with 20 species collected throughout the history of this survey.

Population Characteristics of Bluegill

In 2010, bluegill were found in low abundance in Hipple Lake and LaFramboise Bay (CPUE of 2.3 and 0.3 fish/net-night, respectively; Longhenry et al. 2010). No bluegill were collected during the survey in 2011 at either location and 32 bluegill were captured in 2012 in Hipple Lake (Table 17; Table 18). Bluegill CPUE in Hipple Lake was 1.6 (fish/net-night) captured in Hipple Lake were of the quality to preferred length (80 PSD; 19 PSD-P; Figure 8). Although based on small sample sizes, it appears the 2007 year class was particularly strong, but the 2009 and 2010 year classes experienced faster growth (Table 19).

Population Characteristics of Black Crappie

Catch per unit effort of black Crappie in Hipple Lake was higher in 2012 (8.1 fish/net-night) than in 2011 (5.9 fish/night; Figure 9). A total of 161 black crappies were collected at both sites. Proportional size distribution of black crappie in LaFramboise Bay and Hipple Lake was higher in 2012 (100) than in 2010 (15) or 2011 (28; Figure 9) . Relative weight was 97 and 105, at Hipple Lake and LaFramboise Bay respectively, indicting good black crappie condition (Table 16; Table 17). Black crappie found in Hipple Lake and LaFramboise Bay exhibit similar growth rates compared to statewide and regional means (Table 20; Willis et al. 2001).

Population Characteristics of White Bass

Catch per unit effort of white bass, combined from LaFramboise Bay and Hipple Lake, was 87% lower in 2012 (3.2 fish/net-night) compared to 2011 (23.7 fish/net-night; Figure 10). Proportional size distribution and PSD-P of white bass (100 and 67, respectively) were high, indicating a population with few individuals smaller than the preferred length category. Growth of white bass is similar to state and regional averages with a mean length of 368-mm at age-5 compared to the state and regional mean of 360-mm (Table 21).

Table 17. Total catch (N), catch per unit effort (CPUE; No./net night), percent of total catch (%), standard error (SE), proportional size distribution (PSD), PSD-preferred length (PSD-P) and relative weight (W_r) of fish species caught in ten, overnight 1.9 cm bar mesh frame nets at Hipple Lake, Hughes County, South Dakota, during May, 2012. Mean W_r was calculated from stock length and greater fish only.

Species	N	%	CPUE	SE	PSD	PSD-P	Mean W_r
Black bullhead	27	6	2.7	0.8	78	0	--
Black crappie	158	35	15.8	5.2	99	4	97
Bluegill	32	7	3.2	1.2	88	19	111
Channel catfish	58	13	5.8	5.2	95	19	--
Common carp	11	2	1.1	0.3	82	64	--
Gizzard shad	26	6	2.6	1.0	100	0	--
Largemouth bass	2	0	0.2	0.1	100	50	--
Northern pike	2	0	0.2	0.2	0	0	--
Shortnose gar	59	13	5.9	1.8	--	--	--
Smallmouth bass	4	1	0.4	0.4	75	25	86
Walleye	9	2	0.9	0.4	67	22	77
White bass	60	13	6.0	2.0	100	67	89
White crappie	1	0	0.1	0.1	100	100	90

Table 18. Total catch (N), catch per unit effort (CPUE; No./net night), percent of total catch (%), standard error (SE), proportional size distribution (PSD), PSD-preferred length (PSD-P) and and relative weight (W_r) of fish species caught in ten, overnight 1.9 cm bar mesh frame nets at LaFramboise Bay, Hughes County, South Dakota during May, 2012. Mean W_r was calculated from stock length and greater fish only.

Species	N	%	CPUE	SE	PSD	PSD-P	Mean W_r
Black bullhead	0	0	0	--	--	--	--
Black crappie	3	3	0.3	0.2	100	0	105
Bluegill	0	0	0	--	--	--	--
Channel catfish	2	2	0.2	0.2	50	0	--
Common carp	36	40	3.6	1.5	97	53	--
Gizzard shad	0	0	0	--	--	--	--
Largemouth bass	0	0	0	--	--	--	--
Northern pike	0	0	0	--	--	--	--
Shortnose gar	12	13	1.2	0.5	--	--	--
Smallmouth bass	19	21	1.9	0.8	68	11	95
Walleye	14	16	1.4	0.5	21	0	73
White bass	3	3	0.3	0.2	100	67	91
White crappie	0	0	0	--	--	--	--

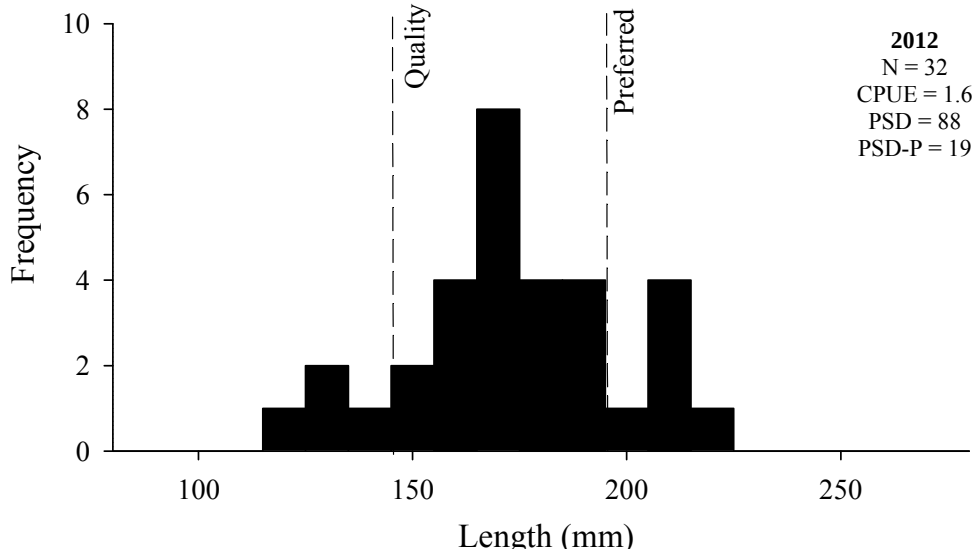

Figure 8. Length-frequency, catch rate (CPUE), proportional size distribution (PSD), and PSD of preferred-length fish (PSD-P) for bluegill sampled in frame net sets, from Hipple Lake and LaFramboise Bay (combined),Lake Sharpe, Hughes County, South Dakota during 2012.

Table 19. Average back-calculated lengths (mm), number (N), and standard error (SE) for each age class of bluegill sampled from Hipple Lake and LaFramboise Bay (combined), Lake Sharpe, Hughes County, South Dakota 2012.

			Back-calculated Age						
Year Class	Age	N	1	2	3	4	5	6	7
2010	2	2	113	136					
2009	3	7	73	149	162				
2008	4	4	51	101	160	175			
2007	5	10	44	96	130	171	187		
2006	6	5	46	94	132	147	173	187	
2005	7	3	46	91	119	148	166	197	218
Mean		**31**	**62**	**111**	**141**	**160**	**175**	**192**	**218**
SE			11	10	9	7	6	5	0
Statewide Mean			55	103	141	166	180		
Region II Mean			52	97	134	164	180		

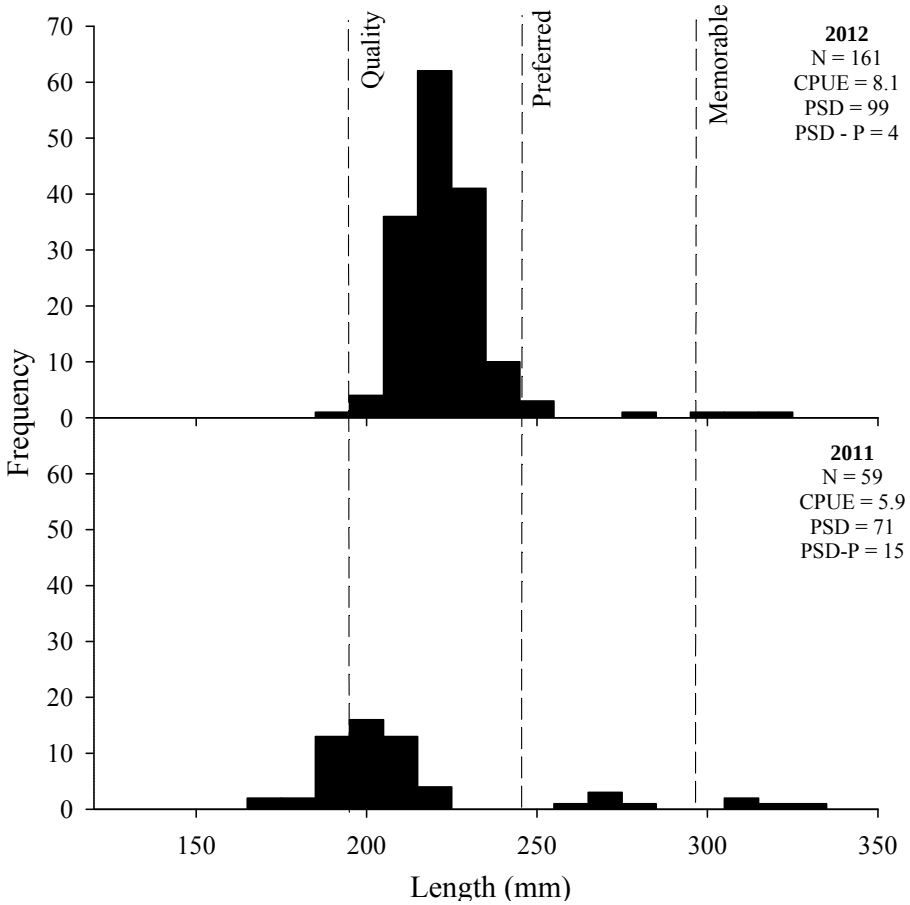

Figure 9. Length-frequency, catch rate (CPUE), proportional size distribution (PSD), and PSD of preferred-length fish (PSD-P) for black crappie sampled in frame nets from Hipple Lake and LaFramboise Bay (combined), Lake Sharpe, Hughes County, South Dakota during 2011 and 2012.

Table 20. Average back-calculated lengths (mm), number (N) and standard error (SE) for each age class of black crappie sampled from Hipple Lake and LaFramboise Bay (combined), Lake Sharpe, Hughes County, South Dakota 2012.

			Back-calculated Age						
Year Class	Age	N	1	2	3	4	5	6	7
2009	3	151	118	189	226				
2008	4	5	113	160	200	238			
2007	5	1	74	109	123	154	190		
2006	6	3	151	233	272	290	302	314	
Mean		**160**	**114**	**173**	**205**	**227**	**246**	**314**	
SE			16	26	31	39	56	0	
Statewide Mean			83	147	195	229	249		
Region II Mean			75	132	177	209	235		

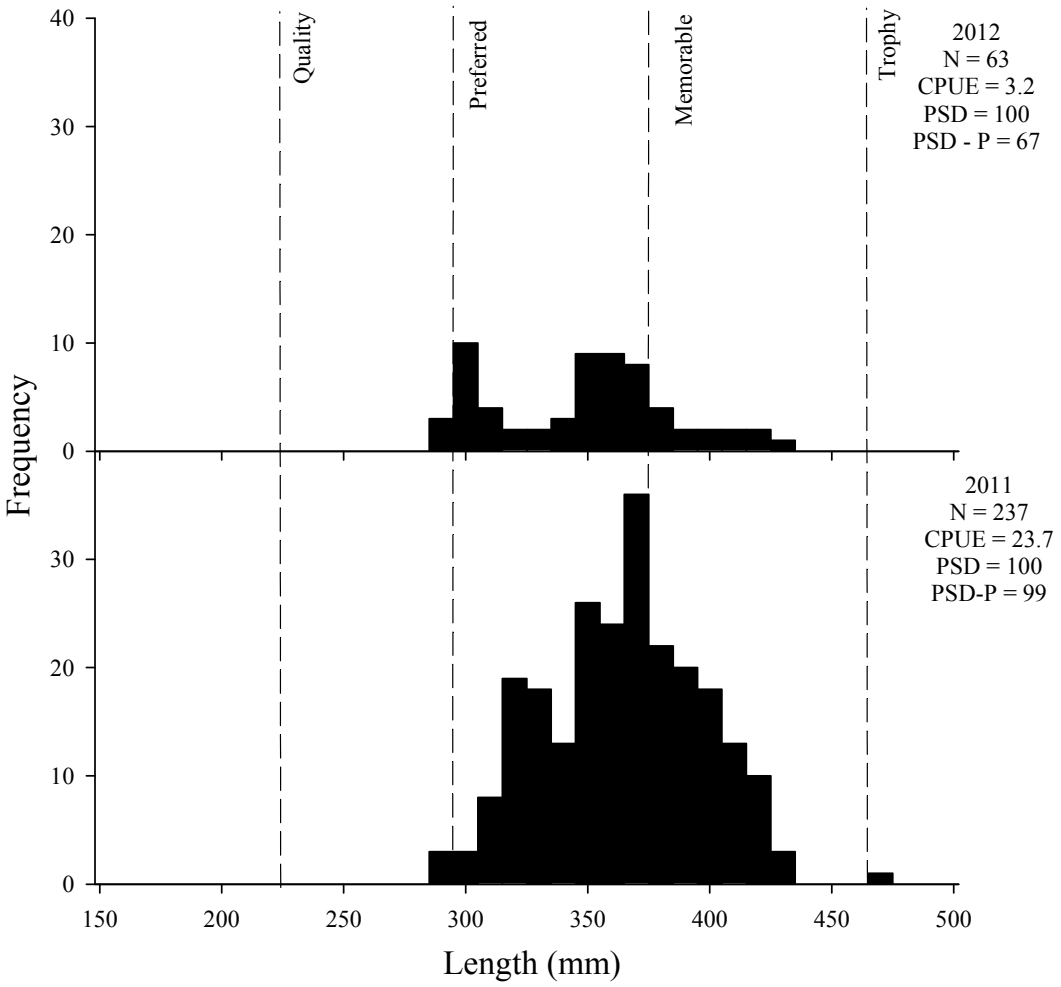

Figure 10. Length-frequency, catch rate (CPUE), proportional size distribution (PSD), and PSD of preferred-length fish (PSD-P) for white bass sampled in frame nets sets from Hipple Lake and LaFramboise Bay (combined), Lake Sharpe, Hughes County, South Dakotaduring 2011 and 2012.

Table 21. Average back-calculated lengths (mm), number (N) and standard error (SE) for each age class of white bass sampled from Hipple Lake and LaFramboise Bay (combined), Lake Sharpe, Hughes County, South Dakota 2012.

			Back-calculated Age						
Year Class	Age	N	1	2	3	4	5	6	7
2010	2	20	170	260					
2009	3	23	161	284	319				
2008	4	12	169	261	319	337			
2007	5	4	194	277	320	348	361		
2006	6	3	183	279	322	356	370	384	
2005	7	1	145	260	331	355	372	382	403
Mean		**63**	**170**	**270**	**322**	**349**	**368**	**383**	**403**
SE			7	5	2	4	3	1	0
Statewide Mean			142	241	299	339	360		
Region II Mean			142	243	297	334	360		

LARVAL GIZZARD SHAD ASSESSMENT

Gizzard Shad Trawling

Peak gizzard shad densities exhibit high annual variability in Lake Sharpe and can occur anywhere between 14-May (2007) to 9-July (2008); thus, sampling for larval shad occurred semimonthly from May through August (Longhenry et al. 2010; Table 22). Shad densities in Lake Sharpe increased in 2012 compared to 2011 (peak larval gizzard shad density 1,911 and 8.89 fish/100m^3, respectively; Table 23). Gizzard shad densities are thought to be much higher in Hipple Lake because shallow backwater areas warm much faster than the rest of the reservoir. Larval gizzard shad densities were high in 2012 in Hipple Lake (5,734 fish/100m^3), which is slightly lower than the highest recorded peak density in Hipple Lake in 2010 (5,900 fish/100m^3; Table 24).

Table 22. Dates of larval trawl sampling of Lake Sharpe, South Dakota, 2006-2012.

Period	Actual sampling date
1	May 11 - 18
2	May 26 - 29
3	June 7 - 15
4	June 22 - 28
5	July 6 - 12
6	July 19 - 27
7	August 3 - 9

Table 23. Average gizzard shad density per 100 m^3 sampled during May to August, 2008 to 2012 in Lake Sharpe, South Dakota. Sample size (N) and standard deviations (in parentheses) shown.

Zone	Period	2008 Density	N	2009 Density	N	2010 Density	N	2011 Density	N	2012 Density	N
2	1	0.14 *(0.31)*	5	0.00 *(0.00)*	6	0.26 *(0.63)*	6	0	5	29.54 *(34.05)*	6
	2	0.00 *(0.00)*	7	40.50 *(91.49)*	6	0.00 *(0.00)*	6	--	0	1,911.38 *(3,608.47)*	6
	3	1.90 *(4.38)*	6	658.47 *(1,017.93)*	6	1,971.93 *(3,080.10)*	6	0	6	357.58 *(569.32)*	6
	4	83.41 *(161.13)*	9	475.64 *(629.78)*	6	22.94 *(32.80)*	6	0	8	341.28 *(379.68)*	6
	5	700.91 *(1,437.60)*	6	18.83 *(45.07)*	6	19.27 *(43.80)*	6	0	4	26.81 *(65.53)*	6
	6	11.32 *(21.37)*	6	30.78 *(32.89)*	6	5.86 *(11.42)*	6	0	6	48.21 *(70.57)*	6
	7	9.44 *(19.07)*	8	41.33 *(101.24)*	6	---	0	0.25 *(0.61)*	6	3.82 *(9.24)*	6
	Peak	700.91 *(1,437.60)*		658.47 *(1,017.93)*		1,971.93 *(3,080.10)*		0.25 (0.61)		1,911.38 *(3,608.47)*	
	Date	July 9		June 8		June 7		Aug 8		May 29	

Zone	Period	2008 Density	N	2009 Density	N	2010 Density	N	2011 Period	N	2012 Density	N
3	1	0.00 *(0.00)*	8	0.00 *(0.00)*	6	0.88 *(1.33)*	6	0	6	0	6
	2	0.00 *(0.00)*	5	0.00 *(0.00)*	6	0.93 *(1.37)*	6	--	0	9.29 *(20.91)*	6
	3	2.27 *(4.49)*	6	126.44 *(287.70)*	6	4.65 *(3.91)*	6	0	6	3.78 *(7.03)*	8
	4	7.10 *(12.06)*	6	97.56 *(163.42)*	6	283.12 *(417.53)*	6	0	6	117.63 *(306.28)*	7
	5	208.62 *(243.75)*	6	52.00 *(64.98)*	6	176.83 *(278.63)*	6	0.82 (1.92)	14	13.84 *(8.89)*	6
	6	45.49 *(39.07)*	6	30.88 *(48.78)*	6	4.04 *(5.33)*	6	6.33 (9.14)	14	0.45 *(0.50)*	6
	7	5.10 *(6.17)*	5	6.50 *(11.30)*	6	---	0	8.89 (18.19)	14	0.31 *(0.44)*	6
	Peak	208.62 *(243.75)*		126.44 *(287.70)*		283.12 *(417.53)*		8.89 (18.19)		117.63 *(306.28)*	
	Date	July 9		June 8		June 22		Aug 8		June 26	

Table 24. Density of gizzard shad (No./100 m^3) from May to August, 2008 – 2012 in Hipple Lake, Lake Sharpe, South Dakota. Sample size (N) and standard deviations (SE; in parentheses) are shown.

	2008		**2009**		**2010**		**2011**		**2012**	
Period	**Density**	**N**	**Density**	**N**	**Density**	**N**	**Density**	**N**	**Density**	**N**
1	0.23 *(0.40)*	3	0.00 *(0.00)*	2	0.52 *(0.90)*	3	0	3	44.31 *(32.55)*	4
2	0.00 *(0.00)*	2	81.00 *(126.51)*	3	0.00 *(0.00)*	3	--	0	5,734.14 *(4,611.39)*	2
3	0.16 *(--)*	1	1,969.70 *(151.36)*	2	5,914.00 *(902.95)*	2	0	1	1,072.73 *(293.81)*	2
4	15.69 *(26.49)*	3	950.91 *(560.27)*	3	83.22 *(--)*	1	0	3	511.92 *(351.83)*	4
5	5.18 *(0.71)*	2	55.41 *(78.36)*	2	56.51 *(73.70)*	2	0	0	160.58 *(--)*	1
6	0.10 *(0.18)*	3	60.75 *(2.92)*	3	28.95 *(--)*	1	0	1	94.19 *(78.06)*	3
7	0.00 *(0.00)*	2	82.66 *(143.18)*	3	--	0	0	2	22.68 *(--)*	1
Peak	15.69 *(26.49)*		1,969.70 *(151.36)*		5,914.00 *(902.95)*		0		5,734.14 *(4,611.39)*	
Date	June 25		June 8		June 7				May 29	

ANGLER USE, SPORTFISH HARVEST, AND PREFERENCE SURVEYS

Angler Use

Estimated fishing pressure for the April-September 2012 daylight period was similar to the long term average (327,020 angler-h; Table 25). Estimated angler days spent on Lake Sharpe during the 2012 survey period (104,814 days) surpassed the reservoir-wide objective of 100,000 angler days (SDGFP 1994).

Similar to previous years, peak fishing pressure on Lake Sharpe occurred in May and June (Johnson and Lott 2001; Lott et al. 2003, 2006b, 2007; Table 26). Most (91%) angling pressure on Lake Sharpe was evenly split between the upper (45%; 146,592 angler-h) and lower (46%; 152,360 angler-h) zones in 2012 (Table 27). The remaining (and lowest; 9% or 28,069 angler-h) angling pressure occurred in the middle zone on Lake Sharpe. Boat fishing was again the most popular form of angling on Lake Sharpe (11.6 h/ha; Table 28).

Catch, Harvest and Release Estimates

Walleye were the most abundant species in the angler catch in 2012 (541,797 fish), nearly a three-fold increase from 2011 (178,666 fish). Most of the walleye harvest occurred in May in the lower zone (Table 30; Table 31). Walleye were followed by smallmouth bass, sauger and white bass in decreasing order of estimated catch. Walleye were also the most frequently released species with an estimated 367,866 walleye caught and released in Lake Sharpe in 2012 (Table 32). Smallmouth bass, white bass and sauger were also commonly caught and released (52,207, 12,477 and 5,795 fish released, respectively).

Although estimated fishing pressure was similar to previous years, estimated fish harvest (207,663 fish) was the 4th highest on record and estimated walleye harvest (173,931 walleye) was the 2nd highest on record. About 99% of the walleye harvested during months that the 381-mm minimum length limit was in effect were between 381-mm (15-in) and 508-mm (20-in) in length (Figure 11). In July and August, when no minimum length limit was in effect, 73% of the walleyes harvested were between 381- and 508-mm in length and 27% were less than 381-mm and less than 1% > 508-mm (20-in). Smallmouth bass harvest was well dispersed across length classes from 200-mm to 500-mm (Figure 12).

Hourly Catch, Harvest, and Release Rates

The estimated hourly catch rate was 2.07 fish/angler-h and estimated release rate was 1.43 fish/angler-h, for all species combined during the April-September daylight period in 2012 (Table 33). In 2012, anglers targeting walleye had a mean hourly catch rate of 3.35 (fish/angler-h), considerably higher than 2011 (2.84 fish/angler-h; Table 34). Hourly catch rates of anglers targeting smallmouth bass, white bass, and channel catfish were 1.14, 1.81, and 0.57 fish/angler-h, respectively (Table 34). Hourly catch rates of smallmouth bass, white bass, and channel catfish were below the five-year average in 2012 (Table 35). Catch rates of smallmouth bass and channel catfish have been decreasing since 2007; similarly, catch rates of white bass have decreased since 2009 (Table 35). Fish abundance may influence hourly catch rates of anglers to some extent. However, it is likely that an increase in the percent of total angling trips specifically

targeting smallmouth bass, channel catfish, or white bass, and changes in the likelihood of shore anglers being interviewed by survey clerks may be responsible most of the decrease in hourly catch rates of these species.

Hourly catch rates for walleye were highest in May and June in 2012, but harvest rates were highest during May and July (Table 36). The release rate for walleye was the highest in June when the 381-mm minimum length limit was in effect. The removal of the minimum length limit in July and August normally results in an increase in the harvest rate; however, harvest rates in August were lower than some months when the length restriction was in effect.

The number of parties that caught four or more walleye increased from 33% in 2011 to 41% in 2012, reservoir-wide (Table 37). The number of anglers that harvested a limit of four walleye in 2012 was 22%, similar to 23% in 2011 (Table 37). The percent of angling parties that caught a smallmouth bass has generally decreased during the 2008-2012 period; however, the percent of angling parties harvesting smallmouth bass has remained relatively unchanged throughout the same time period (Table 38).

Angler Demographics and Economic Impacts

For the April-September 2012 daylight period, Lake Sharpe anglers contributed about $8.3 million dollars to local economies, based on an estimated 104,814 trips at an estimated $79 per trip (U.S. Department of the Interior-Fish and Wildlife Service, and U.S. Department of Commerce-Bureau of the Census 2007). This estimated impact is similar to previous years (Fincel et al. 2012).

Non-residents made up 11% of the angler contacts on Lake Sharpe in 2012, down almost half from 19% in both 2011 and 2010 (Table 39). Most non-resident anglers using Lake Sharpe in 2012 were from Nebraska, Iowa and Minnesota (Table 40). Patterns in angler state of residency in 2012 remained similar to previous years (Fincel et al. 2012). Residents of 38 states and two foreign countries were interviewed while fishing Lake Sharpe.

About 57% of resident angling parties interviewed on Lake Sharpe during the 2012 survey were local anglers from Hughes and Stanley counties (Table 41; Figure 13). Pennington (Rapid City), Minnehaha (Sioux Falls) and Beadle (Huron) county residents made up 6%, 5% and 5% of the interviewed angling parties, respectively. The percent of angler interviews from residents of Beadle, Brookings, Davison, Hand, and Lyman counties remained within ranges observed in previous years (Longhenry et al. 2011).

Travel is required for anglers fishing Lake Sharpe as the reservoir is located a fair distance from large population centers. Most (42%) anglers drove >100 miles to fish on Lake Sharpe (Table 42). Residents of Hughes and Stanley Counties composed the majority of anglers traveling <25 miles and 25-49 miles, one way, to fish Lake Sharpe in 2012. Anglers from Minnehaha, Pennington and Beadle counties composed the majority of anglers traveling 100-199 miles to fish Lake Sharpe. The percent of interviewed anglers traveling in excess of 200 miles, one way, to fish Lake Sharpe in 2012 was lower than previous years (Fincel et al. 2012). Walleye were targeted less frequently in 2012 than in 2011; however walleye remain the primary species targeted by anglers on Lake Sharpe (Table 43).

Satisfaction and Attitudes

Anglers' perception of their fishing experience is important to the success of a fishery. Angler responses help fisheries managers determine if current management practices and regulations are providing a fishery that meets angler needs and expectations. In 2012, anglers were asked to consider all factors when evaluating their level of satisfaction with their fishing trip. The median trip rating for the April-September 2012 period was "very satisfied" (median of 1; Table 44). The median satisfaction rating of "very satisfied" for 2012 is well above the long term average. About 87% of angling parties interviewed in 2012 indicated some degree of satisfaction, which surpasses the Lake Sharpe Strategic Plan objective of 70%. Neutral anglers made up 8% of all contacts, and more importantly, dissatisfied anglers decreased 50%, from 10% of all contacts in 2011 to 5% in 2012. Median satisfaction rating of anglers asked: "Considering numbers, sizes and species caught, how satisfied are you with your fishing experience?" remained high in 2012 and 82% of anglers showed some level of satisfaction (Table 45).

Gigliotti (2004) documented that factors other than the number of walleye harvested likely influence trip satisfaction. This is supported by the data from this study, as 76% of anglers harvesting zero walleye expressed some degree of satisfaction with their trip (Table 46). Angler satisfaction decreased to 67% s when asked "Considering numbers, sizes, and species caught, how satisfied are you with your fishing experience today?" in 2012 (Table 47).

In 2012, anglers were asked a suite of questions regarding proposed spearfishing regulation changes. Most resident anglers were in favor of allowing northern pike spearing statewide through the ice (65%; Table 48); however, fewer non-residents were in favor of the proposed regulation change (41%).

Table 25. Angler use and harvest estimates for surveys conducted during the April-September daylight period, except where noted.

Year	Fishing pressure (h)	Angler days	Estimated fish harvest	Estimated walleye harvest	Reference
1973-1974*	208,800	46,400	76,813	62,479	Schmidt (1975)
1984	241,986	52,605	87,020	64,784	Riis (1986)
1985	274,376	62,358	123,942	66,584	Riis (1986)
1991	303,381	70,554	143,307	93,027	Fielder et al. (1992)
1992	402,543	100,636	219,152	157,220	Stone et al. (1994)
1993	291,970	60,827	102,833	83,133	Stone et al. (1994)
1994	347,125	91,752	152,981	130,009	Riis & Johnson (1995)
1995	356,391	122,893	166,949	140,943	Riis et al. (1996)
1996	477,220	101,536	170,568	142,506	Riis et al. (1997)
1997	442,827	100,097	191,079	159,274	Johnson et al. (1998)
1998	502,631	111,696	252,496	207,144	Johnson and Lott (1999)
1999	386,315	84,784	186,720	155,724	Johnson and Lott (2000)
2000	325,532	71,893	144,730	104,076	Johnson and Lott (2001)
2001	300,078	77,141	116,476	91,029	Johnson et al. (2002)
2002	385,357	90,459	196,600	141,612	Lott et al. (2003)
2003	397,220	99,305	140,796	105,275	Lott et al. (2004)
2004	309,663	87,475	108,869	60,375	Lott et al. (2006)
2005	271,331	75,370	110,500	56,535	Lott et al.(2007)
2006	342,974	99,702	142,209	110,443	Potter and Lott (2007)
2007	335,017	89,100	137,616	111,174	Potter et al. (2008)
2008	316,726	95,113	125,353	92,545	Adams et al. (2009)
2009	404,094	126,279	208,412	154,229	Longhenry et al. (2010)
2010	387,037	107,810	185,399	140,859	Longhenry et al. (2011)
2011	170,847	49,378	85,345	72,622	Fincel et al. (2012)
2012	327,020	104,814	207,663	173,931	This Report

* June 1973 through May 1974

Table 26. Estimated fishing pressure (angler-h), by month and zone, with 80% confidence intervals (CI), for the April-September 2012 daylight period.

Zone	Month						
	April	May	June	July	August	Sept.	Total
Lower	13,641	39,847	41,863	31,608	8,760	16,641	152,360
80% CI	5,424	9,411	8,105	7,381	2,733	6,221	16,863
Middle	4,102	6,181	5,105	775	1,612	10,294	28,069
80% CI	1,772	2,440	1,927	419	539	2,713	4,542
Upper	18,911	31,771	7,707	21,976	23,833	19,688	146,592
80% CI	3,931	6,142	9,881	5,125	9,282	3,392	16,575
Total	36,655	77,799	77,379	54,359	34,205	46,623	327,020
80% CI	6,930	11,500	12,925	8,996	9,691	7,587	24,078

Table 27. Estimated fishing pressure, expressed as angler-h (h) and hour per hectare (h/ha), by reservoir zone, for standard creel surveys conducted during the April-September daylight period, 1999-2012. Asterisk (*) denotes survey was conducted during the flood of 2011 which resulted in fewer angler interviews.

Year	Zone							
	Lower		Middle		Upper		Total	
	h	h/ha	h	h/ha	h	h/ha	h	h/ha
1999	216,972	11.8	38,410	9.1	130,933	142.6	386,315	16.3
2000	187,469	10.2	51,778	12.2	86,285	94.0	325,532	13.8
2001	179,082	9.8	49,885	11.8	71,111	77.4	300,078	12.7
2002	180,568	9.8	91,401	21.6	113,388	123.5	385,357	16.3
2003	211,403	11.5	36,021	8.5	149,796	163.1	397,220	16.8
2004	124,860	6.8	34,773	8.2	150,030	163.4	309,663	13.1
2005	102,978	5.6	20,174	4.7	148,179	161.4	271,331	11.5
2006	143,410	7.8	30,064	7.1	169,500	184.6	342,974	14.5
2007	198,422	10.7	19,184	4.5	117,411	127.9	335,017	13.6
2008	173,956	9.4	25,671	6.0	117,099	127.5	316,726	13.4
2009	232,351	12.6	28,514	6.7	143,228	156.0	404,094	17.1
2010	236,971	12.8	19,931	4.7	130,134	141.8	387,037	16.4
2011	101,083	5.5	26,072*	6.1*	43,693*	47.6*	170,847*	7.2*
2012	152,360	8.2	28,069	6.6	146,592	160.0	327,020	13.8

Table 28. Estimated fishing pressure, expressed as angler-h (h) and hours per hectare (h/ha), by type of fishing, with 80% confidence intervals (CI), for the standard April-September daylight survey period, 2008-2012. Asterisks (*) denotes survey was conducted during the flood of 2011 which resulted in fewer angler interviews.

Type of fishing	Year				
	2008	**2009**	**2010**	**2011**	**2012**
Boat (h)	261,082	337,989	343,966	150,686*	274,295
80% CI	24,150	30,642	28,985	18,907	21,332
H/ha	11.0	14.3	14.5	6.4*	11.6
Shore (h)	55,644	66,104	43,071	20,161*	52,725
80% CI	9,093	10,224	5,482	5,031	9,014
H/ha	2.4	2.8	1.8	0.9*	2.2

Table 29. Estimated number of walleye caught, harvested, and released during the April-September daylight period, 1994-2012.

Year	Caught	Harvested	Released	Percent Harvested
1994	248,777	130,009	118,718	52
1995	237,615	140,943	96,656	59
1996	499,686	142,506	357,180	29
1997	365,493	159,274	206,219	44
1998	468,578	207,144	261,434	44
1999	348,087	155,724	192,363	45
2000	339,022	104,076	234,946	31
2001	332,904	91,029	241,874	27
2002	377,184	141,612	235,572	38
2003	528,520	105,275	423,244	20
2004	160,974	60,375	100,244	38
2005	98,794	56,535	42,259	57
2006	196,523	110,442	86,081	57
2007	340,733	111,174	229,560	33
2008	301,749	92,545	209,204	31
2009	478,729	154,230	324,500	32
2010	283,144	140,859	142,285	50
2011	178,666	72,622	106,044	41
2012	541,797	173,931	367,866	32
Mean	332,999	123,700	209,276	37

Table 30. Estimated number of fish harvested, by species and month, with 80% confidence intervals (CI), for the April-September 2012 daylight period.

Species	Month						
	April	**May**	**June**	**July**	**Aug.**	**Sept.**	**Total**
Walleye	18,668	50,209	34,458	34,860	11,184	24,553	173,931
80% CI	4,534	11,503	11,284	6,991	3,993	3,993	18,999
Sauger	461	1,894	291	32	0	112	2,790
80% CI	218	805	69	32	0	85	842
Channel catfish	107	318	461	263	750	231	2,130
80% CI	63	229	295	248	928	154	1,044
White bass	493	1,248	712	205	45	61	2,764
80% CI	144	1,134	512	209	64	51	1,272
Smallmouth bass	3,869	5,487	3,524	1,390	501	1,424	16,195
80% CI	2,468	2,069	1,174	825	312	642	3,597
Rainbow trout	78	0	136	93	165	29	501
80% CI	94	0	143	107	138	43	248
Yellow perch	51	90	31	448	290	85	995
80% CI	54	90	46	451	192	67	507
Other*	703	5,737	1,067	403	46	400	8,357
Total	24,430	64,983	40,680	37,694	12,981	26,895	207,663
80% CI	6,167	10,805	10.131	7,465	4,259	4,600	18,773

*Other includes black bullhead, black crappie, bluegill, common carp, Chinook salmon, freshwater drum, goldeye, northern pike, rainbow trout and white crappie.

Table 31. Estimated number of fish harvested, for selected species, by zone, with 80% confidence intervals (CI), for the April-September 2012 daylight period.

Species	Zone			
	Upper	**Middle**	**Lower**	**Total**
Walleye	71,453	9,810	92,668	173,931
80% CI	14,045	2,273	12,591	18,999
Sauger	2,256	232	302	2,790
80% CI	831	40	131	842
Channel catfish	1,352	362	416	2,130
80% CI	980	266	240	1,044
White bass	1,535	744	485	2,764
80% CI	1,223	238	257	1,272
Smallmouth bass	1,428	402	14,365	16,195
80% CI	606	246	3,537	3,597
Rainbow trout	460	0	41	501
80% CI	244	0	47	248
Yellow perch	67	51	877	995
80% CI	63	56	500	507
Total*	79,705	17,767	110,191	207,663
80% CI	12,297	3,657	13,706	18,773

* Other includes black bullhead, black crappie, bluegill, common carp, Chinook salmon, freshwater drum, goldeye, northern pike, and white crappie.

Table 32. Estimated number of fish released, by species and month, with 80% confidence intervals (CI) for the April-September 2012 daylight period.

Species	Month						
	April	May	June	July	Aug.	Sept.	Total
Walleye	33,668	121,678	141,883	41,114	6,211	23,312	367,866
80% CI	11,218	24,895	37,057	9,250	4,190	5,114	47,414
Sauger	343	2,204	3,111	75	0	62	5,795
80% CI	337	1,026	3,920	95	0	70	4,068
Channel catfish	61	621	896	1,505	1,116	800	4,999
80% CI	42	279	622	436	1,069	373	1,392
White bass	822	4,900	4,396	237	879	1,242	12,477
80% CI	242	1,683	6,904	159	461	554	7,148
Smallmouth bass	7,215	18,927	12,244	4,141	2,973	6,708	52,207
80% CI	2,992	3,988	3,006	1,340	1,418	3,375	7,006
Rainbow trout	1,199	147	175	0	0	0	1,521
80% CI	910	154	178	0	0	0	940
Yellow perch	31	228	89	1,427	370	1,315	3,459
80% CI	36	168	53	881	185	1,052	1,396
Other*	2,016	10,090	3,172	1,722	832	1,263	19,096
Total	45,355	158,795	165,966	50,221	12,381	34,702	467,420
80% CI	13,707	29,015	37,019	8,153	5,299	7,875	50,564

*Other includes black crappie, bluegill, Chinook salmon, common carp, freshwater drum, goldeye, lake herring, northern pike, shorthead redhorse, shortnose gar, shovelnose sturgeon, smallmouth buffalo, white crappie, and white sucker.

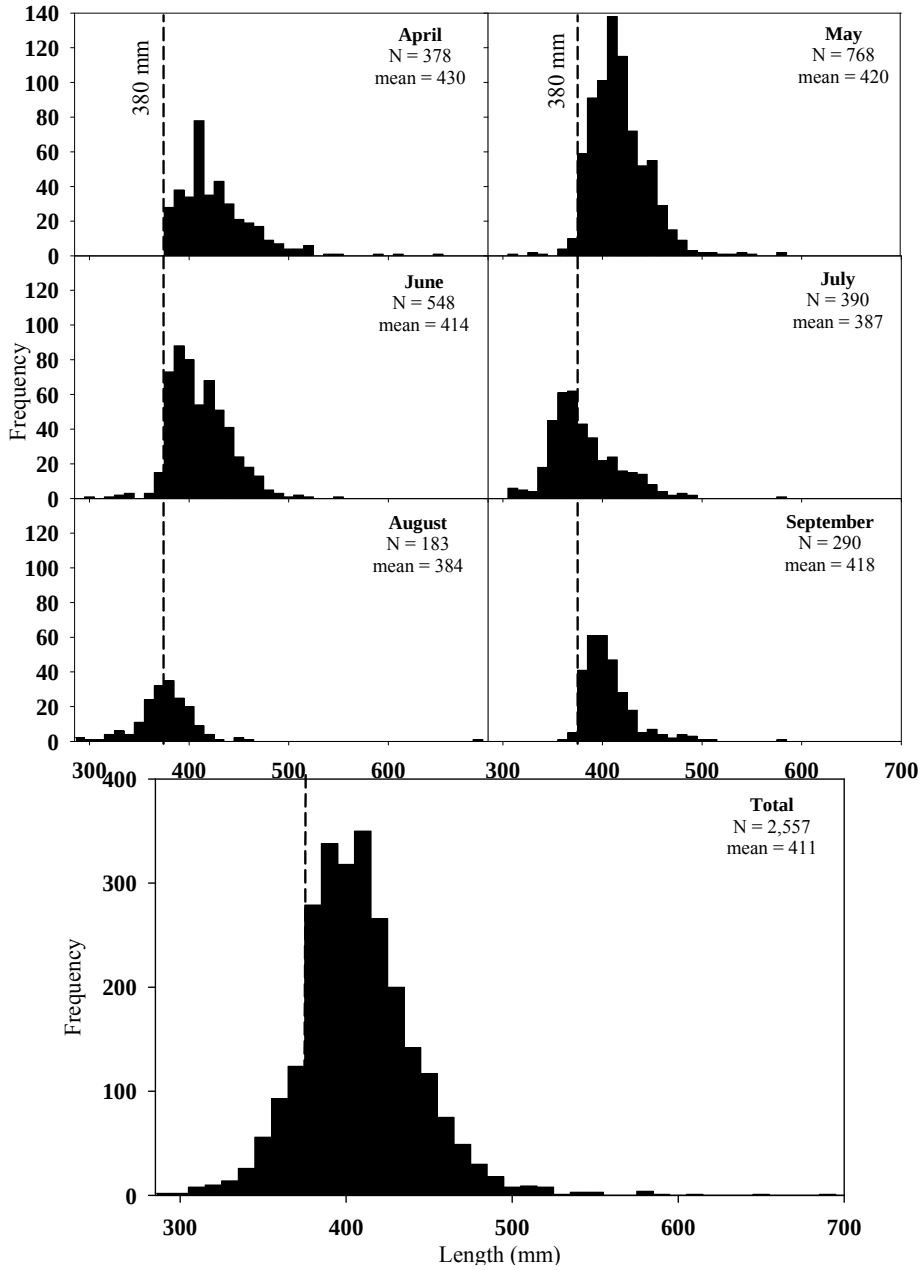

Figure 11. Length-frequency distribution of walleye harvested by anglers, by month during the April-September 2012 daylight period. Vertical line represents the 380-mm minimum length limit.

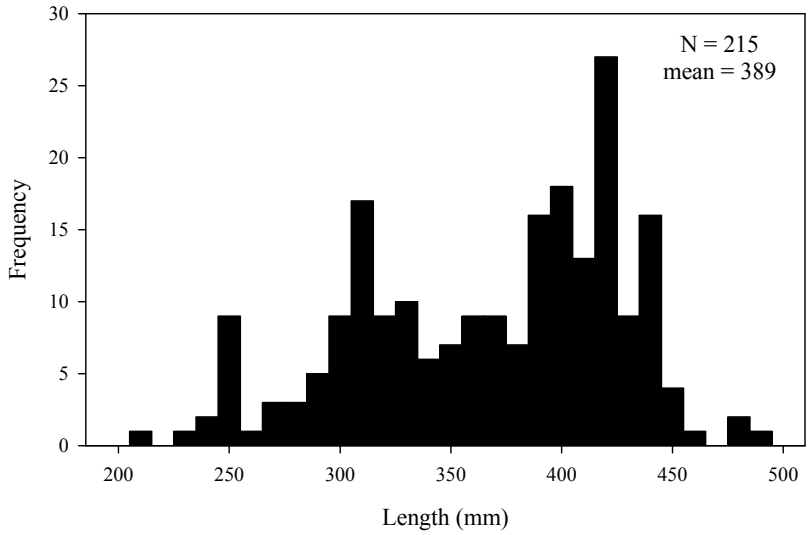

Figure 12. Length-frequency distribution of smallmouth bass harvested by anglers during the April-September 2012 daylight period.

Table 33. Estimated hourly catch, harvest, and release rates, by species, for all anglers interviewed during the April-September 2012 daylight survey period. Trace (T) indicates values >0 but <0.005.

Species	Catch rate (fish/angler-h)	Harvest rate (fish/angler-h)	Release rate (fish/angler-h)
Walleye	1.66	0.53	1.13
Sauger	0.03	0.01	0.02
White bass	0.05	0.01	0.04
Smallmouth bass	0.21	0.05	0.16
Channel catfish	0.02	0.01	0.01
Rainbow trout	0.01	T	0.01
Yellow perch	0.01	T	0.01
Other*	0.08	0.03	0.05
Total	2.07	0.64	1.43

* Other includes black crappie, bluegill, Chinook salmon, common carp, freshwater drum, goldeye, lake herring, northern pike, shorthead redhorse, shortnose gar, shovelnose sturgeon, smallmouth buffalo, white crappie, and white sucker.

Table 34. Estimated hourly catch, harvest, and release rates, by species, for anglers targeting the species listed during the April-September 2012 daylight period.

Target species	Catch rate (fish/angler-h)	Harvest rate (fish/angler-h)	Release rate (fish/angler-h)
Walleye	3.35	1.11	2.24
White bass	1.81	0.60	1.21
Smallmouth bass	1.14	0.51	0.63
Channel catfish	0.57	0.12	0.45
Rainbow trout	2.78	0.17	2.61

Table 35. Estimated hourly catch rates for walleye, smallmouth bass, white bass, channel catfish, and all fish combined, by year, for all anglers, for the April-September daylight survey period, 1993-2012.

Year	Catch rate (fish/angler-h)				
	Walleye	Smallmouth bass	White bass	Channel catfish	All fish
1993	0.72	0.01	0.04	0.01	0.84
1994	0.72	0.02	0.03	0.01	0.84
1995	0.67	0.03	0.02	0.02	0.83
1996	1.05	0.05	0.02	0.01	1.18
1997	0.83	0.05	0.06	0.02	1.00
1998	0.93	0.08	0.09	0.01	1.18
1999	0.90	0.13	0.06	0.03	1.20
2000	1.04	0.17	0.09	0.03	1.41
2001	1.11	0.13	0.06	0.05	1.40
2002	0.98	0.13	0.22	0.05	1.45
2003	1.33	0.20	0.23	0.05	1.89
2004	0.52	0.19	0.27	0.08	1.13
2005	0.36	0.10	0.31	0.06	0.88
2006	0.57	0.31	0.08	0.05	1.14
2007	1.02	0.60	0.09	0.04	1.85
2008	0.95	0.42	0.06	0.04	1.53
2009	1.18	0.32	0.12	0.03	1.75
2010	0.73	0.25	0.12	0.04	1.27
2011	1.05	0.24	0.05	0.02	1.43
2012	1.66	0.21	0.05	0.02	2.07

Table 36. Estimated hourly catch, harvest, and release rates (fish/angler-h), for walleye and all species combined, by month, for the April-September 2012 daylight survey period.

Month	Walleye			All fish combined		
	Catch rate	Harvest rate	Release rate	Catch rate	Harvest rate	Release rate
April	1.43	0.51	0.92	1.90	0.67	1.23
May	2.21	0.65	1.56	2.88	0.84	2.04
June	2.28	0.45	1.83	2.67	0.53	2.14
July	1.40	0.64	0.76	1.62	0.69	0.93
August	0.51	0.33	0.18	0.74	0.38	0.36
September	1.03	0.53	0.50	1.32	0.58	0.74
Total	1.66	0.53	1.13	2.07	0.64	1.43

Table 37. Percentage of angling parties catching (top panel) or harvesting (bottom panel) specified number of walleye or sauger per angler in each reservoir zone during the April – September 2011 and 2012 daylight survey periods.

Number/ trip	Catch per trip							
	2011				2012			
	Lower	Middle	Upper	Total	Lower	Middle	Upper	Total
≥ 1	67	51	39	46	85	29	59	63
≥ 2	54	44	24	34	76	19	49	54
≥ 3	45	41	19	38	71	13	42	47
≥ 4	38	39	16	33	64	7	37	41
≥ 5	29	34	8	26	56	6	32	36
≥ 6	22	31	6	21	52	5	28	32
≥ 7	18	29	4	18	44	3	22	27
≥ 8	15	28	3	16	38	2	19	23
≥ 9	12	24	2	13	33	2	17	20
≥10	10	21	2	11	28	0	15	17

Number/ trip	Harvest per trip							
	2011				2012			
	Lower	Middle	Upper	Total	Lower	Middle	Upper	Total
≥ 1	52	45	37	46	75	15	43	49
≥ 2	40	40	23	36	61	10	31	38
≥ 3	30	34	17	28	50	4	25	30
≥ 4	23	29	14	23	37	4	18	22

Table 38. Percent of angling parties that caught and harvested the specified number of smallmouth bass on an angling trip, per person, for the lower zone of Lake Sharpe during the April-September daylight survey period, 2008-2012.

Number/ trip	Catch per trip					Harvest per trip				
	2008	**2009**	**2010**	**2011**	**2012**	**2008**	**2009**	**2010**	**2011**	**2012**
≥ 1	57	47	36	44	21	13	9	3	8	5
≥ 2	43	32	22	29	11	6	3	0	2	2
≥ 3	35	24	14	22	7	3	0	0	0	1
≥ 4	28	21	10	18	5	2	0	0	0	0
≥ 5	24	18	8	16	4	0	0	0	0	0
≥ 6	20	15	6	13	2	Daily limit of 5				
≥ 7	17	11	4	10	1					
≥ 8	13	8	3	8	1					
≥ 9	12	7	2	6	1					
≥10	11	6	2	5	1					

Table 39. Percent of total angler contacts and number of contacts (N) for resident and non-resident (states combined) anglers during the April-September daylight period, 2008-2012.

Zone		Year				
		2008	2009	2010	2011	2012
Lower	**N**	233	703	707	329	432
	Residents (%)	78	76	74	70	73
	Non-residents (%)	22	24	26	30	27
Middle	**N**	176	233	171	197	206
	Residents (%)	90	91	90	90	93
	Non-residents (%)	10	9	10	10	7
Upper	**N**	572	676	537	181	616
	Residents (%)	89	89	88	93	89
	Non-residents (%)	11	11	12	7	11
Total	**N**	1,281	1,612	1,415	707	616
	Residents (%)	85	84	81	81	89
	Non-residents (%)	15	16	19	19	11

Table 40. Percent of total non-resident angler contacts for anglers from the states listed during the April-September daylight survey period, 2008-2012.

State	Percent by Year				
	2008	2009	2010	2011	2012
Iowa	23	24	25	24	22
Nebraska	25	20	31	30	30
Colorado	6	6	4	6	4
Minnesota	19	25	17	27	20
Wisconsin	4	2	1	2	1
Wyoming	6	4	3	1	5
Other*	16	19	19	10	18

*Other includes Alaska, Arizona, Arkansas, California, Florida, Georgia, Idaho, Illinois, Indiana, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Montana, New Jersey, New Mexico, New York, Nevada, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, and four (2010) and two (2012) parties from other countries.

Table 41. Percent of resident anglers contacted, county of residence, and major cities within a county for anglers on Lake Sharpe, during the April-September daylight survey period, 2008-2012.

County	Major City	Percent by year				
		2008	2009	2010	2011	2012
Beadle	**Huron**	4	6	6	5	5
Brookings	**Brookings**	1	1	1	2	1
Davison	**Mitchell**	3	2	3	1	2
Hand	**Miller**	2	2	2	2	1
Hughes	**Pierre**	48	45	41	44	49
Lyman	**Presho, Kennebec**	2	2	3	2	2
Minnehaha	**Sioux Falls**	10	8	10	11	5
Pennington	**Rapid City**	6	6	5	5	6
Stanley	**Fort Pierre**	4	5	5	3	8

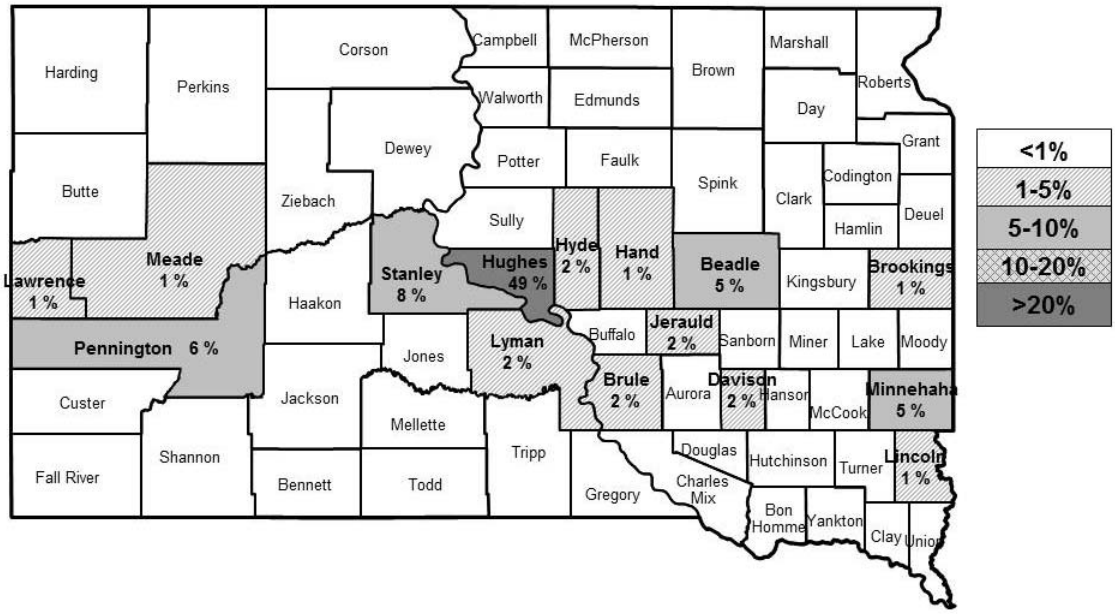

Figure 13. Percent of resident angler contacts by county during the April-September 2012 daylight survey period.

Table 42. Percent of anglers driving a specified distance, one way, to fish on Lake Sharpe, South Dakota during the April-September daylight survey period, 2008-2012.

Distance (miles)	Percent by year				
	2008	2009	2010	2011	2012
<25	38	36	32	33	45
25-49	6	9	9	9	6
50-99	13	9	8	9	7
100-199	18	17	21	17	17
≥200	26	29	30	32	25

Table 43. Percent of anglers that specifically target a species on Lake Sharpe, South Dakota during the April-September daylight survey period, 2008 - 2012.

Target species	Percent by year				
	2008	2009	2010	2011	2012
Walleye	60	58	72	71	65
Anything	32	33	19	20	30
Rainbow trout	<0.5	1	1	1	1
White bass	1	2	2	2	<0.5
Smallmouth bass	4	2	2	2	1
Other*	2	4	4	3	3

*Other includes black crappie, channel catfish, Chinook salmon, common carp, northern pike, smallmouth buffalo, and white crappie.

Table 44. Responses of anglers who were asked the following question during the April-September 2012 daylight survey period: "Considering all factors, how satisfied are you with your fishing trip today?" 1 = very satisfied, 2 = moderately satisfied, 3 = slightly satisfied, 4 = neutral or no opinion, 5 = slightly dissatisfied, 6 = moderately dissatisfied, and 7 = very dissatisfied, where N is sample size.

Month	Satisfaction rating								
	Satisfied			Neutral/N.O.	Dissatisfied				
	1	2	3	4	5	6	7	N	Median
April	81	32	14	19	3	6	1	156	1
May	123	47	14	9	2	2	3	200	1
June	74	41	9	9	0	0	0	133	1
July	35	21	11	11	4	2	2	86	2
August	21	20	9	8	2	3	3	66	2
September	56	37	9	5	5	2	0	114	1.5
Total	390	198	66	61	16	15	9	755	1
Percent		87%		8%		5%			

Table 45. Responses of anglers who were asked the following question during the April-September 2012 daylight survey period: "Considering numbers, sizes, and species caught, how satisfied are you with your fishing experience today?" 1 = very satisfied, 2 = moderately satisfied, 3 = slightly satisfied, 4 = neutral or no opinion, 5 = slightly dissatisfied, 6 = moderately dissatisfied, and 7 = very dissatisfied, where N is sample size.

Month	Satisfaction rating								
	Satisfied			Neutral/N.O.	Dissatisfied				
	1	2	3	4	5	6	7	N	Median
April	46	17	7	19	6	1	2	98	2
May	90	28	10	10	5	0	0	143	1
June	52	22	6	6	4	1	0	91	1
July	17	11	6	4	5	4	0	47	2
August	8	9	8	7	3	4	0	39	3
September	31	25	9	5	0	2	3	75	2
Total	244	112	46	51	23	12	5	493	2
Percent		82%		10%		8%			

Table 46. Responses of anglers who were asked the following question during the April-September 2012 daylight survey period: "Considering all factors, how satisfied are you with your fishing trip today?" compared to the average number of walleye harvested per trip. 1 = very satisfied, 2 = moderately satisfied, 3 = slightly satisfied, 4 = neutral/no opinion (N.O.), 5 = slightly dissatisfied, 6 = moderately dissatisfied, 7 = very dissatisfied where N is sample size.

Walleye/ angler	Satisfaction rating							N	Median
	Satisfied			Neutral/N.O.	Dissatisfied				
	1	2	3	4	5	6	7		
0	121	105	31	49	13	11	6	336	2
0-0.9	25	17	11	5	1	1	2	62	2
1.0-1.9	36	27	12	5	1	1	1	83	2
2.0-2.9	38	12	5	1	1	0	0	57	1
3.0-3.9	38	15	3	0	0	1	0	57	1
4	119	22	4	1	0	1	0	147	1

Table 47. Responses of anglers who were asked the following question during the April-September 2012 daylight survey period: "Considering numbers, sizes, and species caught, how satisfied are you with your fishing experience today?" compared to the average number of walleye harvested per trip. 1 = very satisfied, 2 = moderately satisfied, 3 = slightly satisfied, 4 = neutral/no opinion (N.O.), 5 = slightly dissatisfied, 6 = moderately dissatisfied, 7 = very dissatisfied, where N is sample size.

Walleye/ angler	Satisfaction rating							N	Median
	Satisfied			Neutral/N.O.	Dissatisfied				
	1	2	3	4	5	6	7		
0	61	35	29	38	17	11	5	196	3
0-0.9	17	14	3	3	4	0	0	41	2
1.0-1.9	26	13	7	1	2	1	0	50	1
2.0-2.9	28	15	2	3	0	0	0	48	1
3.0-3.9	29	12	2	4	0	0	0	47	1
4	80	23	3	1	0	0	0	107	1

Table 48. Response (% agreement) of anglers who were asked the following question during the April-September 2012 daylight period: "Are you in favor or against allowing northern pike spearing statewide through the ice?" where N is the sample size.

	In favor	**N**	**Against**	**N**	**No opinion**	**N**
Resident	65%	272	5%	22	30%	127
Non-Resident	41%	30	11%	8	48%	35
Total	61%	302	6%	30	33%	162

FISHERY STATUS AND 2012 OUTLOOK

The Missouri River flood of 2011 was catastrophic and the extreme high flows altered physical and chemical habitats. The effects of the historic 2011 flood are not well understood, and the aftermath may influence this system for a number of years. Despite the large physical changes in Lake Sharpe anglers continued to fish and success was high in 2012. The main objective of the Lake Sharpe Fisheries Strategic Plan is "To provide a fishery that can annually support a minimum of 100,000 angler days of recreation with a harvest rate of 0.35 fish/angler-h, and a 70% angler trip satisfaction rating." Despite the potential negative effects of the 2011 flood, the goals of the Lake Sharpe Strategic Plan were met in 2012.

In 2012, the harvest rate for all fish species was 0.64 fish/angler-h and angler satisfaction was at 87%, which exceeded the goals of the Lake Sharpe strategic plan. The Lake Sharpe walleye-specific objectives of 100,000 walleye harvested and a harvest rate of 0.3 walleye/angler hour were also met in 2012, with harvest rate of 0.53 walleye/angler-h and an estimated 173,931 walleyes harvested. High recruitment of the 2005 through 2009 walleye year classes into the population is providing the walleye fishery with a large proportion of young walleye. Natural production appeared to be low in 2010 and 2011.

Lake Sharpe currently has a large abundance of fish less than 381-mm (15-in). Relative abundance and size structure indices of all walleye remain near the long-term average. Growth of walleye remained low even with an abundance of gizzard shad in 2012. Condition (W_r) of walleye during the August/September survey similar to the long term mean for fish greater than stock-length.

Smallmouth bass gillnet catch rates have decreased every year since 2009. Additionally, size structure indices suggested a decrease in size structure in 2012. However, an increase in W_r was observed suggesting the few large smallmouth bass present in Lake Sharpe are in good condition. More smallmouth bass were caught during the SD BASS tournament in 2012 compared to previous years, and more fish greater than memorable length were caught.

MANAGEMENT RECOMMENDATIONS

- Monitor effects of several consecutive year classes of above average walleye reproduction.

- Determine the importance of Hipple Lake and LaFramboise Bay for production, recruitment and over-winter survival of gizzard shad and sport fish in Lake Sharpe.

- Further evaluate effects from the 2011 Missouri River flood.

- Evaluate management objectives for secondary species, including white bass, channel catfish, rainbow trout, and smallmouth bass, to more accurately reflect the potential of these species for recreational opportunities on Lake Sharpe.

- Critically evaluate cold-water stocking programs in Lake Sharpe tailrace fishery.

- Monitor the aquatic vegetation and track any major changes in species diversity and changes in aquatic invasive species.

- Update the Lake Sharpe Fisheries Management Plan by December 2013.

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APPENDIX

Appendix 1. Common and scientific names of fishes mentioned in this report.

Common name	Scientific name
Bigmouth buffalo	*Ictiobus cyprinellus*
Black bullhead	*Ameiurus melas*
Black crappie	*Pomoxis nigromaculatus*
Bluntnose minnow	*Pimephales notatus*
Brassy minnow	*Hybognathus hankinsoni*
Burbot	*Lota lota*
Channel catfish	*Ictalurus punctatus*
Chinook salmon	*Oncorhynchus tshawytscha*
Common carp	*Cyprinus carpio*
Emerald shiner	*Notropis atherinoides*
Fathead minnow	*Pimephales promelas*
Flathead chub	*Platygobio gracilis*
Freshwater drum	*Aplodinotus grunniens*
Gizzard shad	*Dorosoma cepedianum*
Goldeye	*Hiodon alosoides*
Golden shiner	*Notemigonus crysoleucas*
Johnny darter	*Etheostoma nigrum*
Lake herring	*Coregonus artedi*
Largemouth bass	*Micropterus salmoides*
Northern pike	*Esox Lucius*
Paddlefish	*Polyodon spathula*
Rainbow smelt	*Osmerus mordax*
Rainbow trout	*Oncorhynchus mykiss*
River carpsucker	*Carpiodes carpio*
Red shiner	*Cyprinella lutrensis*
Sauger	*Sander canadensis*
Shorthead redhorse	*Moxostoma macrolepidotum*
Shortnose gar	*Lepisosteus platostomus*
Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Silvery minnow	*Hybognathus nuchalis*
Smallmouth bass	*Micropterus dolomieu*
Smallmouth buffalo	*Ictiobus bubalus*
Spottail shiner	*Notropis hudsonius*
Suckermouth minnow	*Phenacobius mirabilis*
Walleye	*Sander vitreus*
White bass	*Morone chrysops*
White crappie	*Pomoxis annularis*
White sucker	*Catostomus commersonii*
Yellow perch	*Perca flavescens*

APPENDIX

Appendix 2. Common and scientific names of emergent vegetation mentioned in this report.

Common name	**Scientific name**
Curly leaf pondweed	*Potamogeton crispus*
Eurasian water milfoil	*Myriophyllum spicatum L*
Fan leafed crowfoot	*Cabomba caroliniana*
American elodea sago	*Elodea canadensis*
Pondweed	*Potamogeton* spp
Cattail	*Typha* spp