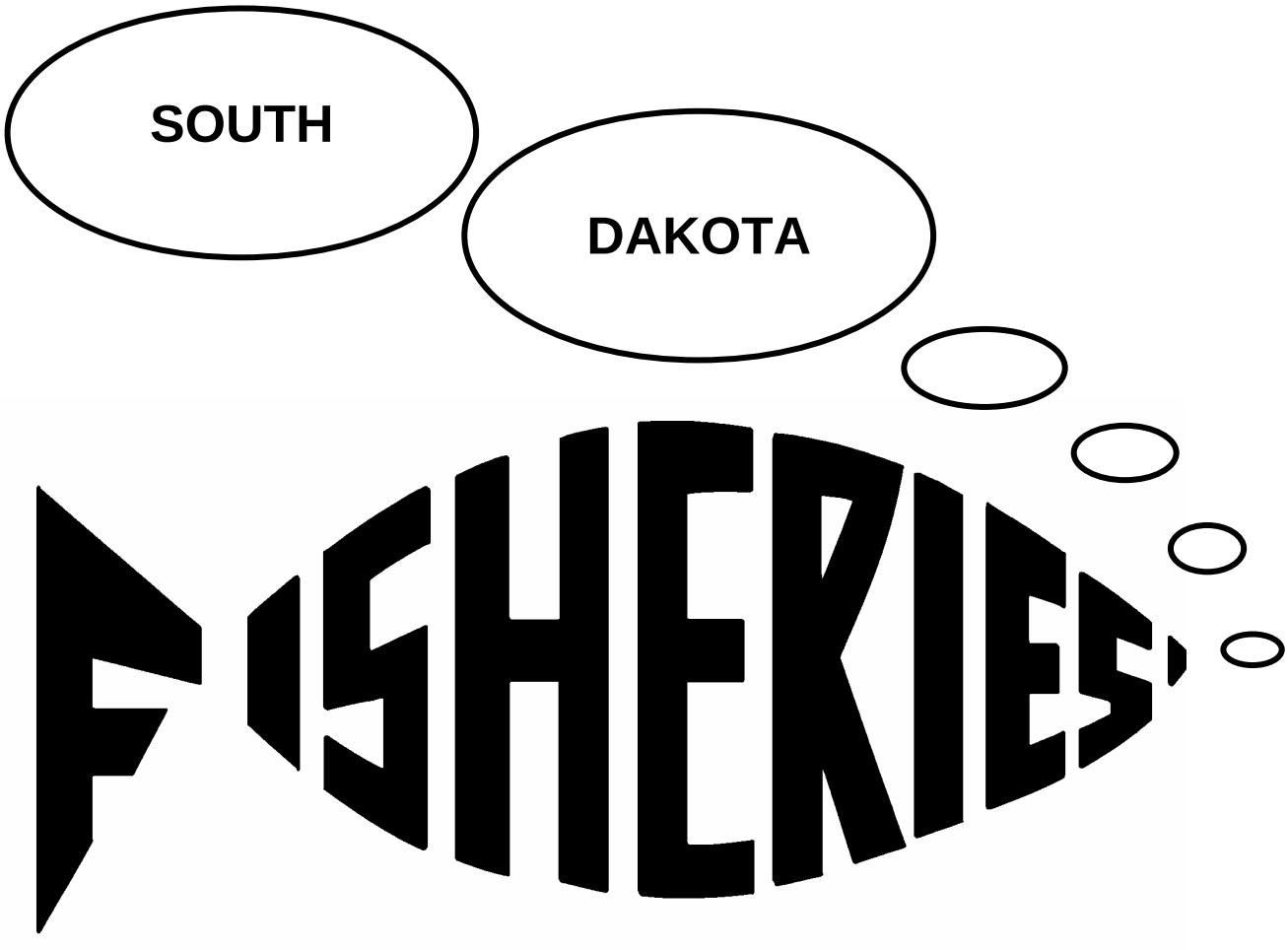

ANNUAL FISH POPULATION AND ANGLER USE, HARVEST, AND PREFERENCE SURVEYS ON LAKE SHARPE, SOUTH DAKOTA, 2011

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Game, Fish and Parks
Wildlife Division
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ANNUAL FISH POPULATION AND ANGLER USE, HARVEST AND PREFERENCE SURVEYS ON LAKE SHARPE, SOUTH DAKOTA, 2011

By

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Annual Report

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PREFACE

Information collected during 2011 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.

The authors would like to thank the following individuals from the South Dakota Department of Game, Fish and Parks who helped with data collection, data entry, manuscript preparation, and report editing: Brian Beel, Layne Duvall, Nicholas Emme, Josh Gerber, Nicholas Johnson, Doug Jones, Darla Kusser, Emily Moses, Mallory Petersen, Nate Satre, John Simpson, Keith Swartz, and Jim Riis.

The collection and analysis of data for these surveys was funded, in part, by Federal Aid in Sport Fish Restoration, (D-J) project F-21-R-44, Statewide Fish Management Surveys. Some of these data have been presented previously in segments F-21-23 through 43.

EXECUTIVE SUMMARY

In 2011 the Missouri River system experienced a flood event of unprecedented magnitude. We recommend using caution when comparing 2011 trends to previous years. The extreme high flows prevented sampling in some locations and likely skewed sampling results in other areas. This report includes annual fish population data and angler use, harvest, and preference data collected in 2011, 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 walleye gillnet catch per unit effort (CPUE) in 2011 was lower than 2010 (20.1 fish/net-night and 22.2 fish/net-night, respectively). Walleye ranging from 150 to 630 mm were collected during the August 2011 gill net survey. Approximately 32% of walleye in the 2011 gill net sample were ≥ 381-mm (15-inch minimum length), 7% were ≥ 457-mm (18 inches), and less than 1% were ≥ 508-mm (20 inches). Approximately 68% of the walleye sampled during the August gill net survey in 2011 were below the minimum harvest length limit.

Mean age-0 electrofishing CPUE of 15 fish/h indicates that walleye production occurred in 2011. Walleye relative weight (*Wr*) for 2011, at 82, was similar to the five year average of 83 for Lake Sharpe. Age-2 (2009) walleye comprised the largest portion of the walleye catch in gill nets in 2011, followed by age-3 (2008).

Twenty-two species of age-0 and/or small prey fishes were collected by shoreline seining in 2011. All species have been previously sampled in Lake Sharpe. Gizzard shad CPUE of 13 fish/haul represents the lowest ever observed in the shoreline seine survey, however, gizzard shad reproduction was likely delayed due to below average water temperatures which may have reduced the number of offspring detected in the standard survey.

Since 2003, a protected slot regulation on smallmouth bass has been in place on Lake Sharpe. This was adjusted in 2008, and continued through 2011. Smallmouth bass growth throughout this period of time remained similar achieving 385 mm at age-5 and

428 mm at age-8 in July. Growth of Lake Sharpe smallmouth bass appears to decline considerably with age which results in limited trophy potential. After evaluating the regulation and determining the objectives were not being met, the protected slot regulation was removed 1-January, 2012.

Despite widespread boating closures on Lake Sharpe, an estimated 49,378 angler days were spent on the reservoir during the April-September 2011 daylight period. Although sizeable, this does not meet the Lake Sharpe strategic plan goal of 100,000 angler days. This decreased use likely contributed to the estimated walleye harvest of 72,622, which fails to meet the strategic plan goal of 100,000 fish.

Estimated hourly harvest rate for all species combined for the April-September 2011 daylight period (0.50 fish/angler-h) was higher than the strategic plan objective (0.35 fish/angler-h). The walleye catch, harvest, and release rates for 2011 (1.05, 0.43, 0.62, respectively) were similar to the 2009 period (1.18, 0.38, 0.80, respectively). The smallmouth bass catch rate was 0.24 fish/angler-h during 2011. The white bass catch rate in 2011 (0.05 fish/angler-h) was substantially lower than in previous years (Longhenry et al 2010).

Approximately 82% of angling parties interviewed in 2011 indicated some degree of satisfaction with their fishing trip which surpasses the Lake Sharpe strategic plan objective of 70%. It is estimated that for the April-September 2011 daylight period, fishing on Lake Sharpe contributed approximately $3.9 million back to the local and regional economy. (49,378 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). Approximately 48% of South Dakota resident anglers fished the Missouri River system in 2003 and 35% of those anglers fished Lake Sharpe (Gigliotti 2004). Approximately 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 is a 128 km long mainstem Missouri River flow-through reservoir and has a surface area of 24,686 ha. The reservoir 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 2011, as well as comparisons of this data to data obtained previously. A list of common names, scientific names and species abbreviations for fish mentioned in this report is presented in Appendix 1.

MANAGEMENT OBJECTIVES

Reservoir-wide Objectives

- Provide a minimum of 100,000 angler days of recreation with a harvest rate of 0.35 fish per angler hour, and a 70% angler trip satisfaction rating.
- Continually work to preserve or enhance and protect the existing fish community structure, diversity and aquatic habitats of Lake Sharpe

Species-Specific Objectives

- Provide a walleye fishery that can annually support a minimum of 75,000 angler days of recreation with a harvest of 100,000 walleye and a harvest rate of 0.3 walleye per angler hour.
- Provide a white bass fishery that can annually support a minimum of 5,000 angler days of recreation with a harvest of 30,000 white bass and a harvest rate of 0.3 white bass per angler hour.
- Provide a rainbow trout fishery that can annually sustain a minimum of 5,000 user-days of angling, a catch rate of 0.2 fish per hour for anglers specifically fishing for rainbow trout, and an annual harvest of 2,500.
- Provide a smallmouth bass fishery that can sustain a minimum of 5,000 days of smallmouth bass angling opportunity, a harvest of 10,000, and a catch rate of 0.3 fish per angling hour for anglers specifically fishing for smallmouth bass.
- Provide a channel catfish fishery that can sustain a minimum of 10,000 days of recreation, and an annual harvest of 15,000, and a catch rate of 0.33 fish per angling hour for anglers specifically fishing for channel catfish.

STUDY AREA

Lake Sharpe is located in central South Dakota (Figure 1) and extends from Oahe Dam to Big Bend Dam. 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, seining, and electrofishing locations have historically included Farm Island, DeGrey/Fort George lakeside use area, Joe Creek lakeside use area, and North Shore lakeside use area. Electrofishing is also conducted at LaFramboise Island and the Oahe Dam stilling basin. Additionally, frame-nets were used to sample panfish communities in Hipple Lake (Figure 2) and LaFramboise (Figure 3) back-water areas. Historical, biological, chemical and physical parameters have been discussed previously (Benson 1968; Riis 1986; Schmidt 1975). Selected physical characteristics, management classification, and fish population survey schedules for Lake Sharpe are presented in Table 1.

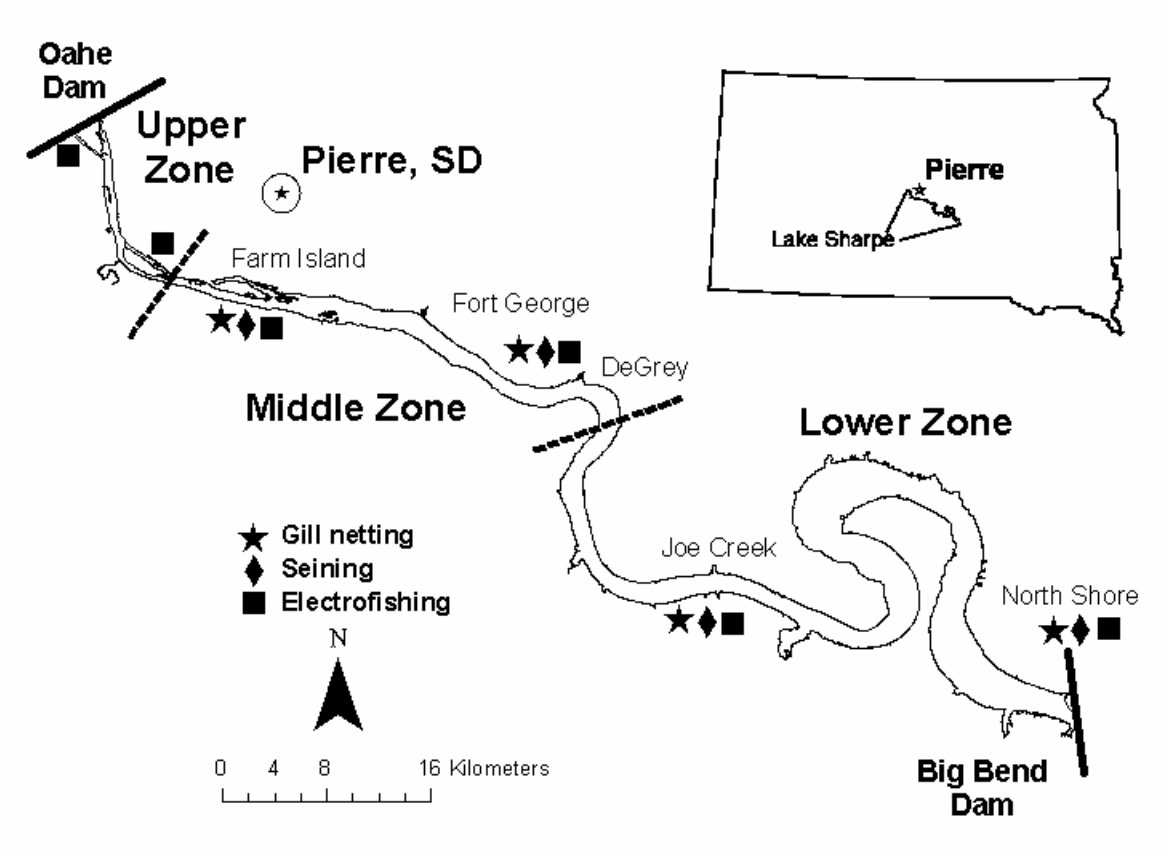

Figure 1. Lake Sharpe, South Dakota, gill netting, seining, and electrofishing locations.

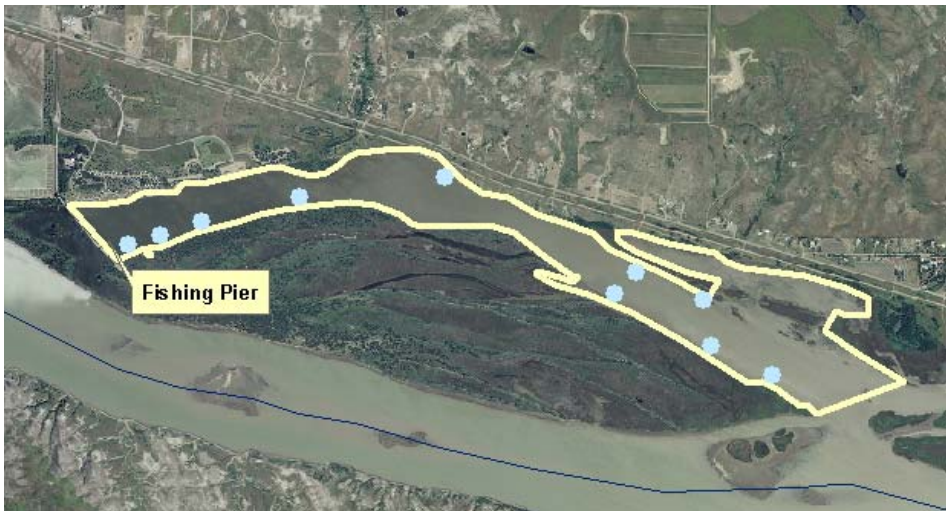

Figure 2. Frame net locations within the Hipple Lake portion of Lake Sharpe, South Dakota.

Figure 3. Frame net locations within the LaFramboise Bay portion of Lake Sharpe, South Dakota.

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 months	August & September
Nighttime electrofishing survey dates:	September
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 inch) minimum length limit was placed on Lakes Oahe, Sharpe, and Francis Case (Table 2). In 1999, the minimum length was increased to 381 mm (15 inches) during all months except July and August, and a stipulation that, at most, one fish in the daily limit could be 457 mm (18 inches) 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 inches) 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 inches) stipulation was increased to 508 mm (20 inches).

Experimental regulations for smallmouth bass were implemented in 2003 and evaluated through 2007 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 inches) 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 inch) protected slot length limit with at most one fish 457 mm (18 inches) 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 due to the lack of additional growth smallmouth bass exhibit beyond 420 mm. The regulation for smallmouth bass was determined unsuccessful in improving the trophy potential of Lake Sharpe.

Table 2. History of special harvest regulations for walleye and smallmouth bass, on Lake Sharpe, South Dakota, 1968 through 2011.

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 2011, variable-mesh gill nets, seines, electrofishing, larval trawls, and frame nets 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 (approximately 20 h). Three nets were placed at the 0-9m depth and three were placed in >9.1 m; where possible (Figure 1). Bar mesh dimensions included 12.7, 19.1, 25.4, 31.8, 38.1, and 50.8 mm (½, ¾, 1, 1 ¼, 1 ½, and 2 inches). All fish collected were identified and enumerated. At each sampling location, the first 50 individuals of each species were measured (TL; mm) and weighed (g). All walleye and sauger were measured, weighed and otoliths were removed for ageing purposes (10 per one cm length group per sampling location).

Sampling occurred at the North Shore location in August 2011 as usual; however, with the record flows through Oahe Dam attempts to sample Joe Creek and Hipple Lake proved ineffective. Second attempts were made in September to sample Joe Creek and Hipple Lake and were successful, but the DeGrey net sets and two of the six net sets at Hipple Lake were not completed due to high discharge that lasted into the fall of 2011.

Nylon seines were used to collect age-0 fish and small 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 (Figure 1). All fish were placed on ice, identified and enumerated. Due to the record discharge through Oahe Dam in 2011, sampling at the Fort George and Farm Island locations was not completed during the standard period, therefore, sampling was conducted at a later date.

In May, ten 19.1 mm (3/4 inch) bar mesh frame nets with 0.9 m x 1.5 m frames and 18 m leads were placed into the waters of LaFramboise Bay and Hipple Lake for two overnight sets. Nets fished approximately 20 h and were rotated around the embayment each day for a total sample effort of ten net-nights per location. All species were enumerated, measured for total length, weighed and released. Scales were removed from bluegill, white bass, and crappie for age assessment.

In early July in the West Bend region, 106.7 m long and 2.4 m high monofilament gillnets (25.4, 31.8, 38.1, 44.5, 50.8, 57.2, and 63.5 mm bar mesh) were fished on the bottom in water less than 9.1 m deep. Length of set ranged from two to five h for a total of 18 independent nets. All live fish were enumerated and released, except for smallmouth bass which were measured for length, weight, and had otoliths removed for age assessment.

Larval gizzard shad were collected every 10-14 days from May through August using a 1.0 m diameter ichthyoplankton trawl with 1,000 μm bar mesh. Trawl duration was approximately 10 min and a flowmeter was mounted in the mouth of the trawl to estimate water volume filtered. 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, a 178 ha backwater area of Lake Sharpe was sampled separately during each sampling period. Larval gizzard shad density was calculated as the number of shad per 100 m^3 of water filtered at each location during each period. A mean density was calculated by averaging all densities during that period for that specific zone.

Fall, nighttime electrofishing for age-0 walleye was included in standard fish population surveys beginning in 1995. In September, six 15 min electrofishing runs were conducted at night along the shoreline at each sampling location. A 5.3 m Smith-Root SR-18 electrofishing boat with a 5.0 GPP electrofisher was used. The electrofishing unit was set for pulsed DC current at a 30 pulse/s frequency. Voltage and amperage ranged from 270 to 300 V and 7 to10 A, respectively. Beginning in 1998, a sampling location was included at DeGrey to provide uniformity between electrofishing, seining, and gill-netting survey sites. In 2000, electrofishing sites at LaFramboise Island and the Oahe Dam stilling basin were added to the list of standard electrofishing sites for a total of six sampling locations (Figure 1). In 2003, DeGrey was replaced with Fort George, as a standard seining and electrofishing station due to lack of shoreline access at DeGrey. Otoliths were taken from a representative sample of walleye <240-mm in length to determine the maximum length for age-0 fish. In 2011, no sampling was completed at the stilling basin location due to safety concerns.

Data Analysis

Relative abundance of fish species were expressed as mean catch per unit effort (CPUE) for gill net (No./net night and No./h), frame net (No./net night), seine (No./haul) and electrofishing (No./h) catches. Larval densities were calculated as number per 100 m^3 of water filtered. A standard net night for the gill-net survey was approximately 20 h. Age and growth analyses were conducted for walleye, sauger, and smallmouth bass. Walleye and sauger less than 350 mm were aged using whole otoliths submersed in water while fish greater than 350 mm were aged from otoliths cracked in half and charred prior to aging (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; Anderson 1980, Gablehouse 1984, Guy et al 2007) was calculated for walleye, sauger, smallmouth bass, channel catfish, white bass, and yellow perch. Length categories used in PSD are listed in Appendix 2.

Relative weight (*Wr;* Anderson 1980) was calculated using standard weight (W_s) equations developed for smallmouth bass (Kolander et al. 1993), walleye (Murphy et al. 1990), sauger (Guy et al. 1990), channel catfish (Brown et al. 1995), white bass (Brown and Murphy 1991), and yellow perch (Willis et al. 1991). Size structure indices (PSD, PSD-P, and PSD-M) and mean *Wr* values for white bass and yellow perch are presented in Appendix 3.

ANGLER USE, SPORTFISH HARVEST, AND PREFERENCE SURVEYS

Data Collection

Prior to 2003, angler use and sport-fish harvest survey techniques were designed using a template by Schmidt (1975) consisting of two independent parts. First, aerial pressure counts were used to estimate fishing pressure. Second, angler interviews were used to obtain estimates of individual angler harvest, catch and release rates. Since 2003, a bus route survey design (Jones and Robson 1991) has been used for the angler use and harvest survey to increase the statistical reliability of the pressure estimates generated. A bus route design is a modified access survey typically used for fisheries with numerous access sites spread over a broad geographical region (Robson and Jones 1989; Jones et al. 1990).

Creel surveys were conducted from 1-April, 2011 through 30-September, 2011 for the sunrise-to-sunset (daytime) period. Diagrams of bus routes used on Lake Sharpe during the April-September survey period appear in Appendix 4 through Appendix 9. Day selection (weekday or weekend/holiday), shift time (day beginning at sunrise or ending at sunset), route direction (travel or wait start), starting location, and route selection were randomly selected.

Standard angler interviews included gathering information on trip length, type of fishing, target species, zip code, number in party, number and species of fish harvested and released, and lengths of walleye and smallmouth bass harvested by anglers. Angler satisfaction, preference and attitude questions were included in each angler interview during the 2011 reservoir-wide angler use and harvest survey. Anglers were asked how satisfied they were with their fishing trip, considering all factors, as well as if they were in favor of the current smallmouth bass regulations on Lake Sharpe. Boat anglers were asked what body of water their boat was on prior to Lake Sharpe and how many days ago that was. A complete list of satisfaction, attitude and preference questions asked in conjunction with the 2011 angler use and harvest survey appears in Appendix 10.

In 2011, the record flows and flooding that occurred in upper portion of Lake Sharpe affected angler access which altered the ability to survey anglers. The angler survey for the upper portion was canceled from 26-May to the end of the survey period.

The middle portion of the lake was not surveyed from 26-May to 30-June, 2011. The lower portion of the lake was not affected by closures of fishing access sites.

Data Analysis

Pressure count and angler interview data were analyzed using the Creel Application Software (CAS) package (Soupir and Brown 2002) and 80% confidence intervals were calculated for estimates of fishing pressure and harvest. Catch, harvest, and release numbers and rates were calculated. Lengths of harvested walleye and smallmouth bass were determined as was angler demographic information. Median values of satisfaction question responses were calculated for each month and for the entire April-September survey period.

RESULTS AND DISCUSSION

AUGUST GILL NET POPULATION ASSESSMENT

Species Composition and Relative Abundance

Walleye and channel catfish comprised the majority of the gill net catch in 2011 representing 60% and 9% of the catch, respectively (Table 3). Other species commonly caught during the 2011 survey included yellow perch, common carp, and sauger. Catch per unit effort has been used as an index of population abundance or density (Hubert 1996). Walleye CPUE of 20 fish/net-night in 2011 was at the five year average. Channel catfish CPUE of three fish/net-night in 2011 was slightly lower than the five year average.

Population Parameters for Walleye

Multiple walleye year classes were present in 2011 with numerous walleye between stock and quality length (Figure 4). Approximately 32% of walleye in the 2011 gill net sample were ≥ 381 mm (15-inches), 7% were ≥ 457 mm (18 inches), and 1% were ≥ 508 mm (20 inches). Proportional size distribution and PSD – P for walleye and sauger were similar to values observed in the past three years at 39 and 86 respectively and one and 43, respectively (Table 5).

Historically, walleye relative weight for Lakes Sharpe, Francis Case, and Lewis and Clark are generally between 80 and 90. Walleye relative weight for Lake Sharpe in 2011 was 83, which is within the normal range (Table 6). Variability in relative weights 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 inch) minimum length limit during their fourth or fifth growing season (Table 7; Table 8). Age-2 walleye (i.e., produced in 2009) comprised the largest percentage of the 2011 gill net sample, and only one age-0 walleye was captured during the gill net survey in 2011 (Table 9).

Walleye recruitment in 2011 (i.e., number age-0 walleye collected per hour of nighttime electrofishing during the fall), suggests a reduced year class. The catch rate of 15 age-0 walleye per h (Table 10) was lower than the long-term average of 40.8 per h. The mean length of age-0 walleye in 2011 was 124 mm which is the smallest ever observed in the standard survey.

Population Parameters for Sauger

Twenty-eight sauger were collected during the gill net survey in August/September 2011, for a mean CPUE of 1.8 fish/net night (Table 4; Figure 6). While sauger abundance is not as high as walleye abundance (Table 4), PSD for sauger is generally high in Lake Sharpe with a PSD-preferred in 2011 of 43 (Table 5). Relative weight for sauger in the 2011 was 76, which is lower than the mean *Wr* for walleye in 2011. Sauger up to age-6 were collected in the 2011 standard survey ranging in total length from 200 to 505 mm (Table 10; Figure 6). No age-0 sauger were collected with gill nets or fall nighttime electrofishing in 2011 (Table 11).

Population Parameters for Channel Catfish

Most channel catfish population indices (PSD-P, PSD-M) and *Wr* remained similar in the 2007-2011 period (Table 12), although PSD has increased slightly from 60 in 2008 to 82 in 2011. Channel catfish CPUE of 3.0 in 2011 was lower than the five year average of 5.0 (Table 4). Catch rates may have declined in 2011 due to high discharge. A large portion (75%) of the channel catfish were in the quality to preferred range for 2011 (Figure 7). In Lake Sharpe, channel catfish are long lived but grow slowly (Table 13) which may explain the limited changes in population indices over time. Growth rates have slowed since the closure of Big Bend Dam in 1963. Elrod (1974) documented a gradual reduction in growth rates during the first eight years following impoundment of the reservoir. Due to slow growth, age structures (pectoral spines) are collected every five years on Lake Sharpe (next scheduled in 2013).

Table 3. Relative species composition, by percent of total catch, of fish species collected during the standard August gill net survey 2007-2011. Trace (T) indicates values < 0.5%.

Species	Year				
	2007	**2008**	**2009**	**2010**	**2011**
Walleye	49	52	52	48	60
Channel catfish	13	14	16	12	9
Yellow perch	5	3	7	9	9
Common carp	5	7	6	4	6
Sauger	6	7	7	2	5
White bass	4	2	1	1	1
Gizzard shad	10	3	4	14	1
Freshwater drum	2	3	T	1	1
Smallmouth bass	3	1	1	3	1
*Others	3	6	6	5	7

*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 values (SE) for fish species collected with standard experimental coolwater gill net sets in 2007-2011. Trace (T) indicates values < 0.5%.

Species	2007	2008	2009	2010	2011
Bigmouth buffalo	0	0.1 (0.1)	0	0	0
Black bullhead	0	0.1 (0.1)	0	0	0.2 (0.1)
Black crappie	0	T	0	0.1 (0.1)	0.1 (0.1)
Bluegill	0	0	0	0	0
Channel catfish	5.5 (0.9)	5.5 (1.0)	5.4 (0.9)	5.6 (1.7)	3.0 (0.6)
Common carp	2.1 (0.8)	2.5 (0.7)	1.9 (0.5)	1.7 (0.5)	1.9 (0.5)
Freshwater drum	1.0 (0.4)	1.1 (0.4)	0.1 (0.1)	0.6 (0.2)	0.2 (0.1)
Gizzard shad	4.4 (2.9)	1.2 (0.7)	1.3 (1.1)	7.0 (3.9)	0.4 (0.4)
Goldeye	0	0	T	0.2 (0.1)	0
Northern pike	0	0	0	T	0.1 (0.1)
Rainbow smelt	0	0	T	0	0
Rainbow trout	0	T	0	0	0
River carpsucker	0.2 (0.1)	0.1 (0.1)	0.5 (0.3)	1.1 (0.6)	0.6 (0.4)
Sauger	2.6 (0.7)	2.6 (0.5)	2.5 (0.6)	1.1 (0.3)	1.8 (0.6)
Shorthead redhorse	0.3 (0.1)	0.1 (0.1)	0.1 (0.1)	T	0.7 (0.5)
Shortnose gar	0.1 (0.1)	0.1 (0.1)	0	T	0.2 (0.1)
Shovelnose sturgeon	0.5 (0.2)	1.5 (0.6)	1.3 (1.2)	0.4 (0.3)	0.1 (0.1)
Smallmouth bass	1.3 (0.9)	0.2 (0.1)	0.4 (0.3)	1.4 (1.2)	0.3 (0.2)
Smallmouth buffalo	T	0	T	T	0
Spottail shiner	0.1 (0.1)	0	0	0.1 (0.1)	0.1 (0.1)
Walleye	21.6 (3.4)	19.3 (3.2)	17.8 (4.3)	22.2 (4.3)	20.1 (3.1)
White bass	2.0 (1.2)	1.5 (0.9)	0.5 (0.3)	0.6 (0.4)	0.4 (0.2)
White crappie	0.1 (0.1)	T	0	0.1 (0.1)	0.1 (0.1)
White sucker	T	0	T	T	0.3 (0.2)
Yellow perch	2.4 (0.7)	1.0 (0.3)	2.3 (0.9)	4.0 (1.5)	3.1 (0.9)

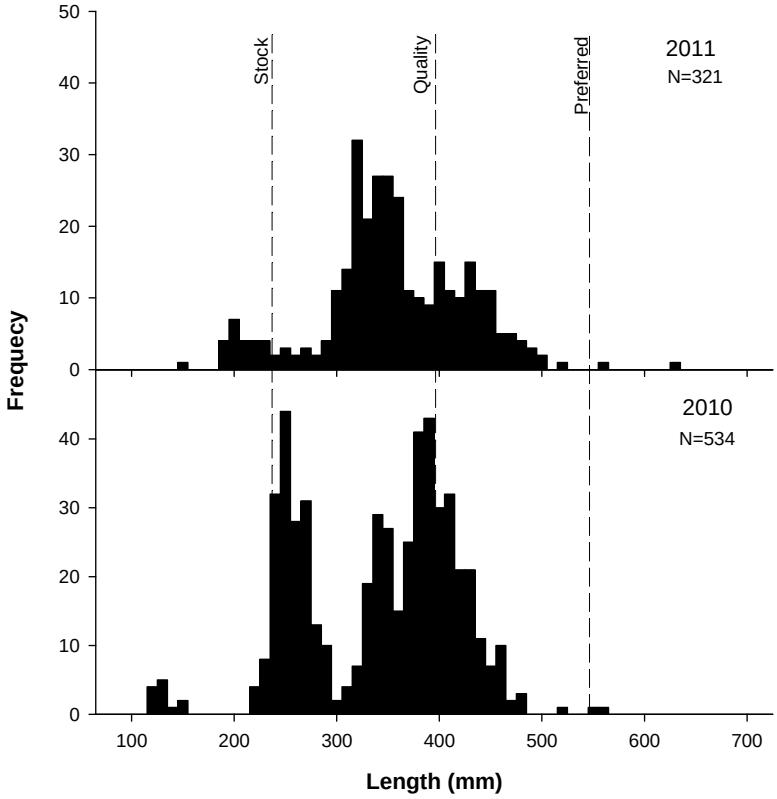

Figure 4. Length frequency of walleye collected in standard gill-net sets in August 2010 and 2011.

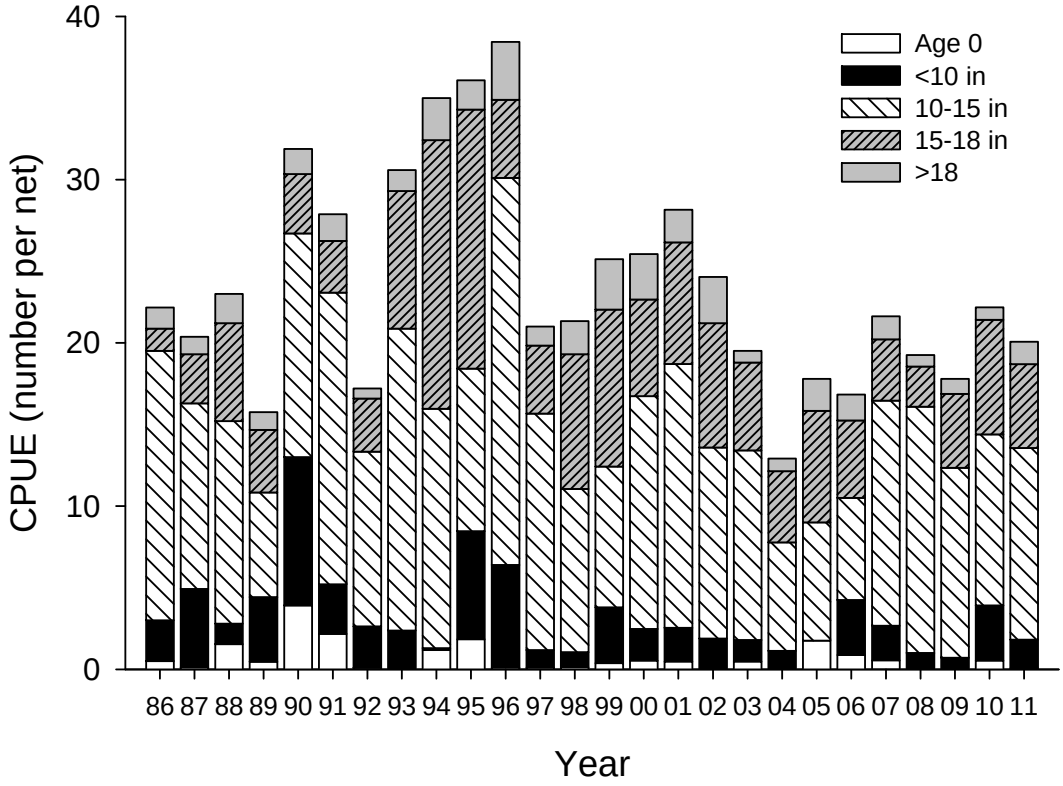

Figure 5. Size structure and abundance (CPUE) of walleye collected in the standard gill net survey in August, 1986-2011.

Table 5. Walleye and sauger proportional size distrubtion (PSD), proportional size distribution of preferred (PSD-P) and memorable length (PSD-M) fish collected in the standard gill net survey 2007-2011.

Year	Walleye				Sauger			
	PSD	PSD-P	PSD-M	Ns	PSD	PSD-P	PSD-M	Ns
2007	24	1	0	455	77	18	0	61
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

Table 6. Mean walleye relative weight (*Wr*) by length group for 2007-2011. N is the number of stock-length fish in a sample.

Year	Length group							
	Stock-quality		Quality-preferred		Preferred-trophy		>Stock length	
	Wr	N	*Wr*	N	*Wr*	N	*Wr*	N
2007	83	341	80	108	79	3	82	452
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

Table 7. Mean length-at-age-at-capture (mm) for walleye collected in the standard August gill net survey 2007-2011.

Year		Length at age at capture (mm)								
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
2007	**Mean**	251	336	392	419	425	434	451	441	468
	N	101	234	11	25	12	17	16	9	9
	SE	2.2	1.3	5.1	5.0	14.7	7.3	9.4	5.2	8.3
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	-
Grand mean		248	336	384	412	423	434	437	461	461

Table 8. Mean annual growth (length) increment estimates for walleye collected in the standard experimental coolwater gill net survey for the 2006-2007, 2007-2008, 2008-2009, 2009-2010, and 2010-2011 periods.

Year	Growth increment added during period (mm)							
	1-2	**2-3**	**3-4**	**4-5**	**5-6**	**6-7**	**7-8**	**8-9**
2006-2007	73	32	27	15	8	12	17	--
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	--

Table 9. Age distribution of walleye collected from 2007-2011 with standard gill net sets as determined by aging otoliths.

Year	Age												
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
2007	13	110	289	11	25	12	17	16	9	9	2	0	4
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

Table 10. Mean nighttime electrofishing catch per unit effort (CPUE; No./h) and total length (mm) for age-0 walleye collected in September and October 2007-2011. SE is standard error values about means and N is sample size.

	Catch per unit effort (No./h)			Mean length (mm)		
Year	**CPUE**	**N**	**SE**	**Length**	**N**	**SE**
2007	30	36	4.2	169	272	1.2
2008	96	36	11.0	156	868	0.6
2009	42	36	9.0	149	378	0.9
2010	59	36	6.4	137	343	1.3
2011	15	30	5.7	124	73	1.5

Table 11. Mean length-at-age-at-capture (mm) values for sauger collected in the standard August coolwater gill net survey, 2007-2011.

Year		Length at age at capture (mm)								
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
2007	**Mean**	249	328	395	412	423	420	--	--	--
	N	11	38	4	5	2	1	--	--	--
	SE	6.0	3.8	14.0	19.9	17.7	0.0			
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	--	--	--
Grand mean		235	333	390	430	428	424	--	--	397

Table 12. Age distributions of sauger collected in standard gill net survey from 2007-2011.

	Age										
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2007	1	11	38	4	5	2	0	1	0	0	0
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

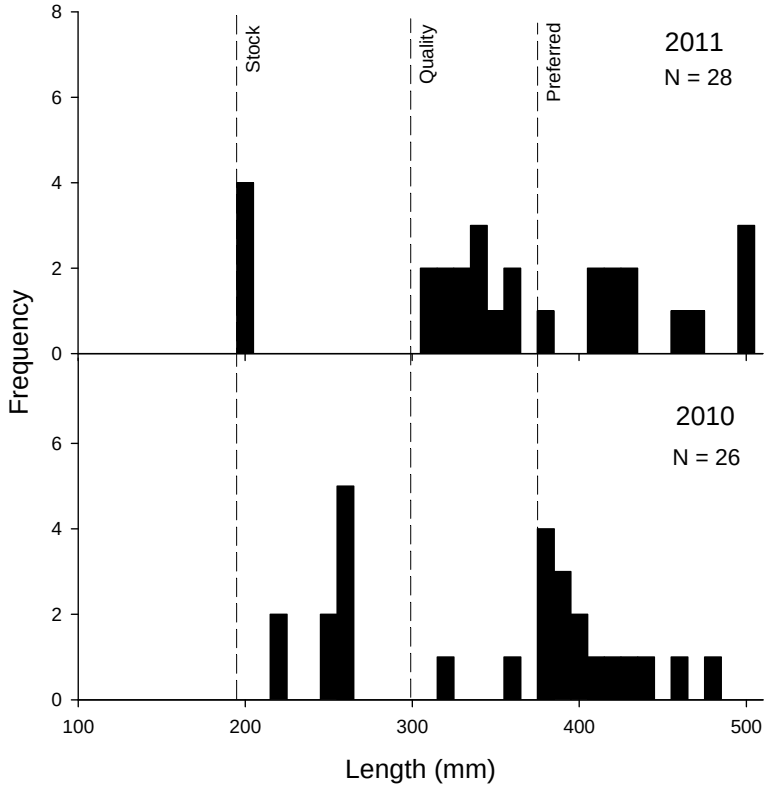

Figure 6. Length frequency of sauger collected in the standard gill net survey in August 2010 and 2011.

Table 13. Channel catfish proportional size distribution (PSD), proportional size distribution of preferred and memorable-length (PSD-P and PSD-M) fish, and relative weight (*Wr*) for 2007-2011. Mean *Wr* values are for stock-length fish only.

Year	PSD	PSD-P	PSD-M	*Wr*	N
2007	64	2	0	81	116
2008	60	2	0	83	132
2009	79	1	0	93	127
2010	74	1	0	88	118
2011	82	2	0	89	45

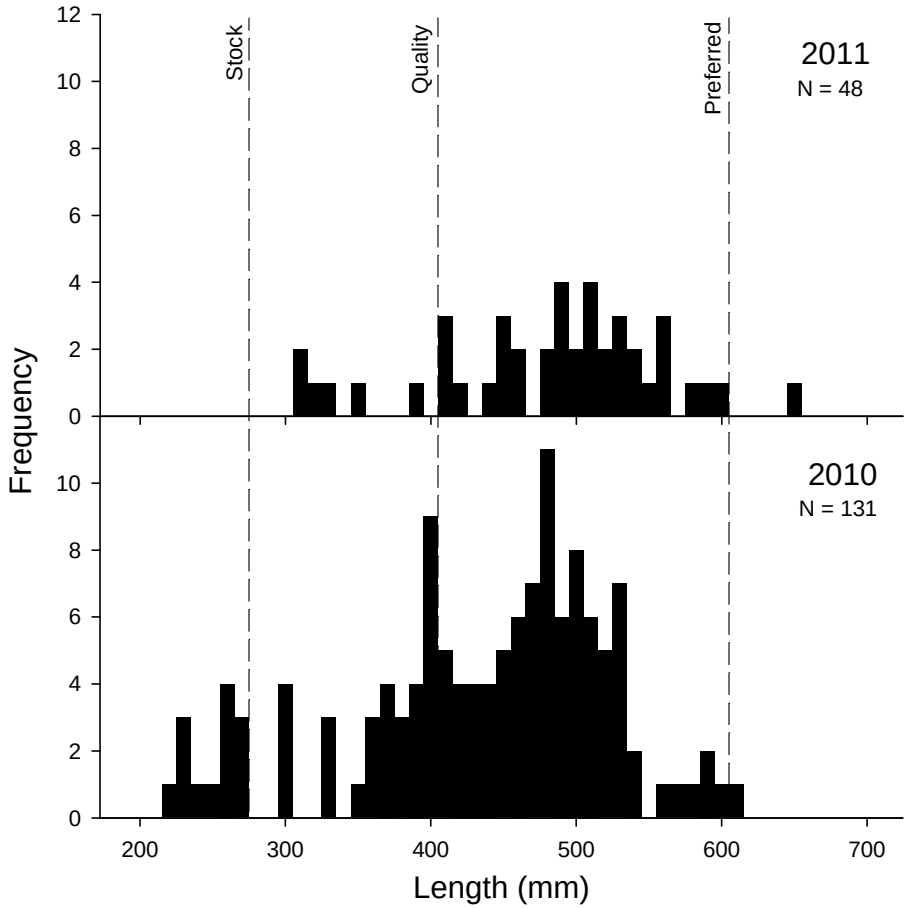

Figure 7. Length frequency of channel catfish collected in the standard, coolwater gill net survey in August 2010 and 2011.

Table 14. Mean length at age (mm) for channel catfish collected in August 2003 and 2008. N is the number of fish of each age in the sample. SE is standard error.

Age	2003			2008		
	Length	N	SE	Length	N	SE
1	--	0		243	1	--
2	219	1	5	288	9	7
3	320	3	9	298	10	12
4	278	10	11	326	5	19
5	298	26	10	401	1	--
6	333	75	11	418	3	19
7	346	18	12	--	0	--
8	334	9	13	422	11	16
9	364	3	13	436	27	20
10	406	6	12	489	22	12
11	477	16	12	473	7	13
12	435	8	14	530	5	24
13	541	8	11	545	3	35
14	595	5	14	519	2	29
15	555	3	13	640	1	--
16	600	3	12	584	2	3
17	608	4	12	--	0	--
18	625	3	14	--	0	--
19	590	2	11	--	0	--
20	716	1	14	--	0	--

MONOFILAMENT GILL NET SMALLMOUTH BASS ASSESSMENT

Population Parameters for Smallmouth Bass

Smallmouth bass relative abundance, as indexed by number caught per gill net per hour (1.09 fish/h in 2011), decreased when compared to previous catch rates (Table 15). Increased netting effort was used to increase the overall sample size of adult smallmouth bass collected. This decrease in CPUE can likely be attributed to the low retention time of Lake Sharpe and high flows from the flood of 2011. Size structure increased (PSD-M = 21;Table 15; Figure 8) and condition remained near the five year average of 90. Growth has remained constant over the previous five years, as most smallmouth bass require five years of growth to surpass 356 mm (14 inches; Table 16).

Table 15. Mean smallmouth bass CPUE (No./h), hours of netting effort, PSD, PSD-P, PSD-M, and relative weight (*Wr*) in early July 2007-2011at West. Ns is the number of stock-length fish collected for *Wr* sample, SE is standard error.

Year	CPUE (fish/hr)	SE	Effort (hrs)	PSD	PSD-P	PSD-M	*Wr*	Ns
2007	2.47	0.62	53.9	66	40	4	95	110
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

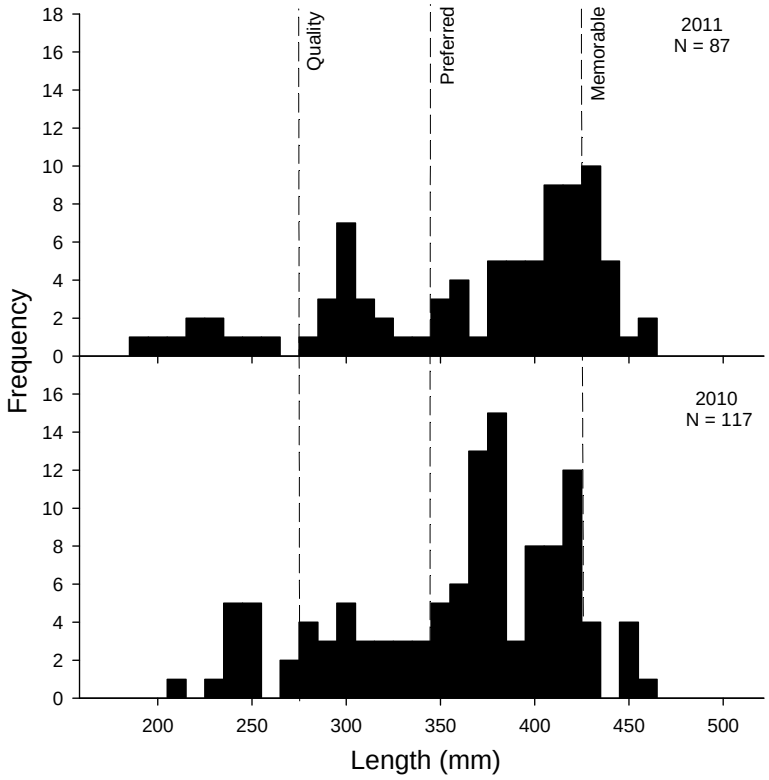

Figure 8. Length frequency of smallmouth bass collected in July 2010 and 2011 at West Bend.

Table 16. Mean length at age (mm) for smallmouth bass collected in July 2007-2011 at West Bend.

		Length at age at capture (mm)								
Year		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
2007	**Mean**	--	275	315	358	383	402	414	432	433
	N	0	47	9	11	14	13	7	2	3
	SE	--	3.8	7.8	3.8	5.2	4.2	5.0	10.5	6.7
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	--
Grand mean		233	256	310	358	385	404	416	428	432

SMALLMOUTH BASS TOURAMENT DATA

On 18-July, 2010 and 24-September, 2011, South Dakota Bass Anglers Sportsmen Society (BASS) Federation held a trail tournament and state championship on Lake Sharpe. Biologists from the Ft. Pierre and Chamberlain Regional Offices were present to collect smallmouth bass following weigh-in and record length, weight, and remove dorsal spines for ageing purposes. Mean length was 403 mm in 2010 and increased to 430 mm in 2011 (Table 17; Longhenry et al 2010). Mean weight was 931 g in 2010 and 991 g in 2011 (Figure 9). Despite increased catch of larger individuals, relative weight decreased from 2010 to 2011 (90 to 80, respectively). The reduction in relative weight may be a result of low gizzard shad production in 2011.

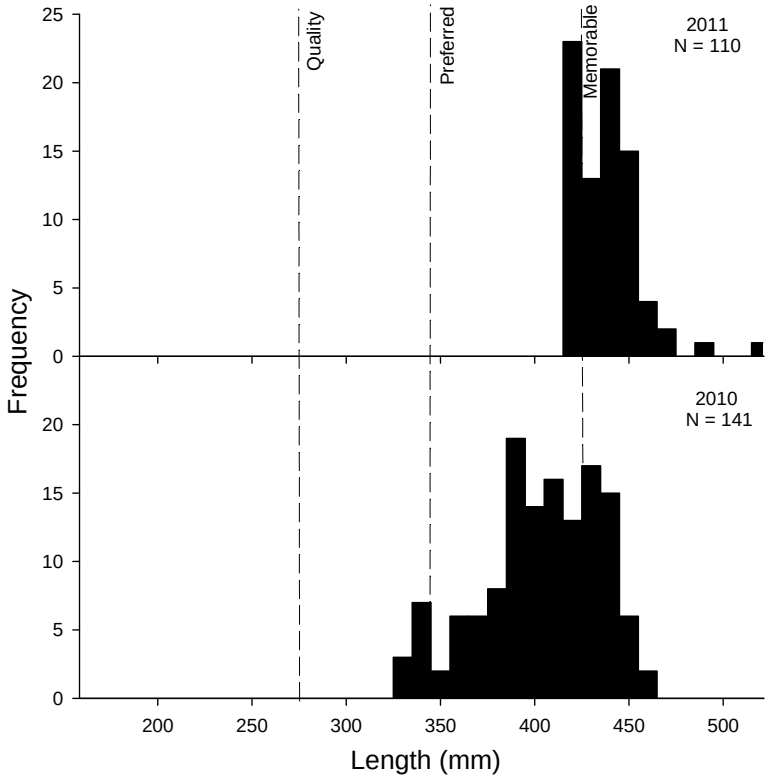

Figure 9. Length frequency of tournament angler caught smallmouth bass during 18-July, 2010 and 24-September, 2011 near West Bend region of Lake Sharpe, South Dakota.

Table 17. Mean length at age (mm) for tournament caught smallmouth bass on 24-September, 2011 at West Bend and aged 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	--	--

SHORELINE SEINING SURVEY

Twenty two species of small littoral fishes were collected by shoreline seining in 2011 (Table 18). All species had previously been collected in Lake Sharpe. The overall catch rate for all species combined was 41 fish per pull in 2011, which is considerably lower than the long term mean of 658 fish per pull. Age-0 walleye CPUE for shoreline seining was 0.8 which is lower than the long term average of 4.2. Likewise, mean CPUE values for other species captured during the seining survey were well below long term averages. Caution should be used when making inferences based on seining catch data. Highly variable catch rates are inherent of the gear, and values may not represent the true population (Lyons 1986, Parsley et al. 1989).

Table 18. Mean catch per unit effort (CPUE; No./haul) and standard error (SE) values for fish species collected in the standard August seining survey 2007-2011. Catches are for age-0 fishes except where noted. Asterisk (*) indicates both age-0 and adult fish included in CPUE.

Species	2007	2008	2009	2010	2011
Black crappie	0	0	0	1.5 (1.1)	0.1 (0.1)
Bluegill	0	0	0	0	0.2 (0.3)
Bluntnose minnow	2.5 (1.3)	3.9 (1.8)	1.1 (0.6)	8.9 (6.5)	0.3 (0.2)
Brassy minnow*	0	0	0.3 (0.2)	0	0.1 (0.1)
Channel catfish	1.4 (1.1)	0.1 (0.1)	0.1 (0.1)	0.8 (0.7)	0.1 (0.1)
Common carp	0.1 (0.1)	0.2 (0.1)	0	0.1 (0.1)	0.1 (0.1)
Emerald shiner*	9.6 (4.6)	28.6 (7.6)	21.9 (7.6)	32.3 (13.2)	8.3 (6.8)
Freshwater drum	11.6 (6.0)	21.6 (8.0)	4.8 (2.4)	7.7 (2.6)	0
Fathead minnow	0	0	0.1 (0.1)	0.1 (0.1)	0.7 (0.7)
Gizzard shad	175.8 (54.8)	1,619.6 (640.8)	492.9 (178.7)	593.9 (194.4)	13.3 (8.0)
Goldeye	0	7.4 (3.5)	0	0.9 (0.2)	0
Johnny darter*	0.6 (0.3)	0.8 (0.5)	5.0 (3.0)	1.1 (0.4)	1.5 (0.8)
Largemouth bass	0.1 (0.1)	0.8 (0.3)	0.1 (0.1)	0	0.1 (0.1)
Red shiner	0	0	0	0.1 (0.1)	0
River carpsucker	3.4 (1.6)	16.1 (9.0)	0.3 (0.2)	8.5 (7.8)	0.3 (0.2)
Sand shiner	0	0	0	0.9 (0.6)	0.2 (0.1)
Sauger	0	0	0	0	0
Smallmouth bass	3.3 (0.9)	8.2 (1.7)	4.0 (1.4)	11.5 (3.5)	1.6 (0.9)
Spottail shiner*	6.1 (1.9)	5.4 (1.2)	16.3 (10.5)	39.1 (23.1)	3.8 (1.9)
Walleye	1.3 (0.5)	1.8 (0.7)	1.1 (0.3)	0.8 (0.4)	0.8 (0.5)
White bass	2.2 (0.6)	74.8 (50.5)	2.2 (0.8)	6.8 (2.6)	6.9 (5.0)
White crappie	2.6 (1.0)	0.3 (0.2)	8.8 (3.9)	8.1 (5.0)	0.1 (0.1)
White sucker	0.1 (0.1)	0.1 (0.1)	0.3 (0.3)	0.8 (0.4)	0.2 (0.1)
Yellow perch	19.4 (5.3)	10.2 (4.5)	24.9 (9.5)	48.8 (44.6)	1.8 (1.3)

LAFRAMBOISE AND HIPPLE LAKE BACKWATER PANFISH POPULATION ASSESSMENT

Field Observations of Water Temperature and Aquatic Vegetation

Temperature loggers (Onset HOBO) were placed at locations on the north and south shorelines of Hipple Lake at Farm Island. All temperature loggers were deployed in April 2011 and retrieved in October. Temperature was recorded every hour for each temperature logger. During 2011, water levels and Oahe Dam releases were substantially above average, resulting in dramatic increases in water elevation and flow in the Laframboise embayment. Hipple Lake levels increased but, due to the causeway and island, no increased flows were seen during this survey.

Emergent vegetation, including curly leaf pondweed (*Potamogeton crispus*), Eurasian water milfoil (*Myriophyllum spicatum L.)*, fan leafed crowfoot (*Cabomba caroliniana*), American elodea (*Elodea canadensis*), and sago pondweed (*Potamogeton* spp.) is prevalent in both embayments. Cattail (*Typha* spp.) and bulrush stands are more common in Hipple Lake, but can also be found in LaFramboise.

Species Composition and Relative Abundance

Channel catfish, white bass, common carp, black crappie, and smallmouth buffalo were the most abundance species collected in Hipple Lake, while walleye, white bass, smallmouth bass, and common carp were the most abundant in LaFramboise. This survey is intended to target the panfish community; 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 during this survey since inception.

Population Parameters for Bluegill

In 2010, bluegill were found in low abundance within Hipple Lake and LaFramboise Bay (CPUE of 2.3 and 0.3 fish/net-night, respectively); however, no bluegill were collected during the survey in 2011 (Table 19; Table 20).

Population Parameters for Black Crappie

Black Crappie CPUE at Hipple Lake was slightly lower in 2011 (5.4 fish/net-night) than in 2010 (6.7 fish/night). LaFramboise Bay black crappie CPUE (0.5 fish/net-night) was dramatically lower in 2011 than in 2010 (4.0 fish/net-night). LaFramboise Bay and Hipple Lake PSD-P values, combined, were slightly lower in 2011 (15) than in 2010 (28; Figure 10). Relative weight (*Wr)* was 92 and 90, at Hipple Lake and LaFramboise Bay respectively, indicting good black crappie condition (Table 17; Table 18). A total of 59 black crappies were collected at both sites. Black crappie found within Hipple Lake and LaFramboise Bay exhibit similar growth rates when compared to statewide and regional means (Table 21; Willis et al. 2001).

Population Parameters for White Crappie

White crappie CPUE within Hipple Lake and LaFramboise Bay was low (Table 19; Table 20). In 2010, twenty individuals were collected for an overall CPUE of 1.0 fish/net-night. The 2011 sample consisted of one white crappie collected at both sites combined, therefore, length frequencies, age and growth analysis are not depicted.

Population Parameters for White Bass

White bass frame net CPUE was variable at each site in 2011 when compared to 2010 catch rates. The LaFramboise Bay CPUE was lower in 2011 (0.7 fish/net-night) than in 2010 (9.2 fish/net-night; Table 19). Conversely, the Hipple Lake white bass CPUE (23.0 fish/net-night) was higher in 2011 than in 2010 (8.6 fish/net-night; Table 17). PSD and PSD-P values for Hipple Lake (100 and 99, respectively) were high indicating a population with few individuals smaller than the preferred length category. LaFramboise Bay had a similar PSD and PSD-P of 100 and 100 respectively.

The 2011 white bass catch rate (23.7 fish/net-night Hipple Lake and LaFramboise Bay combined) was higher than in 2010 (17.8 fish/net-night; Figure 11). White bass relative weight (*Wr*) of 89 at Hipple Lake was similar to the *Wr* of 93 at LaFramboise Bay. Growth of white bass is similar to state and regional averages with a mean length of 365 mm at age-5 compared to the state and regional mean of 360 mm (Table 21).

Table 19. Total catch of ten, overnight 1.9 cm bar mesh frame nets at Hipple Lake during May, 2011. Mean Wr was calculated from stock length fish only.

Species	N	%	CPUE	SE	PSD	PSD-P	Mean *Wr*
Bigmouth buffalo	3	<1	0.3	0.2	100	100	--
Black bullhead	3	<1	0.3	0.2	0	0	93
Black crappie	54	8	5.4	3.5	72	13	92
Bluegill	0	0	0	--	--	--	--
Channel catfish	259	36	25.9	8.9	99	6	--
Common carp	56	8	5.6	1.5	100	32	--
Gizzard shad	7	1	0.7	0.4	100	0	--
Rainbow trout	0	0	0	--	--	--	--
Sauger	0	0	0	--	--	--	--
Shorthead redhorse	1	<1	0.1	0.1	100	100	--
Shortnose gar	35	5	3.5	0.2	--	--	--
Smallmouth bass	9	1	0.9	0.7	100	89	94
Smallmouth buffalo	50	7	5.0	4.3	100	92	--
Walleye	6	1	0.6	0.4	83	33	87
White bass	230	32	23.0	6.2	100	99	89
White crappie	0	0	0	--	--	--	--
White sucker	3	<1	0.3	0.2	100	100	--

Table 20. Total catch of ten, overnight 1.9 cm bar mesh frame nets at LaFramboise Bay during May, 2011. Mean *Wr* was calculated from stock length fish only.

Species	N	%	CPUE	SE	PSD	PSD-P	Mean *Wr*
Bigmouth buffalo	0	0	0	--	--	--	--
Black bullhead	0	0	0	--	--	--	--
Black crappie	5	12	0.5	0.2	60	40	90
Bluegill	0	0	0	--	--	--	--
Channel catfish	2	5	0.2	0.1	100	0	106
Common carp	6	14	0.6	0.3	100	33	97
Gizzard shad	0	0	0	--	--	--	--
Rainbow trout	1	2	0.1	0.1	--	--	--
Sauger	1	2	0.1	0.1	100	100	69
Shorthead redhorse	0	0	0	--	--	--	--
Shortnose gar	0	0	0	--	--	--	--
Smallmouth bass	6	14	0.6	0.2	100	67	111
Smallmouth buffalo	0	0	0	--	--	--	--
Walleye	11	26	1.1	0.6	73	27	90
White bass	7	17	0.7	0.2	100	100	93
White crappie	1	2	0.1	0.1	0	0	84
White sucker	2	5	0.2	0.1	100	100	102

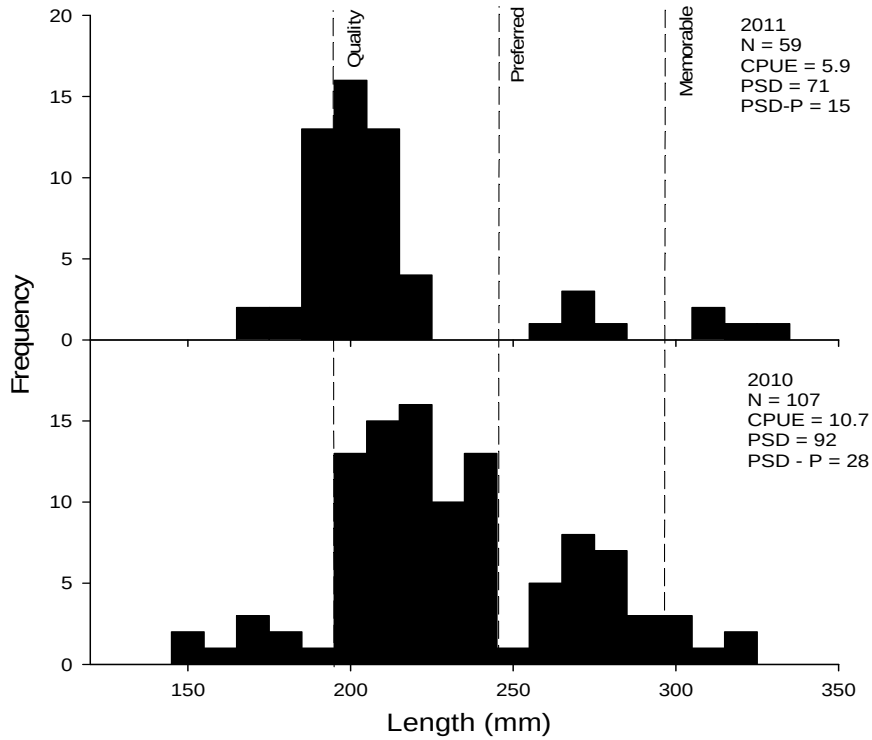

Figure 10. Length frequency, catch rate (CPUE), proportional size distribution (PSD), and proportional size distribution of preferred-length fish (PSD-P) for black crappie sampled in frame nets combined from Hipple Lake and LaFramboise Bay during 2010 and 2011.

Table 21. Average back-calculated lengths (mm) for each age class of black crappie sampled from Hipple Lake and LaFramboise Bay (combined) 2010.

			Back-calculated Age						
Year Class	Age	N	1	2	3	4	5	6	7
2009	1	3	136						
2008	2	58	66	155					
2007	3	29	71	146	219				
2006	4	9	67	134	220	264			
2005	5	7	99	174	228	270	290		
Mean		**107**	**88**	**152**	**222**	**267**	**290**		
SE			14	9	3	3	0		
Statewide Mean			83	147	195	229	249		
Region II Mean			75	132	177	209	235		

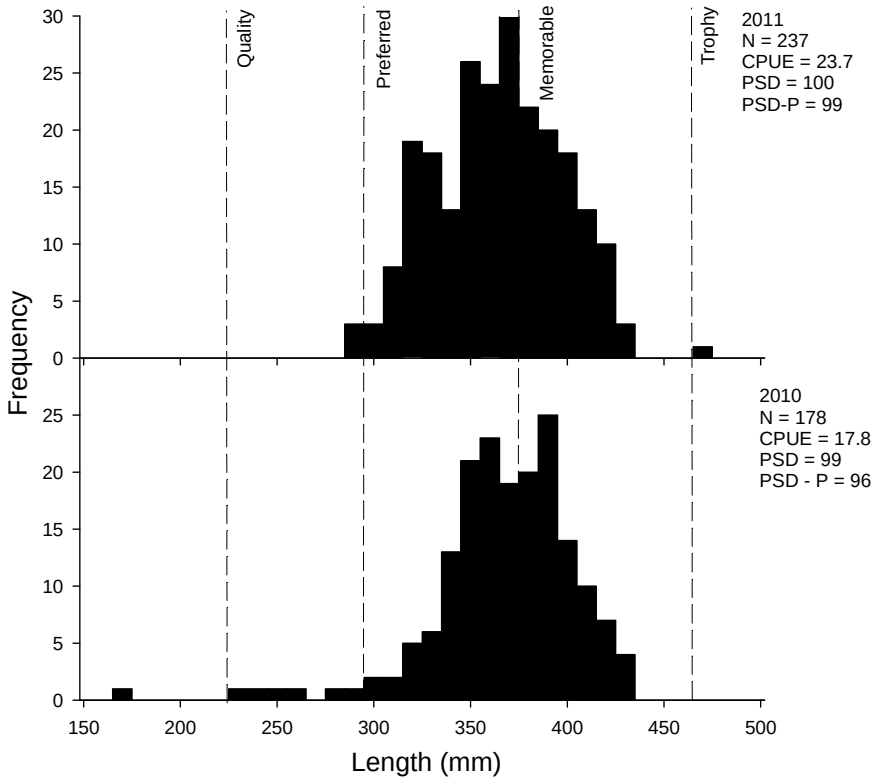

Figure 11. Length frequency, catch rate (CPUE), proportional size distribution (PSD), and proportional size distribution of preferred-length fish (PSD-P) for white bass sampled in frame nets sets combined from Hipple Lake and LaFramboise Bay during 2010 and 2011.

Table 22. Average back-calculated lengths (mm) for each age class of white bass sampled from Hipple Lake and LaFramboise Bay (combined) 2011.

			Back-calculated Age									
Year Class	Age	N	1	2	3	4	5	6	7	8	9	10
2009	2	2	162	295								
2008	3	52	176	271	326							
2007	4	9	166	274	314	345						
2006	5	47	177	274	316	342	359					
2005	6	44	168	269	323	350	363	377				
2004	7	30	175	272	318	347	365	378	389			
2003	8	35	165	269	321	348	368	381	390	399		
2002	9	17	171	273	321	347	368	384	396	406	413	
2001	10	3	168	270	308	342	366	385	396	405	411	421
Mean		**239**	**170**	**274**	**318**	**346**	**365**	**381**	**393**	**403**	**412**	**421**
SE			2	3	2	1	1	2	2	2	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 occurs continuously from May through August (Table 23). Shad densities in Lake Sharpe decreased in 2011 and were well below the five year average. Gizzard shad densities are thought to be much higher in Hipple Lake due to the shallow backwater areas warming much faster than the rest of the reservoir. No larval shad were collected in Hipple Lake in 2011 (Table 24; Table 25). The highest peak density in Hipple Lake was recorded in 2010 at 5,900 fish per 100 m^3.

Table 23. Dates of larval trawl sampling of Lake Sharpe, South Dakota.

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 24. Average gizzard shad density per 100 m^3 sampled during May to August, 2007 to 2011. Sampled during 6 or 7 periods. Sample size (N) and standard deviations (in parentheses) are shown.

		2011		2010		2009		2008		2007	
Zone	**Period**	**Density**	**N**	**Density**	**N**	**Density**	**N**	**Density**	**N**	**Density**	**N**
2	1	0	5	0.26 *(0.63)*	6	0.00 *(0.00)*	6	0.14 *(0.31)*	5	395.24 *(754.60)*	6
	2	--	0	0.00 *(0.00)*	6	40.50 *(91.49)*	6	0.00 *(0.00)*	7	226.90 *(391.75)*	7
	3	0	6	1,971.93 *(3,080.10)*	6	658.47 *(1,017.93)*	6	1.90 *(4.38)*	6	82.65 *(135.76)*	7
	4	0	8	22.94 *(32.80)*	6	475.64 *(629.78)*	6	83.41 *(161.13)*	9	49.50 *(83.12)*	8
	5	0	4	19.27 *(43.80)*	6	18.83 *(45.07)*	6	700.91 *(1,437.60)*	6	3.49 *(5.09)*	6
	6	0	6	5.86 *(11.42)*	6	30.78 *(32.89)*	6	11.32 *(21.37)*	6	5.97 *(9.08)*	6
	7	0.25 *(0.61)*	6	---	0	41.33 *(101.24)*	6	9.44 *(19.07)*	8	5.32 *(9.87)*	8
	Peak	0.25 (0.61)		1,971.93 *(3,080.10)*		658.47 *(1,017.93)*		700.91 *(1,437.60)*		395.24 *(754.60)*	
	Date	Aug 8		June 7		June 8		July 9		May 14	
3	1	0	6	0.88 *(1.33)*	6	0.00 *(0.00)*	6	0.00 *(0.00)*	8	29.48 *(69.96)*	6
	2	--	0	0.93 *(1.37)*	6	0.00 *(0.00)*	6	0.00 *(0.00)*	5	770.39 *(1,058.20)*	6
	3	0	6	4.65 *(3.91)*	6	126.44 *(287.70)*	6	2.27 *(4.49)*	6	69.68 *(101.51)*	6
	4	0	6	283.12 *(417.53)*	6	97.56 *(163.42)*	6	7.10 *(12.06)*	6	28.37 *(37.00)*	6
	5	0.82 (1.92)	14	176.83 *(278.63)*	6	52.00 *(64.98)*	6	208.62 *(243.75)*	6	30.10 *(49.56)*	6
	6	6.33 (9.14)	14	4.04 *(5.33)*	6	30.88 *(48.78)*	6	45.49 *(39.07)*	6	1.85 *(0.84)*	6
	7	8.89 (18.19)	14	---	0	6.50 *(11.30)*	6	5.10 *(6.17)*	5	0.47 *(0.76)*	5
	Peak	8.89 (18.19)		283.12 *(417.53)*		126.44 *(287.70)*		208.62 *(243.75)*		770.39 *(1,058.20)*	
	Date	Aug 8		June 22		June 8		July 9		May 27	

Table 25. Gizzard shad density per 100 m^3 during May to August, 2007 – 2011 in Hipple Lake. Sampled during 6 or 7 periods. Sample size (N) and standard deviations (in parentheses) are shown.

	2011		**2010**		**2009**		**2008**		**2007**	
Period	**Density**	**N**	**Density**	**N**	**Density**	**N**	**Density**	**N**	**Density**	**N**
1	0	3	0.52 *(0.90)*	3	0.00 *(0.00)*	2	0.23 *(0.40)*	3	790.48 *(977.20)*	3
2	--	0	0.00 *(0.00)*	3	81.00 *(126.51)*	3	0.00 *(0.00)*	2	666.70 *(612.21)*	2
3	0	1	5,914.00 *(902.95)*	2	1,969.70 *(151.36)*	2	0.16 *(NA)*	1	270.12 *(108.45)*	2
4	0	3	83.22*(--)*	1	950.91 *(560.27)*	3	15.69 *(26.49)*	3	156.53 *(130.75)*	2
5	0	0	56.51 *(73.70)*	2	55.41 *(78.36)*	2	5.18 *(0.71)*	2	8.71 *(6.42)*	2
6	0	1	28.95*(---)*	1	60.75 *(2.92)*	3	0.10 *(0.18)*	3	11.88 *(10.07)*	3
7	0	2	---	0	82.66 *(143.18)*	3	0.00 *(0.00)*	2	20.58 *(7.76)*	2
Peak	0		5,914.00 *(902.95)*		1,969.70 *(151.36)*		15.69 *(26.49)*		790.48 *(977.20)*	
Date			June 7		June 8		June 25		May 14	

ANGLER USE, SPORTFISH HARVEST, AND PREFERENCE SURVEYS

Angler Use

As a result of high discharges during the 2011 flood, a boating closure was placed on upper Lake Sharpe on 26-May. Additionally, temporary levee structures constructed in the Pierre/Fort Pierre area to hold back flood waters prevented access to many of the shore fishing areas. As water discharges decreased, access in the middle portion of Lake Sharpe increased and the angler survey was reinstated on 1-July. Due to the restricted access of the upper zone of Lake Sharpe, the angler use survey was canceled beginning 26-May through 30-September. Like the middle zone, angler activity increased with access in the upper zone of Lake Sharpe (Table 26).

A total of 707 angling parties were interviewed during the April-September 2011 daylight angler use and harvest survey compared to 1,415 angling parties in the same period in 2010. Estimated fishing pressure for the April-September 2011 daylight period (170,847 angler-h) was the lowest recorded since survey inception (Table 27). Estimated angler days spent on Lake Sharpe during the 2011 survey period (49,378 days) did not meet the reservoir-wide objective of 100,000 angler days (SDGFP 1994).

The majority (59%) of the angling pressure on Lake Sharpe occurred in the lower zone in 2011 (101,803 angler hours; Table 28). Estimated angling pressure by reservoir zone on Lake Sharpe is often highest in lower Lake Sharpe and lowest in the middle zone (Table 28; Johnson and Lott 2001; Johnson et al. 2002; Lott et al. 2003). 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). Boat fishing was again the most popular form of angling on Lake Sharpe, though reduced greatly from previous years (6.4 H/ha; Table 29).

Catch, Harvest and Release Estimates

Walleye were the most abundant species in the angler catch in 2011 with an estimated catch of 178,666 fish. Walleye were followed by smallmouth bass, white bass, and channel catfish in decreasing order of estimated catch. An estimated 85,345 fish were harvested from Lake Sharpe during the April-September daylight period (Table 30).

Approximately 41% of walleye caught were harvested, while smallmouth bass, white bass and channel catfish were 10%, 36% and 57%, respectively.

Approximately 99% of the walleye harvested during the months that the 381 mm minimum length limit was in effect were between 381 and 508 mm in length (15 and 20 inches) (Table 31). During 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 during July and August (Figure 12). For the April-September 2011 daylight survey period, approximately 87% of the smallmouth bass harvested were < 355 mm in length, 9% were ≥ 457 mm in length and 4% of the smallmouth bass measured during angler interviews were within the protected slot length limit (Figure 13). Estimated harvest of walleye during the 2011 survey period was 72,622 fish, which is well below the Lake Sharpe strategic plan objective of 100,000 (SDGFP 1994). Walleye harvest was highest in May (24,263 fish harvested). Most walleye were harvested in lower Lake Sharpe (38,954 fish), as compared to 16,444 walleye harvested in upper Lake Sharpe (Table 32).

An estimated 158,880 fish were released during the April-September 2011 daytime period on Lake Sharpe (Table 33). Estimated number of walleye released and fishing pressure was highest during May and June when the 381-mm minimum length limit was in effect (Table 33; Table 34). An estimated 37,084 smallmouth bass were released during 2011 with nearly 52% of those released during May. The higher percentage of smallmouth bass released was due, in part, to the 355-457 mm protected slot length limit.

Estimates of walleyes caught, harvested, and released during the standard April-September daylight survey period in 2011 were lower when compared to the 18 year mean (Table 33). Approximately 41% of caught walleye were harvested in 2011 which is near the 18 year average of 40% (Table 33).

Hourly Catch, Harvest, and Release Rates

Estimated hourly catch and release rates for all species combined for the April-September 2011 daylight period were 1.43 fish/h and 0.93 fish/h, respectively (Table 34). The catch rate for walleye increased from 0.73 fish/angler-h in 2010 to 1.05 fish/angler-h

in 2011. The white bass catch rate remained below past values (i.e., 0.31 in 2005, Lott et. al. 2007), likely due to the white bass die off that occurred in July 2005 (Lott et. al. 2007).

Anglers targeting walleye had a mean hourly catch rate of 2.84 fish/angler-h for the April-September daylight period (Table 35), while the mean catch rate of walleye by all anglers was 1.05 fish/angler-h (Table 35). Anglers targeting smallmouth bass, white bass, and channel catfish had mean hourly catch rates of 2.00, 3.28, and 1.48 fish/angler-h, respectively.

High walleye catch rates in 2011, can be attributed, in part, to low gizzard shad abundance, similar to what occurred in 2003 (Table 36). Low hourly catch rates for walleye from 2004 to 2006 were likely related to higher shad production, a decrease in walleye abundance and an increase in mean age of fish in the walleye population. In 2011, the hourly catch rate of walleye in Lake Sharpe was 1.05 fish/angler-h, which is well above the level indicative of an excellent walleye fishery (0.3 fish/angler-h) according to Colby et al. (1979).

Catch rates have been relatively similar for smallmouth bass, channel catfish, and white bass from 1993-2011 (Table 36). Abundance of fish may influence hourly catch rates by anglers to some extent. However, it is likely that an increase in the percentage of total angling trips specifically for smallmouth bass, channel catfish, and white bass, and an increase in the likelihood of shore anglers being interviewed by survey clerks may be responsible for the majority of the increase in hourly catch rates. As previously mentioned, the bus route survey design is more effective at capturing shore angler information than the access site/aerial survey design. Both white bass and channel catfish are species frequently targeted and caught by shore anglers. Therefore, increasing the percentage of total interviews from shore anglers would lead to an increase in catch rates for species commonly caught or targeted from shore.

Hourly catch rates for walleye were highest during September in 2011, while harvest rates were highest during August (Table 37). High catch rates during August and September are unusual for Lake Sharpe, but can likely be attributed to the influence of many factors associated with the 2011 flood event. The release rate for walleye was the highest during September 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, the August and September harvest rates were substantially higher than all other months in 2011.

The percentage of angling parties catching and harvesting a specified number of walleye in 2011 was larger than what was recorded in 2011 (Table 38). The largest increases were observed in the middle zone where 39% of angling parties caught 4 or more walleye compared to 1% in 2010 (Longhenry et al. 2011). Accordingly, the percentage of anglers harvesting a limit of four walleye in the middle zone increased from 0% in 2010 to 29% in 2011. Reservoir-wide the number of parties catching 4 or more walleye increased from 22% in 2010 to 33% in 2011, and the percentage of anglers harvesting a limit of 4 walleye increased from 13% in 2010 to 23% in 2011 (Table 38)

Smallmouth bass catch and harvest rates per trip for angling parties fishing the lower zone of Lake Sharpe, from 2007 through 2011, serve as a tool for evaluating effects of the 355-457 mm protected slot length limit implemented in 2008 (Table 39). The percentage of angling parties catching a smallmouth bass has generally decreased during the 2007-2011 period; however, the percentage of angling parties harvesting smallmouth bass has remained relatively unchanged throughout the same time period.

Angler Demographics and Economic Impacts

For the April-September 2011 daylight period, Lake Sharpe anglers contributed approximately 3.9 million dollars to local economies, based on an estimated 49,378 trips at an estimated $79 per trip for South Dakota's Missouri River reservoirs (U.S. Dept. of Interior, Fish and Wildlife Service, and U.S. Dept. of Commerce, Bureau of the Census 2007). This estimated impact is lower than previous years due to the limited fishing access in the upper and middle zones, especially during June and July. In 2010, estimated economic impacts were 8.5 million dollars.

In 2011, average angling party size on Lake Sharpe was 2.2 anglers/party and average trip length was 3.5 h, during the April-September period. Residents comprised 81% of angling parties interviewed on Lake Sharpe during the April-September 2011 daytime survey period (Table 40). The percentage of resident anglers is generally lowest in lower Lake Sharpe and highest in middle Lake Sharpe. Campground facilities at West

Bend and Big Bend Dam may contribute to the higher percentage of non-residents fishing this zone of the reservoir. The majority of anglers fishing middle Lake Sharpe are local residents.

The majority of non-resident anglers fishing Lake Sharpe in 2011 were from the states of Nebraska, Minnesota, and Iowa. Patterns in angler state of residency in 2011 remained similar to previous years (Table 41). From 2007 to 2011, residents of 39 states and two foreign countries were interviewed while fishing Lake Sharpe.

Approximately 47% of resident angling parties interviewed on Lake Sharpe during the 2011 survey were local anglers from Hughes and Stanley counties (Figure 14; Table 42). Minnehaha (Sioux Falls) and Pennington (Rapid City) county residents made up 11% and 5% of the interviewed angling parties, respectively. The percentage of angler interviews from residents of Beadle, Brookings, Davison, Hand, and Lyman 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. Residents of Hughes and Stanley Counties comprised the majority of anglers traveling <25 miles and 25-49 miles, one way, to fish Lake Sharpe in 2011. Anglers from Minnehaha, Pennington and Beadle counties comprised the majority of anglers traveling 100-199 miles to fish Lake Sharpe (Table 43). Walleye remain the primary targeted species in Lake Sharpe (Table 44). The percentage of interviewed anglers traveling in excess of 200 miles, one way, to fish Lake Sharpe in 2011 was similar previous years. Higher travel costs in 2010 and 2011 did not appear to inhibit anglers traveling to Lake Sharpe.

Satisfaction and Attitudes

Angler's 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 2011, 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 2011 period was "very satisfied" (median of 1; Table 45). The median satisfaction rating of

"very satisfied" for 2011 is the highest rating on record. Approximately 82% of angling parties interviewed in 2011 indicated some degree of satisfaction, which surpasses the Lake Sharpe Strategic Plan objective of 70%. Neutral and dissatisfied anglers comprised 8% and 10% of angler interviews, respectively. 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 44% of anglers harvesting zero walleye expressed some degree of satisfaction with their trip (Table 46).

In 2011, anglers were asked if they were in favor of the current regulation for smallmouth bass. Lake-wide, the largest percentage of anglers (45%) indicated they were in favor of the regulation, but a large portion expressed no opinion (26%; Table 47). When the "no opinion" answers are removed from the sample, 61% were in favor of the current smallmouth bass regulation. By reservoir zone, the middle zone had the lowest percentage of approval (58%).

A portion of the angler parties that released at least one smallmouth bass were also asked an additional smallmouth bass harvest question. Responses indicated that 31% of anglers would have harvested one to five additional smallmouth bass if length restrictions were not in effect (Table 48). The percentage of smallmouth bass caught that were harvested in 2011 was estimated at 10.5% and the estimated number caught was 41,405. If length restrictions were not in effect, percent harvest could have potentially increased to 25.8%, resulting in the harvest of approximately 6000 additional smallmouth bass in 2011 (Table 49).

Table 26. Estimated fishing pressure (angler hours), by month and zone, with 80% confidence intervals (CI), for the April-September 2011 daylight period. FLOOD and asterisk(*) illustrate survey was influenced by the flood of 2011 and the resulting lack of angler access and interviews.

Zone	Month						
	April	**May**	**June**	**July**	**August**	**Sept.**	**Total**
Lower	2,887	27,548	21,262	16,413	10,946	22,027	101,083
80% CI	1,914	9,472	7,050	5,092	2,888	9,702	16,477
Middle	560	5,589	FLOOD *	2,145	10,062	7,716	26,072*
80% CI	296	2,177		1,081	1,801	2,509	6,026
Upper	17,937	25,756	FLOOD *	FLOOD *	FLOOD *	FLOOD *	43,693*
80% CI	6,377	7,506					9,849
Total	21,384	58,893	21,262*	18,557*	21,008*	29,743*	170,847*
80% CI	6,664	12,280	7,050	5,206	3,404	10,021	19,596

Table 27. Angler use and harvest estimates for surveys conducted. All surveys were 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	This Report

* June 1973 through May 1974

Table 28. Estimated fishing pressure, expressed as angler-hours (h) and hour per hectare (h/ha), by reservoir zone, for standard creel surveys conducted during the April-September daylight period, 1999-2011. Asterisk(*) illustrate survey was influenced by the flood of 2011 and the resulting lack of angler access and 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*

Table 29. Estimated fishing pressure, expressed as angler-hours (h) and hours per hectare (h/ha), by type of fishing, with 80% confidence intervals (CI), for the standard April-September daylight survey period, 2007-2011. Asterisk(*) illustrate survey was influenced by the flood of 2011 and the resulting lack of angler access and interviews

Type of fishing	Year				
	2007	**2008**	**2009**	**2010**	**2011**
Boat (h)	293,190	261,082	337,989	343,966	150,686*
80% CI	50,757	24,150	30,642	28,985	18,907
H/ha	12.4	11.0	14.3	14.5	6.4*
Shore (h)	41,827	55,644	66,104	43,071	20,161*
80% CI	7,430	9,093	10,224	5,482	5,031
H/ha	1.8	2.4	2.8	1.8	0.9*

Table 30. Estimated number of fish harvested, by species and month, with 80% confidence intervals (CI), for the April-September 2011 daylight period.

Species	Month						
	April	May	June	July	Aug.	Sept.	Total
Walleye	6,217	24,263	4,698	3,414	15,299	18,731	72,622
80% CI	1,938	7,274	1,813	969	2,452	6,178	10,250
Sauger	142	478	96	0	29	0	744
80% CI	148	312	50	--	48	--	353
Channel catfish	357	859	289	198	124	136	1,964
80% CI	158	468	616	100	66	106	806
White bass	0	3,130	62	16	65	135	3,408
80% CI	--	1,594	66	21	50	99	1,599
Smallmouth bass	22	1,667	999	338	311	984	4,321
80% CI	33	656	846	467	114	608	1,322
Rainbow trout	22	0	0	0	0	0	22
80% CI	33	--	--	--	--	--	33
Yellow perch	0	54	221	90	217	356	936
80% CI	--	40	192	67	99	240	298
Other*	0	875	14	396	42	1	1,328
Total	6,759	31,326	6,379	4,452	16,087	20,343	85,345
80% CI	1,914	7,918	2,088	912	2,463	6,785	11,120

*Other includes black crappie, common carp, freshwater drum, northern pike, and white crappie.

Table 31. Estimated number of fish released, by species and month, for the April-September 2011 daylight period.

Species	Month						
	April	May	June	July	Aug.	Sept.	Total
Walleye	2,471	11,708	6,015	7,617	23,801	54,432	106,044
80% CI	625	5,348	2,764	1,030	5,947	17,250	19,252
Sauger	97	0	14	0	34	0	145
80% CI	64	--	24	--	25	--	73
Channel catfish	51	239	34	212	511	423	1,470
80% CI	62	132	34	223	504	150	591
White bass	28	4,264	296	69	674	627	5,959
80% CI	17	3,066	464	45	372	317	3,140
Smallmouth bass	71	19,283	5,404	2,382	3,951	5,992	37,084
80% CI	69	8,016	2,202	1,188	1,684	3,881	9,403
Rainbow trout	174	0	0	0	0	0	174
80% CI	271	--	--	--	--	--	271
Yellow perch	0	469	222	126	490	1,087	2,393
80% CI	--	569	116	123	181	878	1,075
Other*	389	584	240	477	1,916	2,005	5,611
Total	3,281	36,547	12,225	10,883	31,377	64,566	158,880
80% CI	822	10,674	5,713	1,548	6,425	20,703	24,891

*Other includes bigmouth buffalo, black bullhead, black crappie, bluegill, Chinook salmon, common carp, freshwater drum, gizzard shad, goldeye, lake herring, largemouth bass, northern pike, shorthead redhorse, shovelnose sturgeon, smallmouth buffalo, and white crappie.

Table 32. Estimated number of fish harvested, for selected species, by zone, with 80% confidence intervals (CI), for the April-September 2011 daylight period.

Species	Zone			
	Upper	Middle	Lower	Total
Walleye	16,444	17,224	38,954	72,622
80% CI	5,727	2,619	8,087	10,250
Sauger	534	22	188	744
80% CI	329	22	126	353
Channel catfish	166	1,119	679	1,964
80% CI	167	476	628	806
White bass	1,146	2,032	230	3,408
80% CI	760	1,401	121	1,599
Smallmouth bass	182	178	3,961	4,321
80% CI	106	80	1,315	1,322
Rainbow trout	22	0	0	22
80% CI	33	--	--	33
Yellow perch	54	34	849	936
80% CI	40	20	295	298
Total*	19,224	21,152	44,969	85,345
80% CI	5,926	3,087	8,888	11,120

* Total includes all listed species plus black crappie, common carp, freshwater drum, northern pike, and white crappie.

Table 33. Estimated number of walleye caught, harvested, and released during the April-September daylight period, 1994-2011.

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
Mean	321,399	120,910	200,466	40

Table 34. Estimated hourly catch, harvest, and release rates, by species, for all anglers interviewed during the April-September 2011 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	1.05	0.43	0.62
Sauger	0.01	T	T
White bass	0.05	0.02	0.03
Smallmouth bass	0.24	0.03	0.21
Channel catfish	0.02	0.01	0.01
Rainbow trout	T	T	T
Yellow perch	0.02	0.01	T
Other*	0.04	0	0.06
Total	1.43	0.50	0.93

* Other includes bigmouth buffalo, black bullhead, black crappie, bluegill, Chinook salmon, common carp, freshwater drum, gizzard shad, goldeye, lake herring, largemouth bass, northern pike, shorthead redhorse, shovelnose sturgeon, smallmouth buffalo, and white crappie.

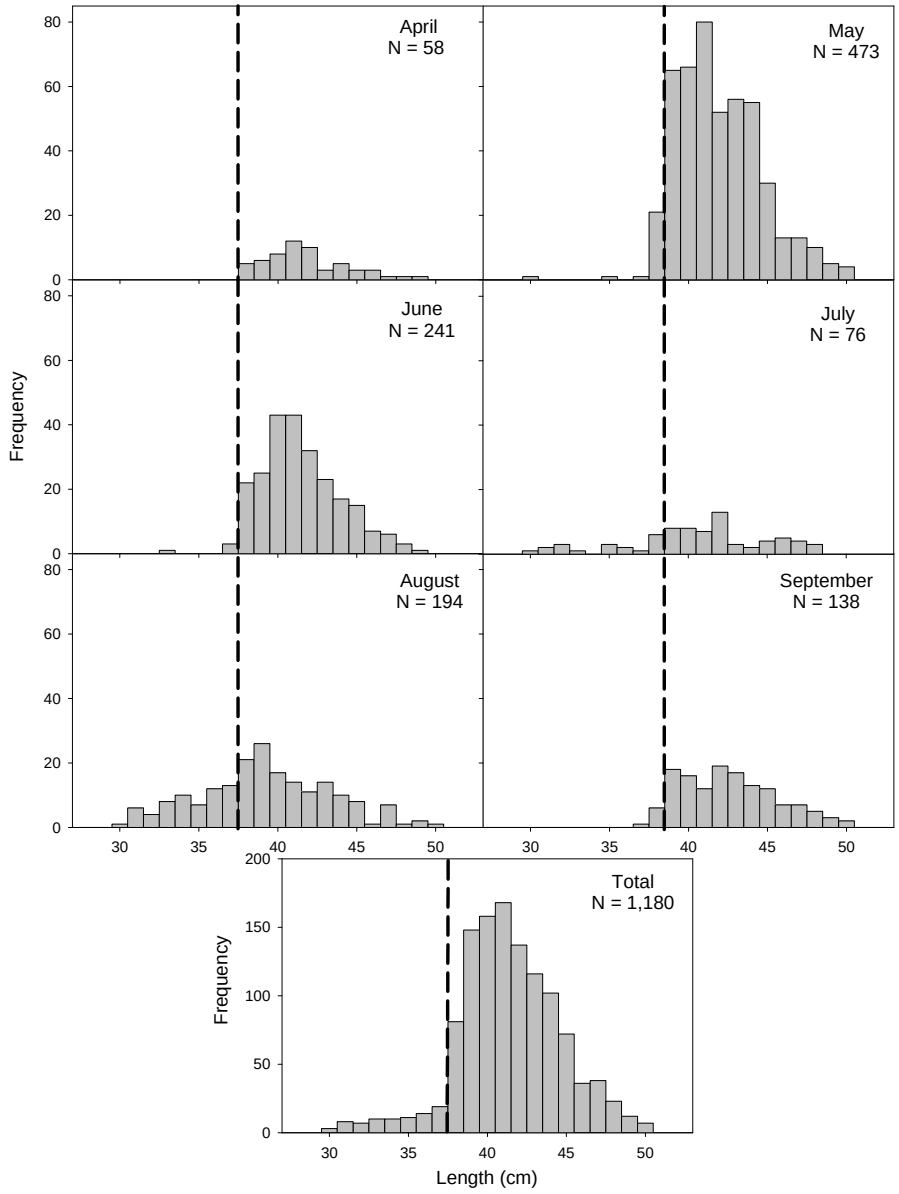

Figure 12. Length frequency distribution of walleye harvested by anglers, by month, during the April-September 2011 daylight period. Vertical line represents the 380 mm minimum length limit.

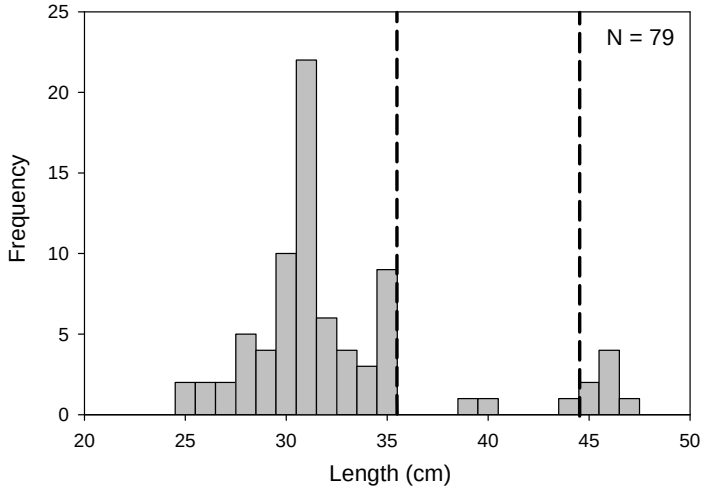

Figure 13. Length frequency distribution of smallmouth bass harvested by anglers during the April-September 2011 daylight period. Vertical lines represent the 356 to 457 mm protected slot limit.

Table 35. Estimated hourly catch, harvest, and release rates, by species, for anglers specifically fishing for the species listed during the April-September 2011 daylight period.

Species	Catch rate (fish/angler-h)	Harvest rate (fish/angler-h)	Release rate (fish/angler-h)
Walleye	2.84	1.02	1.82
White bass	3.28	1.45	1.83
Smallmouth bass	2.00	0.03	1.97
Channel catfish	1.48	0.42	1.06
Rainbow trout	0.98	0.00	0.98

Table 36. 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,1993-2011.

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

Table 37. Estimated hourly catch, harvest, and release rates, (fish/angler-h), for walleye and all species combined, by month, for the April-September 2011 daylight survey period.

Month	Walleye			All fish combined		
	Catch rate	Harvest rate	Release rate	Catch rate	Harvest rate	Release rate
April	0.41	0.29	0.12	0.47	0.32	0.15
May	0.61	0.41	0.20	1.15	0.53	0.62
June	0.50	0.22	0.28	0.88	0.30	0.58
July	0.59	0.18	0.41	0.83	0.24	0.59
August	1.86	0.73	1.13	2.26	0.77	1.49
September	2.46	0.63	1.83	2.85	0.68	2.17
Total	1.05	0.43	0.62	1.43	0.50	0.93

Table 38. Percentage of angling parties catching and harvesting the specified number of walleye and sauger (combined) per person on an angling trip by reservoir zone during the April-September 2010 and 2011 daylight survey periods. Cumulative percent in parentheses.

Number/ trip	Catch per trip							
	2010				2011			
	Lower	Middle	Upper	Total	Lower	Middle	Upper	Total
0	17 (100)	80 (100)	59 (100)	41 (100)	20 (100)	46 (100)	51 (100)	36 (100)
0.0-0.9	12 (83)	9 (21)	8 (42)	10 (58)	13 (80)	6 (57)	9 (48)	10 (56)
1.0-1.9	15 (71)	8 (12)	10 (34)	12 (48)	13 (67)	7 (51)	15 (39)	12 (46)
2.0-2.9	12 (56)	1 (4)	7 (24)	8 (36)	9 (54)	3 (44)	5 (24)	6 (34)
3.0-3.9	10 (44)	2 (3)	3 (17)	6 (28)	7 (45)	2 (41)	3 (19)	5 (38)
4.0-4.9	11 (34)	1 (1)	4 (14)	7 (22)	9 (38)	5 (39)	8 (16)	7 (33)
5.0-5.9	6 (23)	0	3 (10)	4 (15)	7 (29)	3 (34)	2 (8)	5 (26)
6.0-6.9	5 (18)	0	2 (7)	3 (11)	4 (22)	2 (31)	2 (6)	3 (21)
7.0-7.9	3 (13)	0	1 (5)	2 (8)	3 (18)	1 (29)	1 (4)	2 (18)
8.0-8.9	2 (10)	0	1 (4)	1 (6)	3 (15)	4 (28)	1 (3)	3 (16)
9.0-9.9	2 (8)	0	1 (3)	1 (5)	2 (12)	3 (24)	0 2)	2 (13)
≥10	6 (8)	0	2	4	10	21	2	11
Number/ trip	**Harvest per trip**							
	2010				2011			
	Lower	Middle	Upper	Total	Lower	Middle	Upper	Total
0	28 (100)	86 (100)	66 (100)	50 (100)	32 (100)	53 (100)	54 (100)	44 (100)
0.0-0.9	11 (62)	9 (15)	7 (34)	9 (49)	15 (67)	3 (48)	9 (46)	10 (56)
1.0-1.9	16 (51)	4 (6)	10 (27)	12 (40)	12 (52)	5 (45)	14 (37)	10 (46)
2.0-2.9	13 (35)	1 (2)	7 (27)	9 (28)	10 (40)	6 (40)	6 (23)	8 (36)
3.0-3.9	11 (22)	1	3 (10)	6 (19)	7 (30)	5 (34)	3 (17)	5 (28)
4	21	0	7	13	23	29	14	23

Table 39. Percentage of angling parties catching and harvesting 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, 2007-2011.

Number/ trip	Catch per trip					Harvest per trip				
	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
0	23	24	32	43	42	87	77	79	87	81
0.1-0.9	11	19	20	21	15	7	11	11	9	10
1.0-1.9	14	14	15	14	15	4	7	6	3	6
2.0-2.9	8	8	8	8	7	1	3	3	<0.5	2
3.0-3.9	7	7	3	4	4	1	1	<0.5	<0.5	<0.5
4.0-4.9	3	4	3	2	2	0	1	<0.5	0	0
5.0-5.9	6	4	3	2	3	0	<0.5	0	<0.5	0
6.0-6.9	4	3	4	2	3					
7.0-7.9	3	4	3	1	2					
8.0-8.9	2	1	1	1	2			Daily limit of 5		
9.0-9.9	1	1	1	0	1					
01≥	18	11	6	2	5					

Table 40. Percentage of total angler contacts for resident and non-resident (states combined) anglers during the April-September daylight period, 2007-2011. N is the number of parties interviewed.

Zone		Year				
		2007	**2008**	**2009**	**2010**	**2011**
Lower	**N**	559	233	703	707	329
	Residents (%)	70	78	76	74	70
	Non-residents (%)	30	22	24	26	30
Middle	**N**	189	176	233	171	197
	Residents (%)	90	90	91	90	90
	Non-residents (%)	10	10	9	10	10
Upper	**N**	545	572	676	537	181
	Residents (%)	90	89	89	88	93
	Non-residents (%)	10	11	11	12	7
Total	**N**	1,293	1,281	1,612	1,415	707
	Residents (%)	81	85	84	81	81
	Non-residents (%)	19	15	16	19	19

Table 41. Percentage of total non-resident angler contacts for anglers from the states listed during the April-September daylight survey period, 2007-2011.

State	Percent by Year				
	2007	2008	2009	2010	2011
Iowa	19	23	24	25	24
Nebraska	27	25	20	31	30
Colorado	7	6	6	4	6
Minnesota	22	19	25	17	27
Wisconsin	1	4	2	1	2
Wyoming	2	6	4	3	1
Other*	22	16	19	19	10

*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 parties (2010) from other countries.

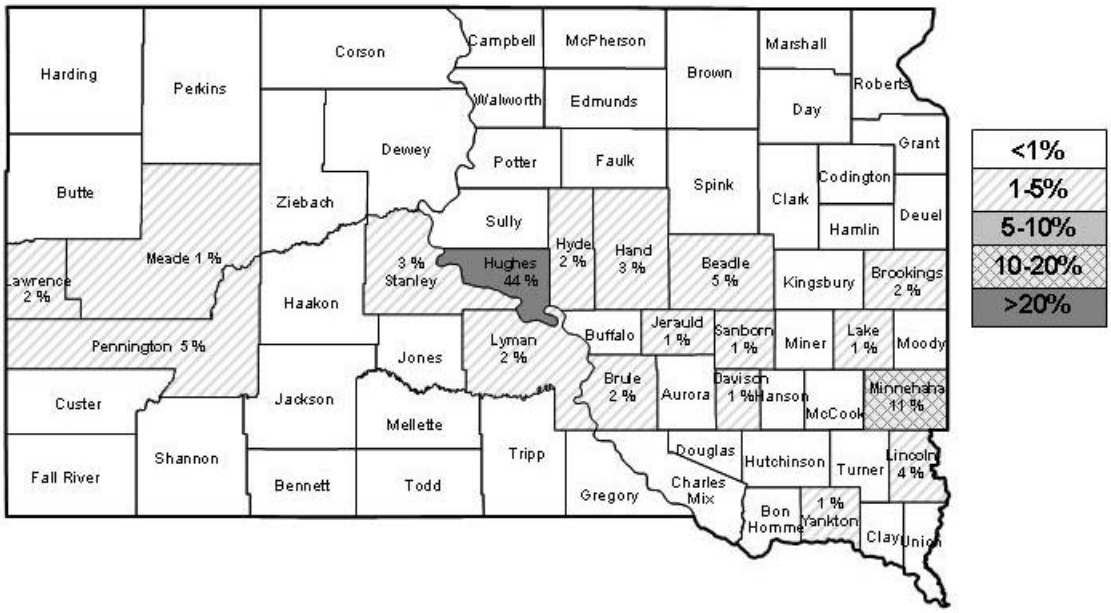

Figure 14. Percentage of resident angler contacts by county, during the April-September 2011 daylight survey period.

Table 42. Percentage of resident angler contacts on Lake Sharpe, of residents of the counties listed, for anglers during the April-September daylight survey period, 2007-2011.

County	Major City	Percent by year				
		2007	2008	2009	2010	2011
Beadle	**Huron**	6	4	6	6	5
Brookings	**Brookings**	1	1	1	1	2
Davison	**Mitchell**	2	3	2	3	1
Hand	**Miller**	2	2	2	2	2
Hughes	**Pierre**	45	48	45	41	44
Lyman	**Presho, Kennebec**	3	2	2	3	2
Minnehaha	**Sioux Falls**	7	10	8	10	11
Pennington	**Rapid City**	7	6	6	5	5
Stanley	**Fort Pierre**	7	4	5	5	3

Table 43. Percentage of anglers driving the specified distances, one way, during the April-September daylight survey period, 2007-2011.

Distance (miles)	Percent by year				
	2007	2008	2009	2010	2011
<25	38	38	36	32	33
25-49	12	6	9	9	9
50-99	11	13	9	8	9
100-199	18	18	17	21	17
≥200	21	26	29	30	32

Table 44. Target species of anglers during the April-September daylight survey period, expressed as percent of total, 2007 - 2011.

Target species	Percent by year				
	2007	2008	2009	2010	2011
Walleye	57	60	58	72	71
Anything	32	32	33	19	20
Rainbow trout	1	<0.5	1	1	1
White bass	2	1	2	2	2
Smallmouth bass	6	4	2	2	2
Other*	2	2	4	4	3

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

Table 45. Responses of anglers who were asked the following question during the April-September 2011 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. N is sample size.

Month	Satisfaction rating								
	Satisfied			Neutral/N.O.	Dissatisfied				
	1	2	3	4	5	6	7	N	Median
April	48	20	7	9	2	1	8	95	1
May	138	60	17	13	8	2	3	241	1
June	34	20	13	9	7	5	1	89	2
July	22	24	7	10	9	5	4	81	2
August	69	20	10	7	3	0	3	112	1
September	53	14	6	7	3	2	4	89	1
Total	364	158	60	55	32	15	23	707	1
Percent		82%		8%		10%			

Table 46. Responses of anglers who were asked the following question during the April-September 2011 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. N is sample size.

Walleye/ angler	Satisfaction rating							N	Median
	Satisfied			Neutral/N.O.	Dissatisfied				
	1	2	3	4	5	6	7		
0	126	75	32	32	18	10	16	309	2
0-0.9	20	22	6	14	6	4	2	74	2
1.0-1.9	27	22	9	4	5	1	1	69	2
2.0-2.9	30	11	6	2	1	0	4	54	1
3.0-3.9	29	4	3	2	0	0	0	38	1
4	132	23	3	1	1	0	0	160	1

Table 47. Responses and percentages of anglers who were asked the following question during the April-September 2011 daylight survey period: "Are you in favor of the current smallmouth bass regulation of a 14 to 18 inch protected slot, which requires all smallmouth bass between 14 and 18 inches to be released?" N is the number of responses.

	Zone	Yes	N	No	N	No opinion	N
With	Upper	49	33	28	19	23	16
No	Middle	42	28	30	20	28	19
Opinion	Lower	45	60	29	38	26	35
Responses	Total	45	121	29	77	26	70
Without	Upper	63	33	37	19	Removed from sample	
No	Middle	58	28	42	20		
Opinion	Lower	61	60	39	38		
Responses	Total	61	121	39	77		

Table 48. Of the smallmouth bass you caught today, how many more bass would your party have harvested had there been no length restrictions?

Number of additional smallmouth bass	%	N
0	62	52
1-5	31	26
6-10	2	2
>10	5	4

Table 49. Potential angler harvest of smallmouth bass based on anglers responses to the following question, "Of the smallmouth bass you caught today, how many more smallmouth bass would your party have harvested had there been no length restrictions on harvesting smallmouth bass?" Estimated values are numbers generated by extrapolating interview data over estimated fishing pressure, while observed values are generated directly from interviews.

	Harvest	**Catch**	**Percent harvested**
Actual			
Observed	158	1,348	**10.5%**
Estimated	4,321	41,405	
Potential			
Observed	136	527	**25.8%**
Estimated	**10,682**	41,405	

FISHERY STATUS AND 2012 OUTLOOK

The flood of 2011 caused several problems with the fisheries and management surveys on Lake Sharpe. Due to decreased access, angler use was decreased in the upper and middle zones of Lake Sharpe and creel surveys were unable to be conducted during the typical peak of the fishing season. During this time, fishing pressure was high in the Oahe tail-waters and as access locations reopened, fishing pressure increased. August surveys (gillnet and seine) were affected due to extreme flows with diminished ability to sample effectively.

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." Not all parts of this objective were met for 2011. Due to reduced angler use surveys in the upper and middle portion of Lake Sharpe, a true estimate is unknown. Current estimated fishing pressure is 49,378 angler days, which is dramatically lower than the goal.

In 2011, the harvest rate for all fish was 0.50 fish/hr and angler satisfaction was at 82% which exceeded the goal. Lake Sharpe walleye-specific objectives of 100,000 walleye harvested with a harvest rate of 0.3 walleye/angler hour were partially met in 2011, with harvest rate of 0.43 walleye/angler-h and an estimated 72,622 walleyes harvested. The estimated walleye harvest is lower than the goal but this is likely a conservative estimate as angler effort and harvest occurred in the upper zone of Lake Sharpe but were not captured by creel surveys.

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 2011 and growth of age-0 walleye was reduced. In Lake Sharpe, there is currently a large abundance (68% of population) of small fish less than 381 mm (15 inches). Growth of walleye remained stable even with an abundance of small walleye and lack of gizzard shad in 2011. Condition (*Wr*) of walleye during the August/September survey was at the long term mean of 83 for fish greater than stock-length.

Smallmouth bass gillnet catch rates dropped from a mean of 2.50 fish/h (2005 to 2010) to 1.09 fish/h (2011). Size structure indices have increased from 2005 through 2011 for smallmouth bass with the larger portion of the population in the memorable class in 2011. Growth and condition has remained the same for Lake Sharpe smallmouth bass. Condition of the smallmouth bass was dramatically lower in September, 2011, (mean *Wr* at 80) during the SD BASS tournament when compared to the July gillnet survey (mean *Wr* at 88). The lower condition may be due reduced gizzard shad availability in 2011.

Harvest of smallmouth bass in 2011 was lower than observed from 2003 to 2010. The lower harvest in 2011 could be attributed to poor angling success in the lower zone of Lake Sharpe. Harvest of smallmouth bass was needed for the protected slot regulation to modify the size structure within Lake Sharpe. Growth of smallmouth bass remained stable over the years of the protected slot, but the increased growth of larger fish which was needed to provide trophy smallmouth bass was not achieved. The protected slot regulation package was removed December 31, 2011. Angler acceptance of this regulation remained at 61% for 2011.

MANAGEMENT RECOMMENDATIONS

- Continue to conduct annual angler use and harvest surveys for the April-September daylight period.
- Continue to conduct annual fish population surveys.
- Monitor effects of several consecutive year classes of above average walleye reproduction.
- Continue to investigate smallmouth bass on Lake Sharpe and determine if changes occur to the population with the removal of the protected slot regulation.
- Evaluate management objectives for secondary species (non walleye), including white bass, channel catfish, rainbow trout, and smallmouth bass, to more accurately reflect the potential of these species, in terms of providing increased angler days on Lake Sharpe.
- Survey Hipple Lake and LaFramboise Bay every year to further monitor the fish populations and to continually collect trend data on these important backwater areas of Lake Sharpe.
- Monitor the aquatic vegetation and track any major changes in species diversity and exotics.
- Update the Lake Sharpe Fisheries Management Plan by December 2012.

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APPENDICES

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

Common Name	Abbreviations	Scientific Name
Bigmouth buffalo	BIB	*Ictiobus cyprinellus*
Black bullhead	BLB	*Ameiurus melas*
Black crappie	BLC	*Pomoxis nigromaculatus*
Blue catfish	BCF	*Ictalurus furcatus*
Bluegill	BLG	*Lepomis macrochirus*
Bluntnose minnow	BLM	*Pimephales notatus*
Brassy minnow	BRM	*Hybognathus hankinsoni*
Channel catfish	CCF	*Ictalurus punctatus*
Common carp	COC	*Cyprinus carpio*
Emerald shiner	EMS	*Notropis atherinoides*
Freshwater drum	FRD	*Aplodinotus grunniens*
Gizzard shad	GZD	*Dorosoma cepedianum*
Goldeye	GOE	*Hiodon alosoides*
Johnny darter	JOD	*Etheostoma nigrum*
Largemouth bass	LMB	*Micropterus salmoides*
Northern pike	NOP	*Esox lucius*
Rainbow smelt	RBS	*Osmerus mordax*
Rainbow trout	RBT	*Oncorhynchus mykiss*
River carpsucker	RIC	*Carpiodes carpio*
Sauger	SAR	*Sander canadensis*
Shorthead redhorse	SHR	*Moxostoma macrolepidotum*
Shortnose gar	SHG	*Lepisosteus platostomus*
Shovelnose sturgeon	SHS	*Scaphirhynchus platorynchus*
Smallmouth bass	SMB	*Micropterus dolomieu*
Smallmouth buffalo	SAB	*Ictiobus bubalus*
Spottail shiner	SPS	*Notropis hudsonius*
Stonecat	STC	*Noturus flavus*

Walleye	WAE	*Sander vitreus*
White bass	WHB	*Morone chrysops*
White crappie	WHC	*Pomoxis annularis*
White sucker	WHS	*Catostomus commersonii*
Yellow perch	YEP	*Perca flavescens*

Appendix 2. Minimum lengths (mm) for length class designations for smallmouth bass, walleye, sauger, channel catfish, white bass and yellow perch (Gablehouse 1984).

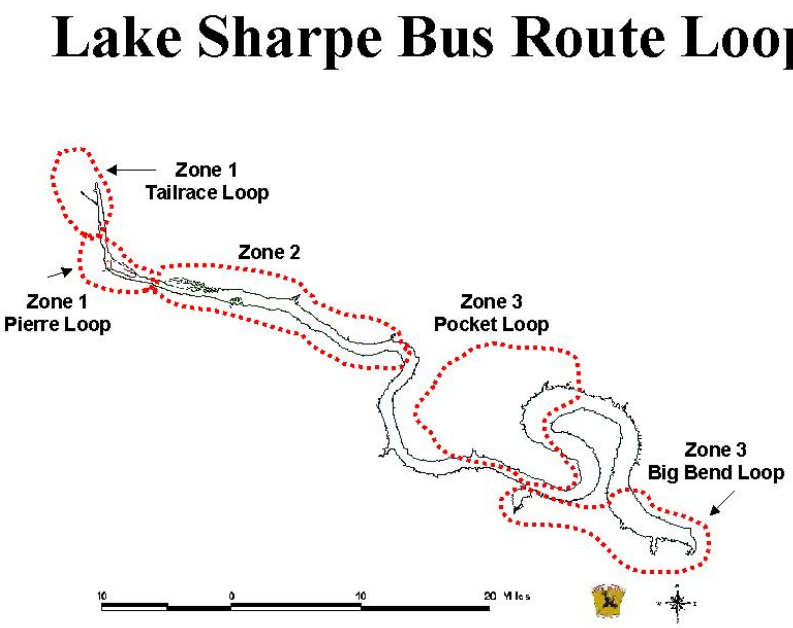
Species	Stock	Quality	Preferred	Memorable	Trophy
Smallmouth bass	180	280	350	430	510
Walleye	250	380	510	630	760
Sauger	200	300	380	510	630
Channel catfish	280	410	610	710	910
White bass	150	230	300	380	460
Yellow perch	130	200	250	300	380

Appendix 3. White bass and yellow perch proportional size distribution (PSD), proportional size distribution of preferred-length fish (PSD-P), and memorable-length fish (PSD-M), and mean relative weight values, for 2007-2011, for fish collected in the standard August gill net survey, on Lake Sharpe South Dakota.

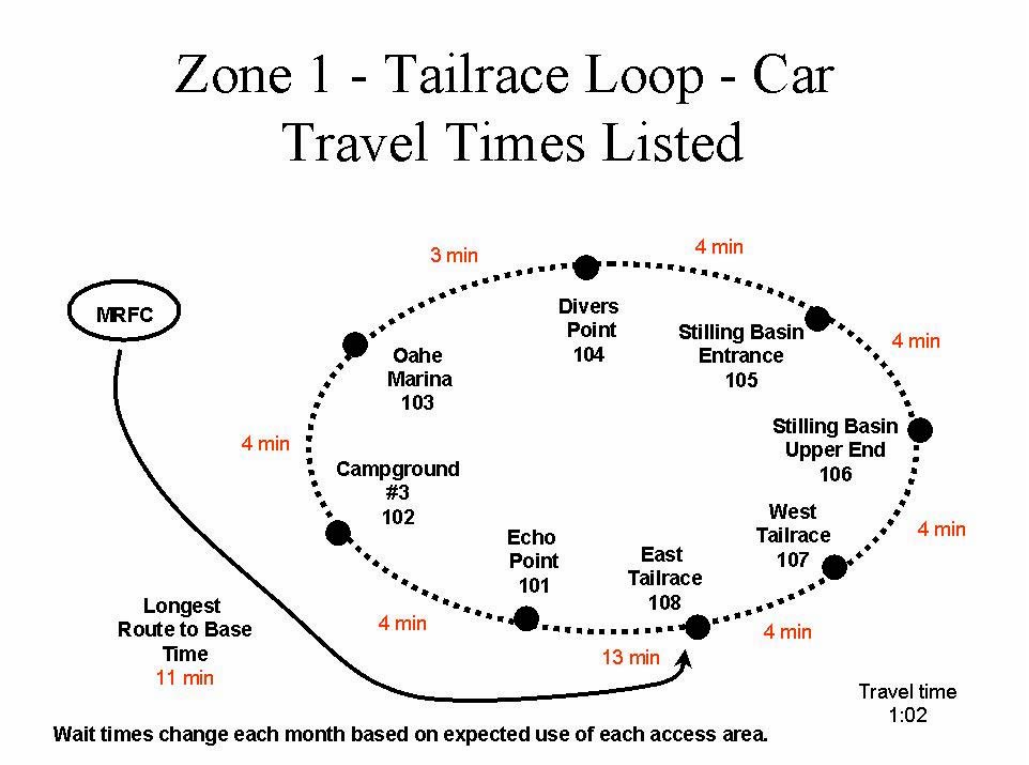
White bass					
Year	**PSD**	**PSD-P**	**PSD-M**	***Wr***	**N**
2007	98	96	20	95	45
2008	100	100	41	95	37
2009	100	92	17	96	12
2010	100	100	18	109	10
2011	71	71	43	86	7

Yellow perch					
Year	**PSD**	**PSD-P**	**PSD-M**	***Wr***	**N**
2007	37	5	0	83	31
2008	47	0	0	87	23
2009	56	0	0	88	34
2010	36	6	0	86	34
2011	61	20	0	82	41

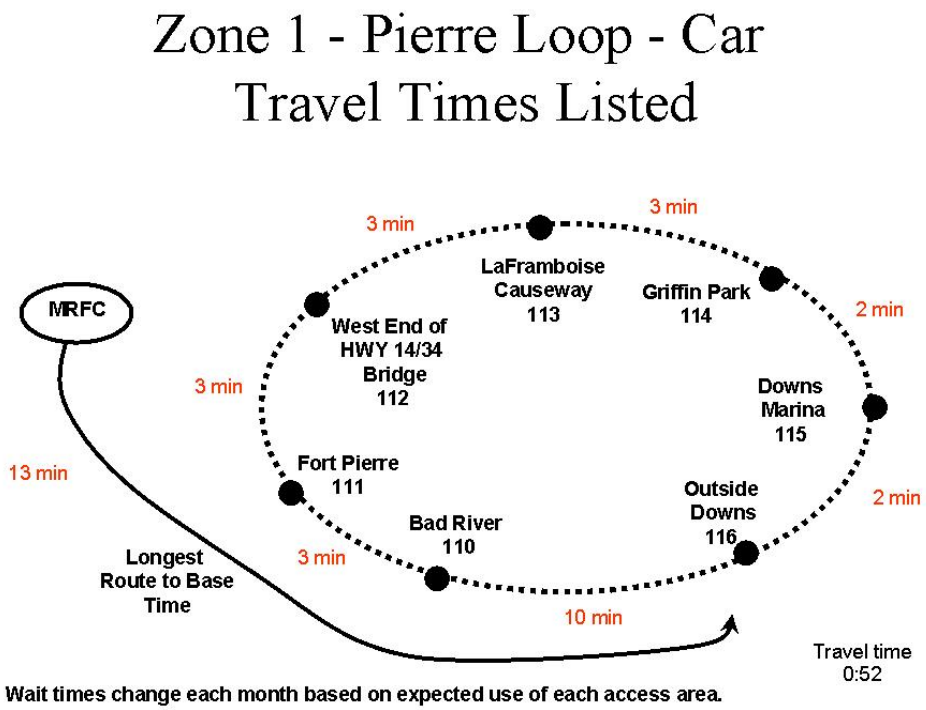
Appendix 4. Lake Sharpe bus route loop map depicting locations of the 5 overall loops for angler use and harvest surveys during April – September, 2011.



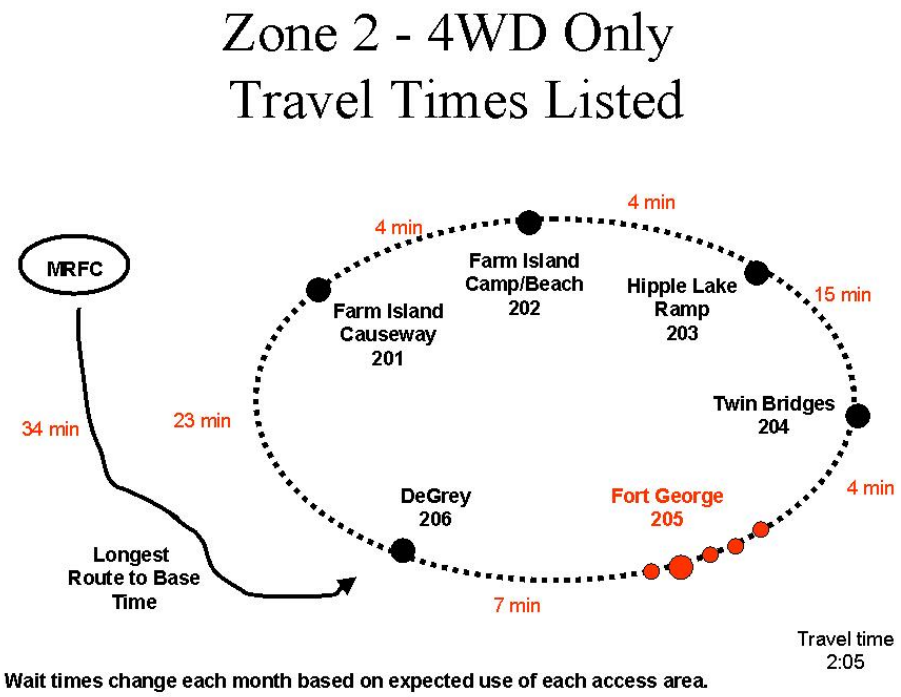
Appendix 5. Overall design of the tailrace loop for angler use and harvest surveys for Lake Sharpe, SD during April-September, 2011.



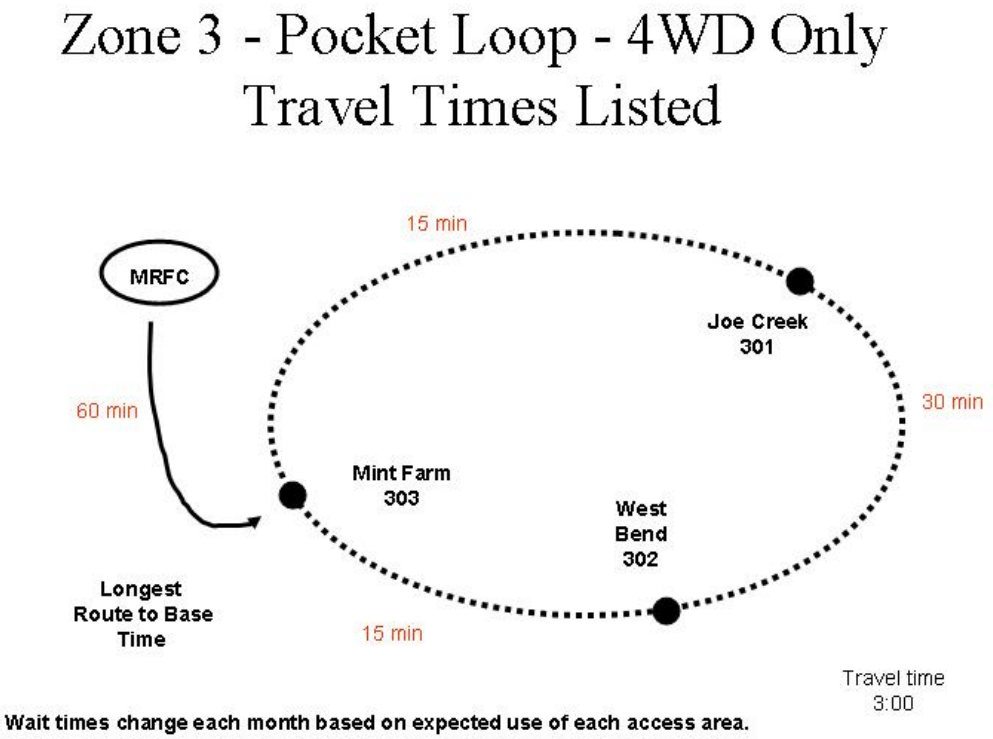
Appendix 6. Overall design for the Pierre Loop for the angler use and harvest survey for Lake Sharpe, SD during April-September, 2011.



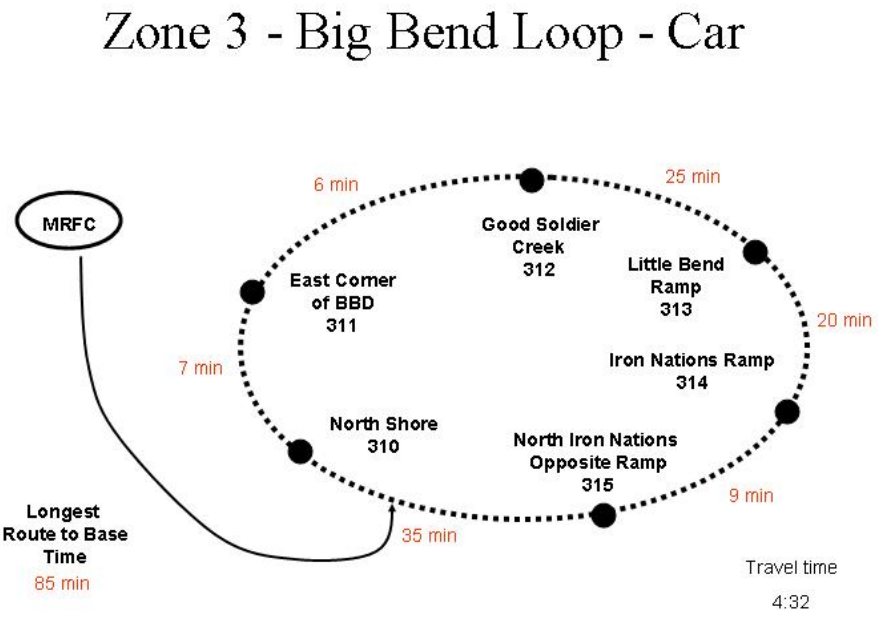
Appendix 7. Overall design for Zone 2 loop for the angler use and harvest survey for Lake Sharpe, SD during April-September, 2011.



Appendix 8. Overall design for the Pocket Loop for the angler use and harvest survey for Lake Sharpe, SD during April-September 2011.



Appendix 9. Overall design for the Big Bend Loop for the angler use and harvest survey for Lake Sharpe, SD during April-September, 2011.



Appendix 10. Angler satisfaction, preference, and attitude questions asked as part of the April-September 2011 angler use and harvest survey on Lake Sharpe, South Dakota.

Trip Satisfaction Question:

Considering all factors, how satisfied are you with your fishing trip today?

(Read the following response categories)

1 = VERY

2 = MODERATELY SATISFIED

3 = SLIGHTLY

4 = NEUTRAL *(neither satisfied or dissatisfied)* or NO OPINION

5 = SLIGHTLY

6 = MODERATELY DISSATISFIED

7 = VERY

Aquatic Nuisance Species Questions:

1. Other than Lake Sharpe, where was the last place you launched your boat?

WATERBODY AND STATE

2. Approximately how many days ago did you launch your boat into that water body?

≤ 5 Days 6 Days to 1 Month > 1 Month

Smallmouth Bass Question:

1. Are you in favor of the current smallmouth bass regulation of a 14-to-18-inch protected slot, which requires all smallmouth bass between 14 and 18 inches to be released?

   YES NO NO OPINION

2. Of the smallmouth bass you caught today, how many more bass would your party have harvested had there been no length restrictions? *(Ask if smallmouth bass were released)*