

ANGLER USE AND FISH HARVEST SURVEYS
ON
ANGOSTURA RESERVOIR, SOUTH DAKOTA, 2001

by

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Progress Report

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PREFACE

Information in this report was collected from January 1, 2001 to December 31, 2001. Funding was provided through Federal Aid in Sportfish Restoration, (D-J) Project F-21-R-33, Job Number 2109. Copies of this report and reference to the data can be made with permission from the author(s) or Director of the Division of Wildlife, South Dakota Department of Game, Fish and Parks, 523 E. Capitol, Pierre, South Dakota 57501-3182.

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EXECUTIVE SUMMARY

This report summarizes angler use, harvest and preference data collected from January through December 2001 for Angostura Reservoir, Fall River County, South Dakota. Annual fish population data from 1994 to 2001 and angler use and harvest data from April through October 1987 are also referenced in parts of this report. Results of these surveys have been used to evaluate angling regulations at Angostura Reservoir and have helped support changes leading to the current regulations.

Since 1992 walleye have been managed under a 14-inch minimum-length-limit from April 1 through December 31. Abundance has increased in the last few years and growth rates are faster than previous years and should be considered fast by statewide standards. In short, the Angostura Reservoir walleye population has grown in size and continues to maintain numbers in or near what is considered a balanced population.

A total of 431 anglers were contacted by creel clerks from January 1st to December 31st, 2001. Of these anglers 322 provided completed interviews from which creel data, including catch, harvest, and attitudes, were determined for all Angostura anglers.

Most Angostura anglers (84%) were South Dakota residents and male (83%). Anglers spent nearly the same number of hours fishing on the weekends as they did the weekdays throughout the year. When asked to rate their fishing trips, anglers appeared, for the most part (62%), to be at least moderately satisfied.

Anglers spent an estimated total of 110,566 hours fishing at Angostura during 2001, 80% of which was boat anglings. The mean fishing trip ranged from 2.8 hours in January to 6.9 hours in June. An estimated 156,373 fish were caught during the year, of which 64,981 were harvested. The primary target fish was walleye and the second fish of choice was black crappie. Harvest of these two species was quite different, however, as anglers released most walleye but readily kept crappies. Harvest differences were probably due, in large part, to the length and daily limit restrictions at the reservoir. Catch and harvest was highest for walleye in May and highest for crappie in April.

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INTRODUCTION

Angostura Reservoir, a large Cheyenne River irrigation reservoir, provides diverse angling and boating opportunities on the southern edge of the Black Hills. The reservoir offers both cool and warm water angling and sustains a large portion of western South Dakota fishing. State park facilities located adjacent to the reservoir are also important in the reservoir's popularity.

Angostura Reservoir is a 1,868-ha impoundment and popular destination for boaters. Although boating pressure has increased in recent years, estimated fishing pressure declined from 9,919 angler days in 1987 to 6,502 days in 1993 and 5,351 days in 1994. Walleye, black crappie, and to a lesser extent, largemouth bass, smallmouth bass, and channel catfish, provide diverse fishing opportunities at the reservoir.

The spring of 1991 brought high water flows into Angostura Reservoir inundating the shoreline vegetation. Early spring rains and snowmelts maintained the lake level at or near maximum pool annually from 1991 through 1999. Due to low precipitation and high demands for irrigation, water levels in 2000 dropped substantially.

In an attempt to establish a declining forage base for increasing sportfish populations, gizzard shad were stocked in the reservoir from 1990 to 1994. Annual seining began in 1994 to index reproduction of the gizzard shad population and continues today. Over-winter survival of adult shad has been successful and, until 2001, Angostura shad were the adult stocking source for the Belle Fourche, Shadehill and Bowman Hailey reservoirs.

A twelve month creel began in January 2001 to determine angling pressure, catch and harvest rates, and angler attitudes at the reservoir. A full time creel clerk was hired to conduct instantaneous pressure counts and interviews with Angostura anglers.

OBJECTIVES

The objective of this creel survey is to provide angler data that is statistically accurate and can be used in determining and implementing an appropriate plan for fisheries management at Angostura Reservoir. Specifically, this survey is intended to provide information and estimates of:

1. angling pressure, angling party size and mean trip length
2. angler catch, harvest and release rates by fish species
3. size structures of harvested fish
4. angler demographics and residency
5. angler preferences and satisfaction

STUDY SITE

Angostura Reservoir was created after the U.S. Bureau of Reclamation constructed Angostura Dam on the Cheyenne River in 1949. The dam was authorized by the Water Conservation Act of 1939 and approved in 1941. The reservoir was originally constructed as a source of irrigation for approximately 12,218 acres of farm/rangeland, and for flood control and hydroelectric power. The 1,200 kilowatt power plant was abandoned in 1960.

Angostura Reservoir is 4,612 surface acres (Figure 1). The reservoir covers approximately 17 miles of the Cheyenne River with an additional 7.6 miles extending along Horse Creek. Average width of the lake is approximately 1/2 mile in the main stem and 1/3 mile in the Horsehead Creek arm. The Angostura Reservoir watershed consists of approximately 9,100 square miles of livestock pastureland. Ownership of the watershed is predominately private with a small portion in Buffalo Gap National Grassland. The South Dakota Department of Game, Fish and Parks manages much of the adjacent land as a recreation/campground area and Game Production Area.

Angostura is managed as a cool and warm water fishery and walleye provide the majority of the sportfish opportunity in the reservoir. Smallmouth bass, largemouth bass and black crappie are also popular. Channel catfish are the most numerous species collected in annual surveys. Other fish species in the reservoir include: bluegill, common carp, emerald shiner, freshwater drum, gizzard shad, green sunfish, northern pike, shorthead redhorse, river carpsucker, spottail shiner, white sucker, and yellow perch.

METHODS

ANGLER USE AND HARVEST SURVEY

An angler use and harvest survey was conducted at Angostura Reservoir during 2001. This survey provided a statistically accurate method for estimating fishing pressure and harvest at the reservoir. The survey consisted of two separate components; angler counts and angler interviews. Progressive counts were conducted by boat and vehicle to estimate fishing pressure. All shore anglers actively engaged in fishing were counted individually. All boats actively fishing were counted and the number of individuals fishing was acquired through angler interviews (see Appendix A for an example Pressure Count sheet). Interviews were conducted with as many anglers as possible. Interviews consisted of a series of questions to estimate harvest, catch and release rates (Appendix B). A list of number codes for both pressure counts and interviews was used to simplify data entry (Appendix C).

The conducted survey was a two-stage stratified roving survey. The first unit of stratification was between weekend/holidays and weekdays. Since increased fishing pressure typically occurs on weekend days and holidays nearly all weekend days and holidays were sampled each month. The second unit of stratification was time periods the clerks were at the reservoir.

Sampling was conducted from January 1 to December 31, 2001. During summer months (April through September) two time periods (1. AM: 7 AM to 1:59 PM; and 2. PM: 2PM to 7:59 PM) were randomly assigned to randomly selected days. Pressure count times were randomly selected on the hour for two counts within each time period (i.e. For AM periods: one randomly selected hour between 7 AM and 10 AM and one hour between 11 AM and 1 PM. For PM periods: one randomly selected hour between 2 PM and 5 PM and one hour between 6 PM and 8 PM). During winter months (January through March and October through December) shifts were run for a complete day starting at 8 AM and finishing at 4 PM. Winter pressure counts were randomly selected from 8 AM, 11 AM and 2 PM or 9 AM, 12 PM and 3 PM. Pressure count and angler interview data were entered into Creel Application Software (CAS) (Soupir and Brown 2002).

RESULTS

PARTY SIZE/TRIP LENGTH

A total of 431 anglers were interviewed at Angostura Reservoir during 2001 (Table 1). Three hundred and twenty-two of these were completed interviews. Mean party sizes ranged from 1 person in December to over 2 for much of the remainder of the year. Mean completed trip lengths for each month ranged from 2.8 hours to 6.9 hours. The greatest mean trip lengths were in the summer months of June and July and the shorter mean trip lengths were in the winter months of January and February.

Table 1. Number of fishing parties interviewed (n), mean party size (anglers/fishing party), number of interviewed fishing parties that had completed their fishing trip and mean length of completed trips (hours/party fishing trip) on Angostura Reservoir in 2002.

Month	N	Mean Party Size	Completed interviews	Mean length of completed trips
January	49	2.03 (2.28)	31	2.80 (2.90)
February	46	2.11 (1.93)	28	3.70 (3.73)
March	23	1.53 (0.14)	12	4.04 (0.26)
April	42	2.25 (1.29)	42	5.83 (3.65)
May	32	2.22 (1.30)	30	5.33 (3.44)
June	41	2.40 (1.23)	37	6.90 (1.51)
July	60	2.37 (1.95)	51	6.19 (3.06)
August	38	2.49 (1.01)	28	5.21 (1.56)
September	29	2.17 (2.29)	14	4.02 (0.49)
October	47	2.08 (2.04)	40	5.14 (3.88)
November	23	1.80 (2.05)	9	4.68 (3.73)
December	1	1.00 (---)	0	--- (---)
Totals	431		322	

FISHING PRESSURE

Total estimated fishing pressure on Angostura in 2001 was 110,566 angling hours (Table 2). Fishing pressure increased substantially in April and reached its highest during May and June. The months with the lowest pressure were the winter months from January to March and December.

Throughout the year the estimated angling pressure during the five weekday period was nearly equal to the pressure observed during the two weekend days and holidays (Table 2). Weekday and weekend/holiday pressure reflected total pressure, in that, they both increased substantially in April and started decreasing in July. The highest month of weekday pressure was June while the highest month of weekend/holiday fishing pressure was May.

Table 2. Weekday, weekend and holiday, and total estimated fishing pressure (angler hours) for all anglers on Angostura Reservoir by month from January to December during 2001. Confidence intervals (95%) are in parentheses.

Month	Weekday	Weekday (%)	Weekend/Holiday	Weekend/Holiday(%)	Total
January	249 (111)	31.4	546 (285)	68.6	794 (305)
February	174 (149)	23.4	571 (318)	76.6	745 (351)
March	476 (722)	57.1	359 (406)	42.9	834 (828)
April	8,370 (3,278)	46.9	9,471 (3,859)	53.1	17,840 (5,063)
May	10,120 (5,243)	36.8	17,404 (9,449)	63.2	27,523 (10,805)
June	13,470 (5,613)	52.9	12,004 (7,590)	47.1	25,473 (9,440)
July	7,263 (2,208)	51.9	6,721 (3,236)	48.1	13,983 (3,917)
August	4,650 (1,433)	60.4	3,046 (2,074)	39.6	7,696 (2,521)
September	2,065 (443)	32.4	4,318 (1,782)	67.6	6,383 (1,836)
October	2,753 (1,361)	50.1	2,743 (994)	49.9	5,496 (1,685)
November	1,243 (643)	35.6	2,252 (1,317)	64.4	3,495 (1,465)
December	147 (190)	48.8	154 (137)	51.2	301 (234)
<i>Totals</i>	<i>50,979 (8,929)</i>	<i>46.1</i>	<i>59,588 (13,521)</i>	<i>53.9</i>	<i>110,566 (16,203)</i>

Boat and shore anglers made up the majority of angler hours spent on Angostura Reservoir in 2001 (Table 3). Anglers fishing from boats during 2001 made up over 80% of the total estimated fishing pressure. Winter anglers using ice shanties spent the most time on the lake per angler with a mean trip length of 9.44 hours followed by boat anglers who spent an average of 5.78 hours per trip. It appears a large portion of angling at Angostura is done by small groups and individual anglers as mean party size was nearly equal to 2 for all fishing types.

Weekday and weekend fishing was closely split during the summer months (Table 3). Of the 89,033 hours spent fishing from boats, slightly over half (54.7%) was on the weekend. Similarly, 52% of shore angling occurred on the weekday. Throughout the winter months, however, creel numbers show that anglers spent more time on the ice during weekends. Approximately 75% of the fishing pressure for both open ice and ice shanty anglers was recorded during the weekend.

Table 3. Estimated angler hours, mean trip length, mean party size, and percent fishing on weekdays and weekends/holidays for different fishing types at Angostura Reservoir in 2002. Confidence intervals (95%) are in parentheses.

	Boat	Shore	Open Ice	Ice Shanty
<i>Angler Hours</i>	89,033.6 (13,971.3)	19,596.2 (3,633.7)	1,360.4 (511.9)	576.3 (235.8)
<i>Mean trip length (hour)</i>	5.78 (1.08)	3.28 (0.89)	2.78 (0.39)	9.44 (2.00)
<i>Mean party size</i>	2.12 (0.25)	2.11 (0.36)	1.94 (0.38)	2.01 (0.40)
<i>% Weekday</i>	45.3	52.0	25.6	24.8
<i>% Weekend</i>	54.7	48.0	74.4	75.2

TARGETED SPECIES

Walleye were the most sought after fish in Angostura during 2001. Forty-three percent of all anglers interviewed indicated walleye as the sportfish they were targeting, while another 34% said walleye was their secondary target (Table 4). Black crappies were also a highly sought after fish. Twenty-four percent of all anglers indicated black crappies as their target species and 46% said crappies were their second choice. Other fish thought of as primary target species were, in order of popularity, smallmouth bass, northern pike, yellow perch and bluegill. Surprisingly, although Angostura currently has a high density of channel catfish and a relatively good population of largemouth bass, these two species were only listed as secondary targets by a few anglers.

CATCH AND HARVEST

Total estimated catch in 2001 (January 1 to December 31) of all fish species by anglers at Angostura Reservoir was 156,345 fish (Table 5). Fourteen species of fish were observed in the catch during the 2001 creel survey. The two most commonly caught species were walleye and black crappie. Nearly 64,000 walleye were estimated to have been caught by anglers and an estimated 51,000 black crappie were caught.

Possession limits, length limits and voluntary release of fish appear to be a very important part of limiting harvest at Angostura. An example of this is seen in the two most sought after fish at Angostura. Regulations limit daily take of walleye to 4 fish per angler with a minimum-length-limit of 14 inches while anglers are able to take 25 black crappie per angler per day. While total estimated catch was higher for walleye estimated harvest of crappies was far greater than walleye harvest.

In addition, voluntary release and size of fish are no doubt major contributors to the low harvest of other species caught. For example, length frequencies from annual gill net data show both the channel catfish and yellow perch populations to be dominated by small fish. Release rates for angled channel catfish and yellow perch were 82% and 96%, respectively. In addition, bass anglers tend to voluntarily release smallmouth and largemouth bass and an estimated 74% of caught smallmouth bass were returned to the water.

Table 4. Primary and Secondary species targeted by anglers and number of anglers (N) indicating a primary and secondary target species in Angostura Reservoir, Fall River County, 2001.

Species	N	Primary Species Sought (%)	N	Secondary Species Sought (%)
Walleye	411	43	57	34
Anything	279	29	2	1
Black crappie	230	24	78	46
Smallmouth bass	12	1	12	7
Northern pike	6	1	8	5
Yellow perch	5	1	2	1
Bluegill	4	1		
Largemouth bass			6	4
Channel catfish			3	2
<i>Total</i>	<i>947</i>	<i>100%</i>	<i>168</i>	<i>100%</i>

Table 5. Summary of estimated catch, harvest and release numbers (95% confidence intervals in parentheses) from Angostura Reservoir, Fall River County, January 1, 2001 to December 31, 2001 for all anglers.

Species	Caught	Catch/ha	Harvested	Harvest/ha	Released
Walleye	63,920	36.9 (13.7)	12,556	7.3 (4.5)	51,364
Black crappie	51,065	29.5 (12.9)	45,122	26.1 (12.8)	5,943
Smallmouth bass	14,702	8.5 (4.0)	3,766	2.2 (1.1)	10,936
Channel catfish	8,362	4.8 (1.6)	1,512	0.9 (0.5)	6,850
Bluegill	7,166	4.1 (1.6)	1,401	0.8 (0.4)	5,765
Yellow perch	3,262	1.9 (0.5)	122	0.1 (0.1)	3,140
Common carp	3,136	1.8 (0.8)	0	0	3,136
Freshwater drum	1,533	0.9 (1.1)	43	0.0 (0.0)	1,490
Rock bass	1,140	0.7 (0.4)	112	0.1 (0.1)	1,028
Largemouth bass	1,089	0.6 (0.8)	101	0.1 (0.1)	988
Northern pike	637	0.4 (0.2)	242	0.1 (0.1)	395
Black bullhead	240	0.1 (0.2)	0	0	240
Green sunfish	69	0.0 (0.0)	0	0	69
Black bass	28	0.0 (0.0)	0	0.0 (0.0)	28
White bass	24	0.0 (0.0)	0	0	24
<i>Total</i>	<i>156,373</i>	<i>90.4 (27.7)</i>	<i>64,981</i>	<i>37.6 (17.2)</i>	<i>91,392</i>

Black Crappie

Anglers at Angostura Reservoir targeted black crappie for harvest. As mentioned, black crappie was the second most sought after species at Angostura Reservoir and the highest harvested in 2001. Over 51,000 crappie were caught by anglers in 2001, of which 88% were harvested (Table 5). Catch was extremely low in the winter months but increased quickly to its highest level in April (Table 6). Throughout the rest of the year, catch and harvest fluctuated, but both showed trends of decline. Mean catch rate was highest in April when 1.17 crappie per hour were caught (Table 7). Anglers were eager to harvest crappie as the mean harvest rate was 1.16 fish per hour. While catch rates were lower during the late summer months, they increased again in October, suggesting crappies in Angostura are most vulnerable to angling in the spring and fall.

Size of crappies at Angostura is good and the sizes caught by anglers were excellent. Crappies over 10 inches were common in the angler harvest (Figure 2). In addition, RSD-P of black crappie in frame nets during 2001 sampling was 63 while RSD-P of angler harvest was over 86 (Galinat, 2001).

Table 6. Estimated numbers of black crappie caught, harvested and released by month at Angostura Reservoir in 2001. Confidence intervals (95%) are in parentheses.

Month	Catch	Harvest	Release
January	0 (0)	0 (0)	0 (0)
February	5 (10)	0 (0)	5 (10)
March	7 (13)	7 (13)	0 (0)
April	20,844 (20,708)	20,708 (19,840)	136 (207)
May	10,451 (5,619)	9,354 (5,422)	1,097 (1,065)
June	5,168 (6,753)	3,529 (6,736)	1,639 (1,087)
July	6,395 (3,822)	3,924 (2,555)	2,471 (1,930)
August	2,569 (2,013)	2,317 (2,017)	253 (233)
September	1,076 (1,586)	804 (1,155)	272 (491)
October	3,821 (2,802)	3,749 (2,808)	72 (81)
November	730 (937)	730 (937)	0 (0)
December	0 (0)	0 (0)	0 (0)
<i>Total</i>	<i>51,065 (22,376)</i>	<i>45,122 (22,116)</i>	<i>5,944 (2,527)</i>

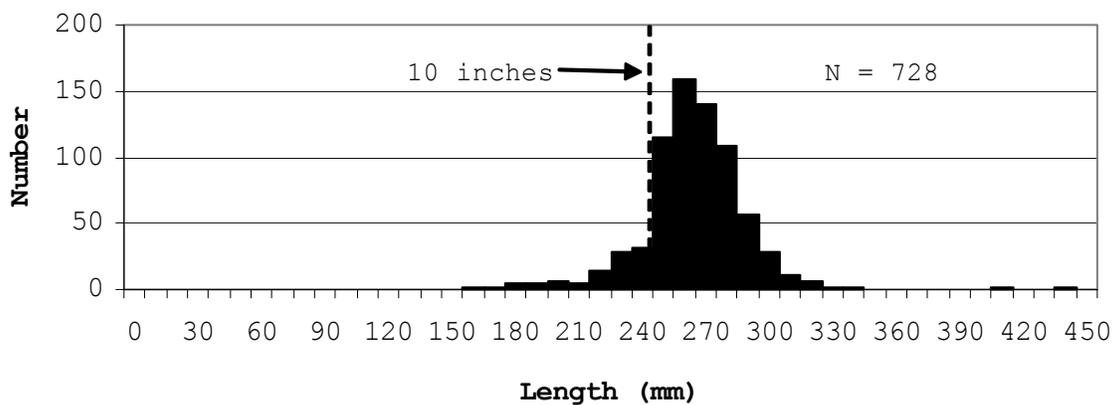


Figure 2. Length frequency of black crappie harvested from Angostura Reservoir by all anglers in 2001.

Table 7. Angler catch, harvest and release rates for black crappie at Angostura Reservoir, by month, in 2001. Confidence intervals (95%) are in parentheses.

Month	Catch rate (fish/angler hour)		Harvest rate (fish/angler hour)		Release rate (fish/angler hour)	
	All anglers	Target anglers	All anglers	Target anglers	All anglers	Target anglers
January	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
February	0.01 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01 (0.01)	0.00 (0.00)
March	0.01 (0.01)	0.02 (0.04)	0.00 (0.00)	0.02 (0.04)	0.32 (0.32)	0.00 (0.00)
April	1.17 (1.63)	2.49 (1.91)	1.16 (1.62)	2.45 (1.87)	0.01 (0.02)	0.05 (0.32)
May	0.38 (0.47)	1.35 (1.17)	0.34 (0.45)	1.26 (1.11)	0.04 (0.03)	0.10 (0.06)
June	0.20 (0.28)	0.77 (1.24)	0.14 (0.28)	0.60 (1.37)	0.06 (0.03)	0.17 (0.13)
July	0.46 (0.31)	2.94 (5.58)	0.28 (0.20)	1.46 (4.14)	0.18 (0.15)	1.49 (3.42)
August	0.33 (0.32)	2.39 (2.23)	0.30 (0.31)	2.32 (2.26)	0.03 (0.04)	0.07 (0.07)
September	0.17 (0.23)	0.74 (0.28)	0.13 (0.18)	0.54 (0.33)	0.04 (0.07)	0.20 (0.10)
October	0.70 (0.90)	1.84 (2.36)	0.68 (0.90)	1.81 (2.36)	0.01 (- --)	0.03 (0.04)
November	0.21 (0.28)	---	0.21 (0.28)	---	0.00 (0.00)	---
December	---	---	---	---	---	---
<i>Total</i>	<i>0.46</i> <i>(0.27)</i>	<i>1.31</i> <i>(0.59)</i>	<i>0.41</i> <i>(0.13)</i>	<i>1.16</i> <i>(0.55)</i>	<i>0.05</i> <i>(0.02)</i>	<i>0.15</i> <i>(0.21)</i>

Channel Catfish

Channel catfish are one of the most numerous fish collected during annual sampling. Catfish, however, have yet to become a popular sportfish at Angostura. No interviewed anglers claimed catfish as their primary target species and only 2% of all interviewed anglers indicated they were fishing for catfish as a secondary target (Table 4).

Angler catch for catfish was highest throughout the summer months of June, July and August (Table 8). Catch rates of channel catfish, however, were extremely low at less than 0.25 fish per hour for every month and a total of 0.01 fish per hour for the year (Table 9). In addition, when catfish were caught harvest was low. Only 18% of all catfish caught were harvested. It is likely that angling for catfish is more popular than suggested by the creel data since a majority of catfish angling occurs in the Cheyenne River inlet of the reservoir by shore fishermen. This area is considered river and not a part of the reservoir, however, and river anglers were not interviewed.

Table 8. Estimated total number of channel catfish caught, harvested and released by month at Angostura Reservoir in 2001. Confidence intervals (95%) are in parentheses.

Month	Catch	Harvest	Release
-------	-------	---------	---------

January	16 (16)	11 (14)	4 (7)
February	79 (108)	28 (42)	51 (96)
March	7 (18)	7 (18)	1 (0)
April	23 (32)	23 (32)	0 (0)
May	157 (229)	157 (229)	0 (0)
June	1,784 (816)	221 (318)	1,562 (624)
July	2,240 (1,268)	350 (412)	1,891 (1,019)
August	1,760 (1,838)	234 (49)	1,526 (1,266)
September	939 (948)	380 (669)	559 (648)
October	1,343 (974)	102 (149)	1,241 (46)
November	15 (31)	0 (0)	15 (31)
December	0 (0)	0 (0)	0 (0)
<i>Total</i>	<i>8,362 (1,799)</i>	<i>1,512 (894)</i>	<i>6,850 (2,127)</i>

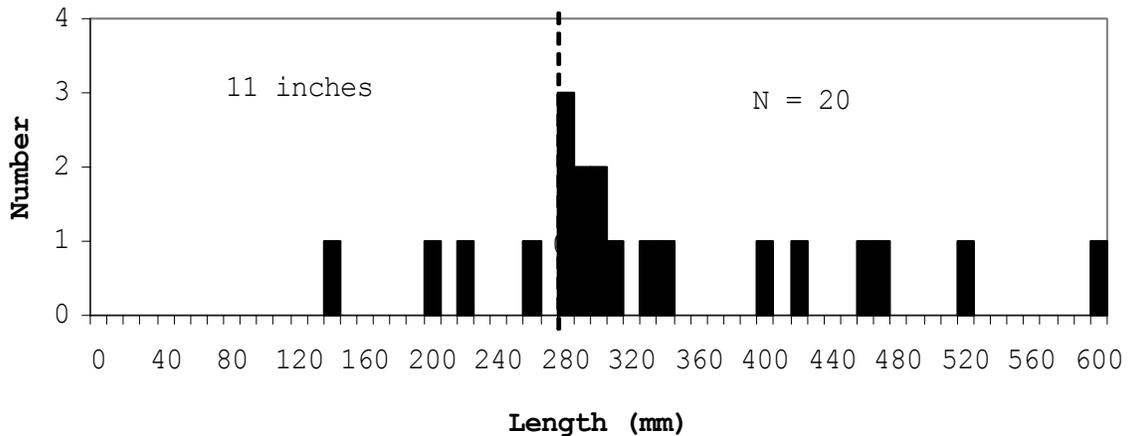


Figure 3. Length frequency of channel catfish harvested from Angostura Reservoir by all anglers in 2001.

Table 9. Angler catch, harvest and release rates for channel catfish at Angostura Reservoir, by month, in 2001. Confidence intervals (95%) are in parentheses.

Month	Catch rate (fish/angler hour)		Harvest rate (fish/angler hour)		Release rate (fish/angler hour)	
	All anglers	Targeted	All anglers	Targeted	All anglers	Targeted
January	0.02 (0.02)	---	0.01 (0.02)	---	0.01 (0.01)	---
February	0.11 (0.11)	---	0.04 (0.08)	---	0.07 (0.06)	---
March	0.01 (0.02)	---	0.01 (0.02)	---	0.00 (0.00)	---
April	0.00 (0.00)	---	0.00 (0.00)	---	0.00 (0.00)	---
May	0.01 (0.01)	---	0.01 (0.01)	---	0.00 (0.00)	---
June	0.07 (0.05)	---	0.01 (0.02)	---	0.06 (0.02)	---
July	0.16 (0.39)	---	0.03 (0.11)	---	0.14 (0.26)	---
August	0.23 (0.25)	---	0.03 (0.01)	---	0.20 (0.18)	---
September	0.15 (0.23)	2.00 (---)	0.06 (0.11)	0.14 (---)	0.09 (0.17)	1.86 (---)
October	0.24 (0.35)	---	0.02 (0.08)	---	0.23 (0.21)	---
November	0.00 (0.01)	---	0.00 (0.00)	---	0.00 (0.01)	---
December	---	---	---	---	---	---
<i>Total</i>	<i>0.08</i> <i>(0.04)</i>		<i>0.01</i> <i>(0.01)</i>		<i>0.06</i> <i>(0.03)</i>	

Largemouth Bass

Although there are a few large largemouth bass and Angostura has been stocked nearly annually from 1988 through 1998 (Appendix Table 5), few anglers target Angostura largemouth bass. Surprisingly, throughout the creel survey no interviewed anglers claimed to be primarily targeting largemouth and only 4% indicated that largemouth were a secondary target (Table 4). The total catch for largemouth bass was extremely small. Only an estimated 1,089 largemouth bass were caught and harvest was nearly nonexistent at an estimated 101 fish for the entire year.

Table 10. Estimated total number of largemouth bass caught, harvested and released by month at Angostura Reservoir in 2001. Confidence intervals (95%) are in parentheses.

Month	Catch	Harvest	Release
January	4 (9)	0 (0)	4 (9)
February	0 (0)	0 (0)	0 (0)
March	0 (0)	0 (0)	0 (0)
April	23 (49)	0 (0)	23 (49)
May	90 (197)	0 (0)	90 (197)
June	747 (1,305)	55 (100)	692 (1,205)
July	0 (0)	0 (0)	0 (0)
August	46 (65)	46 (65)	0 (0)
September	0 (0)	0 (0)	0 (0)
October	150 (293)	0 (0)	150 (293)
November	30 (32)	0 (0)	30 (32)
December	0 (0)	0 (0)	0 (0)
<i>Total</i>	<i>1,089 (1,355)</i>	<i>101 (119)</i>	<i>988 (1,527)</i>

Smallmouth Bass

Other than targeting "any" fish, smallmouth bass were the third most sought after by Angostura anglers (Table 4). Still though, the percentage of anglers indicating they were fishing primarily for smallmouth bass was small (<2%), while a slightly larger portion (7%) indicated smallmouth as a secondary targeted fish.

Smallmouth bass were reportedly caught in every month of the year except December, with the highest catch occurring in May and June (Table 11). Over 14,700 smallmouth were estimated to have been caught over the year, of which one fourth (25.6%; N=3,766) were harvested by anglers. Catch rates were fairly low for the year except in May when anglers targeting smallmouth caught on average between 3 and 4 bass an hour (Table 12). Sizes of the smallmouth harvested by anglers were good. Most of the smallmouth measured by creel clerks were over 11 inches in length (Figure 4).

Table 11. Estimated total number of smallmouth bass caught, harvested and released by month at Angostura Reservoir in 2001. Confidence intervals (95%) are in parentheses.

Month	Catch	Harvest	Release
January	4 (14)	0 (0)	4 (14)
February	28 (59)	0 (0)	28 (59)
March	7 (13)	7 (13)	0 (0)
April	869 (426)	553 (277)	316 (252)
May	8,913 (6,478)	1,909 (1,737)	7,004 (4,887)
June	3,388 (1,819)	929 (445)	2,459 (1,675)
July	1,258 (1,890)	345 (394)	913 (1,795)
August	69 (72)	23 (48)	46 (63)
September	74 (145)	0 (0)	74 (145)
October	90 (---)	0 (0)	90 (---)
November	30 (71)	0 (0)	30 (71)
December	0 (0)	0 (0)	0 (0)
<i>Total</i>	<i>14,702 (7,003)</i>	<i>3,766 (1,858)</i>	<i>10,936 (5,478)</i>

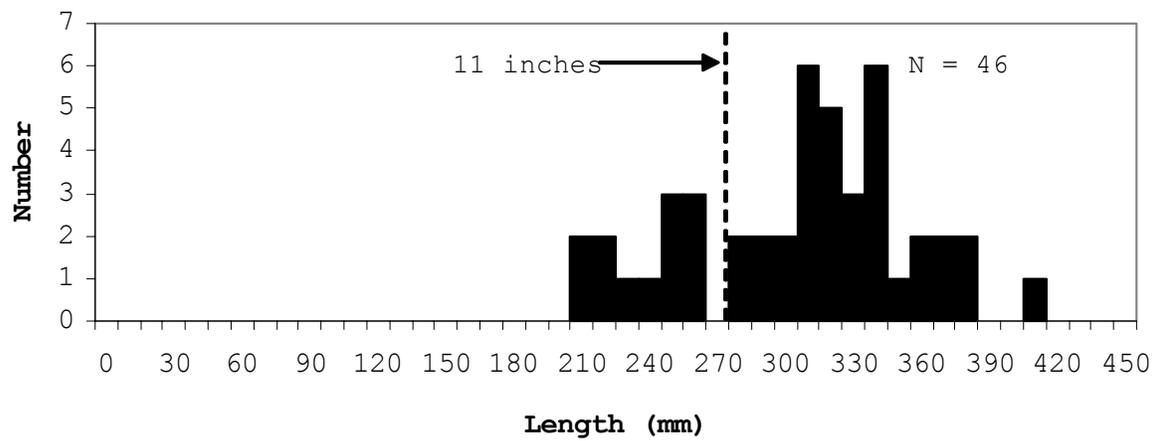


Figure 4. Length frequency of smallmouth bass harvested from Angostura Reservoir by all anglers in 2001.

Table 12. Angler catch, harvest and release rates for smallmouth bass at Angostura Reservoir, by month, in 2001. Confidence intervals (95%) are in parentheses.

Month	Catch rate (fish/angler hour)		Harvest rate (fish/angler hour)		Release rate (fish/angler hour)	
	All anglers	Targeted	All anglers	Targeted	All anglers	Targeted
January	0.01 (0.02)	---	0.00 (0.00)	---	0.01 (0.02)	---
February	---	---	---	---	---	---
March	0.01 (0.02)	---	0.01 (0.02)	---	0.00 (0.00)	---
April	0.05 (0.03)	0.19 (---)	0.03 (0.02)	0.00 (---)	0.02 (0.02)	0.19 (---)
May	0.32 (0.32)	3.53 (---)	0.07 (0.10)	0.50 (---)	0.25 (0.21)	3.03 (---)
June	0.13 (0.12)	0.75 (1.82)	0.04 (0.04)	0.05 (0.34)	0.10 (0.08)	0.71 (2.05)
July	0.09 (0.17)	1.07 (0.71)	0.02 (0.03)	0.13 (0.57)	0.07 (0.15)	0.94 (0.14)
August	0.01 (0.01)	---	0.00 (0.01)	---	0.01 (0.01)	---
September	0.01 (0.02)	---	0.00 (0.00)	---	0.01 (0.02)	---
October	0.02 (---)	0.10 (0.51)	0.00 (0.00)	0.00 (0.00)	0.02 (---)	0.10 (0.51)
November	0.01 (0.02)	---	0.00 (0.00)	---	0.01 (0.02)	---
December	---	---	---	---	---	---
<i>Total</i>	<i>0.13</i> <i>(0.08)</i>	<i>1.07</i> <i>(0.36)</i>	<i>0.03</i> <i>(0.02)</i>	<i>0.13</i> <i>(0.15)</i>	<i>0.10</i> <i>(0.05)</i>	<i>0.94</i> <i>(0.35)</i>

Walleye

Walleye were the most popular fish sought by Angostura anglers. Forty-three percent of all interviewed anglers said they were primarily targeting walleye (Table 4). In addition, 34% of the anglers who indicated targeting a secondary species said walleye was their second target. Estimated catch of walleye for the year was almost 64,000 fish (Table 13). Harvest was surprisingly low at 19.6%. The low harvest is likely attributed to a minimum-length-limit of 14 inches. A large portion of the walleye harvest was fish just over 14 inches (Figure 5). A number of sub-legal walleye were also harvested indicating anglers are eager to harvest the small sized walleye.

Catch rates of walleye for all anglers at Angostura in 2001 was 0.014 fish per hour while catch rates for anglers specifically targeting walleye was 1.3 walleye per hour (Table 14). The highest months for both catch and harvest were May, June and July, suggesting spring and early summer months at Angostura are when walleye are most vulnerable to angling.

Angostura has a 14-inch minimum-length-limit for all months except January, February and March. The three month reprieve from the minimum regulation appears to have little effect. Very few small walleye were harvested during this time and for all harvested walleye less than 14 inches, over 94% were taken during months the minimum-length-limit was in place. Concerning larger walleye: during annual sampling only 3.5% of the sampled walleyes were over 20 inches, while 17.5% (N=2,200) of harvested walleyes were over 20 inches. In addition, over 11% of interviewed anglers who harvested walleye over 20 inches had kept multiple (at least 2) walleye over 20 inches in their daily limit.

Table 13. Estimated total number of walleye caught, harvested and released by month at Angostura Reservoir in 2001. Confidence intervals (95%) are in parentheses.

Month	Catch	Harvest	Release
January	24 (49)	20 (39)	4 (10)
February	175 (386)	158 (349)	17 (27)
March	268 (0)	3 (0)	265 (0)
April	1,526 (1,332)	967 (768)	559 (607)
May	34,273 (21,963)	7,572 (7,668)	26,701 (14,977)
June	16,552 (6,631)	1,667 (785)	14,885 (5,965)
July	10,153 (5,907)	1,778 (721)	8,375 (5,592)
August	317 (357)	135 (148)	181 (240)
September	90 (96)	90 (96)	0 (0)
October	303 (292)	83 (83)	219 (273)
November	239 (165)	82 (110)	158 (125)
December	0 (0)	0 (0)	0 (0)
<i>Total</i>	<i>63,920 (23,736)</i>	<i>12,556 (7,790)</i>	<i>51,364 (17,079)</i>

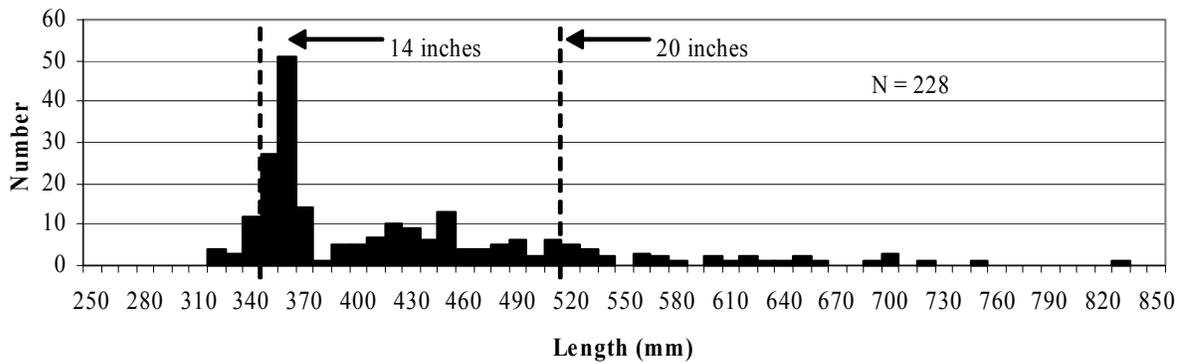


Figure 5. Length frequency of walleye harvested from Angostura Reservoir by all anglers in 2001.

Table 14. Angler catch, harvest and release rates for walleye at Angostura Reservoir, by month, in 2001. Confidence intervals (95%) are in parentheses.

Month	Catch rate (fish/angler hour)		Harvest rate (fish/angler hour)		Release rate (fish/angler hour)	
	All anglers	Targeted	All anglers	Targeted	All anglers	Targeted
January	0.03 (0.05)	0.13 (1.55)	0.03 (0.04)	0.11 (1.24)	0.01 (0.01)	0.03 (0.31)
February	0.24 (0.59)	0.19 (0.21)	0.21 (0.53)	0.18 (0.21)	0.02 (0.05)	0.02 (0.02)
March	0.32 (0.32)	0.38 (0.00)	0.00 (0.00)	0.00 (0.00)	0.32 (0.32)	0.38 (0.00)
April	0.09 (0.08)	0.38 (1.27)	0.05 (0.05)	0.23 (0.75)	0.03 (0.03)	0.15 (0.76)
May	1.24 (1.24)	4.32 (1.60)	0.28 (0.36)	0.64 (0.34)	0.97 (0.90)	3.68 (1.82)
June	0.65 (0.41)	2.55 (1.94)	0.07 (0.05)	0.24 (0.25)	0.58 (0.36)	2.31 (1.73)
July	0.73 (0.56)	2.03 (5.50)	0.13 (0.07)	0.34 (0.20)	0.60 (0.51)	1.70 (5.42)
August	0.04 (0.05)	0.27 (0.64)	0.02 (0.02)	0.17 (0.30)	0.02 (0.03)	0.10 (0.45)
September	0.01 (0.02)	0.08 (0.28)	0.01 (0.02)	0.08 (0.28)	0.00 (0.00)	0.00 (0.00)
October	0.06 (0.06)	0.04 (0.12)	0.02 (0.02)	0.03 (0.09)	0.04 (0.05)	0.01 (0.04)
November	0.07	0.51	0.02	0.45	0.05	0.06

	(0.08)	(1.32)	(0.02)	(1.15)	(0.07)	(0.16)
December	0.00 (---)	0.00 (---)	0.00 (---)	0.00 (---)	0.00 (---)	0.00 (---)
<i>Total</i>	0.46 (0.27)		0.41 (0.13)		0.05 (0.02)	

DEMOGRAPHICS

Eighty-four percent of anglers who fished Angostura in 2001 were South Dakota residents (Figure 6, Appendix Table 16). Sixteen other states were also represented by anglers. Nebraska residents were the second most common angling group to fish Angostura, making up 10% of the total anglers. Anglers from Wyoming and Colorado made up over 1.5% of the anglers each. The remaining anglers represented thirteen states and all made up less than 0.6% of the total anglers.

Angostura anglers are predominately male and between 20 and 59 years of age. Eighty-three percent of the anglers interviewed throughout 2001 were male (Figure 7). In addition, the largest age groups were anglers 20 to 39 years old and anglers 40 to 59 years of age (Figure 8). These two age groups combined represented 70% of the anglers interviewed at the reservoir.

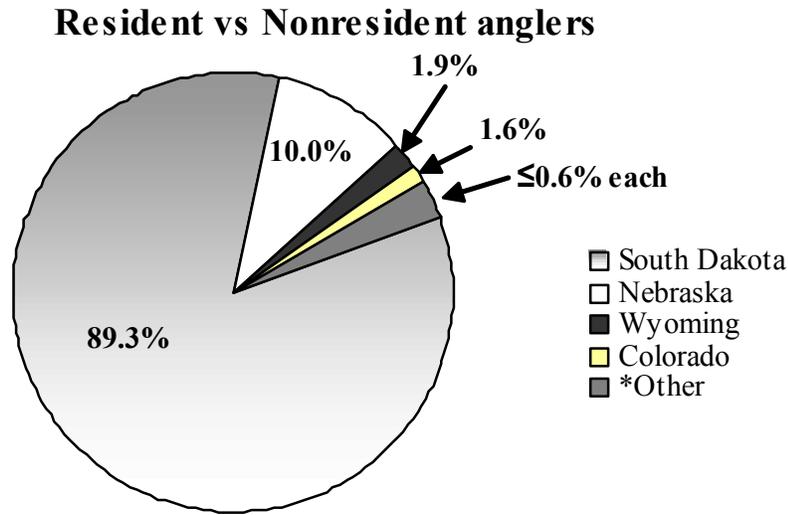


Figure 6. Percent of resident and nonresident anglers, by state, creelied at Angostura Reservoir, Fall River County, during 2001. *Texas, Iowa, North Dakota, California, Illinois, Indiana, Minnesota, Alabama, Arizona, Utah, Washington, Washington, Wisconsin.

Anglers - Male vs Female

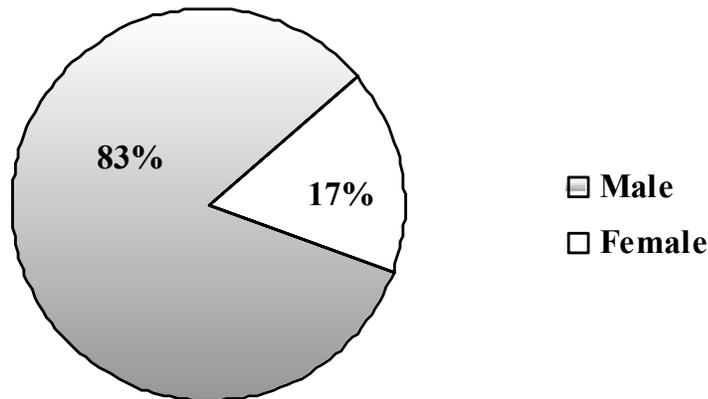


Figure 7. Percent of male anglers vs female anglers interviewed while fishing at Angostura Reservoir, Fall River County, 2001.

Angler - Age Groups

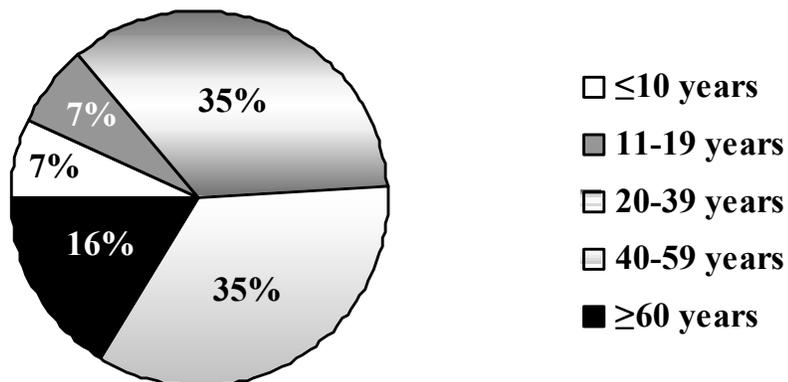


Figure 8. Percent of anglers by age group interviewed while fishing at Angostura Reservoir, Fall River County, 2001.

ANGLER SATISFACTION

Overall, anglers fishing at Angostura were satisfied with their daily fishing trips (Figure 9; Appendix Table 15). Anglers were asked to consider all aspects of their fishing trip then given 6 choices to rate their trip for the day. Over 60% were at least moderately satisfied while 16% felt dissatisfied. Twenty-one percent claimed the day was average or neutral while only 1% had no opinion.

All angling types appeared to have good feelings about their fishing at Angostura (Table 15; Appendix Table 15). The anglers with the highest rates of satisfaction were the open water anglers. Anglers fishing from ice shacks were also relatively satisfied while the open ice anglers had the highest rates of dissatisfied anglers. This is no doubt due to the

low catch rates observed for all species throughout the winter months.

Overall Angler Satisfaction

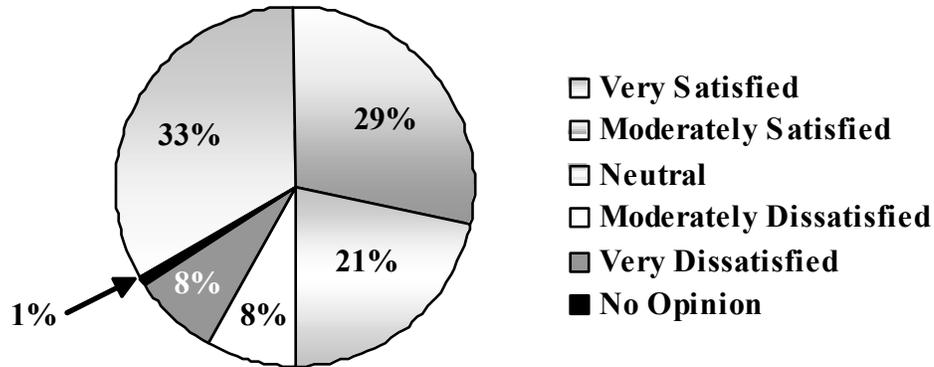


Figure 9. Total angler responses to the question "Considering all factors, how satisfied are you with your fishing trip today?" Anglers were given 6 answer choices: very satisfied, moderately satisfied, neutral, moderately dissatisfied, very dissatisfied and no opinion.

Table 15. Angler responses, by angling type, to the question "Considering all factors, how satisfied are you with your fishing trip today?" Anglers were given 6 answer choices: very satisfied, moderately satisfied, neutral, moderately dissatisfied, very dissatisfied and no opinion.

Answer Code	Answer Description	Boat		Shore		Open Ice		Ice Shanty	
		Count	%*	Count	%*	Count	%*	Count	%*
1	Very Satisfied	160	33.0	48	40.0	2	7.4	1	14.3
2	Moderately Satisfied	144	29.6	26	21.7	10	37.0	4	57.1
3	Neutral	104	21.4	24	20.0	8	29.6	1	14.3
4	Moderately Dissatisfied	36	7.4	14	11.7	2	7.4	1	14.3
5	Very Dissatisfied	38	7.8	6	5.0	5	18.5	0	0.0
6	No Opinion	3	0.6	2	1.7	0	0.0	0	0.0
13	No Answer	37	--	60	--	148	--	59	--

*Percents are only of those anglers who supplied an answer

RECOMMENDATIONS

1. Revise and update the 1998 Angostura Reservoir Fisheries Management Plan with a specific goal, species objectives, strategies to assist in accomplishing the objectives, and a 5-Year Operational Plan.
2. Continue to conduct annual fishery surveys and publish the results in report form as part of the Statewide Fishery Surveys Annual Report.
3. Conduct angler surveys every 5 to 10 years to assess angler attitudes and preferences towards the Angostura fishery and publish the results as required by federal aid funding.
4. Use information from the angler creel surveys and strive to improve the 62% satisfaction rate to equal the 1999 resident and nonresident statewide satisfaction rate of 73% (Gigliotti 2000).
5. Determine to what extent gizzard shad and other forage fish contribute to the Angostura fishery as a forage base for sportfish, specifically walleye.
6. Provide public education efforts that focus on increasing angler awareness of fishing regulations, status of the Angostura fishery and the responsible use and harvest of the resource.

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APPENDICES



South Dakota Department of Game, Fish and Parks
Angostura Reservoir Creel Survey Fishing Pressure Report

Form Pressure/Aerial or Roving or Fixed	
Pressure ID	Office Space Only

Water Body	Date			Survey Time (Military)		Access Area	Creel Clerk	Air Temp	Cloud Cover	Wind Speed	Wind Dir	Precip	Water Temp	Ice Thick	Op Water (x)	Starting Location	Travel Direction
	Month	Day	Year	Arrival	Departure												
			2001														

Type Of Fishing	Total	Running Tally															
Fishing Boats																	
Bank/Shore																	
Open Ice Anglers																	
Ice Shanties Anglers																	

Recreational Boat Usage Types	Total	Running Tally															
General Boat Users																	
Water Skiers																	
Waverunners																	
Canoe/Kayak																	

Water Body	Date			Survey Time (Military)		Access Area	Creel Clerk	Air Temp	Cloud Cover	Wind Speed	Wind Dir	Precip	Water Temp	Ice Thick	Op Water (x)	Starting Location	Travel Direction
	Month	Day	Year	Arrival	Departure												
			2001														

Type Of Fishing	Total	Running Tally															
Fishing Boats																	
Bank/Shore																	
Open Ice Anglers																	
Ice Shanties Anglers																	

Recreational Boat Usage Types	Total	Running Tally															
General Boat Users																	
Water Skiers																	
Waverunners																	
Canoe/Kayak																	

Appendix Figure 1. Example Creel Survey Pressure Report form for Angostura Reservoir, South Dakota, 2001.



South Dakota Department of Game, Fish and Parks
Angostura Reservoir Creel Survey Interview Report

Page _____ of _____

Form Interview- 01	
Interview ID	Office Space Only

Water Body	Date		Time (Military)		Access Area	Creel Clerk	Air Temp	Cloud Cover	Wind Speed	Wind Dir	Precip
	Month	Day	2001	Arrival							

Refused Interview (X)	Time (Military)				Time Not Fished (Minutes)	Completed (X)	Type Of Fishing	Fish Species Sought		Party Size
	Interview Time	Started Fishing	Stopped Fishing	Completed (X)				1	2	

Given Postcard (X)
Returned Postcard (X)

Angler	Gender	Age	Distance Traveled	Zip Code	State	Question Series	Question 1
1						0 1	
2						0 1	
3						0 1	
4						0 1	
5						0 1	

Series 01 Preference Questions:

1) Considering all factors, how satisfied are you with your fishing trip today?
 01=Very satisfied, 02=Moderately satisfied, 03=Neutral, 04=Moderately Dissatisfied, 05=Very Dissatisfied, 06=No Opinion

Species	Number			Species	Length (mm)						
	Kept	Release	Illegal								
1				11		21		31			
2				12		22		32			
3				13		23		33			
4				14		24		34			
5				15		25		35			
6				16		26		36			
7				17		27		37			
8				18		28		38			
9				19		29		39			
10				20		30		40			

Interview Continued (✓)

Comments: _____

Appendix Figure 2. Example Creel Survey Interview Report form for Angostura Reservoir, South Dakota, 2001.



South Dakota Department of Game, Fish and Parks
Angostura Reservoir Creel Survey Code Key

Fish Species:				
001-Anything	102-Central Stoneroller	174-Goldfish	452-Central Mudminnow	710-Sunfish/Crappie/Rock Bass
010-Lamprey	104-Lake Chub	176-Grass Carp	461-Rainbow Smelt	714-Rock Bass
012-Chestnut Lamprey	106-Speckled Chub	178-Common Carp	500-Trout	716-Sacramento Perch
014-Silver Lamprey	108-Sturgeon Chub	180-Silver Carp	505-Cutthroat Trout	722-Green Sunfish
	110-Sicklefin Chub	182-Bighead Carp	510-Coho Salmon	724-Pumpkinseed
	112-Silver Chub	184-Rudd	520-Rainbow Trout	726-Orangespotted Sunfish
020-Sturgeon	114-Hornyhead Chub	200-Sucker	550-Kokanee Salmon	728-Orangespotted X Green
024-Lake Sturgeon	116-Flathead Chub	212-River Carpsucker	555-Chinook Salmon	730-Bluegill
026-Pallid Sturgeon	118-Creek Chub	214-Quillback	560-Brown Trout	735-Bluegill X Green
028-Shovelnose Sturgeon	120-Red Shiner	222-Longnose Sucker	565-Brook Trout	740-Redear Sunfish
	122-Spottin Shiner	230-Blue Sucker	577-Burbot	745-Bluegill X Redear
032-Paddlefish	126-Common Shiner	240-Lake Chubsucker	580-Killifish	750-Smallmouth Bass
	128-Golden Shiner	252-Smallmouth Buffalo	582-Plains Topminnow	760-Spotted Bass
040-Gar	130-Emerald Shiner	254-Bigmouth Buffalo	584-Plains Killifish	770-Largemouth Bass
042-Longnose Gar	132-River Shiner	256-Black Buffalo		775-Black Bass Micropterus
044-Shortnose Gar	134-Bigmouth Shiner	262-Shorthead Redhorse		780-White Crappie
	136-Blacknose Shiner	300-Bullhead/Catfish		790-Black Crappie
052-Bowfin	138-Spottail Shiner	310-Black Bullhead		800-Perch
	144-Sand Shiner	320-Yellow Bullhead	587-Western Mosquitofish	810-Iowa Darter
060-Mooneye	146-Silverband Shiner	330-Brown Bullhead	592-Brook Silverside	814-Johnny Darter
062-Goldeye	148-Topeka Shiner	350-Blue Catfish	597-Brook Stickleback	816-Orangethroat Darter
064-Mooneye	150-Western Silvery Minnow	360-Channel Catfish	600-Temperate Bass	818-Blackside Darter
	152-Brassy Minnow	370-Flathead Catfish	610-White Perch	830-Yellow Perch
072-American Eel	154-Mississippi Silvery Minnow	380-Stonecat	620-White Bass	840-Sauger
	156-Plains Minnow	390-Tadpole Madtom	630-Yellow Bass	850-Walleye
080-Herring	158-Suckermouth Minnow	400-Pike	640-Striped Bass	860-Drum
082-Skipjack Herring	160-Bluntnose Minnow	410-Grass Pickerel	645-Striped Bass Hybrid	862-Freshwater Drum
084-Alewife	162-Flathead Minnow	420-Northern Pike	650-Sunshine Bass	
086-Gizzard Shad	164-Pearl Dace	430-Muskellunge	655-Palmetto Bass	
088-Threadfin Shad	166-Northern Redbelly Dace	435-Tiger Muskellunge		
100-Carp/Minnow	168-Finescale Dace			
	170-Blacknose Dace			
	172-Longnose Dace			

Waterbody:	Creel Clerk:	Wind Speed:	Ice Thickness:	State:
1501-Orman Dam	01- Barry Young	01-None	01- 0 to 3 inches	01-Alabama
	02- Gene Gallinat	02-0 to 5 mph	02- 4 to 6 inches	02-Alaska
Access Area:	03- Lynn Culver	03-5 to 10 mph	03- 7 to 9 inches	03-Arizona
101-Gadens Point		04-10 to 15 mph	04- 10 to 12 inches	04-Arkansas
102-Rocky Point	Air & Water Temperature:	05-15 to 20 mph	05- >12 inches	05-California
103-Cannel & South	01- <-20	06-20 to 25 mph		06-Colorado
104-East Shore	02- -10's	07->25 mph		07-Connecticut
105-East shore Dam North	03- -10 to 0	Wind Direction:	Gender:	08-Delaware
	04- 0 to 10	01-None	01-Male	09-Florida
	05- 10's	02-N	02-Female	10-Georgia
	06- 20's	03-NE	03-Unknown	11-Hawaii
	07- 30's	04-E		12-Idaho
	08- 40's	05-SE	Age:	13-Illinois
	09- 50's	06-S	01-Child (0 to 10)	14-Indiana
	10- 60's	07-SW	02-Teen (10 to 20)	15-Iowa
	11- 70's	08-W	03-Young Adult (20 to 40)	16-Kansas
	12- 80's	09-NW	04-Middle Age (40 to 60)	17-Kentucky
	13- 90's	Precipitation:	05-Senior (60+)	18-Louisiana
	14- >100	01-None		19-Maine
		02-Passing Showers		20-Maryland
	Cloud Cover:	03-Constant Light Rain		21-Massachusetts
	01-None	04-Constant Heavy Rain		22-Michigan
	02-Fog	05-Severe Storm		23-Minnesota
	03-Partly Cloudy	06-Light Snow		24-Mississippi
	04-Mostly Cloudy	07-Heavy Snow		25-Missouri
	05-Cloudy	08-Blizzard		26-Montana
	06-Storms Approaching	Type Of Fishing:		27-Nebraska
	07-Storms Present	01- Boat		28-Nevada
		02- Shore		29-New Hampshire
	Zone:	03- Spearing		30-New Jersey
				31-New Mexico
				32-New York
				33-North Carolina
				34-North Dakota
				35-Ohio
				36-Oklahoma
				37-Oregon
				38-Pennsylvania
				39-Rhode Island
				40-South Carolina
				41-South Dakota
				42-Tennessee
				43-Texas
				44-Utah
				45-Vermont
				46-Virginia
				47-Washington
				48-West Virginia
				49-Wisconsin
				50-Wyoming

Appendix Figure 3. Creel Survey Code Key form for Angostura Reservoir, South Dakota, 2001.

Appendix Table 1. Table Series 2: Party Size and Completed Trip Length by month and day type (CAS Program Output).

Table 2.07 Summary report--number of fishing parties interviewed (n), mean fishing party size (anglers/fishing party), number of fishing parties interviewed that had completed fishing trips (n), mean completed fishing trip length (hours/party fishing trip), standard error (SE) and confidence intervals (+/- % CI) totaled over selected strata.

Waterbody		2,701 Angostura								
Work Period		1 January								
Day Type		1 Weekend/Holiday								
Type of Fishing		Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing								
		Party Size				Completed Trip Length				
n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI	
31	2.55	3.40	4.36	6.66	16	4.41	4.30	5.52	8.43	
Work Period		1 January								
Day Type		2 Weekday								
Type of Fishing		Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing								
		Party Size				Completed Trip Length				
n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI	
18	1.78	0.57	0.73	1.12	15	2.03	0.75	0.96	1.47	
Work Period		2 February								
Day Type		1 Weekend/Holiday								
Type of Fishing		Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing								
		Party Size				Completed Trip Length				
n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI	
36	2.33	2.22	2.84	4.35	23	4.38	5.90	7.56	11.56	
Work Period		2 February								
Day Type		2 Weekday								
Type of Fishing		Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing								
		Party Size				Completed Trip Length				
n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI	
10	2.00	1.00	1.29	1.97	5	3.39	0.26	0.33	0.50	
Work Period		3 March								
Day Type		1 Weekend/Holiday								
Type of Fishing		Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing								
		Party Size				Completed Trip Length				
n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI	
17	2.00	0.24	0.31	0.48	7	8.01	0.45	0.58	0.89	
Work Period		3 March								
Day Type		2 Weekday								
Type of Fishing		Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing								
		Party Size				Completed Trip Length				
n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI	
6	1.33	---	---	---	5	2.42	---	---	---	

Appendix Table 1. Continued. Table Series 2: Party Size and Completed Trip Length by month and day type (CAS Program Output).

Work Period	4 April									
Day Type	1 Weekend/Holiday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	n	Mean	Party Size				Completed Trip Length			
	18	2.44	SE	80% CI	95% CI	18	Mean	SE	80% CI	95% CI
			---	---	---		5.46	---	---	---
Work Period	4 April									
Day Type	2 Weekday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	n	Mean	Party Size				Completed Trip Length			
	24	2.17	SE	80% CI	95% CI	24	Mean	SE	80% CI	95% CI
			0.94	1.20	1.84		5.99	2.66	3.41	5.22
Work Period	5 May									
Day Type	1 Weekend/Holiday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	n	Mean	Party Size				Completed Trip Length			
	15	2.60	SE	80% CI	95% CI	13	Mean	SE	80% CI	95% CI
			1.03	1.32	2.01		4.76	2.54	3.26	4.98
Work Period	5 May									
Day Type	2 Weekday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	n	Mean	Party Size				Completed Trip Length			
	17	2.06	SE	80% CI	95% CI	17	Mean	SE	80% CI	95% CI
			0.84	1.07	1.64		5.57	2.24	2.87	4.39
Work Period	6 June									
Day Type	1 Weekend/Holiday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	n	Mean	Party Size				Completed Trip Length			
	23	2.83	SE	80% CI	95% CI	22	Mean	SE	80% CI	95% CI
			0.80	1.02	1.56		6.47	2.57	3.29	5.04
Work Period	6 June									
Day Type	2 Weekday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	n	Mean	Party Size				Completed Trip Length			
	18	2.22	SE	80% CI	95% CI	15	Mean	SE	80% CI	95% CI
			0.83	1.06	1.62		7.08	---	---	---
Work Period	7 July									
Day Type	1 Weekend/Holiday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	n	Mean	Party Size				Completed Trip Length			
	37	2.41	SE	80% CI	95% CI	30	Mean	SE	80% CI	95% CI
			1.86	2.39	3.65		5.71	2.48	3.18	4.87

Appendix Table 1. Continued. Table Series 2: Party Size and Completed Trip Length by month and day type (CAS Program Output).

Work Period	7 July									
Day Type	2 Weekday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	Party Size					Completed Trip Length				
	n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI
	23	2.35	1.17	1.50	2.30	21	6.41	1.98	2.54	3.88
Work Period	8 August									
Day Type	1 Weekend/Holiday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	Party Size					Completed Trip Length				
	n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI
	21	2.71	0.51	0.65	1.00	16	4.06	0.71	0.92	1.40
Work Period	8 August									
Day Type	2 Weekday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	Party Size					Completed Trip Length				
	n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI
	17	2.41	0.67	0.86	1.32	12	5.61	1.04	1.33	2.04
Work Period	9 September									
Day Type	1 Weekend/Holiday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	Party Size					Completed Trip Length				
	n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI
	21	2.48	2.47	3.16	4.83	9	5.74	---	---	---
Work Period	9 September									
Day Type	2 Weekday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	Party Size					Completed Trip Length				
	n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI
	8	2.00	1.17	1.49	2.29	5	3.02	0.39	0.51	0.77
Work Period	10 October									
Day Type	1 Weekend/Holiday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	Party Size					Completed Trip Length				
	n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI
	32	2.13	2.40	3.08	4.70	28	4.85	5.35	6.86	10.48
Work Period	10 October									
Day Type	2 Weekday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	Party Size					Completed Trip Length				
	n	Mean	SE	80% CI	95% CI	n	Mean	SE	80% CI	95% CI
	15	2.07	1.09	1.39	2.13	12	5.26	1.73	2.22	3.39

Appendix Table 1. Continued. Table Series 2: Party Size and Completed Trip Length by month and day type (CAS Program Output).

Work Period	11 November									
Day Type	1 Weekend/Holiday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	n	Mean	Party Size			n	Completed Trip Length			
			SE	80% CI	95% CI		Mean	SE	80% CI	95% CI
	8	2.13	1.24	1.59	2.43	2	5.33	---	---	---
Work Period	11 November									
Day Type	2 Weekday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	n	Mean	Party Size			n	Completed Trip Length			
			SE	80% CI	95% CI		Mean	SE	80% CI	95% CI
	15	1.67	1.40	1.79	2.74	7	4.39	2.72	3.49	5.33
Work Period	12 December									
Day Type	1 Weekend/Holiday									
Type of Fishing	Totalled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing									
	n	Mean	Party Size			n	Completed Trip Length			
			SE	80% CI	95% CI		Mean	SE	80% CI	95% CI
	1	1.00	---	---	---	0	---	---	---	---

Appendix Table 2. Table Series 3: Fishing Pressure (CAS Program Output)

Table 3.07 Summary report--observed and total fishing pressure (P, h), standard error (SE) and confidence intervals (+/- % CI) totaled over selected stratum.

Waterbody	2701 Angostura							
Work Period	Totalled Over: 1, 10, 11, 12, 2, 3, 4, 5, 6, 7, 8, 9 -- January, October, November, December, February, March, April, May, June, July, August, September							
Day Type	Totalled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)							
Zone	1 Angostura Lake							
Type of Fishing	1 Boat							
	P	Observed SE	80% CI	95% CI	P	Total SE	80% CI	95% CI
	38,676.43	2,962.92	3,798.46	5,807.32	89,033.57	7,128.21	9,138.36	13,971.29
Type of Fishing	2 Shore							
	P	Observed SE	80% CI	95% CI	P	Total SE	80% CI	95% CI
	19,596.20	1,853.94	2,376.75	3,633.72	19,596.20	1,853.94	2,376.75	3,633.72
Type of Fishing	3 Open Ice							
	P	Observed SE	80% CI	95% CI	P	Total SE	80% CI	95% CI
	1,360.49	261.16	334.81	511.88	1,360.49	261.16	334.81	511.88
Type of Fishing	4 Ice Shanty							
	P	Observed SE	80% CI	95% CI	P	Total SE	80% CI	95% CI
	576.28	120.32	154.24	235.82	576.28	120.32	154.24	235.82

Appendix Table 3. Table Series 5: Catch/Harvest/Release Numbers (CAS Program Output) by angler type.

Table 5.07 Summary report-- catch, harvest or release (N), standard error (SE) and confidence intervals (+/- % CI) totaled over selected strata. "Estimate Types" include: all anglers interviewed (All Anglers) and over all species (Overall).

Waterbody		2,701 Angostura												
Work Period		Totaled Over: January, October, November, December, February, March, April, May, June, July, August, September												
Day Type		Totaled Over: Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)												
Zone		1 Angostura Lake												
Type of Fishing		1 Boat												
Estimate Type	Species	Catch				Harvest				Release				
		N	SE	80% CI	95% CI	N	SE	80% CI	95% CI	N	SE	80% CI	95% CI	
All Anglers	178	1,554.36	473.55	607.09	928.16	0.00	0.00	0.00	0.00	1,554.36	473.55	607.09	928.16	
All Anglers	310	47.41	44.99	57.68	88.18	0.00	0.00	0.00	0.00	47.41	44.99	57.68	88.18	
All Anglers	360	5,578.53	1,064.26	1,364.38	2,085.94	975.90	404.06	518.00	791.95	4,602.63	954.37	1,223.51	1,870.57	
All Anglers	420	414.61	144.49	185.23	283.20	29.57	25.97	33.29	50.90	385.04	137.31	176.03	269.13	
All Anglers	620	23.70	26.31	33.73	51.57	0.00	0.00	0.00	0.00	23.70	26.31	33.73	51.57	
All Anglers	714	559.43	291.64	373.88	571.61	23.44	24.90	31.92	48.80	535.99	278.27	356.75	545.42	
All Anglers	722	68.58	55.23	70.81	108.26	0.00	0.00	0.00	0.00	68.58	55.23	70.81	108.26	
All Anglers	730	4,421.22	921.42	1,181.26	1,805.98	881.63	324.26	415.70	635.55	3,539.58	863.75	1,107.33	1,692.95	
All Anglers	750	8,975.31	2,495.81	3,199.63	4,891.79	995.08	363.27	465.71	712.01	7,980.23	2,510.32	3,218.23	4,920.22	
All Anglers	770	965.37	683.78	876.61	1,340.21	101.28	60.84	77.99	119.24	864.09	633.28	811.86	1,241.23	
All Anglers	790	19,728.81	3,185.20	4,083.43	6,243.00	14,923.94	2,659.12	3,408.99	5,211.88	4,804.87	1,195.19	1,532.23	2,342.57	
All Anglers	830	397.00	294.95	378.13	578.11	51.03	56.07	71.88	109.90	345.97	242.29	310.61	474.88	
All Anglers	850	57,274.95	9,026.31	11,571.72	17,691.56	10,443.70	1,727.73	2,214.95	3,386.35	46,831.25	7,859.53	10,075.92	15,404.68	
All Anglers	862	1,504.08	938.06	1,202.59	1,838.59	43.34	34.60	44.36	67.82	1,460.73	920.10	1,179.57	1,803.40	
Overall		101,513.35	13,086.06	16,776.33	25,648.68	28,468.91	3,495.93	4,481.78	6,852.02	73,044.43	11,218.09	14,381.59	21,987.45	
Type of Fishing		2 Shore												
Estimate Type	Species	Catch				Harvest				Release				
		N	SE	80% CI	95% CI	N	SE	80% CI	95% CI	N	SE	80% CI	95% CI	
All Anglers	178	1,582.01	473.47	606.99	928.01	0.00	0.00	0.00	0.00	1,582.01	473.47	606.99	928.01	
All Anglers	310	192.75	132.82	170.28	260.33	0.00	0.00	0.00	0.00	192.75	132.82	170.28	260.33	
All Anglers	360	2,681.56	517.43	663.35	1,014.17	489.72	264.27	338.79	517.96	2,191.84	369.61	473.84	724.44	
All Anglers	420	179.05	125.68	161.13	246.34	179.05	125.68	161.13	246.34	0.00	0.00	0.00	0.00	
All Anglers	714	581.44	177.38	227.40	347.67	89.53	62.84	80.56	123.17	491.91	140.06	179.56	274.52	
All Anglers	730	2,715.01	1,110.15	1,423.21	2,175.89	489.63	149.35	191.47	292.73	2,225.38	1,082.39	1,387.62	2,121.48	
All Anglers	750	5,716.63	1,824.53	2,339.05	3,576.08	2,764.36	875.37	1,122.22	1,715.72	2,952.27	997.23	1,278.45	1,954.57	
All Anglers	770	119.74	101.68	130.35	199.28	0.00	0.00	0.00	0.00	119.74	101.68	130.35	199.28	
All Anglers	790	31,324.99	10,963.22	14,054.85	21,487.92	30,190.93	10,965.79	14,058.14	21,492.95	1,134.05	484.05	620.55	948.74	
All Anglers	830	2,835.94	271.96	348.66	533.05	60.42	62.42	80.02	122.34	2,775.52	241.62	309.76	473.58	
All Anglers	850	6,442.87	1,433.99	1,838.37	2,810.62	1,931.02	720.02	923.07	1,411.24	4,511.85	772.66	990.55	1,514.42	
All Anglers	862	28.79	24.20	31.02	47.42	0.00	0.00	0.00	0.00	28.79	24.20	31.02	47.42	
Overall		54,400.77	11,463.96	14,696.80	22,469.36	36,194.67	11,024.85	14,133.86	21,608.71	18,206.10	3,216.48	4,123.52	6,304.29	

Appendix Table 3. Continued. Table Series 5: Catch/Harvest/Release Numbers (CAS Program Output) by angler type.

Type of Fishing		3 Open Ice											
Estimate Type	Species	N	Catch			N	Harvest			N	Release		
			SE	80% CI	95% CI		SE	80% CI	95% CI		SE	80% CI	95% CI
All Anglers	360	96.09	56.21	72.06	110.17	40.75	23.79	30.50	46.63	55.34	49.09	62.93	96.22
All Anglers	420	41.30	15.04	19.28	29.47	35.13	15.44	19.79	30.26	6.16	6.52	8.35	12.77
All Anglers	750	6.75	6.59	8.45	12.92	6.75	6.59	8.45	12.92	0.00	0.00	0.00	0.00
All Anglers	770	4.31	4.84	6.20	9.48	0.00	0.00	0.00	0.00	4.31	4.84	6.20	9.48
All Anglers	775	27.83	29.86	38.28	58.52	0.00	0.00	0.00	0.00	27.83	29.86	38.28	58.52
All Anglers	790	11.39	8.26	10.59	16.19	6.75	6.59	8.45	12.92	4.64	4.98	6.38	9.75
All Anglers	830	26.27	23.64	30.31	46.33	8.95	6.96	8.92	13.63	17.32	22.59	28.96	44.28
All Anglers	850	174.65	77.89	99.85	152.66	156.42	73.48	94.20	144.02	18.23	14.04	18.01	27.53
Overall		388.59	114.31	146.55	224.06	254.75	81.05	103.91	158.86	133.84	86.02	110.27	168.59

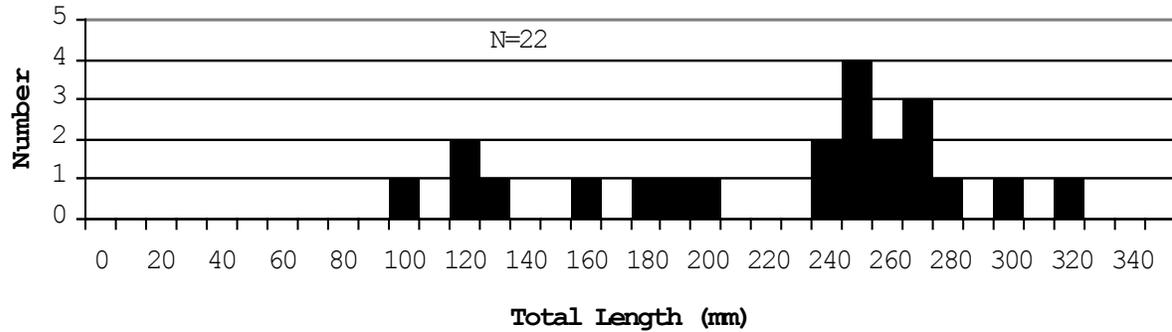
Type of Fishing		4 Ice Shanty											
Estimate Type	Species	N	Catch			N	Harvest			N	Release		
			SE	80% CI	95% CI		SE	80% CI	95% CI		SE	80% CI	95% CI
All Anglers	360	5.97	4.70	6.02	9.20	5.30	4.70	6.02	9.20	0.67	0.00	0.00	0.00
All Anglers	420	1.57	2.02	2.59	3.97	1.57	2.02	2.59	3.97	0.00	0.00	0.00	0.00
All Anglers	730	29.53	11.91	15.27	23.35	29.53	11.91	15.27	23.35	0.00	0.00	0.00	0.00
All Anglers	750	3.67	7.24	9.28	14.18	0.00	0.00	0.00	0.00	3.67	7.24	9.28	14.18
All Anglers	790	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All Anglers	830	3.14	2.09	2.68	4.09	1.57	1.05	1.35	2.06	1.57	2.09	2.68	4.10
All Anglers	850	27.64	21.46	27.51	42.05	24.50	17.41	22.32	34.12	3.14	4.18	5.36	8.19
Overall		71.53	28.72	36.82	56.30	62.48	23.83	30.55	46.71	9.05	9.57	12.28	18.77

Appendix Table 5. Stocking record for Angostura Reservoir, Fall River County, 1988-2001.

Year	Number	Species	Size
1988	91,300	Largemouth bass	Fingerling
1989	252,900 150,000	Largemouth bass Walleye	Fingerling Fingerling
1990	310 450 99,754	Gizzard shad Emerald shiner Walleye	Adult Adult Fingerling
1991	250,000 500 235,000	Largemouth bass Gizzard shad Walleye	Fingerling Adult Fingerling
1992	300 235,000	Gizzard shad Walleye	Adult Fingerling
1993	150,000 235,000	Largemouth bass Walleye	Fingerling Fingerling
1994	43 67,870	Gizzard shad Largemouth bass	Adult Fingerling
1995	100,000 204,555	Largemouth bass Walleye	Fingerling Fingerling
1996	135,387 354,070	Largemouth bass Walleye	Fingerling Fingerling
1997	no fish stocked		
1998	109,962 201,084	Largemouth bass Walleye	Fingerling Fingerling
1999	15 48,000 248,280	Gizzard shad Largemouth bass Walleye	Adult Fingerling Fingerling
2000	97,133 207,779	Rainbow trout Walleye	Fingerling Fingerling
2001	12,638 37,000	Largemouth bass Rainbow trout	Fingerling Fingerling

Appendix Table 6. Composite listing of sample data for black crappies collected by trap nets in Angostura Reservoir, 1994-2001.

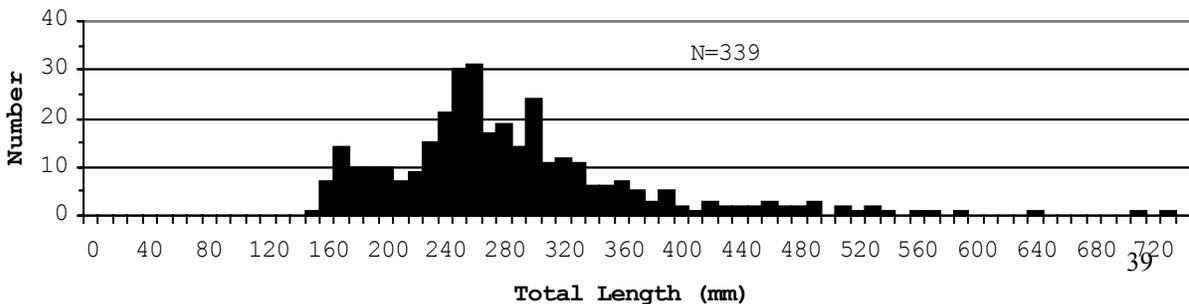
Year	N	CPUE	CPUE-S	PSD	RSD-P
1994	381	30.6 (0.0, 63.7)	30.6 (0.0, 63.7)	56 (52, 61)	0
1995	117	54.5 (42.3, 66.7)	54.5 (42.3, 66.7)	84 (82, 87)	0
1996	338	28.1 (1.2, 54.9)	28.1 (1.2, 54.9)	96 (94, 98)	2 (1, 3)
1997	340	69.3 (28.1, 110.6)	68.0 (28.0, 108.0)	94 (93, 95)	19 (17, 22)
1998	103	8.0 (0.0, 19.0)	8.0 (0.0, 19.0)	100 (100, 100)	68 (60, 76)
2000	146	15.8 (5.4, 26.2)	15.8 (5.4, 26.2)	85 (80, 90)	30 (24, 36)
2001	22	1.8 (0.2, 3.5)	1.6 (0.0, 3.2)	79 (62, 96)	63 (43, 83)



Appendix Figure 4. Length histogram of black crappies collected in trap nets from Angostura Reservoir, August 14 and 15, 2001.

Appendix Table 7. Composite listing of sample data for channel catfish collected by gill nets in Angostura Reservoir, 1994-2001.

Year	N	CPUE	CPUE-S	PSD	RSD-P
1994	197	21.9 (18.0, 25.8)	9.1 (9.3, 16.3)	27 (19, 35)	0 (0, 0)
1995	123	13.7 (1.9, 25.5)	8.4 (3.2, 13.7)	9 (4, 15)	0 (0, 0)
1996	243	27.0 (7.5, 46.5)	21.9 (8.4, 35.4)	18 (13, 22)	1 (0, 1)
1997	267	29.7 (0.0, 65.6)	14.0 (0.0, 28.6)	22 (16, 28)	1 (0, 2)
1998	156	17.3 (0.7, 34.0)	10.4 (0.0, 21.4)	10 (5, 15)	2 (0, 5)
2000	483	96.6 (63.5, 129.7)	50.8 (33.7, 67.9)	20 (16, 24)	3 (1, 5)
2001	339	67.8 (18.6, 117.0)	31.4 (5.1, 57.7)	20 (15, 26)	2 (0, 4)



Appendix Figure 5. Length histogram of channel catfish collected in gill nets from Angostura Reservoir, Fall River County, August 14 and 15, 2001.

Appendix Table 8. Catch data for largemouth bass collected by electrofishing in Angostura Reservoir, September 4, 2001.

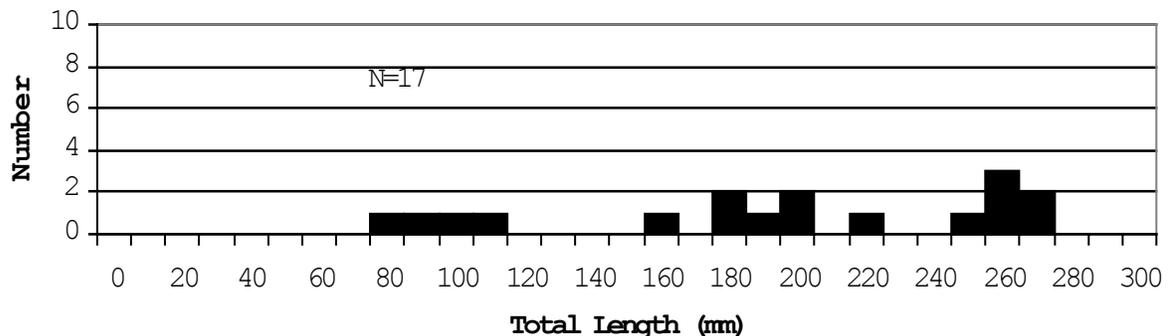
Species	N	CPUE	CPUE-S	PSD	RSD-P
Largemouth bass	8	4.4 (0.0, 10.1)	1.6 (0.0, 3.3)	67 (0, 100)	33 (0, 100)
Mean Wr	Sub Stock	S-Q	Q-P	P-M	
2002	116 (A)	128 (A)	92 (A)	87 (A)	

Appendix Table 9. Composite listing of sample data for smallmouth bass collected in gill nets at Angostura Reservoir, 1997-2001. Confidence intervals (80%) are given in parentheses.

Year	N	CPUE	CPUE-S
1997	57	6.3 (0.0, 18.3)	6.2 (0.0, 5.5)
1998	22	2.4 (0.0, 7.1)	2.2 (0.0, 6.4)
2000	64	12.8 (0.4, 25.2)	12.8 (0.4, 25.2)
2001	9	1.8 (0.0, 4.6)	1.8 (0.0, 4.6)

Appendix Table 10. Composite listing of stock density indices for smallmouth bass from Angostura Reservoir, 1997 - 2001.

Year	PSD	RSD-P	Wr		
			S-Q	Q-P	P-M
1997	30 (20, 41)	0 (0, 0)	106 (0.7)	98 (1.6)	
1998	55 (35, 75)	20 (4, 36)	99 (0.8)	97 (1.6)	93 (10.5)
2000	59 (49, 70)	6 (1, 11)	99 (0.7)	95 (0.2)	94 (3.1)
2001	44 (12, 77)	0 (0, 0)	109 (1.0)	95 (1.6)	



Appendix Figure 6. Length histogram of smallmouth bass collected during night electrofishing at Angostura Reservoir, Fall River County, September 4, 2001.

Appendix Table 11. Angostura Reservoir smallmouth bass age and growth data, Region 1 mean length-at-age, and the South Dakota state-wide smallmouth bass mean length-at-age (Willis et al 2001). Standard errors are in parentheses.

Year Class	Age	N	Age				
			1	2	3	4	5
2001	0	1					
2000	1	7	90				
1999	2	6	90	176			
2001 Mean		14	90 (0)	176 (0)			
2000 Mean		64	80 (3)	168 (7)	268 (15)	360 (14)	420 (0)
<i>Region 1</i>			85 (4)	154 (10)	224 (17)	270 (30)	330 (31)
<i>South Dakota</i>			91 (2)	171 (4)	242 (6)	300 (8)	333 (8)

Appendix Table 12. Composite listing of sample data for walleye collected by gill nets in Angostura Reservoir, 1994-2001. Confidence intervals (80%) are given in parentheses.

Year	N	CPUE	CPUE-S
1994	95	10.6 (6.4, 14.7)	10.6 (6.4, 14.7)
1995	17	1.9 (0.0, 4.2)	1.8 (0.0, 3.9)
1996	15	1.6 (0.0, 4.2)	1.6 (0.0, 4.2)
1997	51	5.3 (0.0, 15.4)	5.3 (0.0, 15.4)
1998	52	5.8 (0.0, 15.4)	5.6 (0.0, 15.1)
2000	249	49.8 (26.0, 73.6)	39.4 (25.2, 53.6)
2001	87	17.4 (5.7, 29.1)	15.4 (4.5, 26.3)

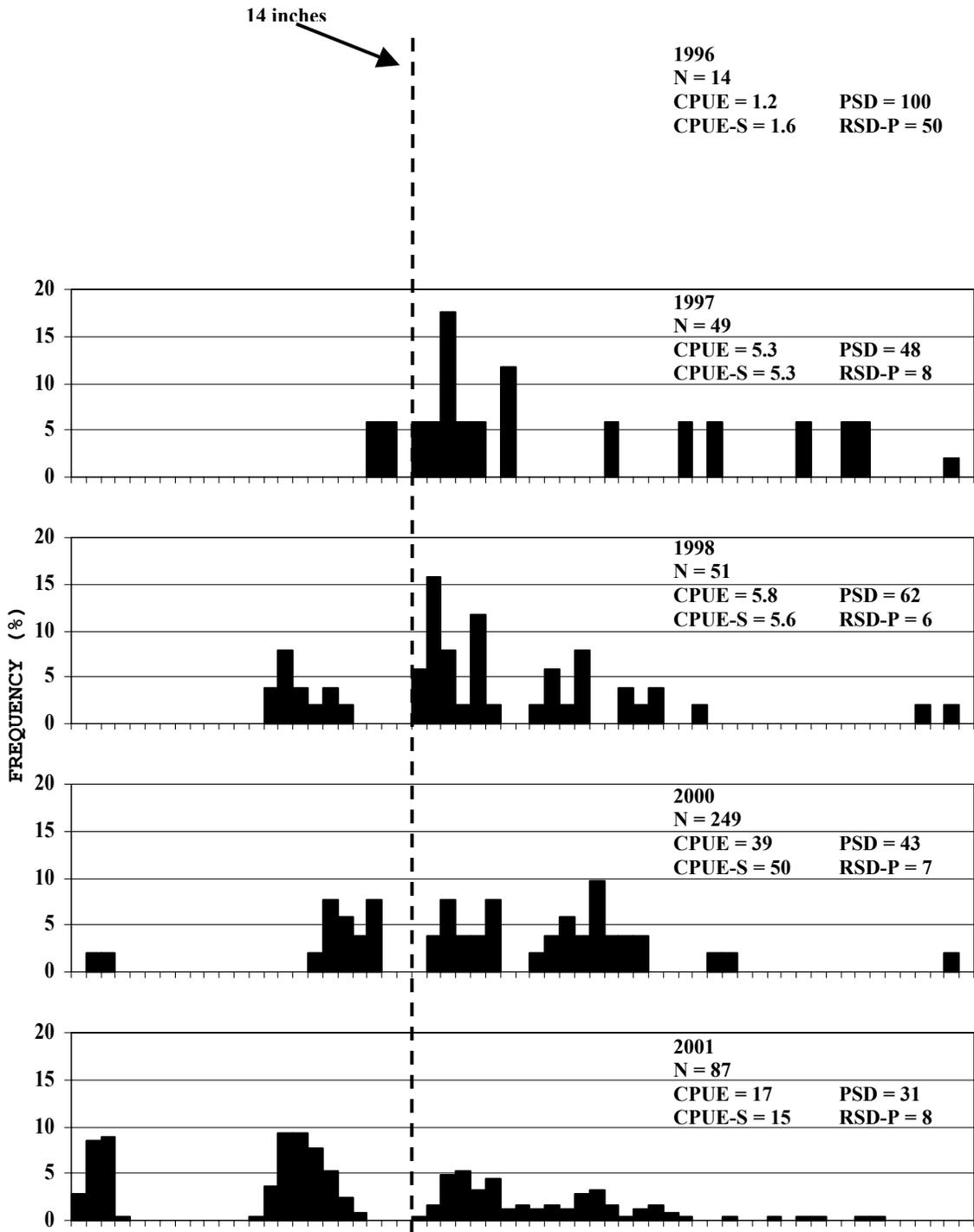
Appendix Table 13. Composite listing of stock density indices for walleye from Angostura Reservoir, 1994 - 2001.

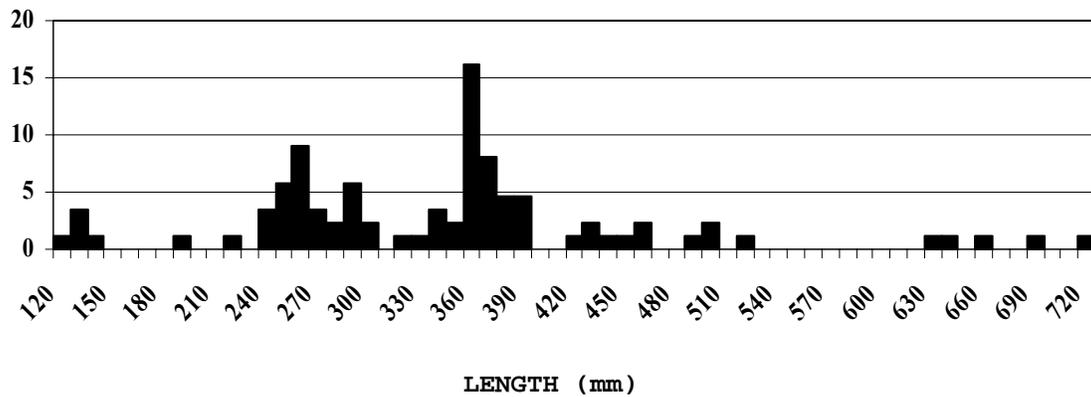
Year	PSD	RSD-P	Wr		
			S-Q	Q-P	P-M
1994	18 (11, 24)	4 (1, 8)	86 (0.6)	78 (0.9)	83 (3.5)
1995	56 (34, 79)	31 (10, 52)	85 (1.1)	85 (1.0)	84 (3.2)
1996	100 (100, 100)	50 (25, 75)		86 (2.0)	81 (6.0)
1997	48 (36, 60)	8 (2, 15)	92 (0.8)	86 (0.8)	90 (1.6)
1998	62 (50, 74)	6 (0, 12)	90 (1.2)	86 (0.5)	79 (1.5)
2000	43 (37, 49)	7 (4, 10)	89 (0.3)	87 (0.2)	81 (1.1)
2001	31 (22, 40)	8 (3, 13)	89 (0.3)	85 (2.5)	85 (A)

Appendix Table 14. Angostura Reservoir walleye year class, age in 2001, sample size (N), mean back-calculated total length-at-age, population standard error (SE), 2000 Angostura mean length-at-age, the Region 1 and South Dakota walleye mean length-at-ages (Willis et al. 2001).

Year Class	Age	N	Age						
			1	2	3	4	5	6	7
2001	0	5							
2000	1	29	223						
1999	2	37	222	340					
1998	3	7	212	328	389				
1997	4	3	236	390	459	487			
1996	5	0	---	---	---	---			

1995	6	2	219	370	477	550	594	633	
1994	7	3	188	320	441	529	590	637	665
2001 Mean			217	350	442	522	592	635	665
			(7)	(13)	(19)	(19)	(2)	(2)	(0)
2000 Mean			221	329	392	439	480	516	573
			(9)	(13)	(19)	(22)	(29)	(37)	(24)
<i>Region 1</i>			164	260	332	385	444		
			(17)	(22)	(27)	(32)	(42)		
<i>S.D. Mean</i>			168	279	360	425	490		
			(3)	(6)	(7)	(8)	(9)		





Appendix Figure 7. Length frequency histograms of walleye collected by gill net in Angostura Reservoir, 1996-2001. Dashed line (---) represents the 14-inch (356-mm) walleye minimum length limit.

Appendix Table 15. Table Series 10: Preferences, Angler Satisfaction (CAS Program Output).

Table 10.03 Summary report--preference question responses totaled over selected strata.

Work Period Totaled Over: 1, 10, 11, 12, 2, 3, 4, 5, 6, 7, 8, 9 -- January, October, November, December, February, March, April, May, June, July, August, September
 Day Type Totaled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)
Type of Fishing Totaled Over: 1,2,3,4,5 -- Boat, Shore, Open Ice, Ice Shanty, Spearing
 Question Series 1
 Question Number 1 Considering all factors, how satisfied are you with your fishing trip today?
 Responses (n) 946

Answer Code	Answer Description	Count	Percent of Total (%)
1	Very Satisfied	211	22.30
2	Moderately Satisfied	184	19.45
3	Neutral	137	14.48
4	Moderately Dissatisfied	53	5.60
5	Very Dissatisfied	49	5.18
6	No Opinion	5	0.53
13	No Answer Recorded	307	32.45

Work Period Totaled Over: 1, 10, 11, 12, 2, 3, 4, 5, 6, 7, 8, 9 -- January, October, November, December, February, March, April, May, June, July, August, September
 Day Type Totaled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)
Type of Fishing 1 -- Boat
 Question Series 1
 Question Number 1 Considering all factors, how satisfied are you with your fishing trip today?
 Responses (n) 522

Answer Code	Answer Description	Count	Percent of Total (%)
1	Very Satisfied	160	30.65
2	Moderately Satisfied	144	27.59
3	Neutral	104	19.92
4	Moderately Dissatisfied	36	6.90
5	Very Dissatisfied	38	7.28
6	No Opinion	3	0.57
13	No Answer Recorded	37	7.09

Work Period Totaled Over: 1, 10, 11, 12, 2, 3, 4, 5, 6, 7, 8, 9 -- January, October, November, December, February, March, April, May, June, July, August, September
 Day Type Totaled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)
Type of Fishing 2 -- Shore
 Question Series 1
 Question Number 1 Considering all factors, how satisfied are you with your fishing trip today?
 Responses (n) 180

Answer Code	Answer Description	Count	Percent of Total (%)
1	Very Satisfied	48	26.67
2	Moderately Satisfied	26	14.44
3	Neutral	24	13.33
4	Moderately Dissatisfied	14	7.78
5	Very Dissatisfied	6	3.33
6	No Opinion	2	1.11
13	No Answer Recorded	60	33.33

Appendix Table 15. Continued. Table Series 10: Preferences

Work Period	Totalled Over: 1, 10, 11, 12, 2, 3, 4, 5, 6, 7, 8, 9 -- January, October, November, December, February, March, April, May, June, July, August, September			
Day Type	Totalled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)			
Type of Fishing	3 -- Open Ice			
Question Series	1			
Question Number	1 Considering all factors, how satisfied are you with your fishing trip today?			
Responses (n)	175			
	Answer Code	Answer Description	Count	Percent of Total (%)
	1	Very Satisfied	2	1.14
	2	Moderately Satisfied	10	5.71
	3	Neutral	8	4.57
	4	Moderately Dissatisfied	2	1.14
	5	Very Dissatisfied	5	2.86
	13	No Answer Recorded	148	84.57
Work Period	Totalled Over: 1, 10, 11, 12, 2, 3, 4, 5, 6, 7, 8, 9 -- January, October, November, December, February, March, April, May, June, July, August, September			
Day Type	Totalled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)			
Type of Fishing	4 -- Ice Shanty			
Question Series	1			
Question Number	1 Considering all factors, how satisfied are you with your fishing trip today?			
Responses (n)	66			
	Answer Code	Answer Description	Count	Percent of Total (%)
	1	Very Satisfied	1	1.52
	2	Moderately Satisfied	4	6.06
	3	Neutral	1	1.52
	4	Moderately Dissatisfied	1	1.52
	13	No Answer Recorded	59	89.39
Work Period	Totalled Over: 1, 10, 11, 12, 2, 3, 4, 5, 6, 7, 8, 9 -- January, October, November, December, February, March, April, May, June, July, August, September			
Day Type	Totalled Over: 1,2,3 -- Weekend/Holiday, Weekday, Weekend/Holiday or Weekday (1 or 2)			
Type of Fishing	4 -- Ice Shanty			
Question Series	1			
Question Number	1 Considering all factors, how satisfied are you with your fishing trip today?			
Responses (n)	3			
	Answer Code	Answer Description	Count	Percent of Total (%)
	13	No Answer Recorded	3	100.00

Appendix Table 16. Total number and percentage of resident and non-resident anglers by state at Angostura Reservoir, Fall River County from January-December, 2001.

State	Count	Percent of Total	Percent of Non-residents
South Dakota	792	83.9	---
Nebraska	94	10.0	61.8
Wyoming	18	1.9	11.8
Colorado	15	1.6	9.9
*Other	25	≤ 0.6 each	≤ 4.0 each

*Texas, Iowa, North Dakota, California, Illinois, Indiana, Minnesota, Alabama, Arizona, Utah, Washington, Washington, Wisconsin.