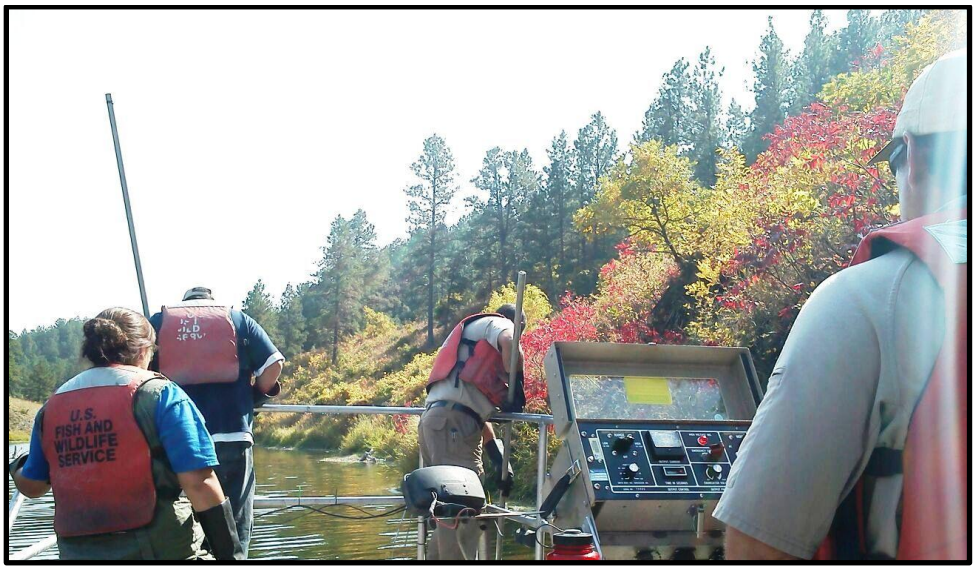
Rosebud Indian Reservation:
2012 Fisheries Survey Report



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INTRODUCTION

The Rosebud Indian Reservation is primarily located in Todd County, south central South Dakota, but also holds land in Gregory, Lyman, Mellette, and Tripp counties. In Todd County, the land area comprises about 360,000 ha (0.89 million acres; 1,388 mi^2) and had a human population of 9,050 at the 2000 census. The total Tribal land area in all five counties is approximately 510,000 ha (1.26 million acres; 1,970 mi^2). The terrain consists of rolling grassland prairie and streams, which have carved deep canyons. Primary land use in the area is for livestock grazing and some farming. The region is semi-arid with temperatures that range from more than 38 ^oC (100 °F) in the summer to -34 ^oC (-30 °F) during the winter (Bernhard and Yarger 1975). The growing season averages 130 days and average rainfall is 41 cm (16 in).

Two primary watersheds are located on the Rosebud Indian Reservation that includes the Little White River (flows south to north) and the Keya Paha River headwaters (flows to the southeast). Most streams are low gradient, silt laden, and generally unsuitable for game fish. However, these streams contain numerous native cyprinid (i.e., minnow) and catostomid (i.e., sucker) species.

Since 1951, the fish management program has been a cooperative effort involving the U.S. Fish and Wildlife Service, The Rosebud Sioux Tribe, and the Bureau of Indian Affairs (Haines 1981). Currently, most game fish populations are found in reservoirs throughout the reservation (Figure Introduction-1). Fish management on the Rosebud Indian Reservation was intensive from the 1950s until early 1990s, when management consisted primarily of stocking, conducting fisheries population surveys, collecting baseline data for developing a fish management plan, and conducting workshops in fish management techniques (Haines 1981). The most recent surveys began again in 2010.

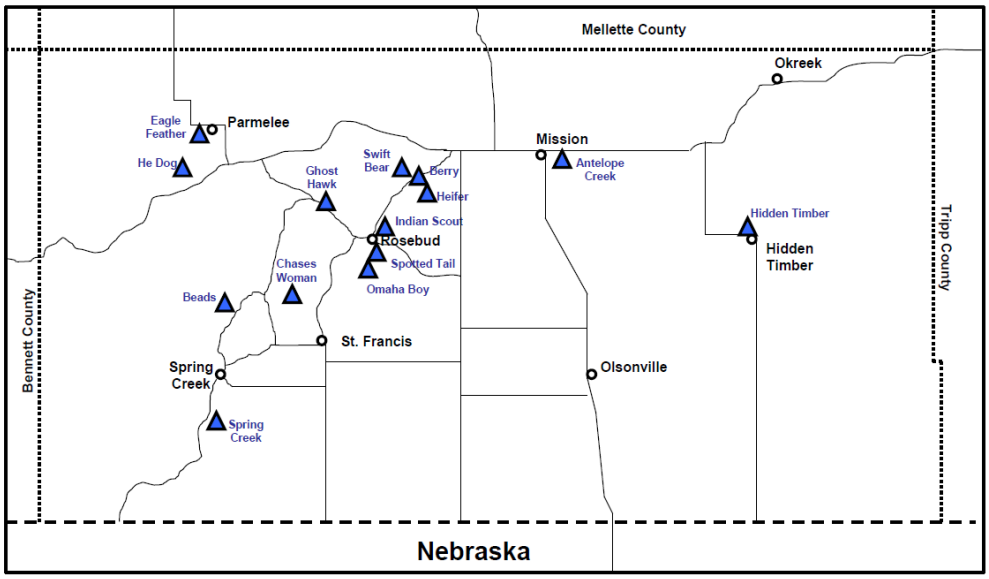

Figure Introduction-1. Map of the Rosebud Indian Reservation identifying reservoirs managed for recreational fisheries.

GENERAL METHODS

Sampling

Electrofishing is the primary method for collecting fisheries information from reservoirs on Rosebud. Electrofishing in 2010 was conducted at night, but surveys were done during the day in 2012. The surveys were completed from a boat using a Smith Root model 5.0 GPP electrofishing system rated at 5,000 watts of output power and 4–6 amps pulsed DC (60 pulses per second). Electrofishing was typically conducted in 10 minute transects along the shoreline. All fish species captured were measured for total length (TL, mm), weighed (g), and released. A list of common names, scientific names, and acronyms for fish in this report are reported in Appendix 1.

Effort

Beads, Chases the Woman, Eagle Feather, Indian Scout, and Rosebud (Spotted-tail) reservoirs were surveyed in 2012 (Table Introduction-1). The surveys were conducted during the day on 27–28 September.

Table Introduction-1. Total effort in reservoirs sampled on the Rosebud Indian Reservation during 2012.

Lake	Electrofishing transects (n)	Electrofishing (minutes)
Beads	3	28
Chases the Woman	2	20
Eagle Feather	4	40
Indian Scout	2	20
Rosebud (Spotted-tail)	2	20

Analyses

Catch per unit effort (*C*/*f*) was assessed by calculating the number of fish (by species) caught per electrofishing hour. Size structure was assessed using stock indices (i.e., proportional size distribution) and length frequency histograms. Length categories and references used for stock indices are reported in Appendix 2-1. Condition of fish was assessed using relative weight (W_r). Standard weight (Ws) parameters and sources are reported in Appendix 2-2.

Water Quality

Surface water quality was measured at one site in each reservoir at the time of each survey. Water temperature (^{o}C), dissolved oxygen (mg/L), pH, and conductivity (µS/cm) were measured with a HACH HQ40d multi-parameter meter (HACH, Loveland, CO, USA). Phenolphthalein alkalinity (mg/L) and total alkalinity (mg/L) were measured with a HACH water quality test kit. Turbidity was quantified using a HACH 2100P Turbidometer.

INDIAN SCOUT RESERVOIR

Introduction

Indian Scout Reservoir (Figure Indian Scout-1, 43.23500 -100.83990) is located just outside of the town of Rosebud. At full pool, the reservoir has a surface area of 1 ha (2.5 ac) and a maximum depth of 6.7 m (22.0 ft).

The dam and outlet structure at the reservoir were renovated in 2011. The survey in 2012 represents the first fisheries survey since the renovation.

Figure Indian Scout-1. Indian Scout Reservoir on the Rosebud Indian Reservation. The white lines indicate electrofishing transects in 2012. (Image credit: www.bing.com/maps)

Results and Discussion

Water quality

Table Indian Scout-1. Surface water quality values from Indian Scout Reservoir, Rosebud Indian Reservation in 2012.

Month / Year	Temp. (°C)	Dissolved oxygen (mg/L)	pH	Pheno. alkal. (mg/L)	Total alkal. (mg/L)	Conduc-tivity (µS/cm)	Tur-bidity (NTU)
9 / 2012	19.3	11.2	8.7	0	120	242	4

Largemouth bass

Largemouth bass was the only species caught during the 2012 electrofishing survey. Mean relative abundance was high (*C/f* = 396.0; SE = 144.0). The current population was mostly composed of smaller individuals (PSD = 4; PSD-P = 4). Mean condition was good (*Wr* = 96; SE = 1). Natural reproduction and recruitment was apparent and growth is occurring; three apparent age classes were present in 2012 (Figure Indian Scout-2).

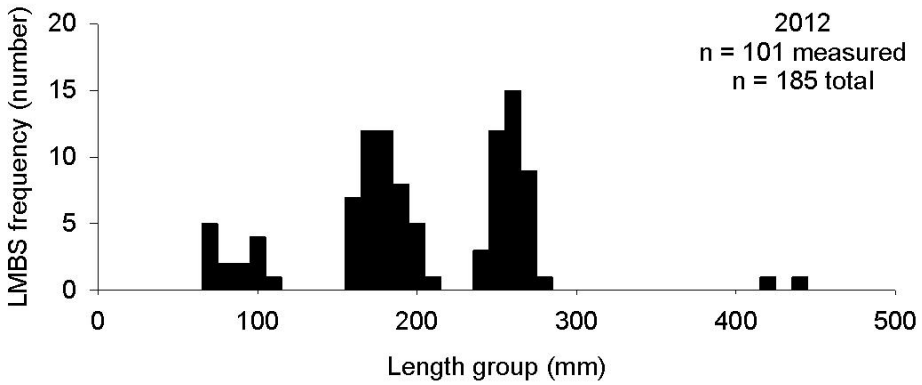

Figure Indian Scout-2. Length frequency histograms (10 mm groups) of largemouth bass caught by electrofishing from Indian Scout Reservoir in 2012.

BEADS RESERVOIR

Introduction

Beads Reservoir (Figure Beads-1, 43.19612 -101.00677) is located in a steep-walled canyon approximately two miles west of the Little White River off BIA Highway 5 between the cities of Rosebud and St. Francis. At full pool, the lake has a surface area of 17 ha (42 ac) and a maximum depth of 10.1 m (33 ft).

Fisheries management at Beads Reservoir has a history dating to the 1950s. The original survey in 1951 (unknown gear used) reported black bullhead, black crappie, bluegill, green sunfish, largemouth bass, and pumpkinseed sunfish. One fingerling largemouth bass stocking occurred in 1951. Throughout the 1960s and 1970s, Beads Reservoir was the primary fishing location on the Reservation for black crappie, largemouth bass, and pumpkinseed sunfish (Haines 1981). In 1979, the dam structure washed out during a severe storm; the next fisheries survey was not conducted until 1982. Channel catfish were stocked from 1987–1989, brook trout were stocked in 1988, and largemouth bass were stocked in 1989. The most recent fisheries survey conducted on Beads Reservoir was in 2010.

Figure Beads-1. Beads Reservoir on the Rosebud Indian Reservation. The white lines indicate electrofishing transects in 2012. (Image credit: www.bing.com/maps)

Results and Discussion

Water quality

Table Beads-1. Surface water quality values from Beads Reservoir, Rosebud Indian Reservation in 2010 and 2012.

Month / Year	Temp. (°C)	Dissolved oxygen (mg/L)	pH	Pheno. alkal. (mg/L)	Total alkal. (mg/L)	Conduc-tivity (µS/cm)	Tur-bidity (NTU)
9 / 2012	20.4	12.1	9.3	0	120	235	17
6 / 2010	21.3	15.7	9.0	0	103	241	.

Black crappie

Approximately 15,000 fingerling black crappies were stocked in 2009. In 2010, black crappies were not observed during electrofishing surveys. In 2012, only two black crappies (lengths = 210, 226 mm) were caught. Based on the two surveys since the 2009 stocking effort, it does not seem that the stocking was successful.

Bluegill

The mean relative abundance (*C*/*f* > 600) of bluegill in Beads Reservoir is large. However, nearly all the fish are small (< 200 mm; Figure Beads-3). Condition has also decreased to < 85 (Figure Beads-4).

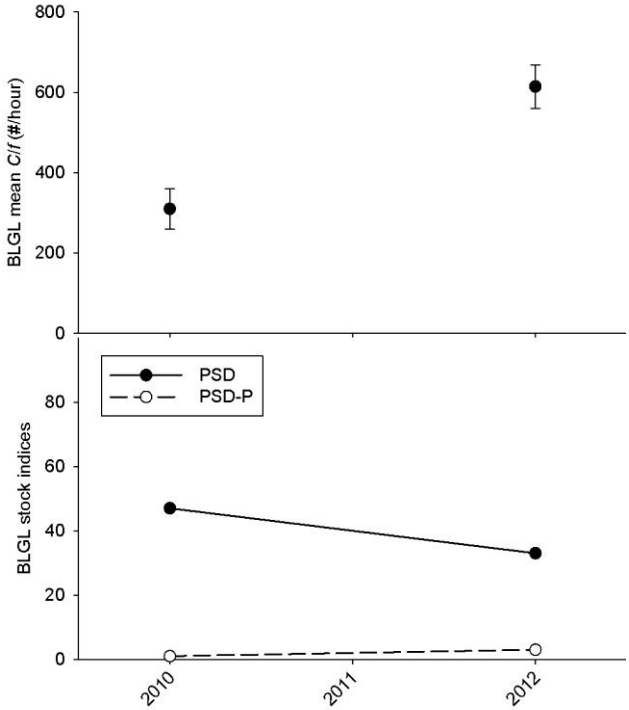

Figure Beads-2. Mean relative abundance (*C*/*f* ± 1 SE; top panel) and stock indices (bottom panel) of bluegill caught by electrofishing from Beads Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

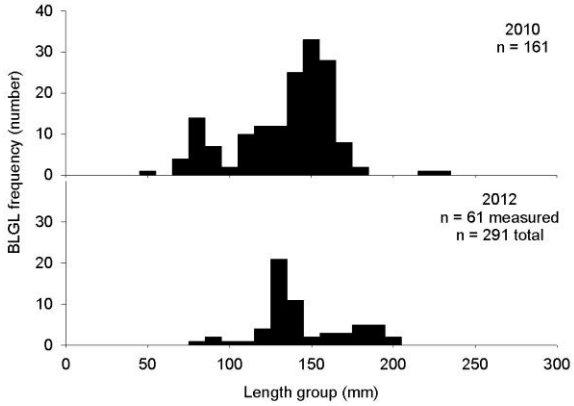

Figure Beads-3. Length frequency histograms (10 mm groups) of bluegill caught by electrofishing from Beads Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

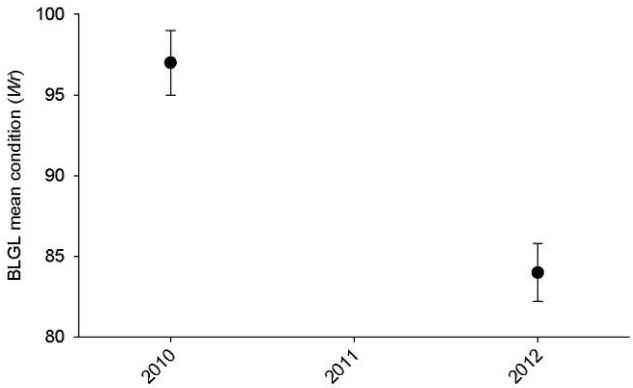

Figure Beads-4. Mean condition (*Wr*) of bluegill caught by electrofishing from Beads Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing). Error bars represent ± 1 SE.

Largemouth bass

The mean relative abundance of largemouth bass in 2012 (*C*/*f* > 80; Figure Beads-5) increased from 2010, but the overall size of fish was smaller (Figure Beads-5 and Beads-6). However, a large range of lengths was observed suggesting that reproduction, recruitment, and growth are occurring (Figure Beads-6). The mean condition (*Wr* = 89) was satisfactory.

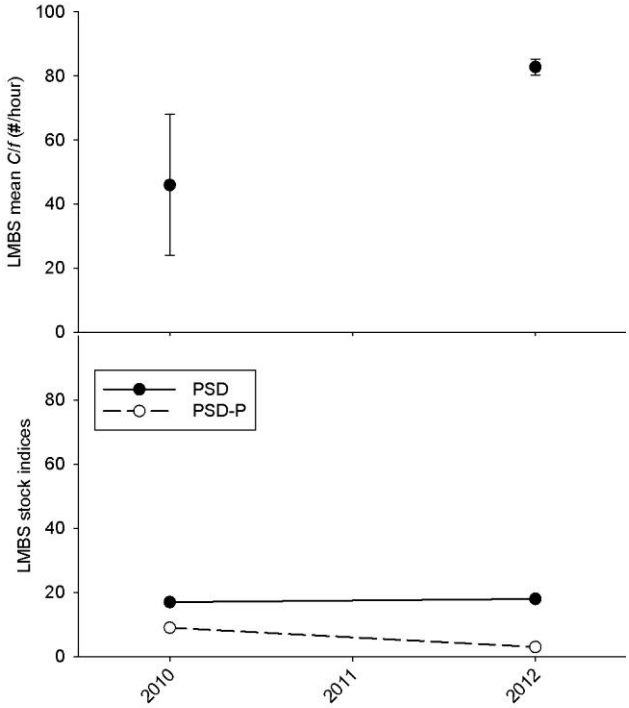

Figure Beads-5. Mean relative abundance (*C/f* ± 1 SE; top panel) and stock indices (bottom panel) of largemouth bass caught by electrofishing from Beads Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

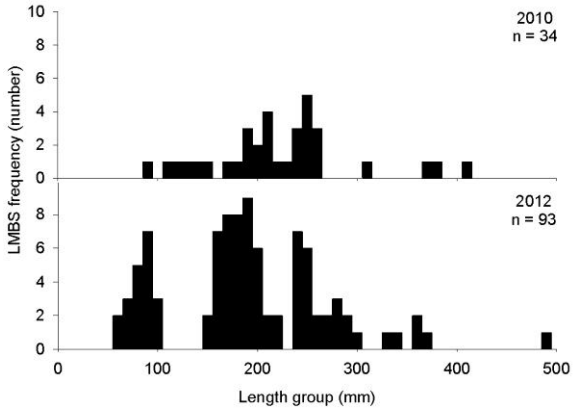

Figure Beads-6. Length frequency histograms (10 mm groups) of largemouth bass caught by electrofishing from Beads Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

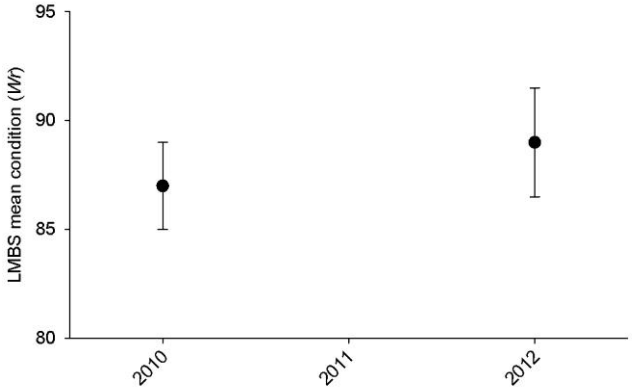

Figure Beads-7. Mean condition (*Wr*) of largemouth bass caught by electrofishing from Beads Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing). Error bars represent ± 1 SE.

Pumpkinseed sunfish

The pumpkinseed sunfish population in Beads Reservoir is good. Mean relative abundance (*C/f* = 48/hour; Figure Beads-8) and the proportion of larger fish (PSD-P = 22; Figure Beads-8) suggest a good number and size structure of pumpkinseed sunfish are present in the reservoir. The length frequency histogram indicates the presence of several age groups and the occurrence of recruitment (Figure Beads-9). Condition (*Wr*) should be monitored because it dropped from >100 in 2010 to 84 in 2012 (Figure Beads-10).

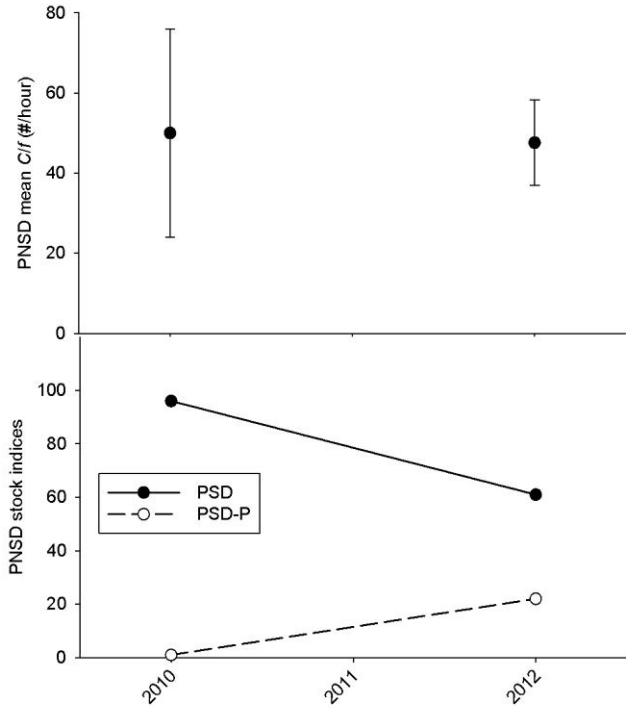

Figure Beads-8. Mean relative abundance (*C/f* ± 1 SE; top panel) and stock indices (bottom panel) of pumpkinseed sunfish caught by electrofishing from Beads Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

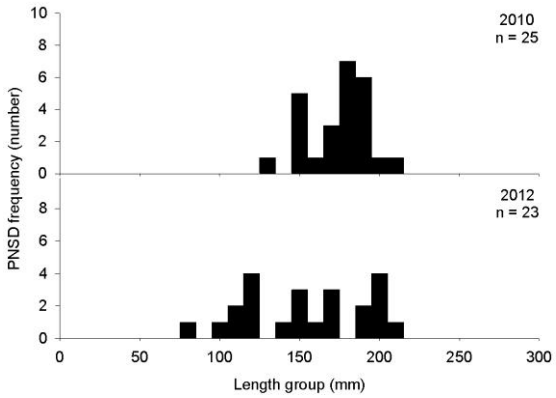

Figure Beads-9. Length frequency histograms (10 mm groups) of pumpkinseed sunfish caught by electrofishing from Beads Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

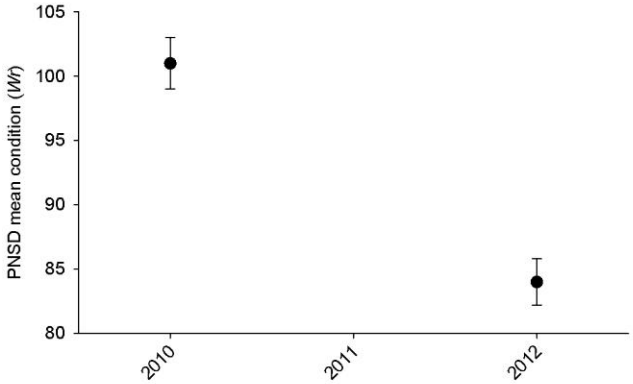

Figure Beads-10. Mean condition (*Wr*) of pumpkinseed sunfish caught by electrofishing from Beads Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing). Error bars represent ± 1 SE.

Walleye

Walleye were stocked in 2009 (n = 3,500), 2010 (n = 4,200), and 2012 (n = 15,000). In both the 2010 and 2012 surveys, walleye were not caught. These data suggest the walleye stockings were largely unsuccessful.

Yellow perch

Fingerling yellow perch (n = 21,000) were stocked in Beads Reservoir in 2010. Only two yellow perch (lengths = 95, 230 mm) were caught in 2010 and only three were caught in 2012 (lengths = 185, 204, 270 mm). Mean condition of the three yellow perch caught in 2012 was low (*Wr* = 79).

CHASES THE WOMAN RESERVOIR

Introduction

Chases the Woman Reservoir (Figure Chases the Woman-1; 43.18746 -100.94590) is located approximately one mile east of the Little White River off BIA Highway 5 between the cities of Rosebud and St. Francis. At full pool, the reservoir has a surface area of 3.2 ha (8 ac) and a maximum depth of 5.8 m (19 ft.). The dam structure was constructed in 1964.

Fisheries management in Chases the Woman Reservoir began shortly after construction of its dam when 2,000 rainbow trout and 1,000 brown trout were stocked in 1965. Rainbow trout were stocked almost annually until 1990. In 1979, the dam structure washed out during a severe storm. The dam was repaired and management resumed in 1983. Fish species observed after 1983 included black bullhead, golden shiner, rainbow trout, white sucker, and yellow perch. Cutthroat trout were stocked in 1986.

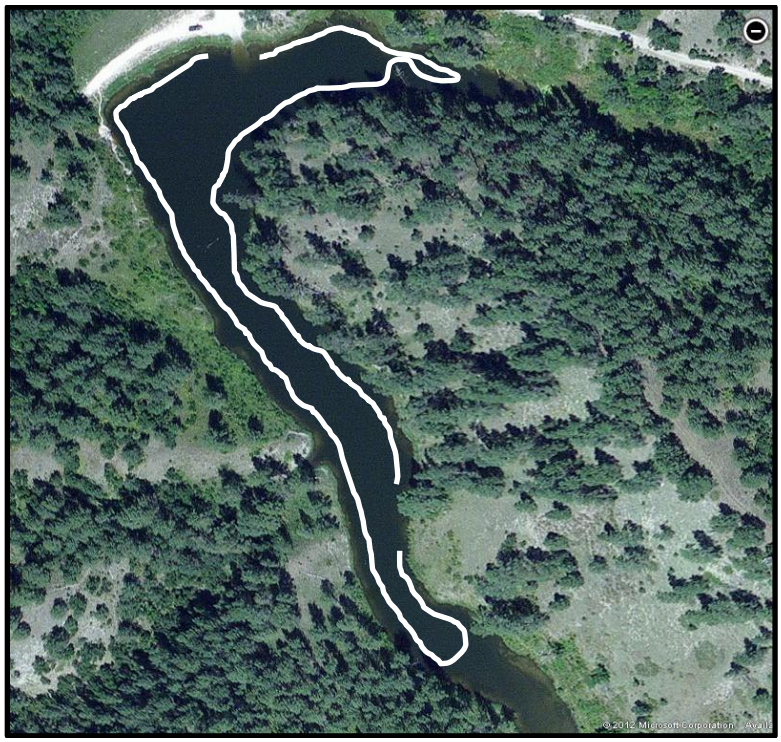

Figure Chases the Woman-1. Chases the Woman Reservoir on the Rosebud Indian Reservation. The white lines indicate electrofishing transects in 2012. (Image credit: www.bing.com/maps)

Results and Discussion

Water quality

Table Chases the Woman-1. Surface water quality values from Chases the Woman Reservoir, Rosebud Indian Reservation in 2010 and 2012.

Month / Year	Temp. (°C)	Dissolved oxygen (mg/L)	pH	Pheno. alkal. (mg/L)	Total alkal. (mg/L)	Conduc-tivity (µS/cm)	Tur-bidity (NTU)
9 / 2012	19.0	9.8	9.0	0	137	270	5
6 / 2010	21.3	11.4	8.8	0	154	236	.

Black crappie

Despite the stocking of 1,500 black crappie in 2009, only five were caught in 2012 (length range = 57–239 mm). Only one black crappie (72 mm) was caught in 2010.

Largemouth bass

Chases the Woman Reservoir continued to have a high relative abundance, small size structure population of largemouth bass (Figures Chases the Woman-2 and -3). The length frequency histograms suggest successful reproduction and slow growth were occurring (Figure Chases the Woman-3). Condition is average (*Wr* > 90; Figure Chases the Woman-4).

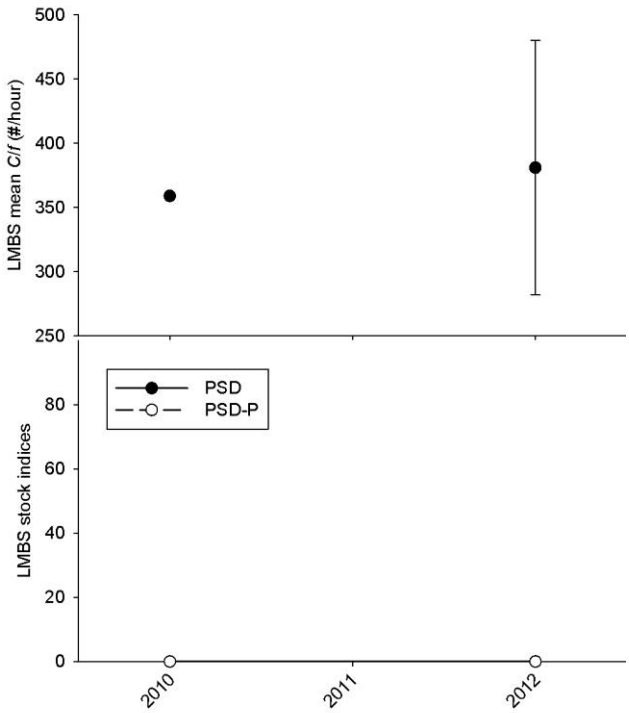

Figure Chases the Woman-2. Mean relative abundance (*C*/*f* ± 1 SE; top panel) and stock indices (bottom panel) of largemouth bass caught by electrofishing from Chases the Woman Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

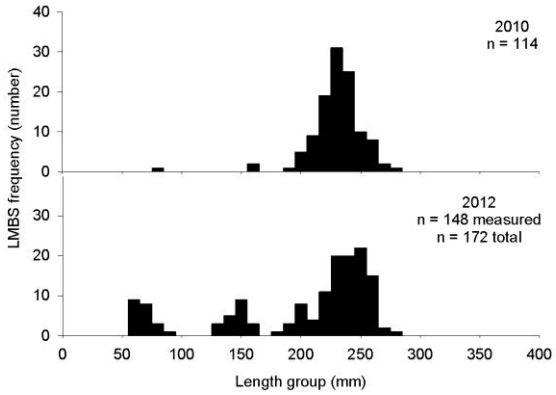

Figure Chases the Woman-3. Length frequency histograms (10 mm groups) of largemouth bass caught by electrofishing from Chases the Woman Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

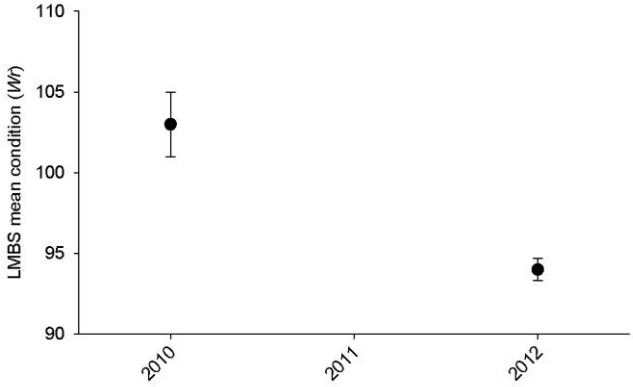

Figure Chases the Woman-4. Mean condition (*Wr*) of largemouth bass caught by electrofishing from Chases the Woman Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing). Error bars represent ± 1 SE.

Northern pike

Northern pike were not caught in 2012. One northern pike (530 mm) was caught in 2010.

Yellow perch

In the spring of 2012, 4.5 kg (10 lb.) of yellow perch were stocked in Chases the Woman Reservoir. None were caught during surveys in 2010 and none were caught in 2012.

EAGLE FEATHER RESERVOIR

Introduction

Eagle Feather Reservoir (Figure Eagle Feather-1; 43.32277 -101.03858) is located 0.5 mile west of the town of Parmelee. At full pool, the reservoir has a surface area of 18 ha (44.5 ac) and a maximum depth of 7.3 m (24 ft.). Eagle Feather Reservoir is within the Cutmeat Creek watershed, which drains >10,000 ha (40 mi^2; ~25,000 ac) of pasture. Cutmeat Creek flows through the communities of Upper Cutmeat, He Dog, and Parmelee. The stream's flow is regulated by White Horse and He Dog dams upstream of Eagle Feather Reservoir. The creek and reservoirs are used extensively to water livestock.

In 1953, the reservoir was completely drained. Information regarding fish stocking during the 1950s is limited, however results from a fisheries survey in 1968 reported black bullhead, bluegill, green sunfish, largemouth bass, northern pike, and white suckers were present. Subsequent surveys from the 1970s to 1992 reported the presence of black bullhead, bluegill, green sunfish, golden shiners, largemouth bass, northern pike, pumpkinseed sunfish, walleye, white suckers, and yellow perch. Eagle Feather Reservoir is a popular recreational fishery for the Rosebud Sioux Tribe.

Figure Eagle Feather-1. Eagle Feather Reservoir on the Rosebud Indian Reservation. The white lines indicate electrofishing transects in 2012. (Image credit: www.bing.com/maps)

Results and Discussion

Water quality

Table Eagle Feather-1. Surface water quality values from Eagle Feather Reservoir, Rosebud Indian Reservation in 2010 and 2012.

Month / Year	Temp. (°C)	Dissolved oxygen (mg/L)	pH	Pheno. alkal. (mg/L)	Total alkal. (mg/L)	Conduc-tivity (µS/cm)	Tur-bidity (NTU)
9 / 2012	17.6	10.1	9.3	0	137	269	24
6 / 2010	21.8	13.4	9.1	.	.	371	.

Black crappie

In 2009, approximately 20,000 black crappies were stocked in Eagle Feather Reservoir. The survey conducted in 2010 reported that 29 black crappies were caught (*C*/*f* = 34.7; SE = 8.7; PSD = 4; PSD-P = 0). However, black crappies were not caught in 2012. Mean condition in 2010 (*Wr* = 73) was low and may have been an indicator of problems with the population obtaining sufficient energy (i.e., prey).

Bluegill

The bluegill population in Eagle Feather Reservoir has a very large number (*C*/*f* >1000/hour; Figure Eagle Feather-2) of small (< 150 mm; Figure Eagle Feather-3) individuals. Mean condition (*Wr* = 84; Figure Eagle Feather-4) has decreased since 2010 and growth does not exceed ~180 mm, suggesting that the density of the population is likely too high.

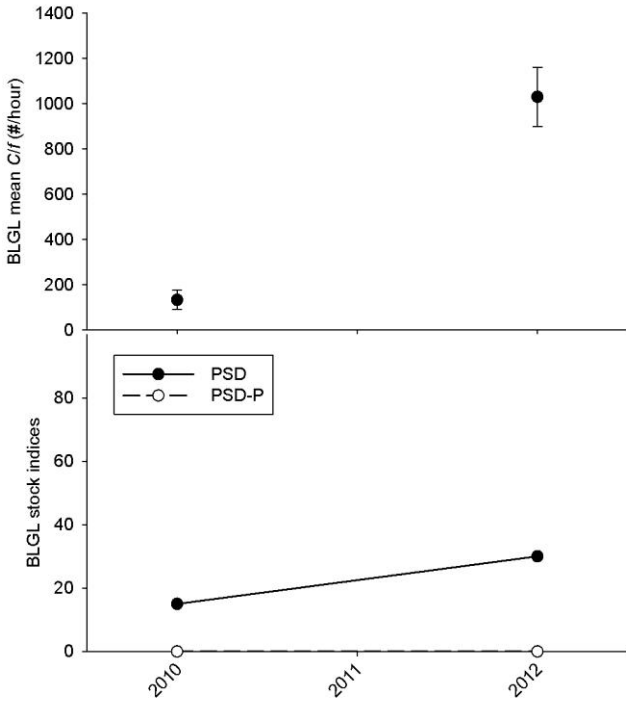

Figure Eagle Feather-2. Mean relative abundance (*C*/*f* ± 1 SE; top panel) and stock indices (bottom panel) of bluegill caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

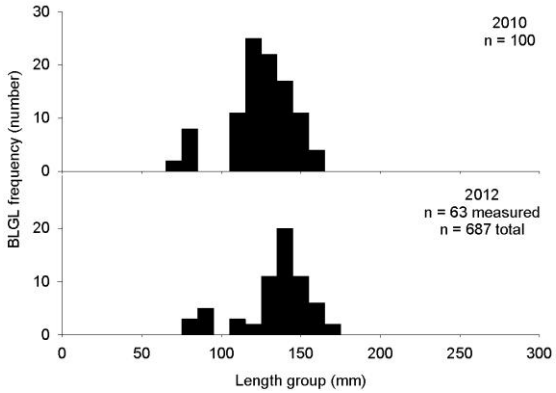

Figure Eagle Feather-3. Length frequency histograms (10 mm groups) of bluegill caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

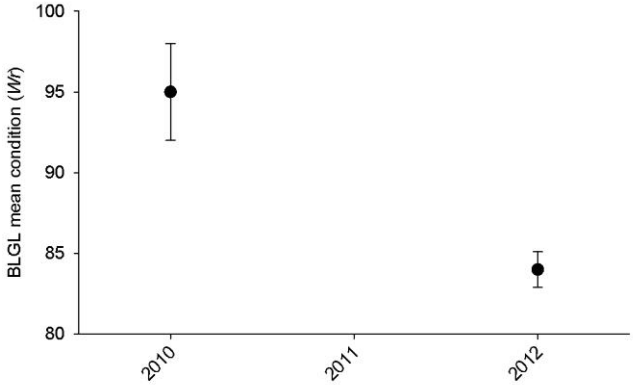

Figure Eagle Feather-4. Mean condition (*Wr*) of bluegill caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing). Error bars represent ± 1 SE.

Golden shiner

Golden shiners were not caught in 2012. One fish (length = 178 mm) was caught in 2010.

Largemouth bass

The largemouth bass population in Eagle Feather Reservoir has not changed much since 2010. Mean relative abundance is low (Figure Eagle Feather-5), but mean condition is good (Figure Eagle Feather-7). Numerous size groups of fish are present including those <100 mm, suggesting that natural reproduction and recruitment is occurring (Figure Eagle Feather-6).

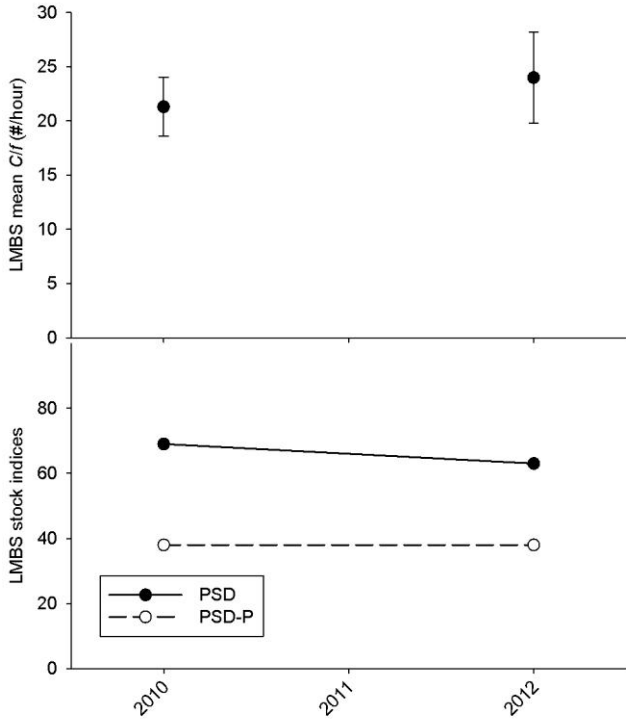

Figure Eagle Feather-5. Mean relative abundance (*C*/*f* ± 1 SE; top panel) and stock indices (bottom panel) of largemouth bass caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

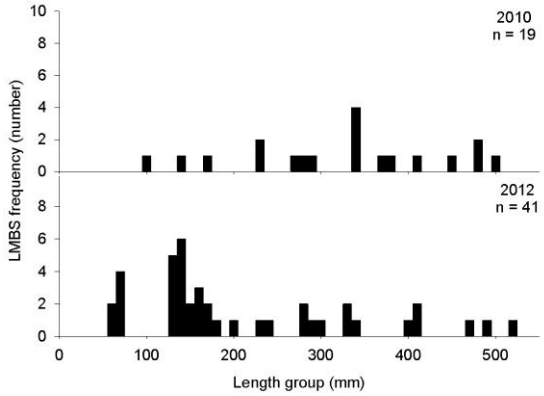

Figure Eagle Feather-6. Length frequency histograms (10 mm groups) of largemouth bass caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

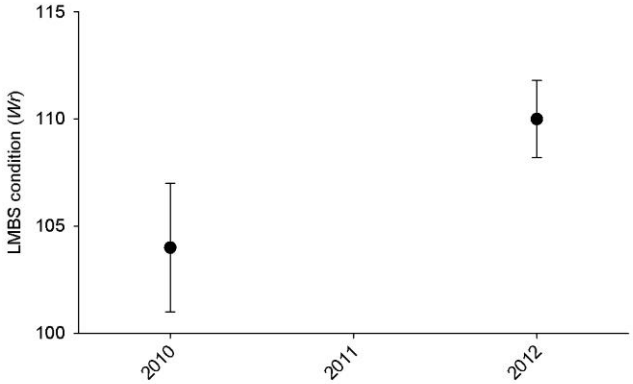

Figure Eagle Feather-7. Mean condition (*Wr*) of largemouth bass caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing). Error bars represent ± 1 SE.

Pumpkinseed sunfish

The pumpkinseed sunfish population has improved since the 2010 survey. Mean relative abundance has increased over 5-fold (*C*/*f* = 128; Figure Eagle Feather-8) and condition is excellent (*Wr* > 100; Figure Eagle Feather-10). The length frequency histograms suggest reproduction, recruitment, and growth are occurring (Figure Eagle Feather-9).

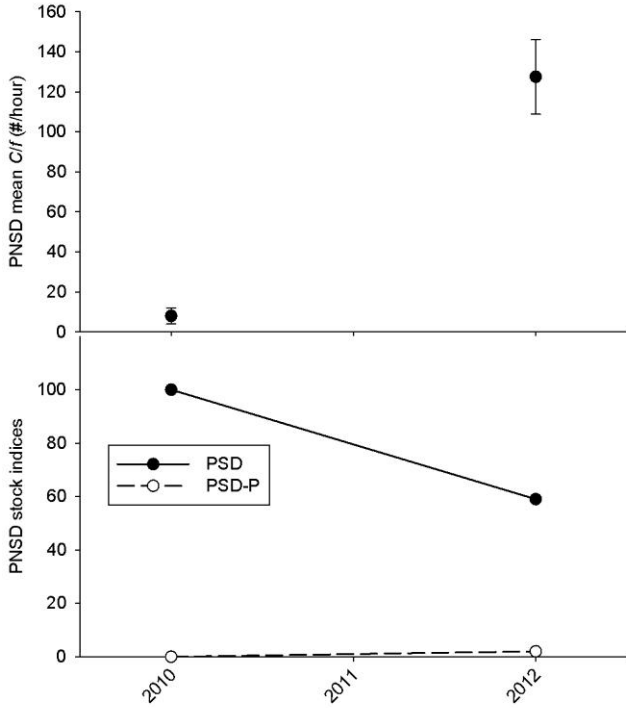

Figure Eagle Feather-8. Mean relative abundance (*C/f* ± 1 SE; top panel) and stock indices (bottom panel) of pumpkinseed sunfish caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

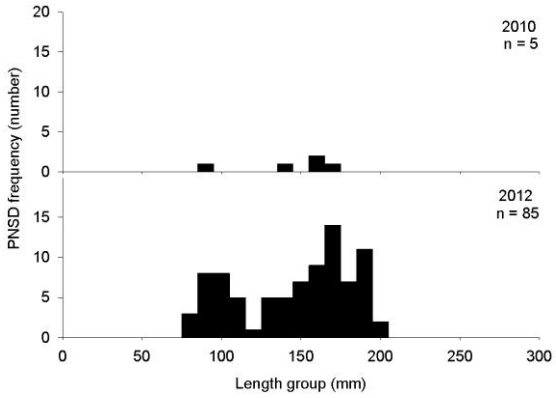

Figure Eagle Feather-9. Length frequency histograms (10 mm groups) of pumpkinseed sunfish caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

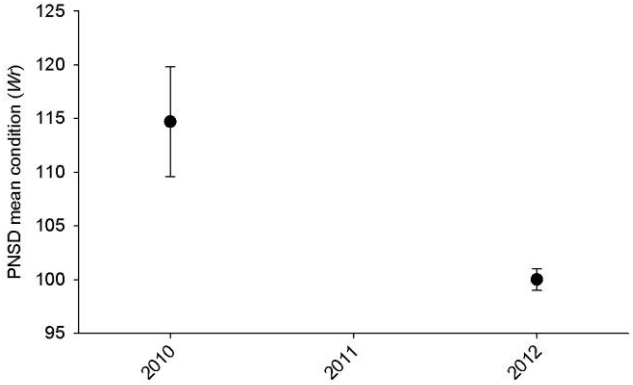

Figure Eagle Feather-10. Mean condition (*Wr*) of pumpkinseed sunfish caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing). Error bars represent ± 1 SE.

Yellow perch

Approximately 22,000 and 10 pounds (number unknown) of fingerling yellow perch were stocked in Eagle Feather Reservoir in 2010 and 2012, respectively. While only four individuals were caught in 2010, the number increased to 46 in 2012. Mean relative abundance was 56 fish/hour (Figure Eagle Feather-11) and most yellow perch were about 150 mm TL (Figure Eagle Feather-12). Mean condition is low (*Wr* < 80; Figure Eagle Feather-13)

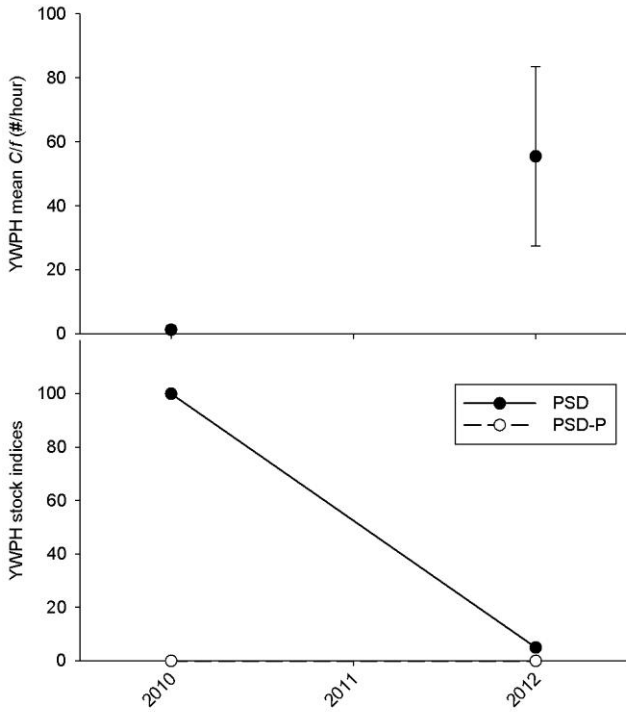

Figure Eagle Feather-11. Mean relative abundance (*C/f* ± 1 SE; top panel) and stock indices (bottom panel) of yellow perch caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

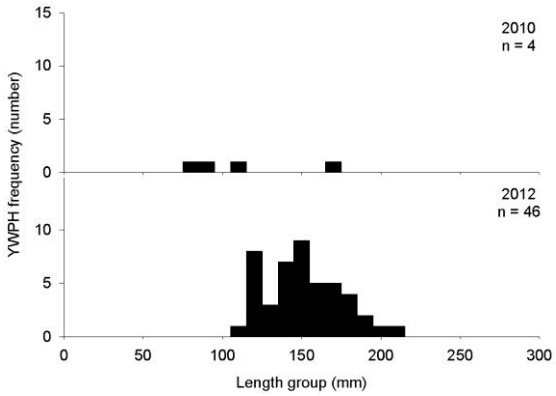

Figure Eagle Feather-12. Length frequency histograms (10 mm groups) of yellow perch caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

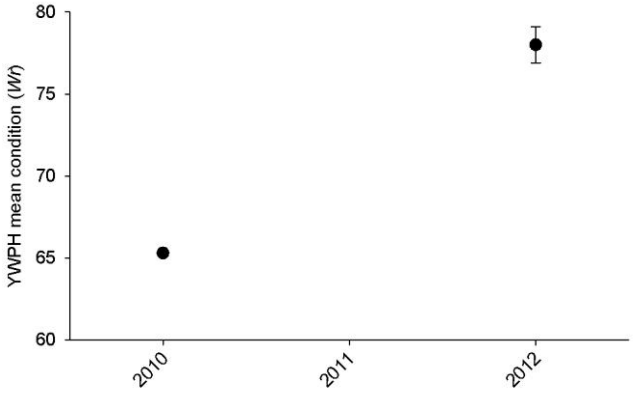

Figure Eagle Feather-13. Mean condition (*Wr*) of yellow perch caught by electrofishing from Eagle Feather Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing). Error bars represent ± 1 SE.

Walleye

Approximately 4,000 walleye fingerlings were stocked in Eagle Feather in 2009. Another 4,400 walleye fingerlings were stocked in 2010. Walleye were not caught during electrofishing in 2010 or 2012, suggesting that the stockings were unsuccessful.

ROSEBUD (SPOTTED-TAIL) RESERVOIR

Introduction

Rosebud Reservoir (Spotted-Tail Reservoir; Figure Rosebud-1; 43.22910 -100.85087) is located within the city of Rosebud. At full pool, the reservoir has a surface area of 3.2 ha (8 ac) and a maximum depth of 4.0 m (13.0 ft.). The Rosebud watershed drains about 14,500 ha (56 mile^2; 36,000 ac). Siltation and extensive vegetation in the reservoir has been common.

The first record of fisheries management in Rosebud Reservoir was from 1951, when the reservoir was chemically treated (rotenone) to remove fish and subsequently stocked with brown trout. From the 1950s to the 1970s, Rosebud was managed as a put-and-take trout fishery. However, the water depth decreased due to siltation and mean water temperatures increased to a level that did not support trout survival, although rainbow trout have been occasionally stocked. Northern pike and channel catfish were stocked in the 1960s and 1970s. Since the 1950s, black bullhead, bluegill, brown trout, creek chubs, fathead minnows, green sunfish, largemouth bass, northern pike, pumpkinseed sunfish, rainbow trout, and white suckers have been caught during fisheries surveys. The reservoir is currently managed for warm water species (e.g., largemouth bass and bluegill).

Rosebud Reservoir is an important fishery, primarily due to its location within the community of Rosebud.

Figure Rosebud-1. Rosebud (Spotted-Tail) Reservoir on the Rosebud Indian Reservation. The white lines indicate electrofishing transects in 2012. (Image credit: www.bing.com/maps)

Results and Discussion

Water quality

Table Rosebud-1. Surface water quality values from Rosebud (Spotted-tail) Reservoir, Rosebud Indian Reservation in 2010 and 2012.

Month / Year	Temp. (°C)	Dissolved oxygen (mg/L)	pH	Pheno. alkal. (mg/L)	Total alkal. (mg/L)	Conduc-tivity (µS/cm)	Tur-bidity (NTU)
9 / 2012	15.5	12.5	8.5	0	154	271	4
6 / 2010	21.4	12.5	8.7	0	137	324	.

Black crappie

In 2010, two black crappies (250 and 260 mm) were caught during the electrofishing survey. Black crappie fingerlings (n = 4,000) were stocked in Rosebud Reservoir in 2009, so the two fish were not likely from this stocking. In 2012, black crappies were not caught during the survey.

Bluegill

Mean relative abundance of bluegill (*C*/*f* = 57) decreased since 2010 (Figure Rosebud-2). However, the population is exhibiting growth (Figure Rosebud-3) and is maintaining good condition (*Wr* > 90; Figure Rosebud-4).

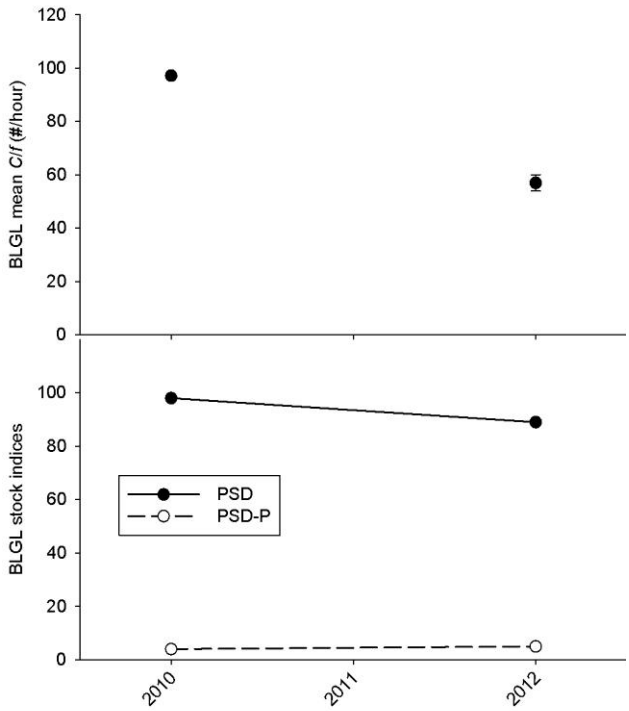

Figure Rosebud-2. Mean relative abundance (*C/f* ± 1 SE; top panel) and stock indices (bottom panel) of bluegill caught by electrofishing from Rosebud Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

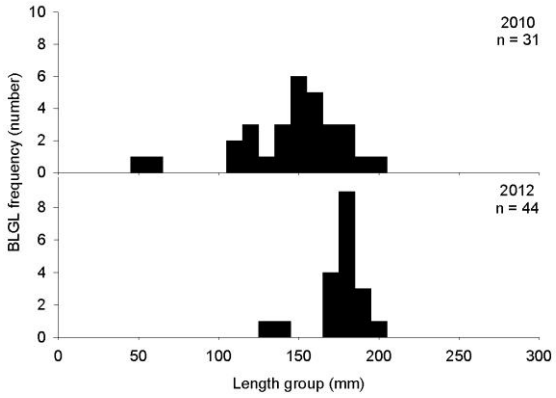

Figure Rosebud-3. Length frequency histograms (10 mm groups) of bluegill caught by electrofishing from Rosebud Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

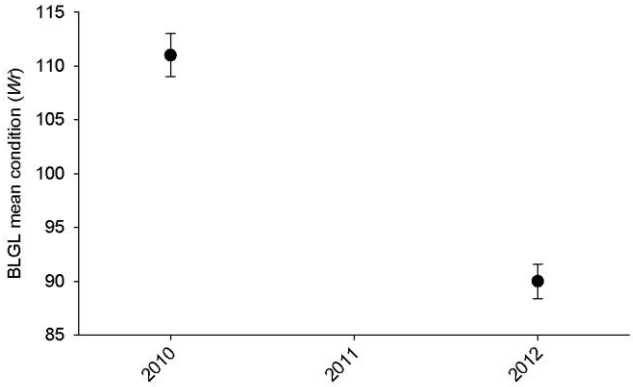

Figure Rosebud-4. Mean condition (*Wr*) of bluegill caught by electrofishing from Rosebud Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing). Error bars represent ± 1 SE.

Largemouth bass

Mean relative abundance (*C*/*f* > 60) of largemouth bass in 2012 has not substantially changed since 2010 (Figure Rosebud-5). Several size classes were present, including those <100 mm, suggesting reproduction and recruitment have occurred (Figure Rosebud-6). However, the majority of individuals were small (<300 mm). Mean condition was excellent (*Wr* > 100; Figure Rosebud-7).

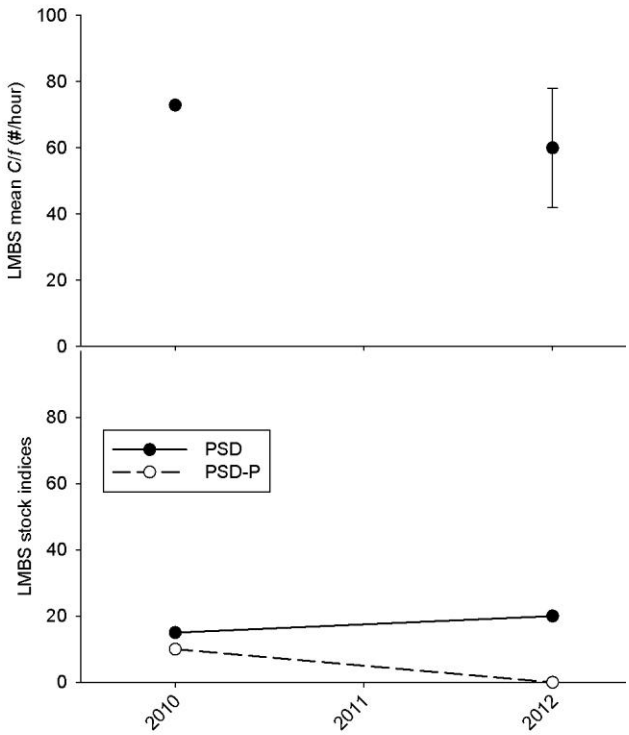

Figure Rosebud-5. Mean relative abundance (*C*/*f* ± 1 SE; top panel) and stock indices (bottom panel) of largemouth bass caught by electrofishing from Rosebud Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

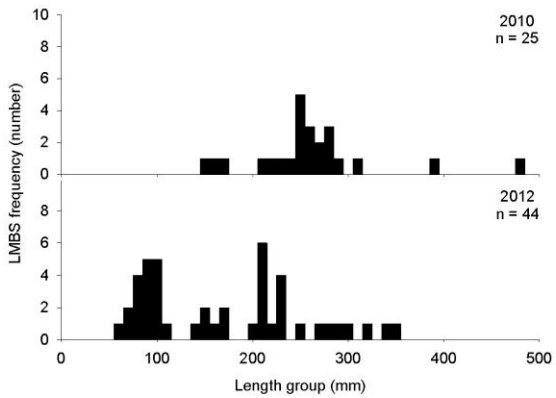

Figure Rosebud-6. Length frequency histograms (10 mm groups) of largemouth bass caught by electrofishing from Rosebud Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing).

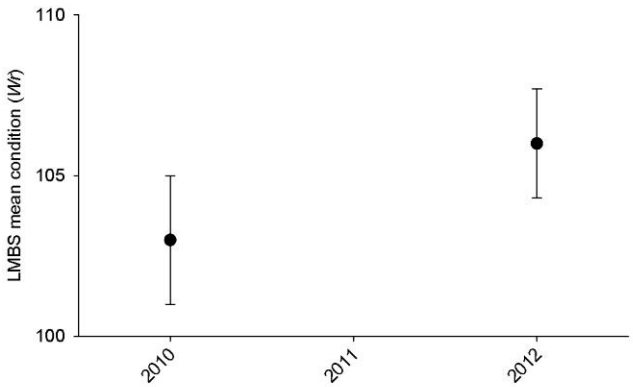

Figure Rosebud-7. Mean condition (*Wr*) of largemouth bass caught by electrofishing from Rosebud Reservoir in 2010 (night electrofishing) and 2012 (day electrofishing). Error bars represent ± 1 SE.

Pumpkinseed sunfish

One pumpkinseed sunfish (176 mm) was caught in 2012.

Rainbow trout

One rainbow trout (270 mm) was caught while electrofishing Rosebud Reservoir in 2010, but none were caught in 2012, although 500 were stocked in the spring (May).

Yellow perch

Approximately 4,000 yellow perch fingerlings were stocked in 2010. However, yellow perch were not caught during the surveys in 2010 or 2012, suggesting the stocking was not successful.

MANAGEMENT RECOMMENDATIONS

General

- Conduct fisheries surveys during the day.
  - In 2012, electrofishing was completed during the day. Research suggests that *C*/*f* is generally better during night electrofishing, but length-frequency and PSD comparisons between day and night electrofishing are similar for many species, especially as water turbidity increases (Dumont and Dennis 1997; Pierce et al. 2001).
  - We observed large numbers of fish during daytime electrofishing, which provided good estimates of size and condition.
  - To monitor and evaluate temporal trends in relative abundance (*C*/*f*), additional daytime electrofishing surveys will need to be completed in the future.
  - Due to increased logistical advantages and decreased cost, we recommend completing future surveys with daytime electrofishing, particularly because current budgets and budget projections suggest that funding will become more limited.
- Survey reservoirs every two years when possible.
  - 2013: Antelope Creek, Ghost Hawk (needs a boat launch), Spring Creek.
  - 2014: Beads, Chases the Woman, Eagle Feather, Indian Scout, and Rosebud reservoirs.
- Consider conducting a creel survey at selected reservoirs to obtain information about angler use and fish harvest information, particularly to evaluate rainbow trout stockings in the spring and harvest of other species during the summer.

Beads Reservoir

- Black crappie, yellow perch, and walleye have not been observed in substantive numbers, despite several attempts at stocking. Consider discontinuing the stocking of these species.
- Bluegill numbers were high, but fish were small and condition was low. Bluegill numbers should be decreased to reduce any competition with limited food resources to potentially increase growth. One way to reduce numbers is to increase the abundance largemouth bass >300 mm, which would increase predation on smaller bluegill. Consider a largemouth bass regulation limiting harvest to those >381 mm (15 in). Alternatively, stocking sub-adult to adult largemouth bass (trap and transfer) could be done.
- Encourage anglers to harvest bluegill, particularly smaller individuals.

Chases the Woman Reservoir

- The reservoir is essentially composed of a large number of small largemouth bass. Based on the large number and because length did not exceed 300 mm (12 in), the population is likely prey limited. Black crappie or yellow perch do not appear to be successful in the reservoir. Consider stocking (trap and transfer) either pumpkinseed sunfish or bluegill to increase forage for largemouth bass.

Eagle Feather Reservoir

- Discontinue stocking black crappie and walleye. The data do not suggest the stockings were successful.
- Yellow perch have shown signs of success. Continue to stock when available.
- While the bluegill population is composed of large numbers of small individuals, the pumpkinseed sunfish population is excellent. The largemouth bass population had a small

relative abundance, but the size structure was composed of numerous sizes, including some large fish. Monitor these three species. If pumpkinseed sunfish continue to do well, do not change anything.

Indian Scout Reservoir

- The largemouth bass population is doing well. Largemouth bass are self-sustaining and growth appears sufficient.
- Consider stocking pumpkinseed sunfish (trap and transfer) to provide an additional game fish and to provide forage for largemouth bass.

Rosebud (Spotted-tail) Reservoir

- Discontinue stocking yellow perch and black crappie because the data does not suggest they are successful.
- Manage as largemouth bass, bluegill fishery.

ACKNOWLEDGMENTS

We thank Frank Vanderwalker and Wes Plank of the Rosebud Sioux Tribe Department of Game, Fish, and Parks for assisting with the electrofishing surveys. We thank Jake Billings for field work assistance and Robert Klumb for providing a review of this report, both from the U.S. Fish and Wildlife Service, Great Plains Fish and Wildlife Conservation Office.

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APPENDICES

Appendix 1. Common and scientific names of fishes found on the Rosebud Indian Reservation.

Common name	Acronym	Scientific name
Black bullhead	BKBH	*Ameiurus melas*
Black crappie	BKCP	*Pomoxis nigromaculatus*
Bluegill	BLGL	*Lepomis macrochirus*
Channel catfish	CNCF	*Ictalurus punctatus*
Common carp	CARP	*Cyprinus carpio*
Creek chub	CKCB	*Semotilus atromaculatus*
Fathead minnow	FHMW	*Pimephales promelas*
Golden shiner	GDSN	*Notemigonus crysoleucas*
Green sunfish	GNSF	*Lepomis cyanellus*
Largemouth bass	LMBS	*Micropterus salmoides*
Northern pike	NTPK	*Esox lucius*
Pumpkinseed	PNSD	*Lepomis gibbosus*
Rainbow trout	RBTT	*Oncorhynchus mykiss*
Walleye	WLYE	*Sander vitreum*
White sucker	WTSK	*Catostomus commersonii*
Yellow perch	YWPH	*Perca flavescens*

Appendix 2. Length category and fish condition parameters.

Appendix 2-1. Minimum total length (mm) for management length categories proposed by Gabelhouse (1984) for selected fish species commonly observed in Rosebud Indian Reservation reservoirs.

Species	Stock	Quality	Preferred	Memorable	Trophy	Reference
Black bullhead	150	230	300	380	450	Gabelhouse 1984
Black crappie	130	200	250	300	380	Gabelhouse 1984
Bluegill	80	150	200	250	300	Gabelhouse 1984
Green sunfish	80	150	200	250	300	Gabelhouse 1984
Largemouth bass	200	300	380	510	630	Gabelhouse 1984
Northern pike	350	530	710	860	1120	Gabelhouse 1984
Pumpkinseed	80	200	250	300	380	Gabelhouse 1984
Yellow perch	130	200	250	300	380	Gabelhouse 1984

Appendix 2-2. Intercept (a) and slope (b) parameters for standard weight (Ws) equations and the minimum total length (TL, mm) recommended for calculating relative weight (*Wr*).

Species	Intercept (a)	Slope (b)	Minimum TL	Reference
Black crappie	-5.618	3.345	100	Neumann and Murphy 1991
Bluegill	-5.374	3.316	80	Hillman 1982
Largemouth bass	-5.528	3.273	150	Henson 1991
Northern pike	-5.437	3.059	100	Willis 1989
Pumpkinseed	-5.179	3.237	50	Liao et al. 1995
Yellow perch	-5.386	3.230	100	Willis et al. 1991

Appendix 3. Glossary of fisheries terms.

Alkalinity: a measure of the resistance of water to change in pH, expressed in mg/L or ppm. Because alkalinity is dependent on minerals such as calcium (Ca) and is related to aquatic vegetation production, alkalinity is an indicator of a water body's potential to produce biomass. An alkalinity value less than 40 mg/L is considered soft water while a value greater than 40 mg/L is considered hard water.

Catch per unit effort (*C*/*f*): an index of abundance used to document relative changes over time (also known as relative abundance), calculated as,

$$C/f = \frac{\text{number of fish (per length group, category, or sample)}}{\text{effort in unit of time (e.g., hour or net night)}}$$

Conductivity: a measure of water's ability to conduct electrical current, which is dependent on the amount of ions in the water. Total dissolved solids (TDS) are equal to ~0.5*conductivity. Conductivity is an approximate measure of a water body's productivity due to a relationship between minerals and productivity.

Effort: the amount of time expended in collecting a sample (e.g., hours, minutes, or net nights). Effort is used to calculate C/f.

Memorable length: the length of a fish (unique to each species) considered as the length that most anglers remember catching, quantified as 59–64% of the world record length for that species.

Net-night: a unit of time (i.e., overnight, <24 hr.) describing the effort expended for a sampling gear, such as a gill net or trap net. For example, if five gill nets were left in the water overnight, five gill net nights of effort were expended.

pH: a measure of how basic or acidic water is. Pure water is considered neutral with a pH of 7. Because pH is on a log10 scale, a change of 1 pH unit equates to a 10-fold increase in H^+ (hydrogen ions).

Preferred length: the length of a fish (unique to each species) that is considered the preferred length that most anglers want to catch, quantified as 45–55% of the world record length for that species.

Proportional size distribution (PSD): the percentage of a sample of stock length fish that are also greater than the number of fish ≥ a fish's length category (i.e., quality, preferred, memorable, trophy), calculated as,

$$\text{PSD} = \frac{\text{number of fish} \geq \text{quality length}}{\text{number of fish} \geq \text{stock length}} \text{ X } 100$$

$$\text{PSD} - \text{P} = \frac{\text{number of fish} \geq \text{preferred length}}{\text{number of fish} \geq \text{stock length}} \text{ X } 100$$

$$\text{PSD} - \text{M} = \frac{\text{number of fish} \geq \text{memorable length}}{\text{number of fish} \geq \text{stock length}} \text{ X } 100$$

$$\text{PSD} - \text{T} = \frac{\text{number of fish} \geq \text{trophy length}}{\text{number of fish} \geq \text{stock length}} \text{ X } 100$$

Relative weight (W_r): an index of the condition, or general well-being, of a fish, calculated as,

$$W_r = \frac{\text{weight (W)}}{\text{standard weight (Ws)}} \times 100$$

where W is the weight (g) of an individual fish and Ws is a length specific standard weight.

Quality length: the length of a fish (unique to each species) that is considered the minimum length most anglers would keep, quantified as 36–41% of the world record length for that species.

Standard error (SE): the **standard** deviation of the sampling distribution of a statistic, calculated as,

$$\frac{\text{standard deviation}}{\sqrt{\text{n}}}$$

or,

$$\sqrt{\frac{\text{variance}}{\text{n}}}$$

where n is the sample number.

Standard weight: weight of a fish standardized by regression of weight on length for a particular species, often determined by the 75th percentile weight rather than average weight in a length-class.

Stock length: the length of a fish (unique for each species) considered as the length that a fish reaches sexual maturity, quantified as 20–26% of the world record length for that species.

Trophy length: the length of a fish (unique to each species) considered to be a length worthy of acknowledgement, quantified as 74–80% of the world record length for that species.

Variance: a measure of the dispersion around the average of the sample, calculated as,

$$(\text{observed value} - \text{sample mean})^2$$

Appendix 4. Fish stocking history in Rosebud Indian Reservation reservoirs. Stocking size acronyms are fry (FY; hatch to 1.49 in), fingerlings (FG; 1.5 to 5.49 in), sub-adult (SA; ≥ 5.5 in, not sexually mature), adult (AD; sexually mature, regardless of size), and mixed (MX; transplanted from natural sources).

		Largemouth bass		Yellow perch		Rainbow trout			Black Crappie		Walleye	
Reservoir	Year	N	Size	N	Size	Month	N	Size	N	Size	N	Size
Antelope Creek	2010	13,600	FG									
Beads	2012										15,000	FG
	2010			21,000	FG						4,200	FG
	2009	3,500	FG						15,000	FG	3,500	FG
Chases Woman	2012			10 lbs.	FG	May	450	AD				
	2010						800	AD				
	2009	400	FG				400	AD	1,500	FG		
Eagle Feather	2012			10 lbs.	FG							
	2010			22,000	FG						4,400	FG
	2009	4,000	FG						20,000	FG	4,000	FG
Ghost Hawk	2012			10 lbs.	FG	May	500	AD				
	2010						900	AD				
	2009	1,200	FG	5,000	FG							
Indian Scout	2012					Oct.	260	AD				
						May	720	AD				
	2010			1,250	FG							
Rosebud	2012					Oct.	250	AD				
						May	500	AD				
	2010			4,000	FG							
	2009	800	FG						4,000	FG		
Spring Creek	2010			37,500	FG							