SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F21-R-47

Name: Sheridan Lake **County:** Pennington

Legal description: Sec. 11-14 T1S R5E; and Sec. 7 T1S R4E
Location from nearest town: 5 miles east and 2 miles north of Hill City, SD
Dates of present survey: June 18, June 9-10, and July 20-21, 2015
Date last surveyed: June 12, and July 21-22, 2014
Most recent lake management plan: Included in B.H. Reservoirs Plan Date: 2015-2019
Management classification: Warmwater permanent
Contour mapped: June 2012

Primary Species: (game and forage)	Secondary and other species:
1. Rainbow trout	1. Northern pike
2. Yellow perch	2. Golden shiner
3. Black crappie	3. Green sunfish
4. Largemouth bass	4. White sucker
5. Smallmouth bass	5. European rudd
6.	6. Black bullhead
7.	7. Rock bass
8.	8. Brown trout

PHYSICAL CHARACTERISTICS

Surface Area: 383 acres **Watershed:** 95,311 acres
Maximum depth: 96 feet **Mean depth:** 30 feet
Lake elevation at survey: unknown (full)

Ownership of lake and adjacent lakeshore property

Sheridan Lake was constructed by the Civilian Conservation Corps for recreational purposes in 1939. Sheridan Lake and its dam are maintained and operated by the United States Forest Service (USFS). The operation and maintenance of campgrounds, picnic areas, parking lots, and boat launch facilities are managed under a special use permit by non-government entities. These entities also cooperate with the USFS during major maintenance and improvement in the off season. The marina and concession operations are leased to private enterprise under other long-term use permits (Personal communication with Amy Ballard, USFS, 1995).

Land use

The ownership of the Sheridan Lake watershed is 85.8% USFS (81,818 ac) and 14.2% private (13,493 ac) (Personal communication Jon Macy, USFS, 1994). The bulk of USFS land is managed for timber production, but is also grazed through a permit process. Most of this land is covered by pine or spruce forest interspersed with meadows. Logging, thinning, and other timber management practices are ongoing. All of these activities contribute to the sediment load into Sheridan Lake carried by Spring and Horse Creeks. Private land is often less forested and more often used as horse pasture, cattle grazing land, home sites, or campgrounds. The watershed also contains the town of Hill City and several other small developments. Small reservoirs including Mitchell, Major, Newton Fork and several unnamed farm ponds are located

within the watershed. Most of the watershed consists of hills with moderate to steep inclines. Roads and trails are prevalent throughout the watershed.

Fishing Access

Sheridan Lake has boat launches on the north and south ends of the lake. Shore fishing is accessible via roads at both locations with floating fishing docks in both locations. Several floating docks are also located at a parking lot off of SD Hwy 385 on the west end of the lake. This area was renovated in the fall of 2012 to include a concrete stairway, ADA accessible ramp to the fishing piers and ice fishing access. Improvements were also made to the south boat ramp at the same time.

Observations of Water Quality and Aquatic Vegetation

Abundant emergent vegetation, primarily cattails, is present in the shallow ends of bays, along shallow shoreline areas, and near the inlets of Spring and Horse Creeks. Submergent vegetation is abundant throughout the lake at depths of six to eight feet. Algae blooms sometimes occur during the summer months and filamentous algae is found at times along the shoreline. Sheridan Lake is also infested with curly leaf pond weed which fills some bays.

Siltation occurs at all inlets, especially the Spring Creek and Horse Creek inlets, and is caused by agricultural use (grazing), timber/logging operations, highway runoff, and natural erosion.

Observations on condition of structures, (i.e. spillway, level regulators, boat ramps, etc.)

A faulty valve in the dam prevented controllable water releases from Sheridan Lake into Spring Creek during 2003. This valve was repaired in late 2004 and attempts have been made recently to open the valve, but it is not a part of lake or stream management at this time. Recent higher water years, since 2008 have allowed water to go over the spillway, significantly adding to flows in Spring Creek.

MANAGEMENT OBJECTIVES

Objective 1. Maintain a mean gill net yellow perch PSD of 30-60

Objective 2. Maintain a rainbow trout through stocking catchable size fish at an annual rate near 50/surface acre.

Objective 3. Maintain a smallmouth bass population with a minimum nighttime electrofishing CPUE for stock-length fish of 20, PSD range between 40 and 70, and a PSD-P equal to or greater than 10. Stock up to 500 adult smallmouth bass in 2015 and 2016

Objective 4. Maintain a largemouth bass population with a minimum nighttime electrofishing CPUE for stock-length and longer fish equal to or greater than 40, PSD range between 40 and 70, and a PSD-P near 10.

Objective 5. Determine feasibility of managing a northern pike fishery by January 2019.

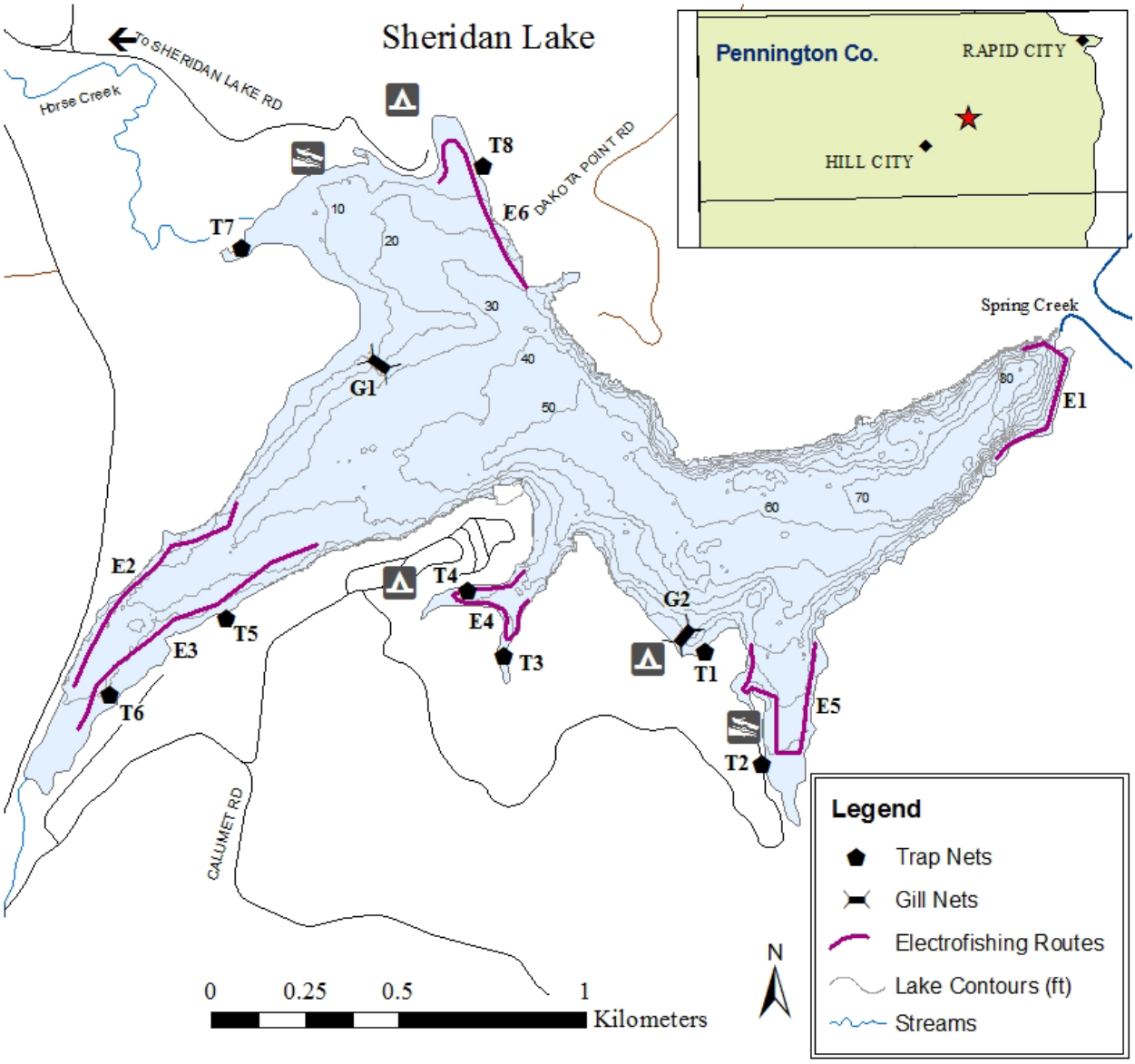

Figure 1. Locations of sampling gears used in the fish population survey of Sheridan Lake, Pennington County, 2015.

BIOLOGICAL DATA

Sampling Effort

A modified fyke (trap) net survey consisting of eight net nights was completed on June 9-10, 2015. In addition, two gill nets were set on July 20, 2015 (Table 1, Figure 1). Gill nets remained in the water overnight for a total of two net nights.

Night electrofishing was conducted at Sheridan Lake on June 18, 2015 to sample largemouth bass and smallmouth bass. Six 10-minute sites were completed.

Table 1**.** Net locations for 2015 fisheries survey of Sheridan Lake, Pennington County.

Set Date	Net #	UTM Lat	UTM Long
6/9	Trap 1	4869584	623295
6/9	Trap 2	4869283	623447
6/9	Trap 3	4869573	622758
6/9	Trap 4	4869748	622663
6/9	Trap 5	4869674	622017
6/9	Trap 6	4869471	621708
6/9	Trap 7	4870662	622060
6/9	Trap 8	4870880	622702
7/22	Gill 1	4870380	622394
7/22	Gill 2	4869664	623225

Results and Discussion

Twelve species of fish were caught in trap nets and four species were caught in gill nets. Yellow perch made up the majority of the catch with 33% and 73% for trap and gill nets, respectively. (Tables 2 & 3). Discussion on primary species sampled during this survey completes this report.

Table 2. Total catch of eight trap nets set in Sheridan Reservoir, Pennington County on June 9-10, 2015. Parameters are reported with confidence intervals.

Species	N	CPUE (80%)	CPUE-S (80%)	PSD (90%)	PSD-P (90%)	*Wr*≥S (90%)
Black bullhead	51	6.4 (3.8)	6.1 (3.8)	86 (8)	35 (11)	113.9 (6.0)
Black crappie	79	9.9 (7.6)	9.7 (7.5)	37 (9)	1 (2)	104.1 (0.2)
Golden shiner	4	0.5 (0.5)	-	-	-	-
Green sunfish	5	0.6 (0.4)	0.6 (0.4)	20 (33)	0	117.0 (3.9)
Largemouth bass	1	0.1 (0.2)	0	0		88.6*
Northern pike	3	0.4 (0.3)	0.2 (0.2)	50 (50)	0	106.1 (73.1)
Rainbow trout	14	1.8 (1.6)	1.8 (1.6)	29 (22)	0	80.9 (2.8)
Rock bass	67	8.4 (3.7)	7.8 (3.3)	19 (9)	0	102.1 (1.3)
European rudd	26	3.25 (4.2)	3.25 (4.2)	100	69 (16)	-
Smallmouth bass	2	0.25 (0.4)	0.25 (0.4)	50 (50)	0	94.8
White sucker	1	0.1 (0.2)	0.1 (0.2)	100	100	94.5
Yellow perch	123	15.4 (7.1)	14.6 (7.0)	56 (7)	6 (4)	92.6 (0.6)

**Wr* for substock fish

Table 3. Total catch for two 150 ft experimental gill nets set in Sheridan Lake, Pennington County on July 21, 2015. Parameters are reported with confidence intervals.

Species	N	CPUE (80%)	CPUE-S (80%)	PSD (90%)	PSD-P (90%)	*Wr*≥S (90%)
Black crappie	15	7.5 (23.1)	7.5 (23.1)	47 (23)	0	83.7 (8.5)
Northern pike	3	1.5 (1.5)	1.5 (1.5)	67 (33)	0	90.3 (12.4)
Rainbow trout	12	6.0 (0)	6.0 (0)	25 (23)	0	80.1 (4.5)
Yellow perch	80	40.0 (18.5)	40.0 (18.5)	69 (8)	3 (2)	100.0 (1.0)

<u>Largemouth bass</u>

During one hour of night boat electrofishing, 106 largemouth bass were captured (Table 4). This is similar to 2012-2014 and over twice as many fish than in 2008-2011. However, surveys prior to 2011 were completed in September.

Sheridan Lake is managed under a 15 inch (381 mm) minimum regulation for largemouth bass. The size structure of largemouth bass has been good with a PSD (>300 mm) of 50 and PSD-P (>380 mm) of 17 in 2015. This is exceeding the management goal of a PSD value of 40 to 60 and a PSD-P value of 10. Length-frequency histogram shows a sample of fish ranging from 50 mm to over 490 mm (19.3 in) with at least three year class nodes present (Figure 3). Fish relative weight (*Wr*) continues to be very good, ranging from 99 to 106 over the past ten years.

Aging of largemouth bass from the 2014 survey indicated most were three to seven years old (Table 4). Some fish were aged past seven; however, their values are not included due to lack of confidence in reliable age estimates. On average, largemouth bass ranged one to two inches per year slower than the SD mean and half an inch per year slower than the Region 1 (western SD) mean (Figure 2) (Willis et. al 2001). They are reaching stock length (200 mm or 8 in) at about three years of age; whereas statewide they reach this at two to three years.

Table 4. Results of largemouth bass captured during night electrofishing surveys of Sheridan Lake, Pennington County, 2005 - 2015.

Month/Year	N	Effort (sec)	CPUE (80%)	CPUE-S (80%)	PSD (90%)	PSD-P (90%)	*Wr*≥S (90%)
9/2005	57	3,488	58 (23)	33 (20)	39 (14)	0	99 (1.3)
9/2007	111	3,450	115 (25)	102 (23)	26 (8)	1 (2)	104 (0.6)
9/2008	54	3,600	54 (22)	46 (19)	61 (12)	9 (7)	105 (1.7)
9/2009	50	3,550	50 (17)	37 (13)	43 (14)	0	104 (1.1)
9/2010	62	3,600	62 (39)	42 (30)	31 (12)	7 (7)	101 (1.8)
5/2011	52	3,676	52 (19)	50 (19)	34 (11)	10 (7)	98 (1.4)
6/2012	113	2,400	170 (50)	152 (59)	42 (9)	6 (4)	107 (1.0)
6/2013	101	3,600	101 (20)	75 (15)	56 (10)	5 (4)	106 (0.2)
6/2014	107	3,600	107 (25)	75 (19)	64 (9)	17 (8)	99 (0.3)
6/2015	106	3,600	106 (32)	55 (21)	51 (11)	16 (8)	106 (1.2)

Table 5. Length (mm) at age (yr) for largemouth bass surveyed in Sheridan Lake, Pennington County by night electrofishing in 2015, with population means for 2012-2015 and the statewide and region 1 (western S.D.) means.

Age →			1	2	3	4	5	6	7
Year	Age	N							
2014	1	1	138						
2013	2	2	108	155					
2012	3	22	78	135	181				
2011	4	25	58	117	173	206			
2010	5	8	63	145	191	239	263		
2009	6	15	74	139	213	270	318	349	
2008	7	7	90	164	235	295	324	362	389
2015 mean			82	138	193	246	292	334	352
2014 mean			73	142	205	264	305	337	355
2013 mean			69	139	202	257	292	321	351
2012 mean			67	119	167	221	267	302	326
Statewide mean			96 (3)	182 (6)	250 (7)	305 (8)	342 (8)		
Region 1 mean			78 (4)	154 (10)	214 (11)	272 (13)	318 (13)		

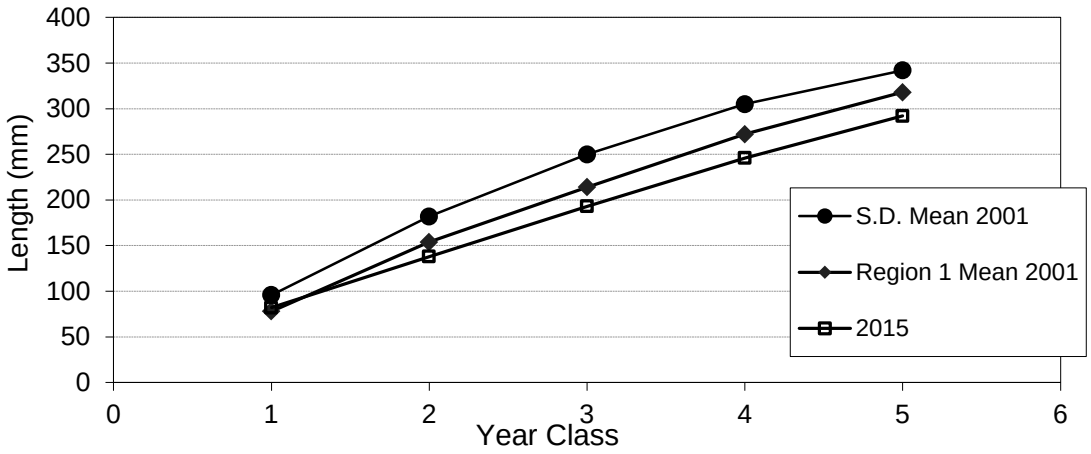

Figure 2. Length-at-age for largemouth bass captured in Sheridan Lake, Pennington County by night electrofishing in 2015 plotted with the South Dakota mean and Region 1 (western South Dakota) mean.

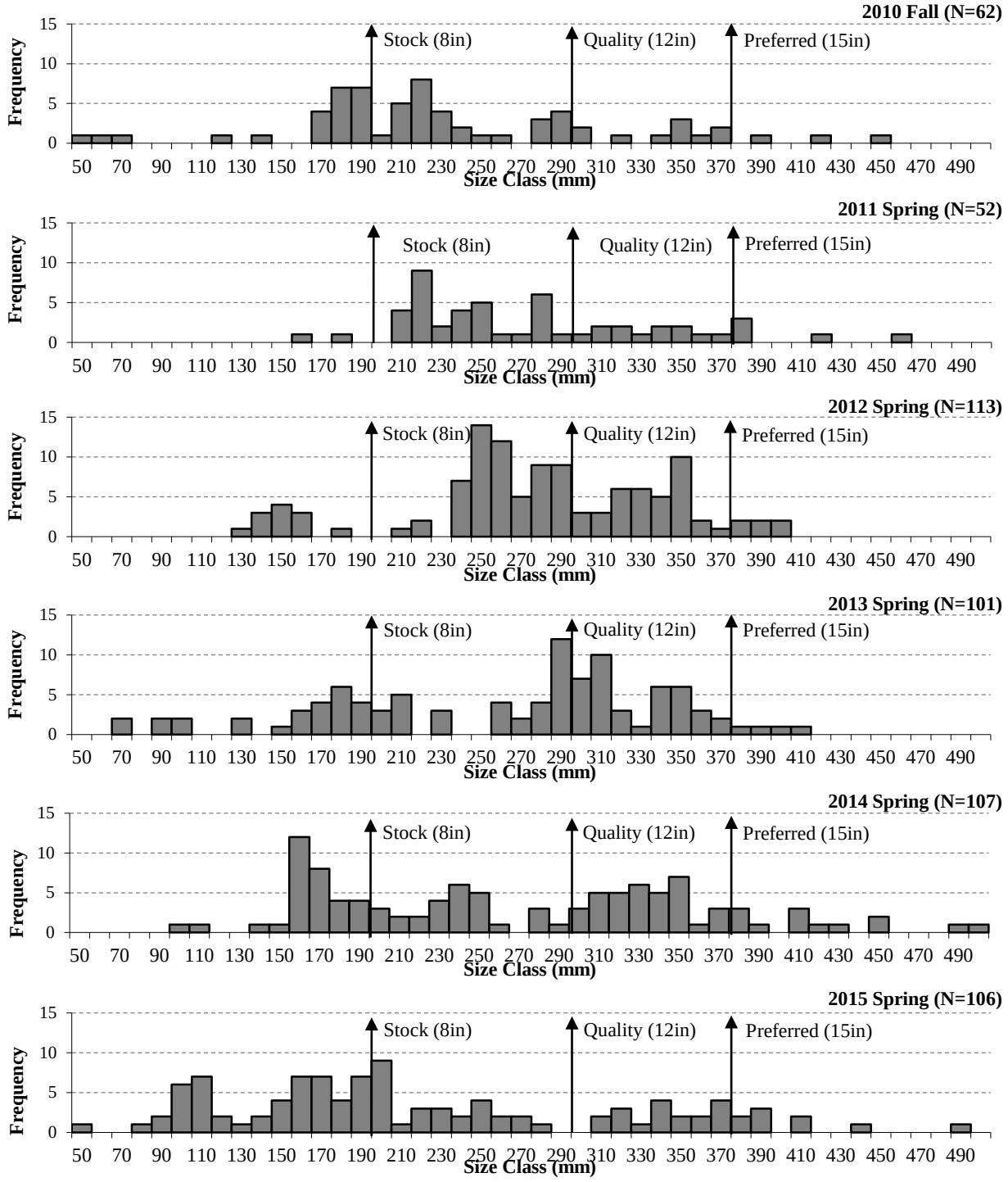

Figure 3. Length frequency histograms for largemouth bass collected by night electrofishing from Sheridan Lake, Pennington County, 2010-2015.

Smallmouth bass

Smallmouth bass fingerlings were stocked into Sheridan Lake in 2010 and 2011 (13,400 total), with adults stocked in 2011 and 2012 (485 total). During the 2014 and 2015 electrofishing survey, one of the six passes was altered in order to include the face of the dam and adjacent shorelines. Eleven smallmouth bass were captured ranging 95-260mm, all less than quality length (280 mm/11 in). The management goal for the future of smallmouth bass in Sheridan Lake is to maintain a population with a minimum nighttime electrofishing CPUE for stock-length fish of 20, PSD range between 40 and 70, and a PSD-P equal to or greater than 10.

Table 6. Results of smallmouth bass captured during night electrofishing surveys of Sheridan Lake, Pennington County, 2014 and 2015.

Month/Year	N	Effort (sec)	CPUE (80%)	CPUE-S (80%)	PSD (90%)	*Wr*≥S (90%)
6/2014	8	3,600	10 (14.8)	5 (7.4)	60 (40)	89.1 (7.7)
6/2015	11	3,600	11 (9.5)	3 (3.0)	0	103.6 (10.2)

Yellow perch

Gill net catch per unit effort of yellow perch improved in 2011-2014 although it was about half as high in 2014 and 2015 as in 2013 (Table 7). Proportion of yellow perch over quality length (PSD) increased in 2015 from 2014. These values are slightly exceeding the management goal of a PSD of 30-60. Relative weight for yellow perch captured in gill nets has been excellent and remained relatively constant with values over 100.

Length frequency histogram shows a sample of fish ranging from 140-265 (Figure 4) with no apparent age class nodes. Yellow perch in Sheridan Lake may not grow much over 240 mm possibly due to high fishing pressure and/or lack of forage. A winter creel census was completed in 2010-2011 and estimated that anglers harvested around 7,700 perch in Jan-March, with a high proportion of harvested fish over 220 mm (Simpson 2011).

Otoliths were taken from yellow perch captured in gill nets (Table 8). A majority of fish were aged at two to four years old with a large age three year class. While some Sheridan Lake yellow perch do exhibit faster growth reaching quality length (200 mm or 8 in) around age-3, on average it takes four years for them to grow to this length. This is similar to the South Dakota scale aged mean but faster than the Region 1 (Western South Dakota) mean (Willis et. al, 2001).

Table 7. Catch data, stock indices, and condition for yellow perch captured with gill nets in Sheridan Lake, Pennington County, 2004 - 2015. Confidence intervals are reported in parentheses.

Year	N	Effort	CPUE (80%)	CPUE-S (80%)	PSD (90%)	PSD-P (90%)	*Wr*-S (90%)
2004	231	2	115.5 (113.9)	115.5 (113.9)	81 (4)	7 (3)	98.1 (0.4)
2005	89	2	44.5 (84.6)	44.5 (84.6)	83 (6)	8 (5)	97.4 (0.7)
2006	193	2	96.5 (238.5)	71.0 (160.1)	78 (6)	1 (2)	99.4 (0.5)
2007	54	2	27.0 (15.4)	27.0 (15.4)	93 (6)	11 (7)	96.5 (0.8)
2008	92	2	46.0 (12.3)	46.0 (12.3)	98 (3)	20 (7)	100.4 (0.1)
2009	21	2	10.5 (13.8)	10.5 (13.8)	100	24 (17)	100.3 (2.3)
2010	14	4	3.5 (3.1)	3.5 (3.1)	93 (13)	14 (17)	103.5 (2.5)
2011	148	2	74.0 (0)	74.0 (2.0)	74 (8)	10 (4)	101.8 (1.2)
2012	219	2	110.0 (60.0)	108.0 (55.0)	79 (4)	11 (3)	106.2 (0.4)
2013	162	2	81.0 (156.9)	80.5 (155.4)	64 (6)	18 (5)	100.4 (0.7)
2014	82	2	41.0 (6.2)	40.0 (9.2)	40 (9)	1 (2)	105.5 (0.2)
2015	80	2	40.0 (18.5)	40.0 (18.5)	69 (8)	3 (2)	100.0 (1.0)

Table 8. Sheridan Lake, Pennington County yellow perch minimum, maximum, and weighted mean lengths (mm) by age (from otoliths) for fish caught in experimental gill nets during the 2015 fishery survey, and Region 1 and Statewide mean lengths by age (from scales) (Willis et al. 2001).

Age	Minimum	Weighted Mean length	Maximum	N	Region 1 Mean	S. Dakota Mean
2	141	188	228	9	117	145
3	183	202	241	43	158	190
4	214	227	239	22	186	220
5	265	265	265	2	208	242
6	244	244	244	2	-	-

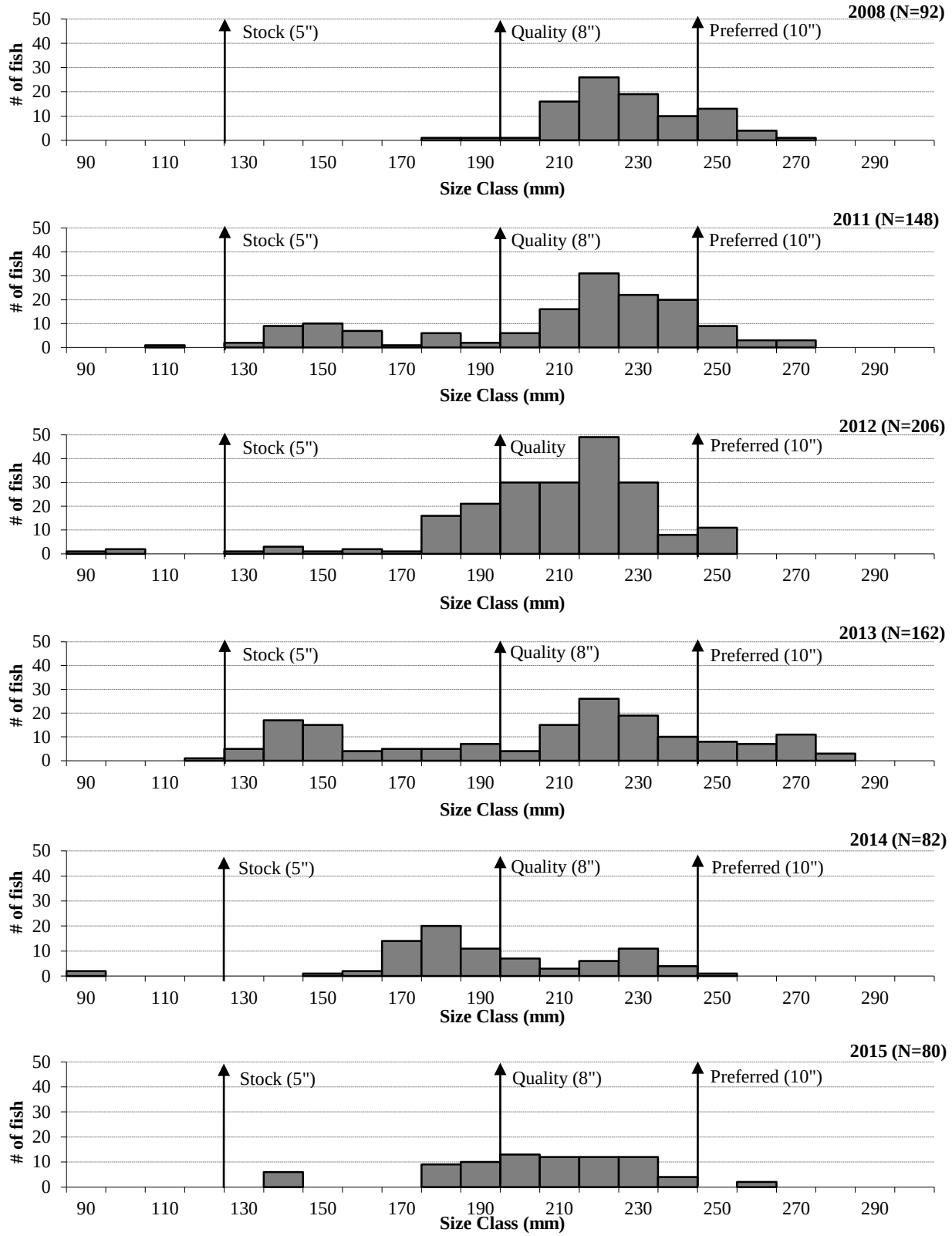

Figure 4. Length frequency histogram for yellow perch captured during gill net surveys of Sheridan Lake, Pennington County, 2008, 2011-2015.

Rainbow trout

Fourteen rainbow trout ranging 310-415 mm were captured in gill nets during the 2015 survey. Sheridan Lake was stocked with 10,000 catchable (around 280 mm) rainbow trout in April and May, over two months prior to the survey. A number of anglers report having high catch rates of rainbow trout over 355 mm (14 in), indicating either a fast growth rate or carryover from prior years' stockings.

RECOMMENDATIONS

1. Continue stocking rainbow trout at current stocking rate.

2. Conduct annual lake survey in 2016.
    a. YSI water chemistry profiles should be taken prior to net placement when gill netting.
    b. Conduct night electrofishing during the spring for largemouth and smallmouth bass.

LITERATURE CITED

Simpson, Greg. 2011. Angler Use and Harvest Survey on Sheridan Lake, South Dakota, January - March, 2011. South Dakota Game, Fish and Parks Completion Report F-21-R-43. Pierre, SD.

Willis, David W. Daniel A. Isermann, Matthew J. Hubers, Bruce A. Johnson, William H. Miller, Todd R. St. Sauver, Jason S. Sorensen, and Eric G. Unkenholz. 2001. Growth of South Dakota Fishes: A Statewide Summary with Means by Region and Water Type. South Dakota Game, Fish and Parks Special Report. Pierre, SD.

APPENDIX

Appendix A. Stocking record for Sheridan Lake, South Dakota, 2007-2015.

Year	Species (Strain)	Size	Stockings	Number
2007	Brown trout (Soda Lake)	Catchable	1	726
	Rainbow trout (Erwin)	Catchable 11”	2	4,100
	Rainbow trout (Shasta)	Catchable	2	7,490
2008	Rainbow trout (Shasta)	Catchable 11"	1	3,582
	Rainbow trout (Utah)	Catchable	1	5,000
2009	Brown trout (Utah)	Catchable 11"	1	1,000
	Rainbow trout (Erwin)	Catchable	1	10,000
	Rainbow trout (McConaughy)	Catchable	3	10,637
	Rainbow trout (McConaughy)	Fingerling	1	6,000
2010	Brown trout (Soda Lake)	Catchable 11"	1	900
	Rainbow trout (Erwin X Arlee)	Catchable	1	9,000
	Rainbow trout (McConaughy)	Catchable	2	9,630
	Smallmouth bass	Fingerling	1	7,800
2011	Rainbow trout (Erwin X Arlee)	Catchable	1	7,920
	Rainbow trout (McConaughy)	Catchable	2	9,630
	Rainbow trout (Shasta)	Fingerling	1	7,933
	Smallmouth bass	Adults	1	200
	Smallmouth bass	Fingerling	1	5,600
2012	Rainbow trout (Erwin X Arlee)	Catchable	1	9,000
	Rainbow trout (McConaughy)	Catchable	2	10,000
	Smallmouth bass	Adult	1	285
2013	Rainbow trout (Erwin X Arlee)	Catchable	1	9,000
	Rainbow trout (McConaughy)	Catchable	2	10,000
	Smallmouth bass	Fingerling	1	6,890
2014	Rainbow trout (Erwin X Arlee)	Catchable	1	1,000
	Rainbow trout (Shasta)	Catchable	4	18,079
2015	Rainbow trout (Shasta)	Catchable	3	15,861
	Rainbow trout (Ennis)	Catchable	1	3,139