

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-30-R-33

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2007 Survey Report

E.V. Spence Reservoir

Prepared by:

Mukhtar Farooqi and Mandy Scott
Inland Fisheries Division
District 1-C, San Angelo, Texas



Carter P. Smith
Executive Director

Phil Durocher
Director, Inland Fisheries

July 31, 2008

TABLE OF CONTENTS

Survey and management summary	2
Introduction	3
Reservoir description	3
Management history.....	3
Methods.....	4
Results and discussion	4
Fisheries management plan.....	5
Literature cited	5
Figures and tables.....	6-14
Water level (Figure 1).....	6
Reservoir characteristics (Table 1)	6
Harvest regulations (Table 2).....	6
Stocking history (Table 3)	7-8
Habitat survey (Table 4).....	9
Gizzard shad (Figure 2)	10
Bluegill (Figure 3).....	11
Largemouth bass (Figure 4).....	12
White crappie (Figure 5)	13
Proposed sampling schedule (Table 5)	14
Appendix A	
Catch rates for all species from all gear types	14
Appendix B	
Map of 2007-2008 sampling locations	15

SURVEY AND MANAGEMENT SUMMARY

Fish populations in E.V. Spence Reservoir were surveyed in 2007 using electrofishing and trap nets, and in 2008 using gill nets. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** E.V. Spence Reservoir is a 14,950-acre reservoir, when full, located on the Colorado River near Robert Lee, Coke County, Texas, and is used for water supply and recreation. It has a history of prolonged water level declines and has never filled to conservation pool. It was approximately 47 ft. below conservation level with a surface area of approximately 3,900 acres at the time of sampling in fall 2007. Golden algae *Prymnesium parvum* blooms caused significant fish kills in the winters of 2001, 2002, and 2003 that effectively eliminated the fishery. In subsequent years, toxic conditions (2005, 2007) and fish kills (2006, 2008), mainly involving gizzard shad, have been documented. Habitat features at the time of sampling consisted primarily of flooded dead terrestrial vegetation and rocky areas. Boat access was limited to a single one-lane temporary ramp and shoreline access was adequate.
- **Management History:** Important sport fish included largemouth bass, striped bass, white crappie, white bass, channel catfish and blue catfish. Striped bass have been stocked almost every year since 1969 to maintain the population with the exception of 2001 to 2003 when the reservoir was impacted by toxic conditions resulting in major fish kills. Stocking resumed in 2004 in an effort to restore the striped bass population. Similarly, Florida largemouth bass, bluegill and channel catfish were stocked in multiple years following these major fish kills to re-establish the fishery.
- **Fish Community**
 - **Prey species:** Electrofishing catch of gizzard shad was good and a high proportion of fish (97%) was available as prey. Electrofishing catch of bluegill was poor as was size structure.
 - **Catfishes:** No channel catfish, blue catfish or flathead catfish were collected by gill nets in 2008.
 - **Temperate basses:** No striped bass were collected during sampling in 2008. White bass catch rate and size structure, as determined by gill nets, were very poor.
 - **Largemouth bass:** Abundance and size structure were poor. No harvestable size (≥ 14 inches) fish were collected in 2007.
 - **Crappie:** Abundance and size structure of white crappie were very poor. No harvestable size (≥ 10 inches) fish were collected in 2007.
- **Management Strategies:** Based on current data, E.V. Spence Reservoir should continue to be managed with existing regulations. The reservoir should be monitored to evaluate recent stocking efforts. Future stockings would be subject to suitable water quality conditions as determined by monitoring cell density and toxicity levels of golden algae. A mandatory standard survey is scheduled to be carried out in 2011-2012 with trap nets, gill nets, and electrofishing gear to assess important fish populations. Additional sampling is scheduled for 2009-2010 with electrofishing gear and gill nets to monitor the recovery of fish populations.

INTRODUCTION

This document is a summary of fisheries data collected from E.V. Spence Reservoir in 2007-2008. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. Although information on other species of fish was collected, this report deals primarily with major sport fish and important prey species. Historical data are presented with the 2007-2008 data for comparison.

Reservoir Description

E.V. Spence Reservoir is a 14,950-acre impoundment, when full, constructed in 1969 on the Colorado River. It is located in Coke County near the town of Robert Lee and is approximately 45 miles north of San Angelo. It has a history of prolonged low water levels and has never filled to conservation pool. The reservoir was operated and controlled by the Colorado River Municipal Water District. Primary water uses included water supply and recreation. Land use around the reservoir was primarily pastureland. Habitat at time of sampling consisted mainly of flooded dead terrestrial vegetation and rocky areas. There was no significant submerged aquatic vegetation in the reservoir. Water level has been consistently low and was 47 ft. below conservation pool at the start of sampling in fall 2007 (Figure 1) with a surface area of approximately 3,900 acres. In the winters of 2001, 2002, 2003 golden algae *Prymnesium parvum* blooms caused major fish kills in the reservoir that essentially eliminated the fishery. Fish kills in the winters of 2006 and 2008 appeared to be limited to large numbers of gizzard shad. In addition, water samples taken in the winter of 2005 and spring of 2007 indicated highly toxic conditions (ichthyo-toxicity units (ITUs) \geq 25). E.V. Spence Reservoir was hypereutrophic based on Carlson's Trophic State Index for Chlorophyll-a (TSI Chl-a) with a mean TSI chl-a of 60.94 and a trend that indicated an increase in algal content (Texas Commission on Environmental Quality 2008). Boat access was limited to a single one-lane temporary ramp and shoreline access was adequate. Other descriptive characteristics for E.V. Spence Reservoir are shown in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Van Zee and Scott 2004) included:

1. Monitor cell densities and toxicity levels of golden algae and stock with forage and game fish species when conditions are favorable for fish survival.
Action: Based on the determination of suitable water quality criteria for the survival of fish, the reservoir was stocked with bluegill, channel catfish, striped bass and largemouth bass on multiple occasions since 2003.
2. Remove the annual 9-day spring quarter creel survey from the 4-year sampling schedule and only perform gill net surveys once every two years.
Action: The 9-day spring quarter creel has been discontinued and gill net surveys have been limited to once every two years.

Harvest regulation history: Sport fish in E.V. Spence Reservoir are currently managed with statewide regulations (Table 2).

Stocking history: Striped bass were originally stocked in 1969 and have been stocked nearly every year since to maintain the population. However, none were stocked between 2001 and 2003 when the reservoir was impacted by major fish kills due to golden algae blooms. Following these fish kills other sport fish and forage fish were stocked to rebuild the populations. Florida largemouth bass were first stocked in 1980, with most stocking conducted during the period 2003-2008. Bluegill were stocked as forage during the period 2005-2007. Channel catfish were stocked from 2003 to 2007. Blue catfish and largemouth bass were last stocked in 2004 and 2005, respectively. The complete stocking history is shown in Table 3.

Vegetation/habitat history: E.V. Spence Reservoir has contained little to no aquatic vegetation in the past as well as in 2007.

METHODS

Fish were collected by electrofishing (1.0 hour at 12, 5-min stations), gill netting (five net-nights at five stations), and trap netting (seven net-nights at seven stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2005).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. A littoral habitat and vegetation survey was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2005) in 2007. Source for water level data was the United States Geological Survey website.

RESULTS AND DISCUSSION

Habitat: In 2007, littoral zone habitat consisted primarily of flooded dead terrestrial vegetation (62.4%) and rocky shoreline (20.9%) (Table 4).

Prey species: Electrofishing catch rates of gizzard shad and bluegill were 379.0/h and 6.0/h, respectively in 2007. The IOV for gizzard shad was excellent, indicating that 97% of gizzard shad were available as prey; this was slightly higher than IOV estimates in previous years (Figure 2). Total CPUE of gizzard shad was considerably higher in 2007 than in 2005 and 2003 (Figure 2). Total CPUE of bluegill in 2007 was lower than in 2005, but similar to that recorded in 2003. Catch rate and size structure, however was very poor in all surveys (Figure 3).

Blue and channel catfish: No blue or channel catfish were collected by gill nets in 2008. In fact, no blue catfish or channel catfish have been collected since 2002 (Van Zee and Scott 2004).

White bass: The gill net catch rate of white bass was 0.2/nn in 2008. Prior to this, no white bass had been collected since 2002 (Van Zee and Scott 2004).

Striped bass: No striped bass were collected by gill nets in 2008. In fact, none have been collected since 2002 (Van Zee and Scott 2004).

Largemouth bass: The electrofishing catch rate for largemouth bass was low (32.0/h) and was similar to the catch rates recorded in previous surveys (34.0/h in 2005 and 19.0/h in 2003). Size structure was poor (PSD = 0) and no harvestable size (≥ 14 inches) fish were collected (Figure 4).

White crappie: The trap net catch rate of white crappie was 0.9/nn in 2007, which is slightly lower than that recorded in 2005 (7.0/nn), but similar to that obtained in 2003 (0.3/nn). White crappie size structure was very poor and no harvestable size (≥ 10 inches) fish were collected (Figure 5).

Fisheries management plan for E.V. Spence Reservoir, Texas

Prepared – July 2008.

ISSUE 1: Golden alga blooms during the winters of 2001, 2002, and 2003 virtually eliminated the fishery at E.V. Spence Reservoir. Blooms were also documented in the winters of 2006 and 2008 resulting in fish kills that appeared to be mainly limited to gizzard shad. Also, water samples collected in the winter of 2005 and spring of 2007 indicated high toxicity levels (ITUs \geq 25).

MANAGEMENT STRATEGY

1. Continue monitoring golden alga cell density and toxicity levels to determine water quality.

ISSUE 2: Multiple restocking efforts since 2003 have not resulted in the development of adequate fish populations as determined by the 2007 and 2008 surveys.

MANAGEMENT STRATEGY

1. If episodic golden alga blooms and toxic conditions continue on a regular basis, consideration should be given to temporarily suspend fish stocking until significant improvements in water quality (e.g., no toxic conditions for a minimum of two years) are documented. When water quality is suitable, stock with bluegill, striped bass, largemouth bass, and channel catfish to help develop these populations and re-establish the fishery.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes additional electrofishing in 2009 and gill netting in 2010. Mandatory monitoring is scheduled in 2011/2012 (Table 5). An additional electrofishing survey in 2009 is necessary to monitor the recovery of the largemouth bass and bluegill populations. Gill net surveys are necessary every two years to monitor abundance of striped bass, white bass, and channel catfish. Trap netting for white crappie at four-year intervals should be adequate for monitoring the population.

LITERATURE CITED

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- DiCenzo, V. J., M. J. Maceina, and M. R. Stimert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.
- Texas Commission on Environmental Quality. 2008. Trophic classification of Texas reservoirs; 2008 Texas water quality inventory and 303(d) list (March 19, 2008). 15 pp.
- Van Zee, B., and M. Scott. 2004. Statewide freshwater fisheries monitoring and management program survey report for E.V. Spence Reservoir, 2003. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

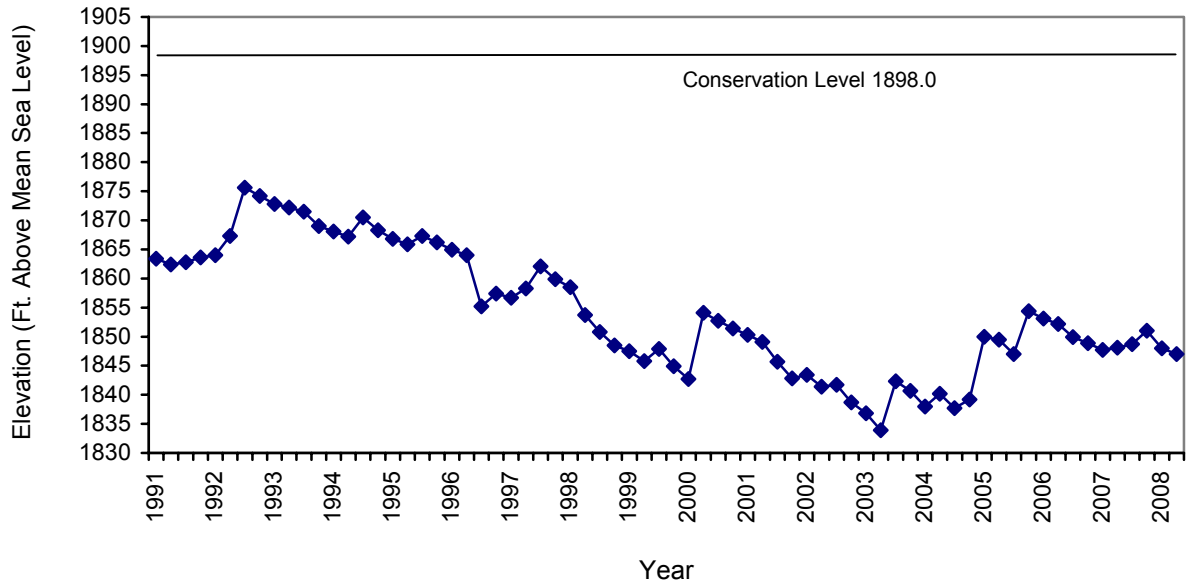


Figure 1. Quarterly water level elevations in feet above mean sea level recorded for E.V. Spence Reservoir, Texas.

Table 1. Characteristics of E.V. Spence Reservoir, Texas.

Characteristic	Description
Year constructed	1969
Controlling authority	Colorado River Municipal Water District
County	Coke
Reservoir type	Main stream
Shoreline Development Index	8.00
Conductivity	$\geq 2,300 \mu\text{mhos/cm}$

Table 2. Harvest regulations for E.V. Spence Reservoir, Texas.

Species	Bag Limit	Minimum-Maximum Length (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 - No Limit
Catfish, flathead	5	18 - No Limit
Bass, white	25	10 - No Limit
Bass, striped	5	18 - No Limit
Bass, largemouth	5	14 - No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No Limit

Table 3. Stocking history of E.V. Spence Reservoir, Texas. Size categories are: FRY = ≤ 1 inch; FGL = 1-3 inches; ADL = adults, and UNK = unknown. Continued on next page.

Species	Year	Number	Size
Threadfin shad	1980	4,000	UNK
	1981	3,000	UNK
	1982	1,200	UNK
	1984	5,700	UNK
	Total	13,900	
Blue catfish	1971	4,325	UNK
	1973	13,000	UNK
	1979	120,359	UNK
	1980	42,228	UNK
	1981	49,996	UNK
	1988	15	ADL
	1992	60,810	FGL
	2002	2,715	FGL
	2004	125,000	FGL
		Total	418,448
Channel catfish	1968	138,000	UNK
	1969	87,650	UNK
	1970	16,000	UNK
	1971	34,200	UNK
	1972	10,000	UNK
	2003	132,861	FGL
	2004	85,471	FGL
	2005	187,342	FGL
	2006	233,974	FGL
	2007	183,235	FGL
		Total	1,108,733
Flathead catfish	1969	26	UNK
	1971	1,825	UNK
	1973	4,000	UNK
	Total	5,851	
White bass	1982	100	UNK
Striped bass	1969	34,500	FGL
	1970	3,000	FGL
	1971	47,328	FGL
	1972	51,835	FGL
	1973	69,834	FGL
	1974	51,075	FGL
	1975	82,068	UNK
	1976	34,975	UNK
	1977	29,698	UNK
	1979	30,525	UNK
	1981	84,182	UNK
	1982	50,000	UNK
	1984	119,500	FGL
	1986	105,384	FGL
	1988	2,000,000	FRY
	1988	150,274	FGL

Table 3. Stocking history continued.

Species	Year	Number	Size
Striped bass	1990	152,136	FGL
	1991	68,644	FGL
	1992	62,700	FGL
	1993	107,545	FGL
	1993	62,950	FRY
	1994	17,500	FGL
	1995	71,346	FGL
	1996	10,403	FRY
	1996	24,794	FGL
	1997	25,229	FGL
	1998	25,223	FGL
	2000	15,010	FGL
	2004	27,041	FGL
	2005	37,243	FGL
	2007	35,774	FGL
	Total	3,670,216	
Palmetto bass	1975	51,748	UNK
Bluegill	2002	301,201	FGL
	2005	374,684	FGL
	2006	473,763	FGL
	2007	180,800	FGL
	Total	1,330,448	
Smallmouth bass	1980	500	UNK
	1981	146,817	UNK
	1982	144,837	UNK
	1985	258	ADL
	Total	292,412	
Largemouth bass	1968	10,990	UNK
	1969	786,000	UNK
	1970	26,000	UNK
	1971	46,946	UNK
	1972	4,500	UNK
	1973	1,650	UNK
	2005	100,885	FGL
	Total	979,971	
Florida largemouth bass	1980	37,900	FGL
	1981	86,000	FGL
	1996	349,276	FGL
	2000	200,031	FGL
	2003	148,516	FGL
	2004	124,706	FGL
	2005	188,526	FGL
	2007	181,428	FGL
	2008	164,710	FGL
	Total	1,481,093	
Green X redear sunfish	1971	70,000	UNK
	1972	2,700	UNK
	Total	72,700	

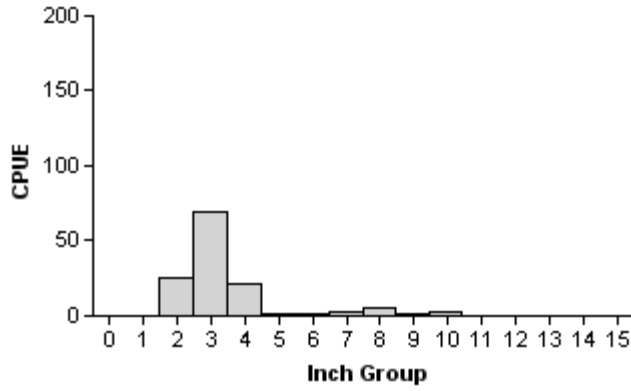
Table 4. Survey of littoral zone and physical habitat types, E.V. Spence Reservoir, Texas, 2007. A linear shoreline distance (miles) was recorded for each habitat type found.

Littoral habitat type	Shoreline Distance	
	Miles	Percent of total
Boulder	0.8	2.1
Eroded bank	1.0	2.6
Flooded dead terrestrial	24.2	62.4
Non-descript	1.5	3.9
Rock bluff	2.2	5.7
Rip-rap	1.0	2.6
Rocky/gravel	8.1	20.9

Gizzard Shad

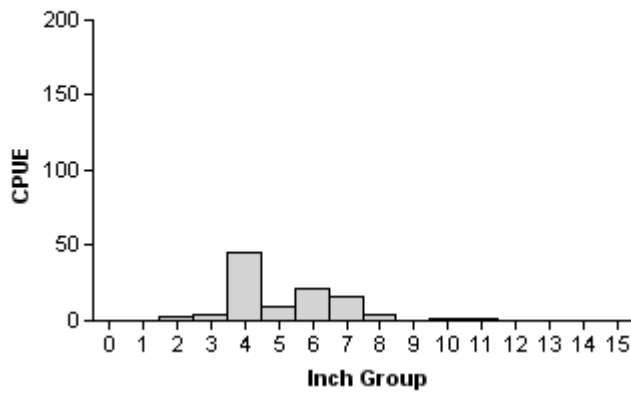
2003

Effort = 1.0
 Total CPUE = 131.0 (23; 131)
 IOV = 92 (4)



2005

Effort = 2.0
 Total CPUE = 108.0 (27; 216)
 IOV = 93 (3)



2007

Effort = 1.0
 Total CPUE = 379.0 (17; 379)
 IOV = 97 (2)

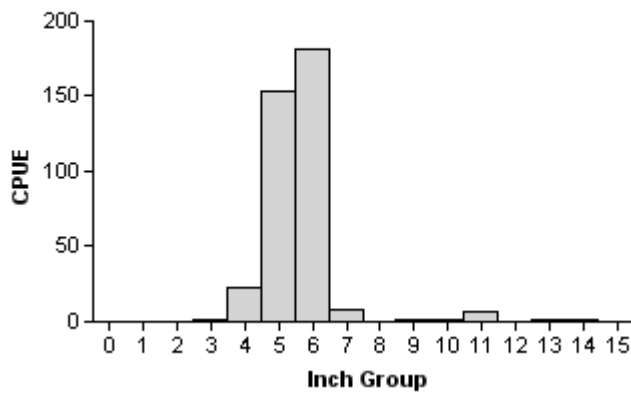
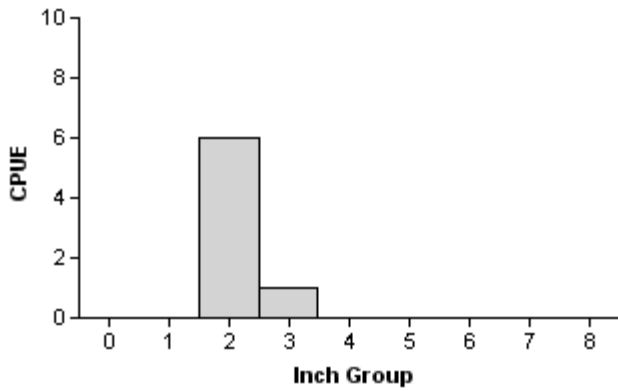


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, E.V. Spence Reservoir, Texas, 2003, 2005, and 2007.

Bluegill

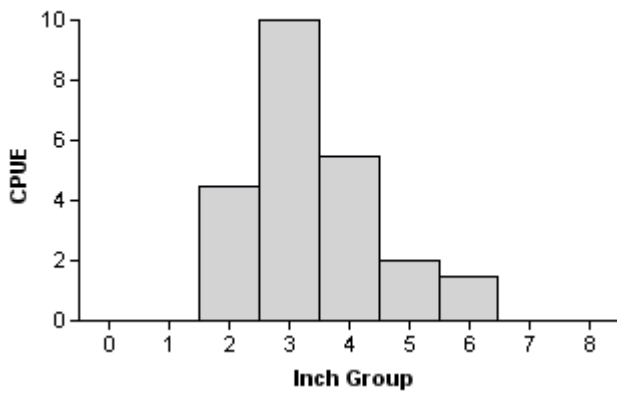
2003

Effort = 1.0
 Total CPUE = 7.0 (61; 7)
 Stock CPUE = 1.0 (100; 1)
 PSD = 0 (0)



2005

Effort = 2.0
 Total CPUE = 23.5 (53; 47)
 Stock CPUE = 19.0 (57; 38)
 PSD = 8 (3.3)



2007

Effort = 1.0
 Total CPUE = 6.0 (52; 6)
 Stock CPUE = 6.0 (52; 6)
 PSD = 0 (0)

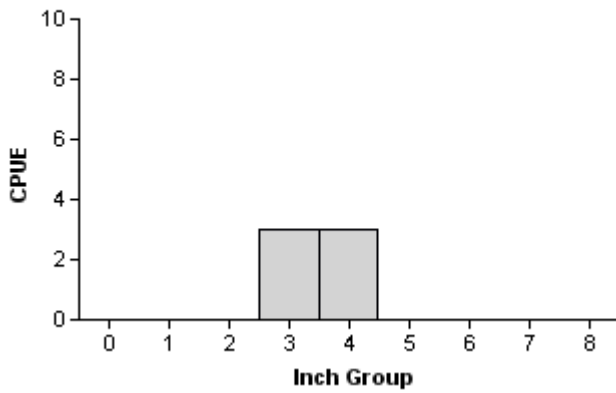
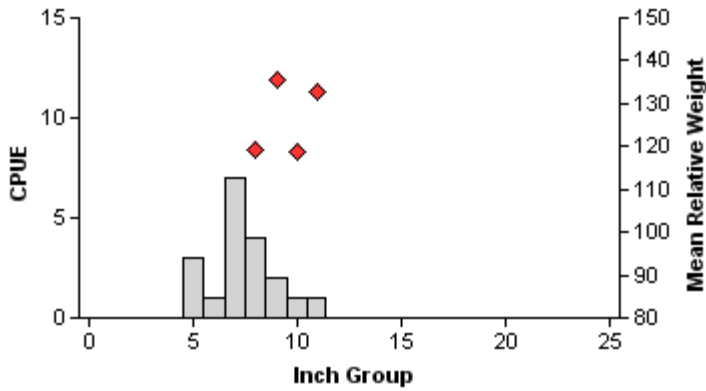


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, E.V. Spence Reservoir, Texas, 2003, 2005, and 2007.

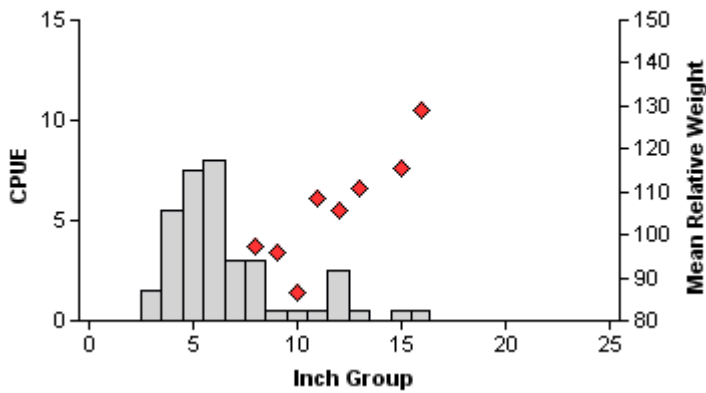
Largemouth Bass

2003



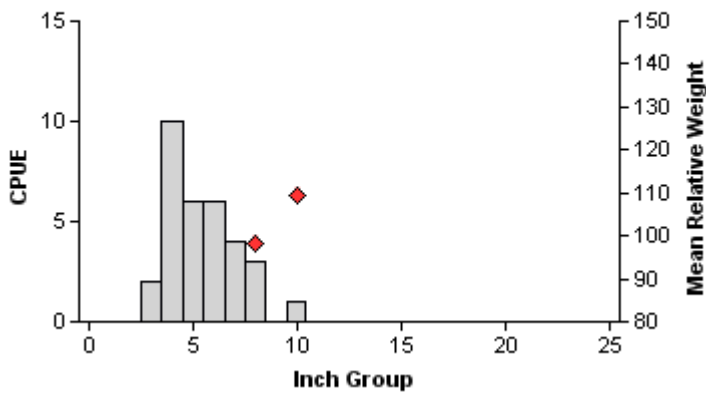
Effort = 1.0
 Total CPUE = 19.0 (27; 19)
 Stock CPUE = 8.0 (43; 8)
 CPUE-14 = 0.0 (0; 0)
 PSD = 0 (0)
 RSD-P = 0 (0)

2005



Effort = 2.0
 Total CPUE = 34.0 (38; 68)
 Stock CPUE = 8.5 (26; 17)
 CPUE-14 = 1.0 (69; 2)
 PSD = 47 (13.1)
 RSD-P = 12 (7.9)

2007



Effort = 1.0
 Total CPUE = 32.0 (25; 32)
 Stock CPUE = 4.0 (67; 4)
 CPUE-14 = 0.0 (0; 0)
 PSD = 0 (0)
 RSD-P = 0 (0)

Figure 4. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, E.V. Spence Reservoir, Texas, 2003, 2005, and 2007.

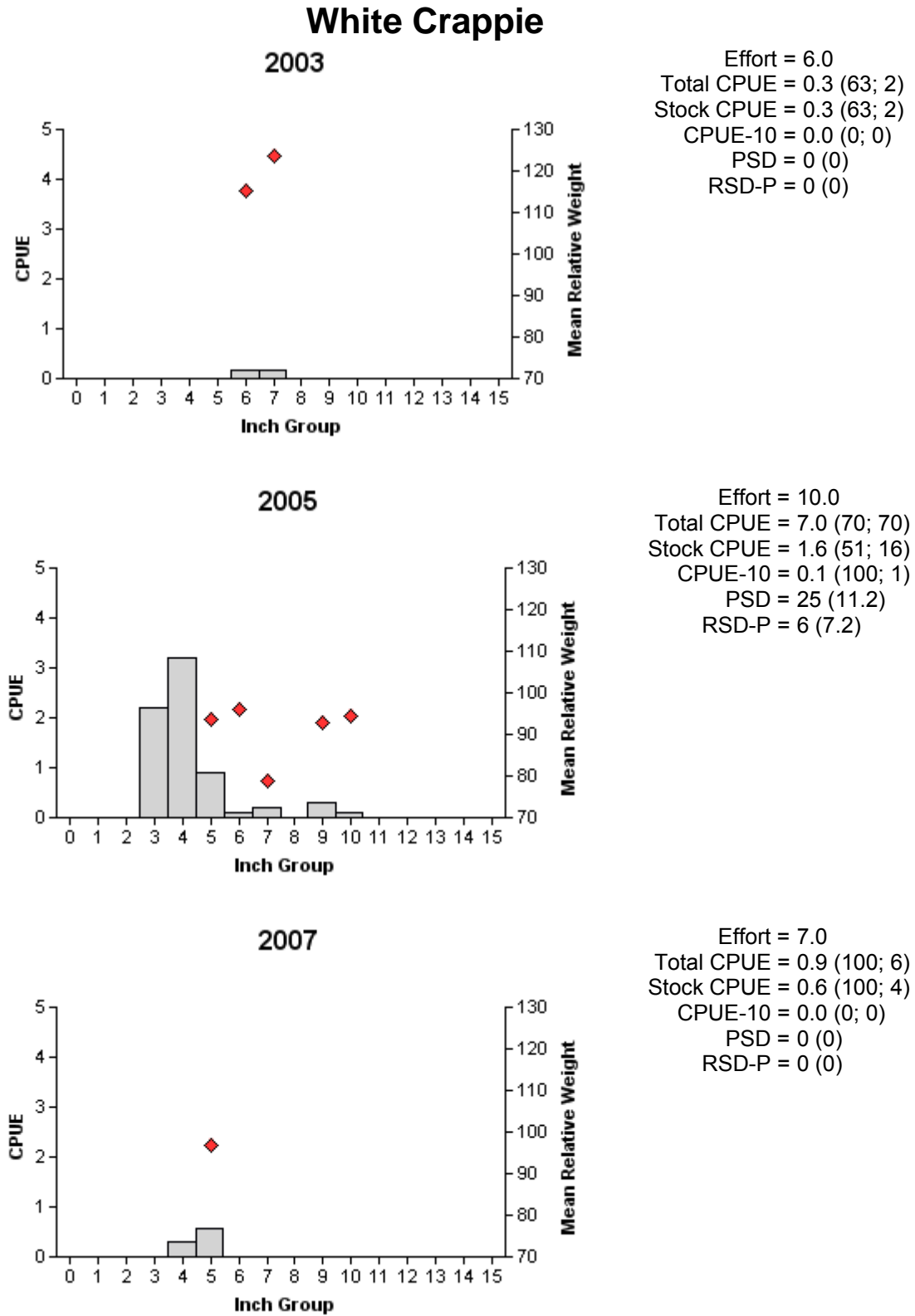


Figure 5. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, E.V. Spence Reservoir, Texas, 2003, 2005, and 2007.

Table 5. Proposed sampling schedule for E.V. Spence Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

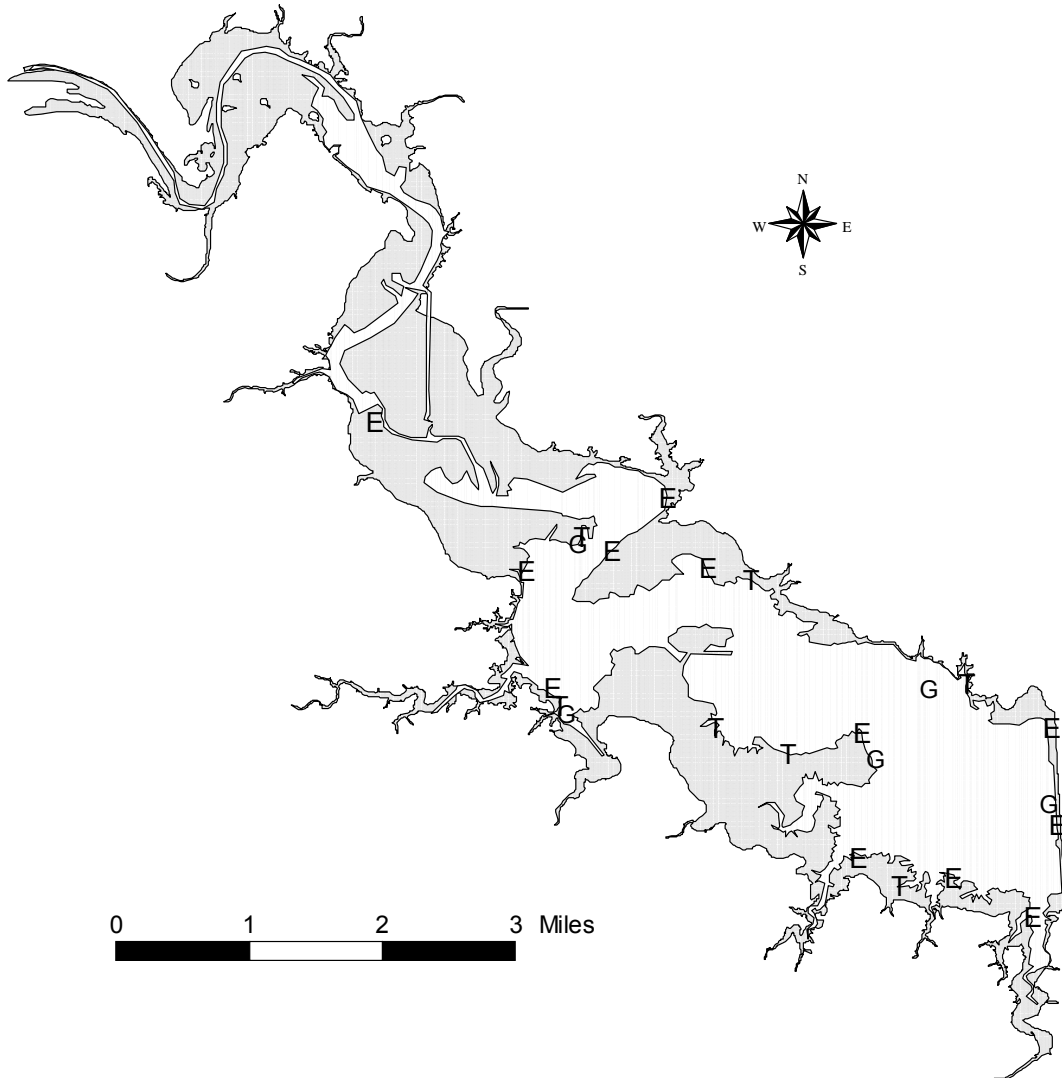
Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Report
Fall 2008-Spring 2009					
Fall 2009-Spring 2010	A		A		
Fall 2010-Spring 2011					
Fall 2011-Spring 2012	S	S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected by all gear types from E.V. Spence Reservoir, Texas, 2007-2008.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose gar	6	1.2				
Gizzard shad					379	379.0
Common carp	7	1.4	11	1.6		
River carpsucker	4	0.8				
Black bullhead			43	6.1	2	2.0
Channel catfish			6	0.9	1	1.0
White bass	1	0.2	110	15.7	12	12.0
Warmouth			1	0.1		
Bluegill			146	20.9	6	6.0
Longear sunfish			1	0.1		
Largemouth bass			3	0.4	32	32.0
White crappie			6	0.9		
Freshwater Drum			3	0.4		

APPENDIX B



Location of sampling sites, E.V. Spence Reservoir, Texas, 2007-2008. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. The reservoir surface area was approximately 3,900 acres at the time of sampling. Shaded area shows reservoir near conservation pool.