

PERFORMANCE REPORT

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FEDERAL AID PROJECT F-30-R-35

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2009 Survey Report

Sulphur Springs Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Sulphur Springs Reservoir were surveyed in 2009 using electrofishing and trap netting, and in 2010 using gill netting. Aquatic vegetation and habitat surveys were conducted during August 2009. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Sulphur Springs Reservoir is a 1,766-acre impoundment located in Hopkins County, Texas, on White Oak Creek, a tributary of the Sulphur River. It was constructed by the City of Sulphur Springs in 1973 as a municipal water supply. Habitat consists primarily of featureless mud banks with very little structural cover. Water clarity in the reservoir is extremely low due to high levels of suspended solids in the water column.
- **Management history:** Important sport fish include white crappie and blue catfish. The management plan from the 2006 survey report included maintaining the catfish population at its current status. Fisheries utilization is limited; however, anecdotal information suggests passive-gear and active-gear catfish fisheries are present in the reservoir.
- **Fish community**
 - **Prey species:** Predominant prey species in the reservoir include gizzard shad and bluegill. Electrofishing catch of gizzard shad was moderate, with the majority being available as prey to most sport fish. Electrofishing catch of bluegill was low and no bluegill measured over 6 inches long. Threadfin shad historically provided additional prey for sport fish in the reservoir, but none were collected during the past three surveys (2001, 2005, and 2009).
 - **Catfishes:** Gill net catch rate of blue catfish was relatively low, but most fish were of legal size. Channel catfish were historically caught in previous surveys of the reservoir, but have not been caught since 2002.
 - **Largemouth bass:** No largemouth bass were sampled during 2009, 2005 or 2001. This indicates that largemouth bass were either extremely rare or the high lake turbidity makes it difficult to observe fish during electrofishing sampling.
 - **White crappie:** White crappie were present in the reservoir, and the population was dominated by small fish. Very few legal-sized white crappie were sampled in 2009.

Management strategies: Conduct monitoring with electrofishing, trap netting, and gill netting surveys in 2013-2014. Conduct aquatic vegetation and habitat surveys in 2013.

INTRODUCTION

This document is a summary of fisheries data collected from Sulphur Springs Reservoir from June 2009 through May 2010. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2009-2010 data for comparison.

Reservoir Description

Sulphur Springs Reservoir is a 1,766-acre impoundment constructed in 1973 on White Oak Creek, a tributary of the Sulphur River. It is located in Hopkins County approximately 1 mile northwest of Sulphur Springs, Texas, and is operated and controlled by the City of Sulphur Springs. The primary water use is for municipal water supply. Habitat at time of sampling consisted of natural shoreline with flooded terrestrial and native emergent vegetation. American lotus was the most abundant emergent aquatic species (315 acres) but it was restricted to the upper end of the reservoir. At time of sampling, the reservoir was 0.6 feet above conservation pool elevation. Boat access consisted of two public boat ramps. Bank fishing access was fair, and limited to areas around the public boat ramps. Water clarity is chronically low due to suspended solids. Other descriptive characteristics for Sulphur Springs Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Jubar and Storey 2006) included:

1. Maintain the catfish population at its current status.

Action: Blue and channel catfish were managed with statewide fishing regulations. This is a limited fishery that may not support additional angling pressure, so no effort was made to promote the catfish fishery in the reservoir.

Harvest regulation history: Sport fishes in Sulphur Springs Reservoir have been managed with statewide regulations (Table 2).

Stocking history: Sulphur Springs Reservoir has not been stocked since 1997 (saugeye). Although saugeye fingerlings were stocked each year from 1993 – 1997 no fishery ever developed. Florida largemouth bass, blue catfish, and palmetto bass were all initially introduced in 1978; of these species only blue catfish were sampled during the 2009-2010 survey year. The complete stocking history is in Table 3.

Vegetation/habitat history: Sulphur Springs Reservoir contained no submerged vegetation and limited native emergent vegetation. Historically, shoreline habitat has been dominated by featureless shore (2005 = 73%) mixed with American lotus and flooded terrestrial vegetation. In August 2009, American lotus comprised the majority of the vegetation in the reservoir (315 acres) (Jubar and Storey 2006).

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 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 2009).

Aquatic vegetation and littoral habitat surveys were performed according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009). Shoreline distances and areas of vegetation were estimated using ArcView GIS software.

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Distribution (PSD), as defined by Guy et al. (2007)], and condition indices [relative weights (W_i)] 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. Ages were determined for 24 white crappie with lengths ranging from 5.4 to 13.9 inches.

RESULTS AND DISCUSSION

Vegetation/habitat: Shoreline habitat during August 2009 was composed primarily of natural shoreline, native emergent, and native floating vegetation (Table 4). The lack of submerged vegetation was likely due to low water clarity in the reservoir (Secchi depth < 1 ft). The limited vegetation and other habitat within the reservoir was likely a contributor to limiting the productivity of sport fishes.

Prey species: Electrofishing catch rates of bluegill and gizzard shad were 2.0/h and 157.0/h, respectively. Index of vulnerability (IOV) for gizzard shad was high, indicating that 99% of gizzard shad were available to existing predators (Figure 1). Total CPUE of gizzard shad was considerably higher in 2009 compared to the 2005 and 2001 surveys (Figure 1). Total CPUE of bluegill in 2009 remained extremely low (Figure 2).

Catfishes: The gill net catch rate of blue catfish was 3.4/nn in 2010. The blue catfish population exhibited a decrease in relative abundance in 2010 compared to 2006 (Figure 3), but natural reproduction was documented. No channel catfish were sampled in the 2006 and 2010 gill net surveys. The most recent survey in which channel catfish were caught was 2002 (0.6/nn) (Jubar and Storey 2006). Anecdotal information suggests catfish angling does occur on this reservoir.

Largemouth bass: No largemouth bass were caught during fall electrofishing in 2009 and 2005. The last survey in which largemouth bass were caught (32/h) was in 1997 (Poarch 1997). High reservoir turbidity was probably the most important factor limiting the success of the largemouth bass population. Lack of suitable habitat compounds this issue.

White crappie: The trap net catch rate of white crappie was 142.6/nn in 2009, which was much higher than in 2005 (36.4/nn) and 2001 (9.0/nn). Several stock-sized (≥ 5 inch) white crappie were sampled in 2009 (Figure 4). Mean relative weight of white crappie was poor (range = 74 to 98), indicating limited prey availability. Most white crappie younger than age 3 exhibited slow growth; few were collected older than age 3 (Figure 5).

Fisheries management plan for Sulphur Springs Reservoir, Texas

Prepared – July 2010.

ISSUE 1: Sulphur Springs Reservoir is extremely turbid, limiting largemouth bass and sunfish populations. The high suspended sediment in the water is likely aggravated by watershed soil characteristics and a scarcity of aquatic vegetation to stabilize the shoreline and bottom sediments. Low water clarity does not seem to limit catfish populations. Anecdotal information suggests directed angler effort is almost exclusively for catfish.

MANAGEMENT STRATEGIES

1. Monitor catfish populations by gill netting every four years.
2. Provide information on catfish populations to local anglers.

ISSUE 2: The white crappie population in the reservoir exhibits slow growth and high density of small individuals.

MANAGEMENT STRATEGY

1. Stock threadfin shad to improve prey base for white crappie.

ISSUE 3: The fish populations at Sulphur Springs Reservoir could benefit from habitat improvements.

MANAGEMENT STRATEGY

1. Introduce additional native emergent vegetation, such as water willow, bull tongue, and pickerelweed to improve nearshore habitat for fishes and to mitigate shoreline degradation and erosion.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes habitat and vegetation sampling, electrofishing, and trap netting in 2013, and gill netting in spring 2014 (Table 5).

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- Poarch, S. M. 1997. Statewide freshwater fisheries monitoring and management program survey report for Sulphur Springs Reservoir, 1996. Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-30-R-22, Job A, 22 pages.

Table 1. Characteristics of Sulphur Springs Reservoir, Texas.

Characteristic	Description
Year constructed	1973
Controlling authority	City of Sulphur Springs
Surface area	1,766 acres
Counties	Hopkins
Reservoir type	City impoundment
Mean depth	10.5 ft.
Maximum depth	28.0 ft.
Shoreline Development Index (SDI)	2.16
Conductivity	80 $\mu\text{mho} / \text{cm}$
Secchi disc range	0 - 1 ft.
Watershed area	55 mi^2

Table 2. Harvest regulations for Sulphur Springs Reservoir.

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: 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 Sulphur Springs Reservoir, Texas. Size Categories are: FGL = 1-3 inches; AFGL = 8 inches, and ADL = adults.

Species	Year	Number	Size
Threadfin shad	1990	7,000	ADL
	1991	14,400	ADL
	Total	21,400	
Blue catfish	1978	29,680	
Channel catfish	1973	76,400	FGL
	1974	18,000	FGL
	Total	94,400	
Palmetto bass	1978	33,680	FGL
	1979	33,600	FGL
	1982	14,028	FGL
	Total	81,308	
Green X redear Sunfish	1973	15,000	FGL
	1974	25,000	FGL
	Total	40,000	
Largemouth bass	1972	1,000	AFGL
	1973	36,250	FGL
	Total	37,250	
Florida largemouth bass	1978	37,080	FGL
Saugeye	1993	67,100	FGL
	1994	69,302	FGL
	1995	40,305	FGL
	1996	67,242	FGL
	1997	75,009	FGL
	Total	318,958	

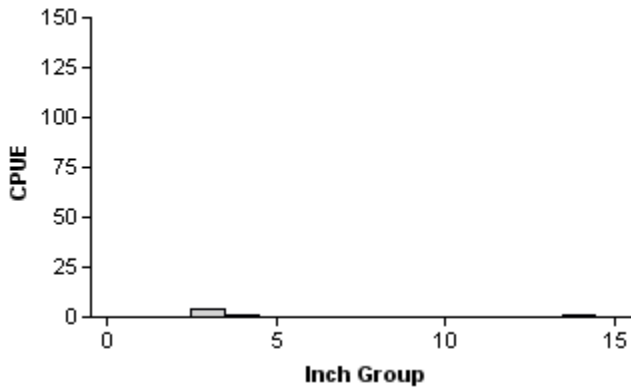
Table 4. Survey of littoral zone and physical habitat types, Sulphur Springs Reservoir, Texas, 2009. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation found.

Shoreline habitat type / Aquatic vegetation species	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Natural shoreline /standing timber	0.25	2.0		
Natural shoreline /flooded terrestrial	0.59	4.7		
Natural shoreline /standing timber /flooded terrestrial	0.11	0.9		
Natural shoreline /standing timber /flooded terrestrial /native emergents	0.29	2.3		
Natural shoreline /flooded terrestrial /native emergent	3.68	28.9		
Natural shoreline /flooded terrestrial /overhanging brush /native emergents	0.10	0.8		
Natural shoreline /native emergents	0.67	5.3		
Natural shoreline /native emergents /native floating-leaved	3.63	28.5		
Natural shoreline /flooded terrestrial	0.70	5.5		
Natural shoreline /overhanging brush	0.04	0.3		
Natural shoreline /overhanging brush /native emergents	0.04	0.3		
Rocky shoreline	2.07	16.3		
Rocky shoreline /flooded terrestrial	0.20	1.6		
Rocky shoreline /native emergents	0.33	2.6		
Native emergents (<i>bulrush,</i> <i>cattail,maidencane</i>)			5.3	0.3
Native emergents and flooded terrestrial			6.3	0.4
Flooded terrestrial			0.8	0.05
American lotus			315.0	17.8
Total			327.4	18.6

Gizzard Shad

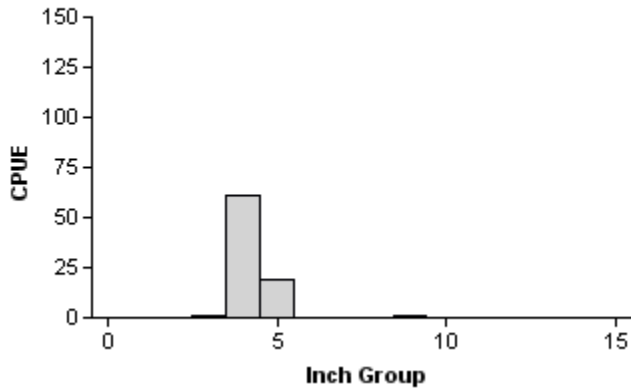
2001

Effort = 1.0
 Total CPUE = 6.0 (52; 6)
 Stock CPUE = 1.0 (100; 1)
 PSD = 100 (0)
 IOV = 83.33 (10)



2005

Effort = 1.0
 Total CPUE = 82.0 (15; 82)
 Stock CPUE = 1.0 (100; 1)
 PSD = 0 (2775.2)
 IOV = 98.78 (1.3)



2009

Effort = 1.0
 Total CPUE = 157.0 (16; 157)
 Stock CPUE = 2.0 (67; 2)
 PSD = 0 (2698)
 IOV = 99.36 (0.5)

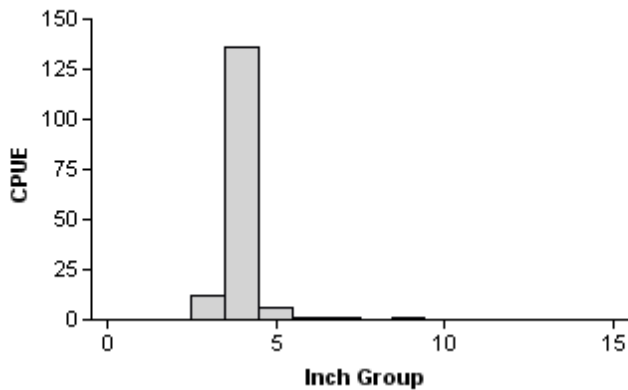
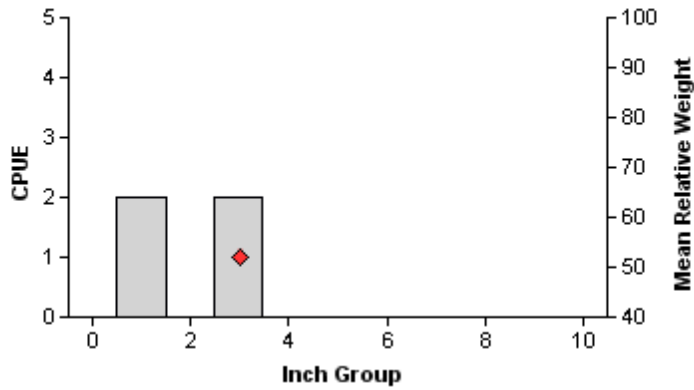


Figure 1. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Sulphur Springs Reservoir, Texas, 2001, 2005, and 2009.

Bluegill

2005

Effort = 1.0
 Total CPUE = 4.0 (77; 4)
 Stock CPUE = 2.0 (67; 2)
 PSD = 0 (165.1)



2009

Effort = 1.0
 Total CPUE = 2.0 (67; 2)
 Stock CPUE = 2.0 (67; 2)
 PSD = 0 (73.9)

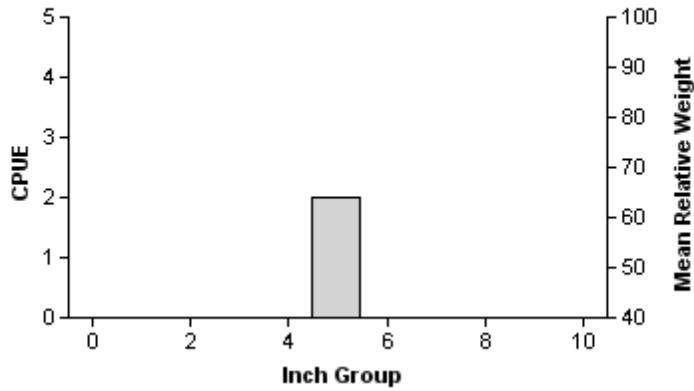


Figure 2. Number of bluegill caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sulphur Springs Reservoir, Texas, 2005 and 2009. No bluegill were collected in 2001.

Blue Catfish

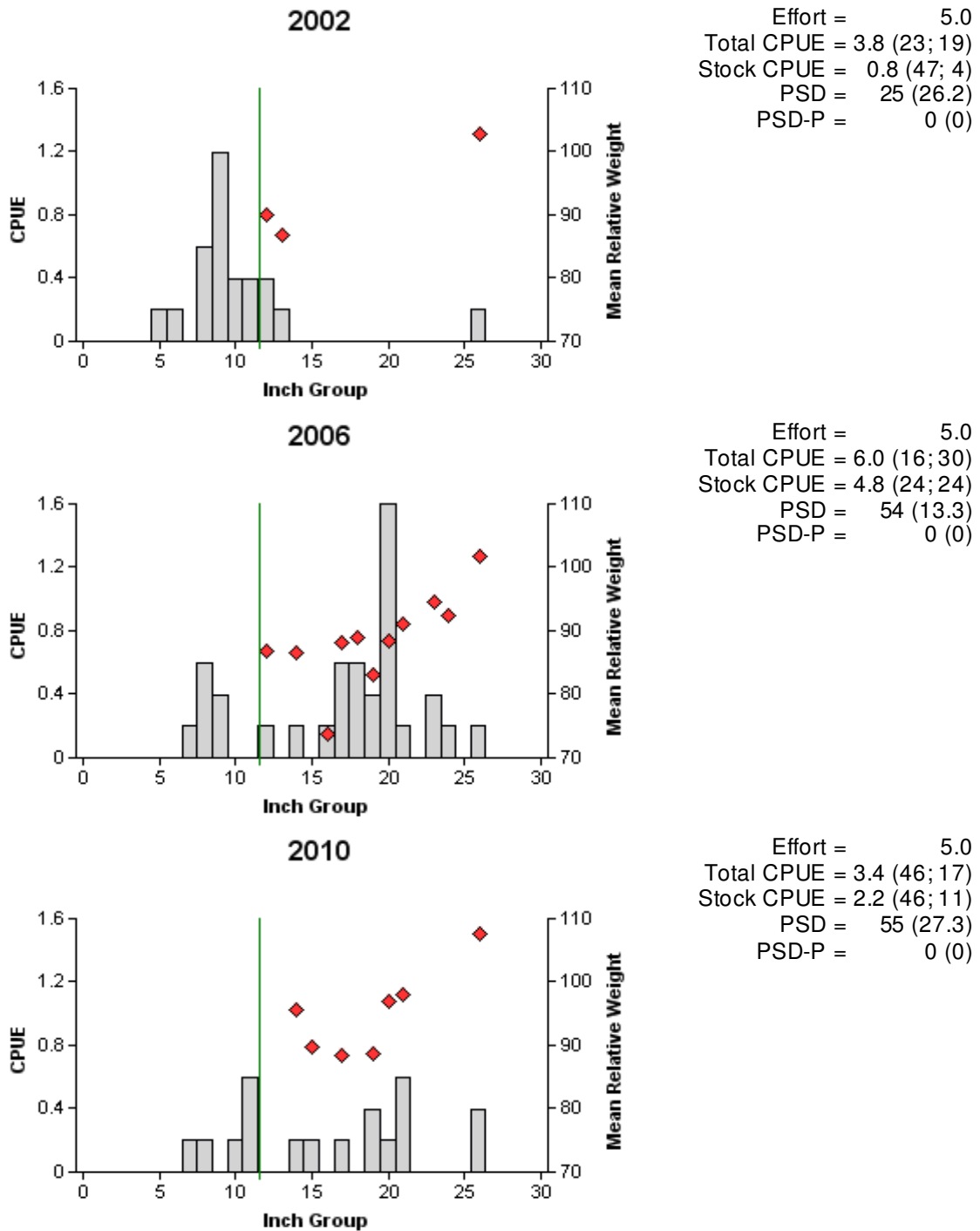


Figure 3. Number of blue catfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Sulphur Springs Reservoir, Texas, 2002, 2006, and 2010. Vertical lines indicate minimum length limit at time of survey.

White Crappie

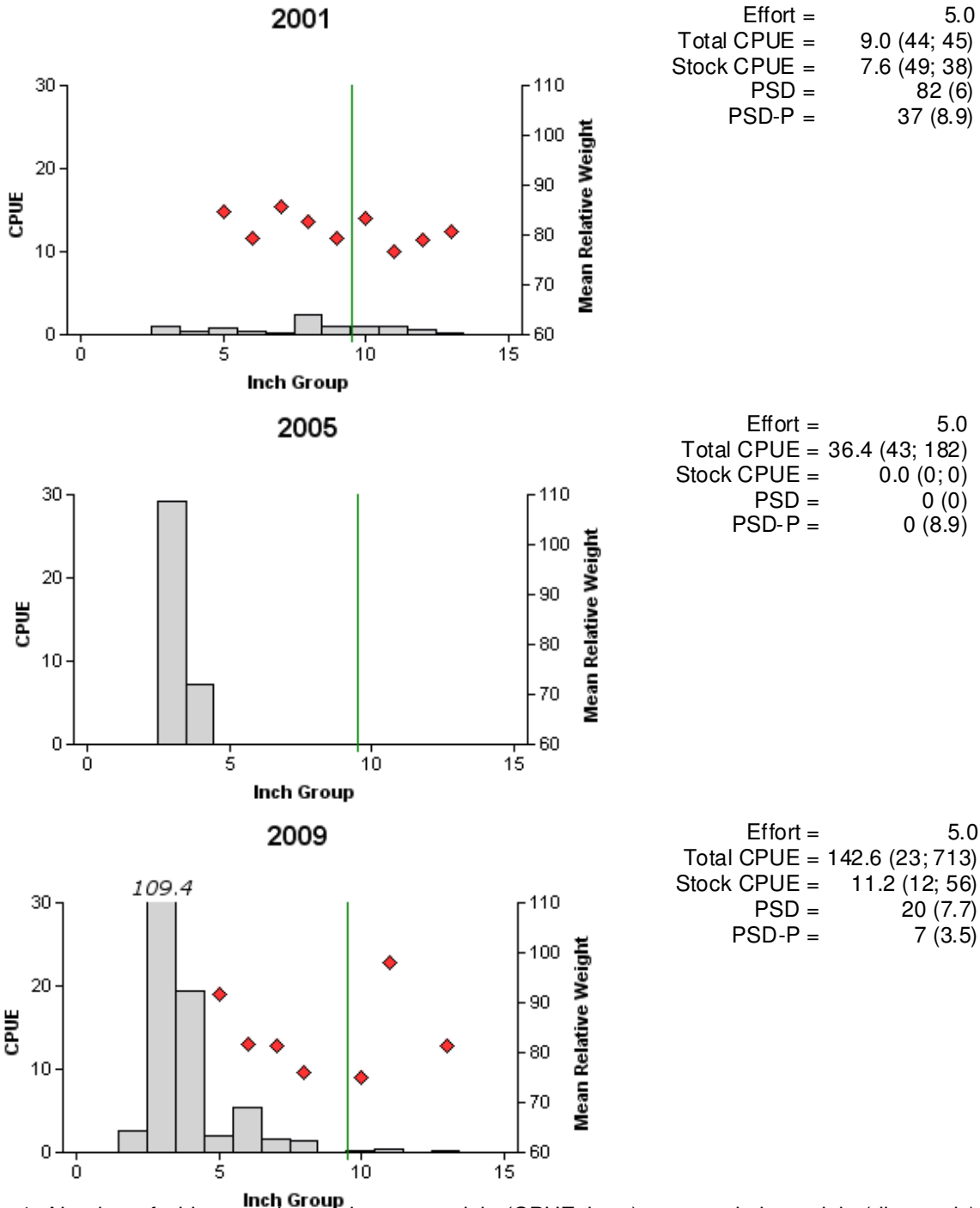


Figure 4. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Sulphur Springs Reservoir, Texas, 2001, 2005, and 2009. Vertical lines indicate minimum length limit at time of survey.

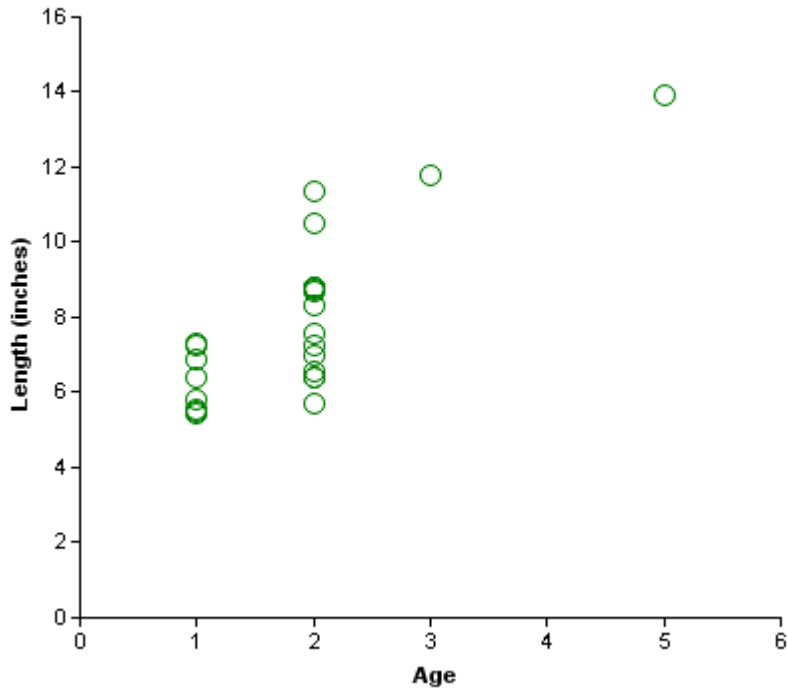


Figure 5. Length at age (inches) of white crappie (N=24) (sexes combined) collected in fall trap netting, Sulphur Springs Reservoir, Texas, October 2009.

Table 5. Proposed sampling schedule for Sulphur Springs 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.

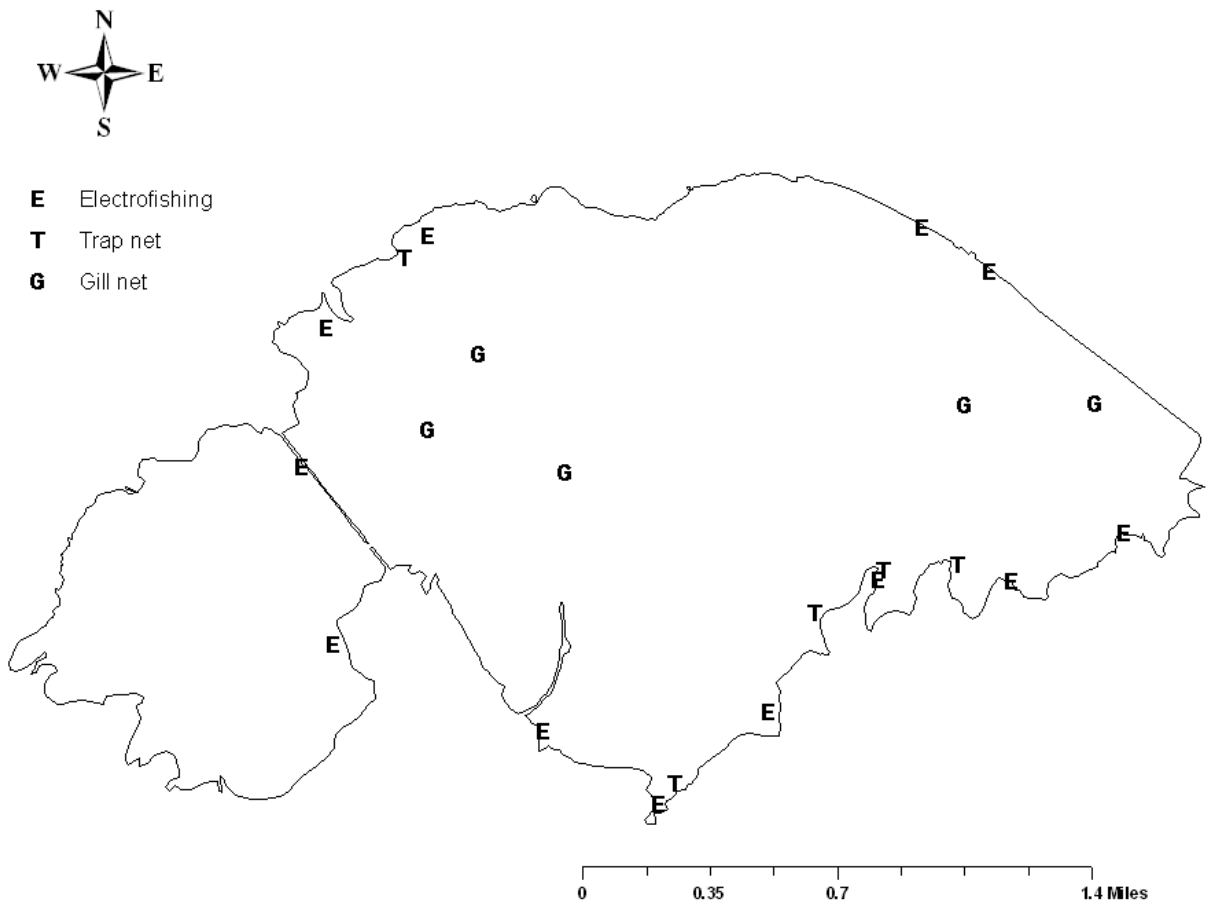
Survey Year	Electrofishing	Trap netting	Gill netting	Vegetation	Report
Fall 2010-Spring 2011					
Fall 2011-Spring 2012					
Fall 2012-Spring 2013					
Fall 2013-Spring 2014	S	A	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Sulphur Springs Reservoir, Texas, 2009-2010.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					157	157.0
Blue catfish	17	3.4				
Green sunfish					1	1.0
Bluegill					2	2.0
Longear sunfish					1	1.0
White crappie			713	142.6		

APPENDIX B



Location of electrofishing, trap netting, and gill netting sites, Sulphur Springs Reservoir, Texas, 2009-2010.