PERFORMANCE REPORT

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FEDERAL AID PROJECT F-30-R-31

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2005 Survey Report

Sulphur Springs Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Sulphur Springs Reservoir were surveyed in 2005 using electrofishing and trap nets, and in 2006 using gill nets. Aquatic vegetation and habitat surveys were conducted during August 2005. 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 largemouth bass, white crappie, and blue catfish. The management plan from the 2001 survey report included investigating options to reduce turbidity and improve fisheries resources. Fisheries utilization is limited; however, 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 bluegills was low and no bluegills were over 6-inches long. Threadfin shad historically provided additional forage for sport fish in the reservoir, but none were collected during 2001 or 2005.

  - **Catfishes:** Gill net catch rate of blue catfish was relatively low, but most fish were of legal size. Although channel catfish were caught in previous surveys of the reservoir (Myers and Storey 2002), no channel catfish were caught in 2006.

  - **Largemouth bass:** No largemouth bass were sampled during 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. No legal-sized white crappie were sampled in 2005.

Management strategies: Conduct standard monitoring with trap nets, gill nets, and electrofishing surveys in 2009-2010. Conduct aquatic vegetation and habitat surveys in 2009.

INTRODUCTION

This document is a summary of fisheries data collected from Sulphur Springs Reservoir in 2005-2006. 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 2005-2006 data for comparison.

Reservoir Description

Sulphur Springs Reservoir is a 1,478-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 featureless banks with limited flooded terrestrial vegetation. American lotus was the most abundant emergent aquatic species (133 acres) but it was restricted to the upper end of the reservoir. At time of sampling, the reservoir was 1.26 feet below 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. 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 (Myers and Storey 2002) included:

1. Improve the water clarity of the lake to enhance sport fish recruitment and habitat.
   Action: No action was taken because the plan was deemed to be impractical due to the tremendous resources and manpower required to make any impact on this system. Low fishing effort was also a mitigating factor.
2. Promote the available fisheries on the reservoir to increase usage.
   Action: No action was taken. Angler utilization and interest are low because of the proximity of the city of Sulphur Springs to good quality fishing lakes such as Lake Fork and Cooper Reservoir.

Harvest regulation history: Sportfishes in Sulphur Springs Reservoir are currently 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 2005-2006 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 (2001 = 77.2%) mixed with flooded terrestrial vegetation and American lotus. In August 2001, American lotus covered a limited amount of the lakeshore (2.3%) (Myers and Storey 2002).

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 2005).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and relative weight (Wr) 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.

RESULTS AND DISCUSSION

Vegetation/habitat: Shoreline habitat during August 2005 was composed primarily of featureless shoreline, American lotus, and flooded terrestrial vegetation (73, 28, and 24% respectively; Table 4). The lack of submerged vegetation was likely due to poor water clarity in the reservoir (Secchi depth < 1 ft). The absence of vegetation and other habitat within the reservoir is likely a contributor to limiting the productivity of sportfishes.

Prey species: Electrofishing catch rates of bluegill and gizzard shad were 4.0/h and 82.0/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 2005 compared to the 2001 survey (Figure 1). Total CPUE of bluegill in 2005 was higher than total CPUE in 2001 (when no bluegill were caught) and size structure was dominated by small individuals (Figure 2).

Catfish: The gill net catch rate of blue catfish was 6.0/nn in 2006. The blue catfish population showed an increase in relative abundance in 2006 compared to 2002 (Figure 4). No channel catfish were sampled during the 2006 gill net survey, and CPUE was extremely low for channel catfish during the 2002 and 1997 surveys (0.6/nn and 0.4/nn, respectively). Although no channel catfish were caught, the spring 2006 gill net survey indicated the occurrence of natural blue catfish reproduction due to the presence of sub-stock size fish. Additionally, many blue catfish were of harvestable size, indicating a productive fishery. Anecdotal information provided by the local game warden indicated there are usually some passive and/or active gear catfish anglers fishing on Sulphur Springs Reservoir on any given day. He also stated that the quality of the fish they caught was good.

Largemouth bass: No largemouth bass were caught during fall electrofishing in 2005 or in 2001. The last survey in which largemouth bass were caught was in 1997; with an electrofishing catch rate 32/h (Figure 5). High lake turbidity is probably the most important factor that limits the success of the largemouth bass population. In addition, habitat issues such as lack of suitable vegetative and woody cover compound this issue.

White crappie: The trap net catch rate of white crappie was 36.4/nn in 2005, much higher than in 2001 (9.0/nn), but lower than in 1997 (64.5/nn). No stock sized white crappie were sampled in 2005 (Figure 6). The PSDs in 2001 and 1997 were 82 and 79, respectively, showing the reservoir historically had the potential for a productive white crappie fishery (Figure 6). Similar to largemouth bass, the white crappie population in Sulphur Springs Reservoir is limited by poor water clarity and a scarcity of suitable aquatic habitat.

Fisheries management plan for Sulphur Springs Reservoir, Texas

Prepared – July 2006.

ISSUE 1: Sulphur Springs Reservoir is highly turbid and this condition limits the reproductive success of Centrarchids which explains the poor populations of largemouth bass, crappie and sunfish. The high amount of suspended solids in the water column is likely created and aggravated by a number of factors including soil type, a scarcity of aquatic vegetation to stabilize the shoreline, the presence of "rough" fish and wind action. Although these conditions are detrimental to the establishment of quality centrarchid populations, they do not seem to limit catfish populations. Anecdotal information suggests directed angler effort is almost exclusively for catfish. Improvement of the lake's water clarity does not appear to be a feasible proposition at this time.

MANAGEMENT STRATEGY

1. Maintain the catfish population at its current status. There is a blue catfish fishery of good quality that has attracted a limited local following, but it is debatable whether this population could sustain increased effort that would result from promoting the fishery.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes habitat and vegetation sampling, electrofishing, and trap netting in 2009, and gill netting in spring 2010 (Table 6).

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. Stimpert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.

Storey, K., and R. Myers. 2002. Statewide freshwater fisheries monitoring and management program survey report for Sulphur Springs Reservoir, 2001. Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-30-R-27, Job A, 20 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 µmho / cm
Secchi disc range	< 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
Saugeye	3	18 - No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No limit

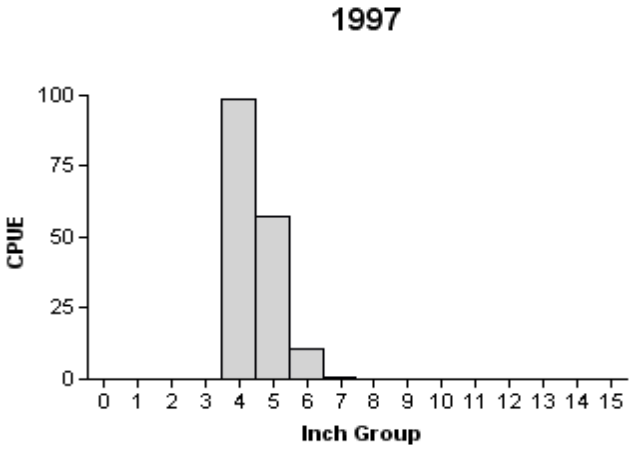
Table 3. Stocking history of Sulphur Springs Reservoir, Texas. Size Categories are: FGL = 1-3 inches; AFGL = 8 inches, and ADL = adults.

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	

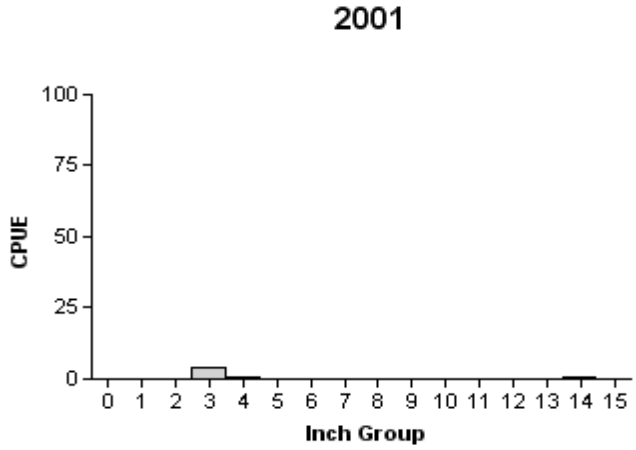
Table 4. Survey of littoral zone and physical habitat types, Sulphur Springs Reservoir, Texas, 2005. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation found.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
American lotus	3.59	28.2	132.7	7.51
Concrete	1.88	14.8		
Dead trees	0.20	1.6		
Eroded bank	2.57	20.2		
Featureless	9.33	73.4		
Flooded terrestrial	3.09	24.3	2.2	0.13
Native emergent	0.24	1.9	0.1	<0.01
Overhanging brush	0.24	1.9		
Rip rap	0.27	2.1		

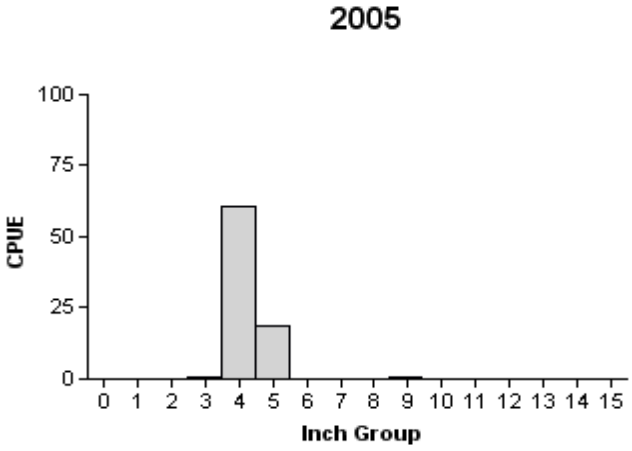
Gizzard Shad



Effort = 1.0
Total CPUE = 168.0 (30; 168)
Stock CPUE = 1.0 (100; 1)
PSD = 0.0 (71.76)
IOV = 100.0 (0)



Effort = 1.0
Total CPUE = 6.0 (52; 6)
Stock CPUE = 1.0 (100; 1)
PSD = 100.0 (0.00)
IOV = 83.33 (0.1)



Effort = 1.0
Total CPUE = 82.0 (15; 82)
Stock CPUE = 1.0 (100; 1)
PSD = 0.0 (27.75)
IOV = 98.78 (0.01)

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, 1998, 2001, and 2005.

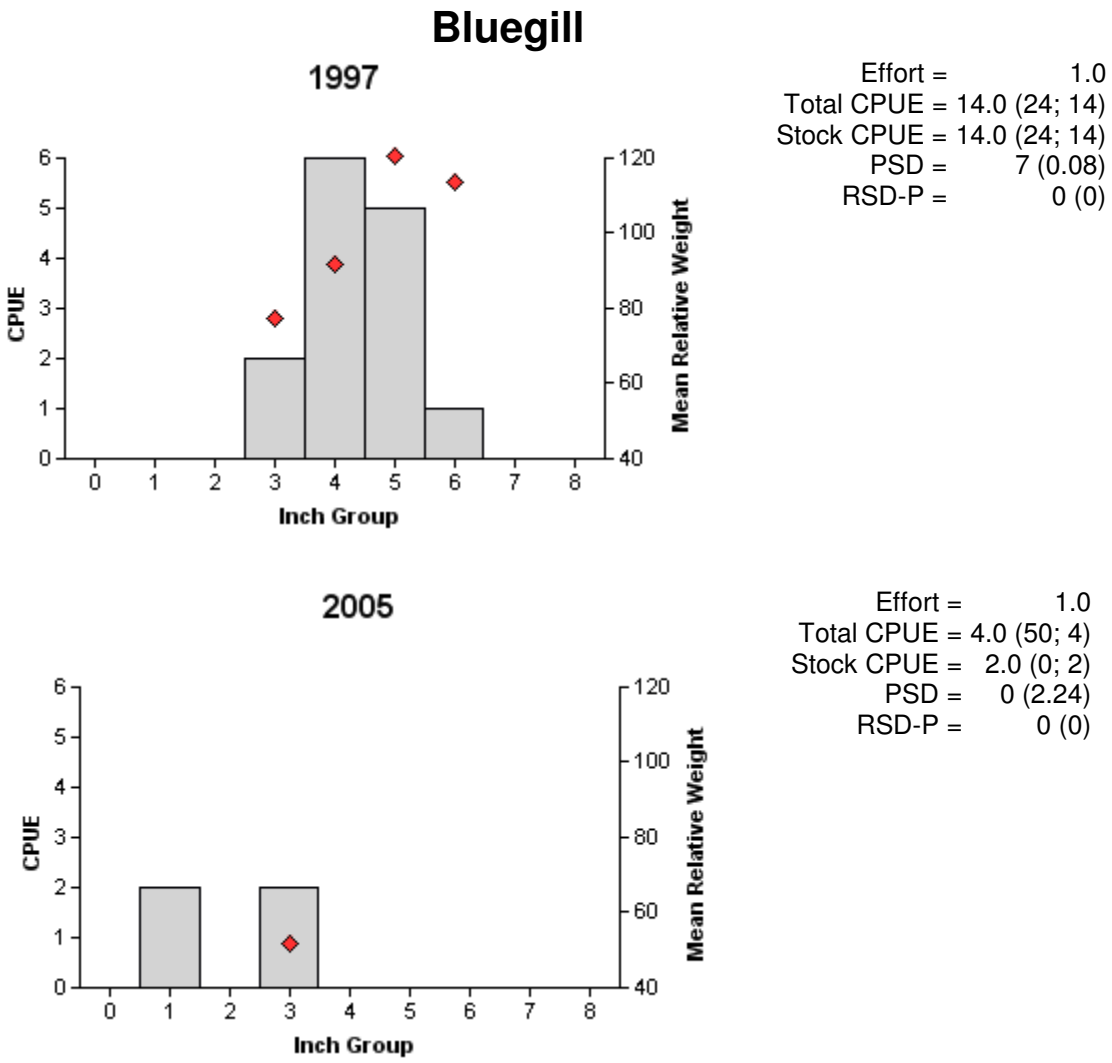


Figure 2. Number of bluegill caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sulphur Springs Reservoir, Texas, 1997 and 2005. No bluegill were collected in 2001.

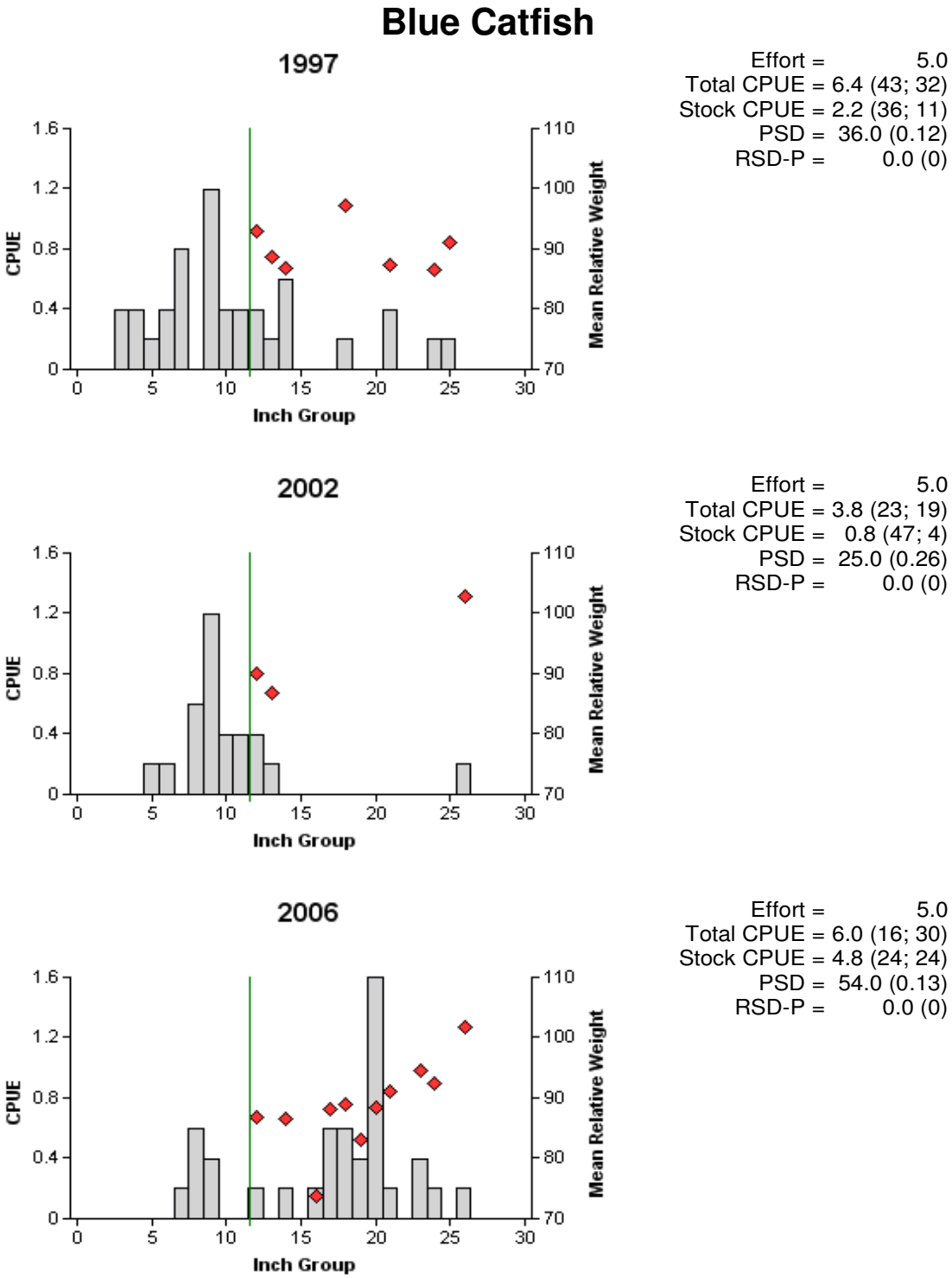


Figure 3. Number of blue catfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Sulphur Springs Reservoir, Texas, 1997, 2002, and 2006. Vertical lines indicate minimum length limit at time of survey.

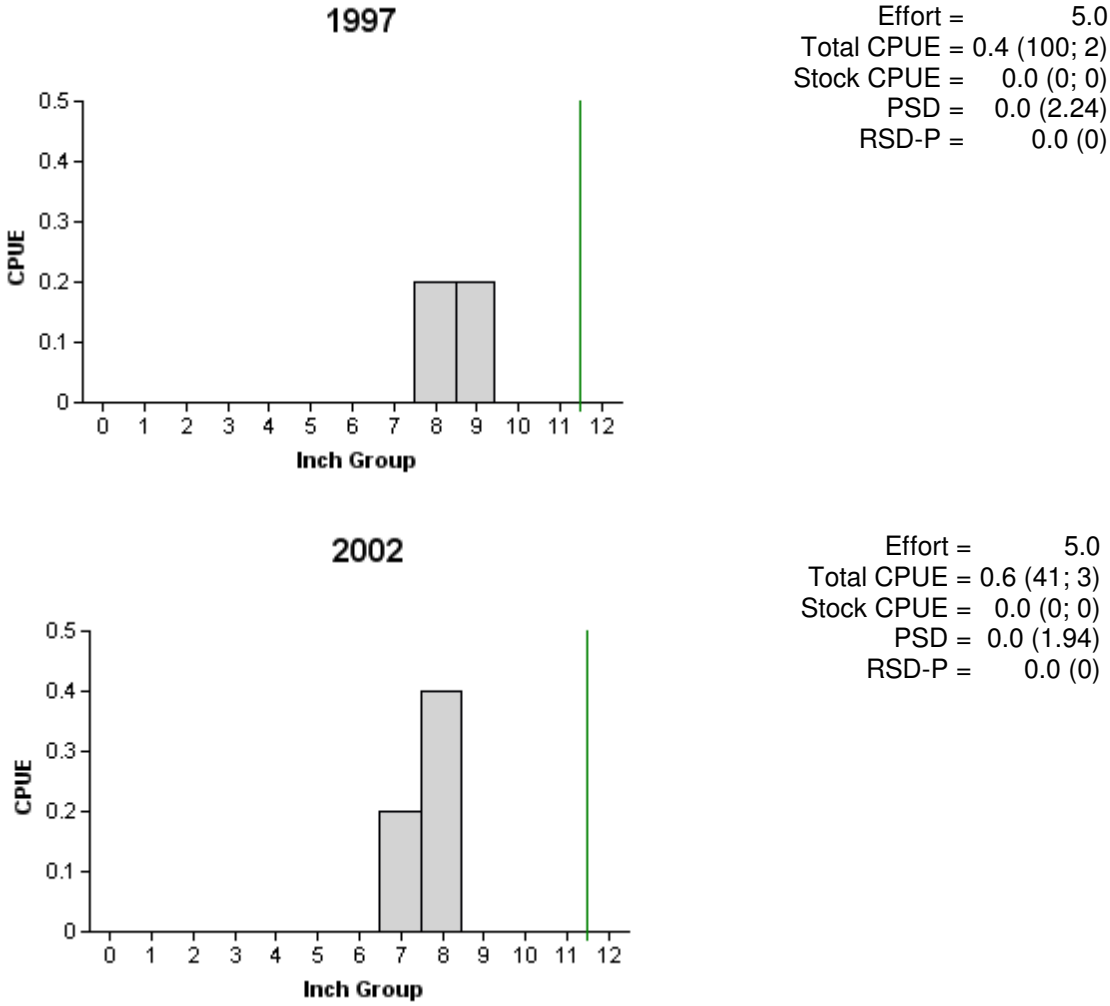


Figure 4. Number of channel catfish caught per net night (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Sulphur Springs Reservoir, Texas, 1997 and 2002. Vertical lines indicate minimum length limit at time of survey. No channel catfish were collected in 2006.

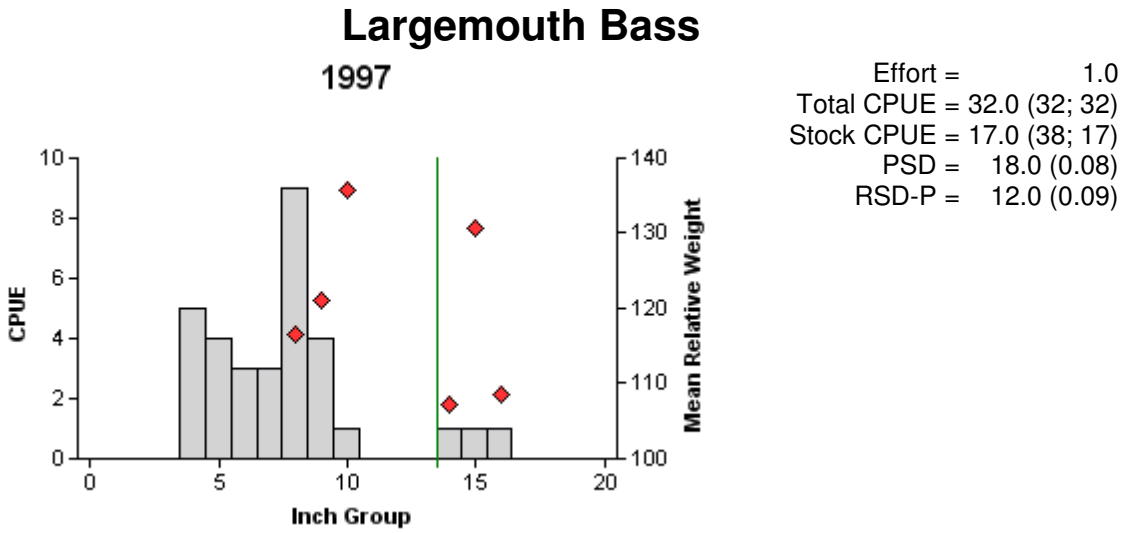


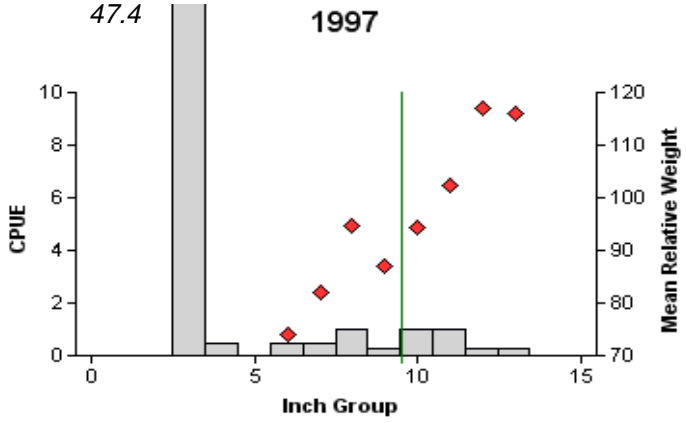
Figure 5. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Sulphur Springs Reservoir, Texas, 1997. Vertical line indicates minimum length limit at time of survey. No largemouth bass were collected in 2001 and 2005.

Largemouth Bass

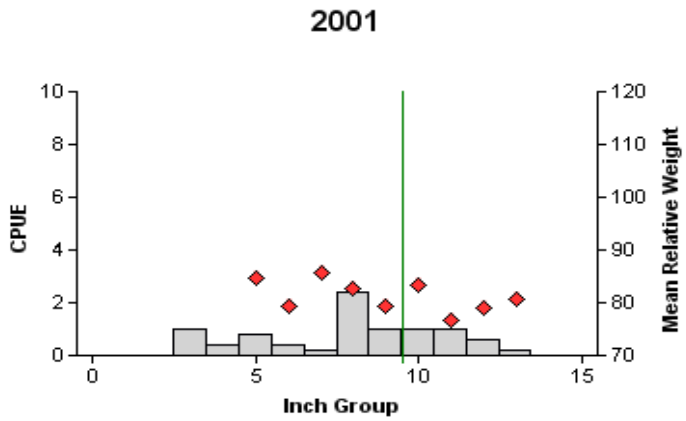
Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Sulphur Springs Reservoir, Texas, 1997. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB.

		Genotype					
Year	Sample size	FLMB	F1	Fx	NLMB	% FLMB alleles	% pure FLMB
1997	12	0	0	1	11	1.4	0.0

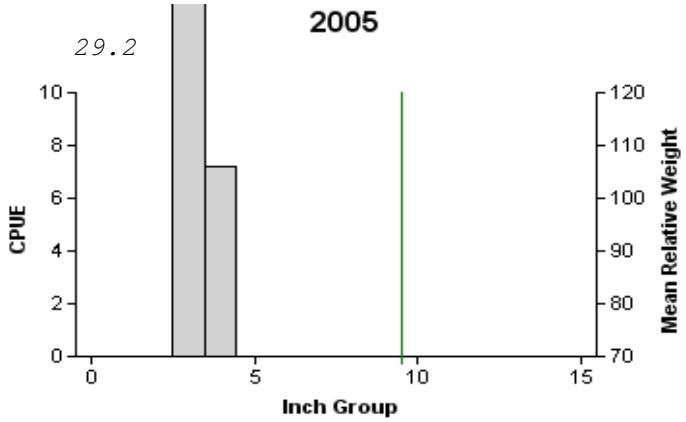
White Crappie



Effort = 4.0
Total CPUE = 64.5 (49; 258)
Stock CPUE = 4.8 (44; 19)
PSD = 79.0 (0.12)
RSD-P = 53.0 (0.16)



Effort = 5.0
Total CPUE = 9.0 (44; 45)
Stock CPUE = 7.6 (49; 38)
PSD = 82.0 (0.06)
RSD-P = 37.0 (0.09)



Effort = 5.0
Total CPUE = 36.4 (43; 182)
Stock CPUE = 0.0 (0; 0)
PSD = 0.0 (120.4)
RSD-P = 0.0 (0)

Figure 6. 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, 1997, 2001, and 2005. Vertical lines indicate minimum length limit at time of survey.

Table 6. 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.

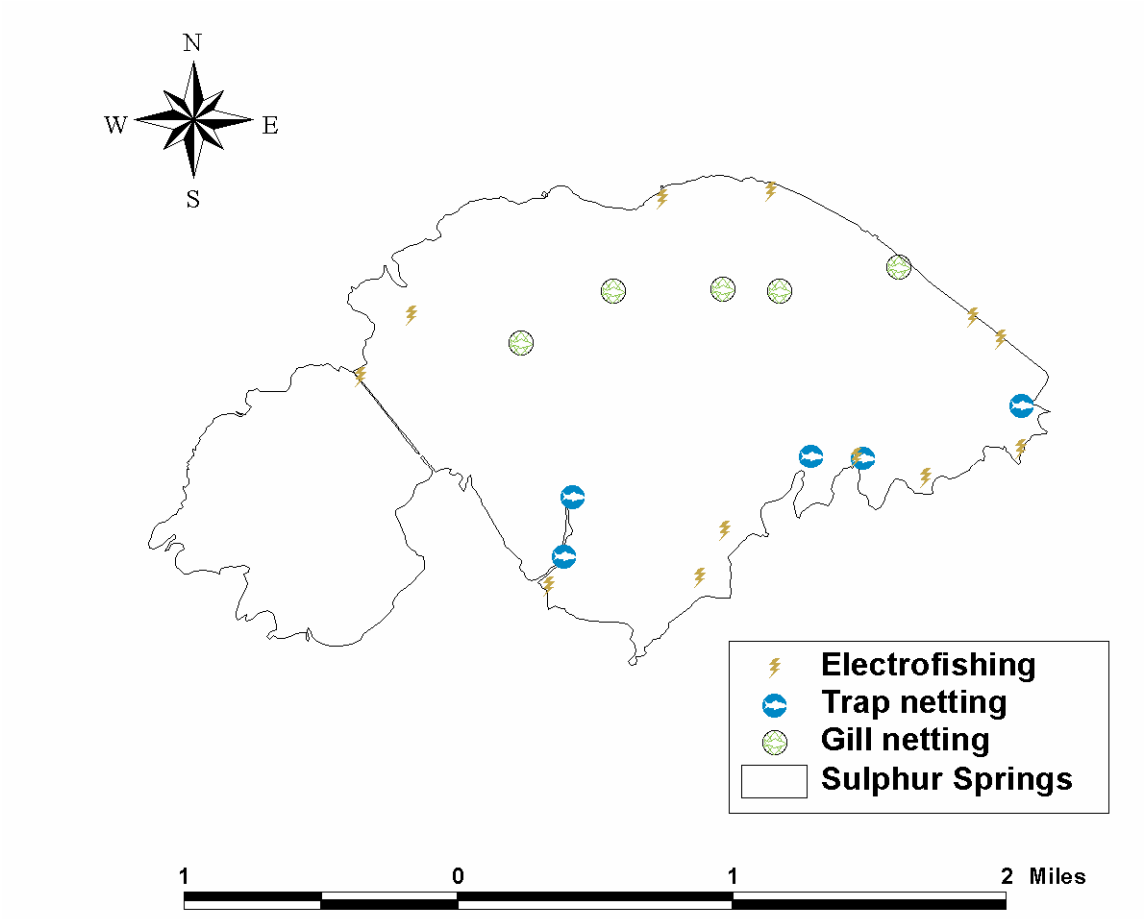
Survey Year	Electrofishing	Trap netting	Gill netting	Vegetation	Report
Fall 2006-Spring 2007					
Fall 2007-Spring 2008					
Fall 2008-Spring 2009					
Fall 2009-Spring 2010	S	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Sulphur Springs Reservoir, Texas, 2005-2006.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					82.0	82.0
Blue catfish	30	6.0				
Bluegill					4.0	4.0
Longear sunfish					1.0	1.0
White crappie			182	36.4		

APPENDIX B



Location of electrofishing, trap netting, and gill netting sites, Sulphur Springs Reservoir, Texas, 2005-2006.

APPENDIX C

Water body records, all tackle category, for Sulphur Springs Reservoir as of 6/12/2006

Species	Weight (lbs)	Length (inches)	Date certified	Gear
Bass, Largemouth	1.9	14.63	9/22/99	Rod & Reel