

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-33

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2007 Survey Report

Cisco Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Cisco 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:** Cisco Reservoir is a 1,050-acre impoundment constructed on Sandy Creek approximately 45 miles east of Abilene, Texas. It is located in the Brazos River Basin, and its primary use was municipal water supply. From 1999 to the end of 2004 water level dropped about 12 feet, but this drop was corrected in 2005. Water level fell again in 2006 and 2007 before heavy rains in June and July 2007 added 15 feet. Water level was 4-foot below conservation level at time of sampling, and littoral habitat consisted primarily of rock, flooded-terrestrial vegetation, and black willow. Boat access consisted of one public boat ramp. Bank fishing access was limited to the boat ramp area.
- **Management History:** Fish populations have been managed with statewide harvest regulations. Attempts to introduce smallmouth bass in the 1990s were unsuccessful. Introductions of blue catfish were also unsuccessful.
- **Fish Community**
 - **Prey species:** Prey fish primarily consisted of various sunfish species and gizzard shad. Although prey fish numbers appeared low, body condition and growth of largemouth bass seemed to indicate that the current forage base was good.
 - **Catfishes:** Channel catfish were present with low abundance.
 - **Temperate basses:** White bass numbers appeared to be increasing and most of the fish collected were 14-17 inches long.
 - **Largemouth bass:** Body condition, size structure, and growth improved in 2007 compared to previous years.
 - **White crappie:** White crappie abundance, according to trap net surveys, was poor. However, fish up to 14" were collected and the overall size structure of the crappie population was much better than it was in 2003, meaning that more legal-size crappie may be available to anglers.
- **Management Strategies:** Conduct geo-referenced habitat survey. Conduct fish monitoring surveys in 2011/2012 including bass-only electrofishing in the spring 2012.

INTRODUCTION

This document is a summary of fisheries data collected from Cisco 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. 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 2007-2008 data for comparison.

Reservoir Description

Cisco Reservoir is a 1,050-acre impoundment constructed on Sandy Creek approximately 45 miles east of Abilene, Texas. It is located in the Brazos River Basin, and its primary use was municipal water supply. Secondary use was recreation.

From 1999 to the end of 2004 water level dropped about 12 feet, but this drop was corrected in 2005 (Figure 1). Water level fell again in 2006 and 2007 before heavy rains in June and July 2007 added 15 feet which, based on historic anecdotal information, put Cisco Reservoir's water level at its highest since the 1970s. Water level was 4-foot below conservation level at time of sampling, and littoral habitat consisted primarily of rock, flooded-terrestrial vegetation, black willow, and chara.

Cisco Reservoir was mesotrophic based on Carlson's Trophic State Index for Chlorophyll-a (TSI Chl-a) with a mean TSI chl-a of 42.63 and a trend that indicated an increase in algal content (Texas Commission on Environmental Quality 2005). Boat access consisted of one public boat ramp. Bank fishing access was limited to the boat ramp area. Other descriptive characteristics for Cisco Reservoir are in Table 1. A contour map of the reservoir was completed in 2007 by district staff.

Management History

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

1. Monitor fish populations to document impact of long-term drought.
Action: A fall electrofishing survey was conducted in 2005. Cisco Reservoir caught significant water in 2005 and in 2007. Comparisons of fish populations during and after low-water years are included in this report.
2. Encourage anglers to harvest white bass, a recent addition to the fish community.
Action: Wrote article in Abilene Reporter News on white bass at Cisco Reservoir and talked with area anglers when opportunities arose.

Harvest regulation history: Fish populations have always been managed with statewide regulations at Cisco Reservoir (Table 2).

Stocking history: Threadfin shad were introduced in 1983 and 1984 but have never been collected after their introduction. Blue catfish were stocked in 1980 and again in 2001, but no blue catfish have been collected in any survey thus far. Channel catfish were stocked in 2000 and 2001. Over 100,000 smallmouth bass were stocked from 1994 to 1997, but they failed to establish a population. Walleye and palmetto bass were stocked in the early 1980s. A lake record palmetto bass was caught in 1996 and weighed 7.27 pounds. Florida largemouth bass were introduced in 1991 and additional stockings occurred in 1994 and 1995. A complete stocking history is in Table 3.

Vegetation/habitat history: Cisco Reservoir has no significant vegetation/habitat management history.

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METHODS

Fishes were collected by electrofishing (1.3 hours at 15 5-min stations), gill netting (five net nights at five stations), and trap netting (10 net nights at 10 sites). 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). Microsatellite DNA analysis was used in 2005 to determine largemouth bass genetics. 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 Size Distribution (PSD)] (Guy *et al.* 2007), and condition indices [relative weight (W_r)] were calculated for some 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 of largemouth bass were determined using otoliths. Source for water level data was the United States Geological Survey website.

RESULTS AND DISCUSSION

Habitat: A habitat survey was last conducted in 1996 (Munger and Dumont 1997).

Prey species: Electrofishing CPUE of gizzard shad and bluegill was 103.2/h and 76.0/h, respectively. The IOV for gizzard shad was 38% in 2007, indicating that few gizzard shad were available as forage to most game fish. This is typical for gizzard shad at Cisco Reservoir as the average IOV from 12 electrofishing surveys dating back to 1987 was 39%. Catch rates of gizzard shad followed a similar pattern in that they were poor, except for an occasional high catch such as the one in 2001 (Figure 2). Bluegill relative abundance remained low in 2007, but has increased since 2001 (Figure 3). Size structure of bluegill was typical of the district: a population dominated by small individuals with a low PSD (Figure 3). Bluegill relative abundance has been similar since 1996, and the drought from 1999 through 2004 had no apparent impact on the population (Figure 4).

Channel catfish: Gill net CPUE of channel catfish was 1.0/nn in 2008 and was similar to catch rates in previous years (Figure 5). Channel catfish continued to be present with low abundance.

White bass: Gill net CPUE of white bass was 4.0/nn in 2008, up from 1.8/nn in 2004. Size structure was composed primarily of larger fish (Figure 6).

Largemouth bass: Electrofishing CPUE of largemouth bass has steadily increased since 2003 and was 144.0/h in 2007, but much of this increase consisted of sub-stock length fish (Figure 7). Relative abundance of stock-length fish declined from 1999 to 2005 before rebounding in 2007 (Figure 8). A strong year class in 2005 impacted the number of stock-length fish in 2007 as well as increasing the PSD from 36 in 2005 to 53 in 2007. However, PSD-14 remained low, ranging from 1 to 7 since 2003 (Figure 7); this has always been the case at Cisco Reservoir (Figure 8). Part of the problem, at least from 1999 to 2003, was poor growth. Mean age of largemouth bass at 12" and 14" was poor in 1999 and was worse in 2003 taking over three and a half years to reach 12" and five years to reach 14" (Table 4). Growth was considerably better in 2007 as fish reached 12" in about two years and 14" in two and a half years. From 2003 to 2007, body condition has steadily improved; mean W_r of stock- to preferred-sized fish was in the mid 90s in 2007 (Table 5). There appeared to be major drought-related impacts on the largemouth bass population at least in terms of electrofishing catch rates, growth, and body condition. However, reports of big largemouth bass being caught were fairly common. In fact the lake record was broken twice since 2003, topped by the current record of 13.20 pounds, which was donated to the ShareLunker program in January 2007. Florida largemouth bass stockings in the early to mid 1990s had a huge impact on enhancing the trophy potential at Cisco Reservoir. In 1993 the Florida largemouth bass allele frequency

was 5%. The Florida allele frequency increased to 61% by 1999 and was 45% in 2005 (Table 6).

White crappie: Trap net CPUE of white crappie was 2.1/nn in 2007, much lower than catch rates in 2003 and 1999 (Figure 9). Catch rate of legal-size fish from 1999 to 2007 were similar and ranged from 1.3 to 3.6 fish/nn (Figure 9). Size structure in 2007 was very different compared to 1999 and 2003 (Figure 9); no fish smaller than 8" were collected in 2007, PSD was 100 in 2007 compared to the low 40s in previous surveys, and PSD-10 increased from 18 in 2003 to 76 in 2007. Because so few crappie were collected in 2007, the reliability of the estimated size structure is questionable.

Fisheries management plan for Cisco Reservoir, Texas

Prepared – July 2008.

ISSUE 1: There is no geo-referenced habitat map of Cisco Reservoir.

MANAGEMENT STRATEGY

1. Conduct geo-referenced habitat survey to document change in habitat resulting from significant rise in water level.

SAMPLING SCHEDULE JUSTIFICATION:

Cisco Reservoir has been sampled intensively with electrofishing gear over the last 15 years. The relative consistency in gizzard shad, sunfish, and largemouth bass samples indicated that frequent sampling may not be necessary under current conditions and that additional monitoring can occur in 2011/2012. In addition to fall electrofishing in 2011, bass-only electrofishing will be conducted in the spring 2012. Other target species can be monitored once every four years. A sampling schedule is in Table 7.

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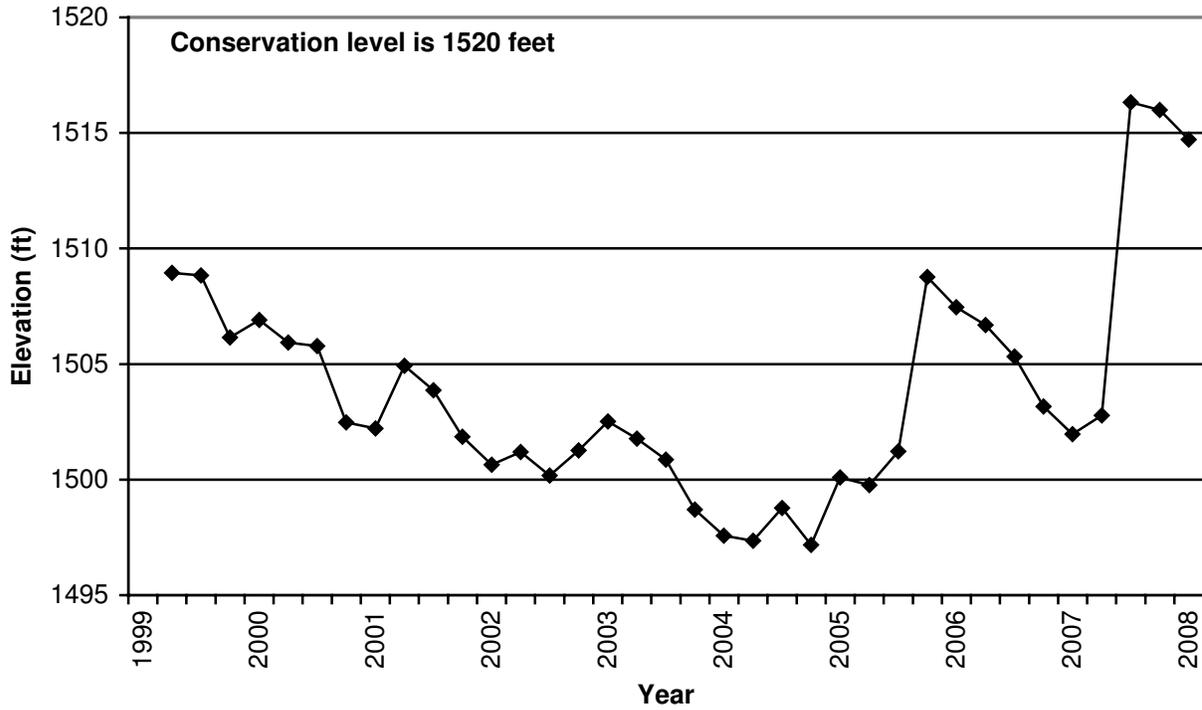


Figure 1. Quarterly water level elevations in feet above mean sea level for Cisco Reservoir, Texas.

Table 1. Characteristics of Cisco Reservoir, Texas.

Characteristic	Description
Year constructed	1928
Controlling authority	City of Cisco
County	Eastland
Reservoir type	Tributary, Brazos River Basin
Shoreline Development Index	2.24
Conductivity	305 umhos/cm

Table 2. Harvest regulations for Cisco Reservoir, Texas

Species	Bag Limit	Minimum Length Limit (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12
Catfish, flathead	5	18
Bass, white	25	10
Bass, largemouth	5	14
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10

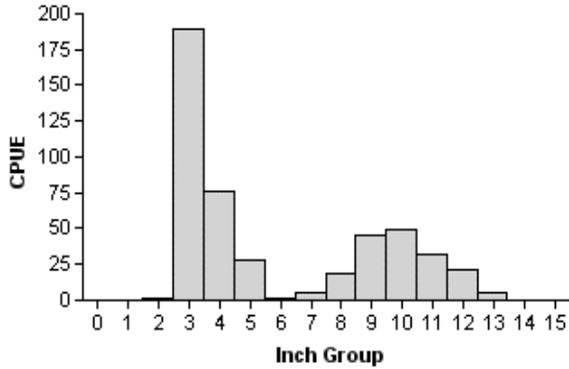
Table 3. Stocking history of Cisco Reservoir, Texas. Size categories are: FRY = < 1 inch, FGL = 1-3 inches and ADL = adults.

Species	Year	Number	Size
Threadfin shad	1983	2,100	ADL
	1984	1,000	ADL
	Total	3,100	
Blue catfish	1980	26,030	FGL
	2001	2,604	FGL
	Total	28,634	
Channel catfish	1970	60,000	FGL
	1979	16,350	FGL
	2000	1,240	FGL
	2001	18,874	FGL
	Total	96,464	
Palmetto bass	1980	11,376	FGL
	1982	10,000	FGL
	Total	21,376	
Smallmouth bass	1984	4,000	FGL
	1987	30	ADL
	1988	13	ADL
	1994	26,386	FGL
	1995	11,970	FGL
	1995	14,250	FRY
	1996	26,309	FGL
	1997	26,900	FGL
	Total	109,858	
Largemouth bass	1970	100,000	FGL
Florida largemouth bass	1991	24,966	FGL
	1994	44,500	FGL
	1995	44,899	FGL
	Total	114,365	
Walleye	1981	2,000,000	FRY
	1983	2,887,000	FRY
	Total	4,887,000	

Gizzard Shad

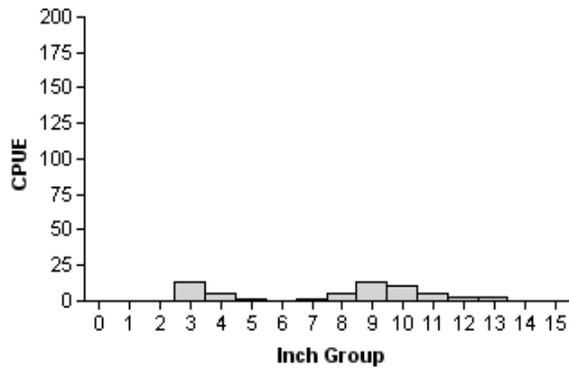
2001

Effort = 1.0
 Total CPUE = 475.0 (31; 475)
 PSD = 33 (8)
 IOV = 64 (8)



2003

Effort = 1.3
 Total CPUE = 58.4 (21; 73)
 PSD = 28 (7)
 IOV = 33 (9)



2007

Effort = 1.3
 Total CPUE = 103.2 (29; 129)
 PSD = 35 (7)
 IOV = 38 (9)

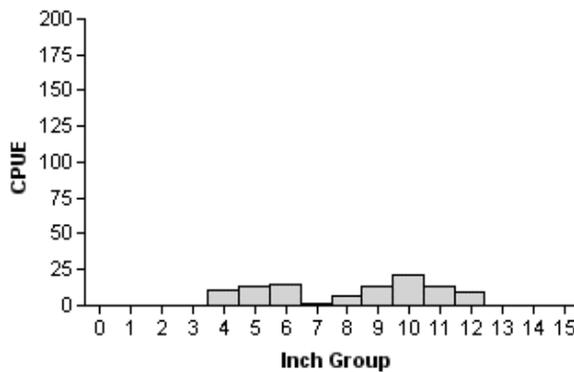
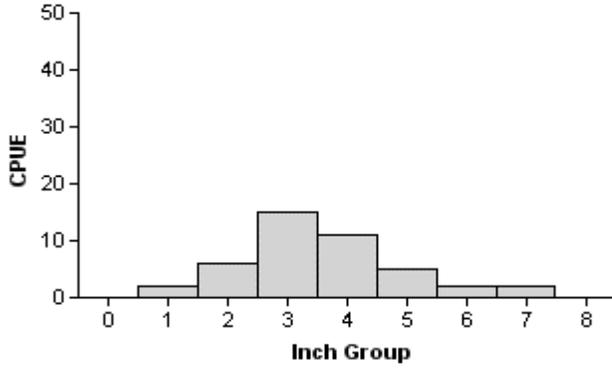


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for PSD and IOV are in parentheses) for fall electrofishing surveys, Cisco Reservoir, Texas, 2001, 2003, and 2007.

Bluegill

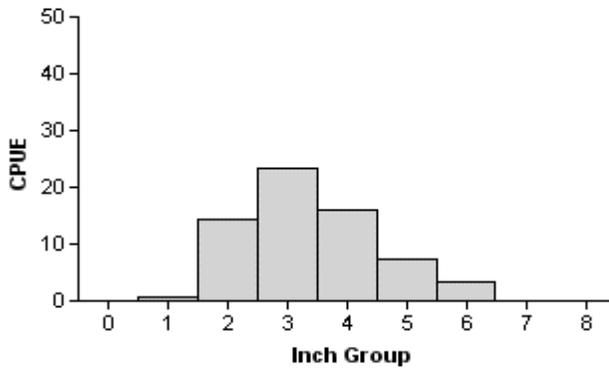
2001

Effort = 1.0
 Total CPUE = 43.0 (18; 43)
 PSD = 11 (7)



2003

Effort = 1.3
 Total CPUE = 64.8 (15; 81)
 PSD = 6 (3)



2007

Effort = 1.3
 Total CPUE = 76.0 (31; 95)
 PSD = 2 (2)

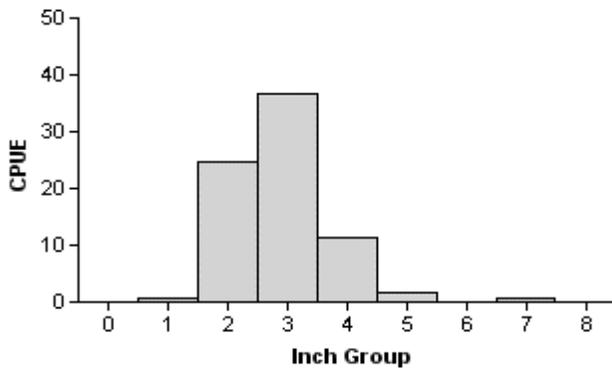


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Cisco Reservoir, Texas, 2001, 2003, and 2007.

Bluegill and Gizzard Shad

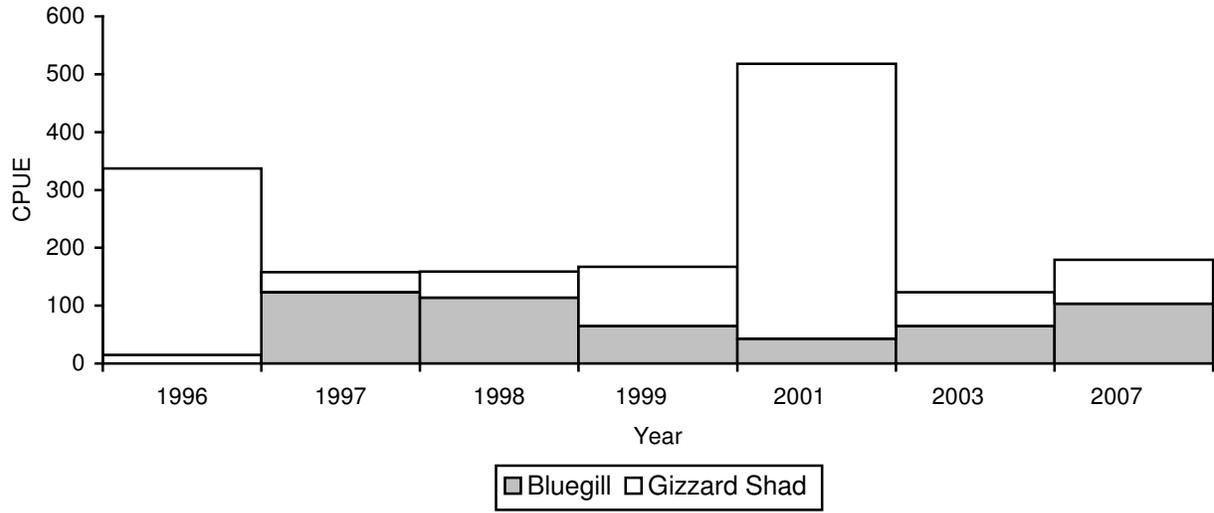


Figure 4. Electrofishing catch per hour (CPUE) of bluegill and gizzard shad from Cisco Reservoir, 1996-2007.

Channel Catfish

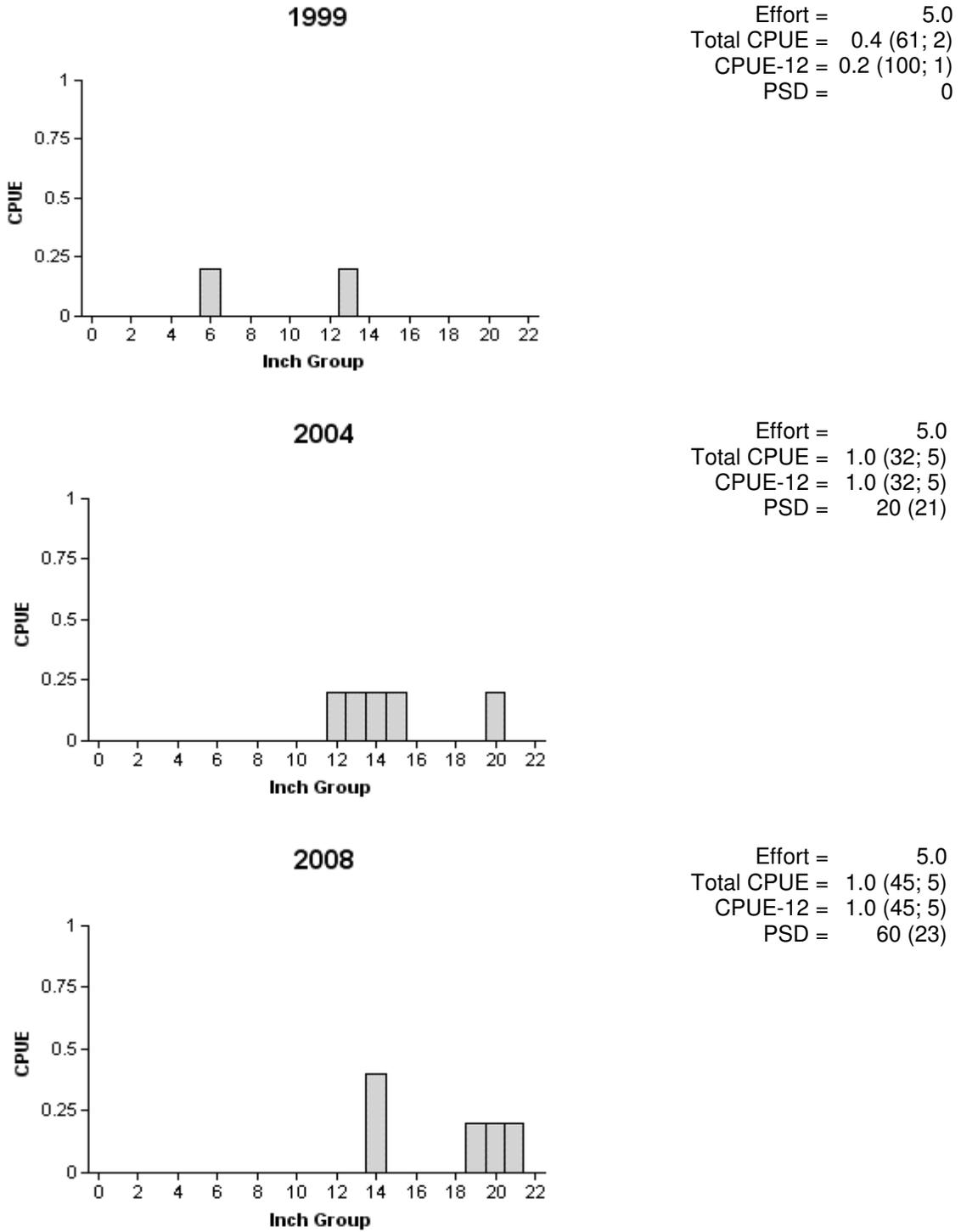
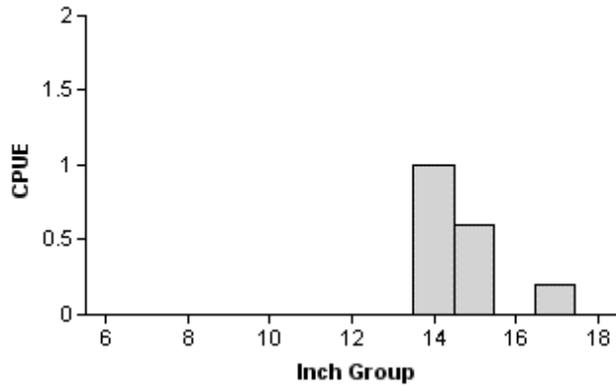


Figure 5. Number of channel catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Cisco Reservoir, Texas, 1999, 2004, and 2008.

White Bass

2004

Effort = 5.0
 Total CPUE = 1.8 (48; 9)
 CPUE-10 = 1.8 (48; 9)



2008

Effort = 5.0
 Total CPUE = 4.0 (52; 20)
 CPUE-10 = 4.0 (52; 20)

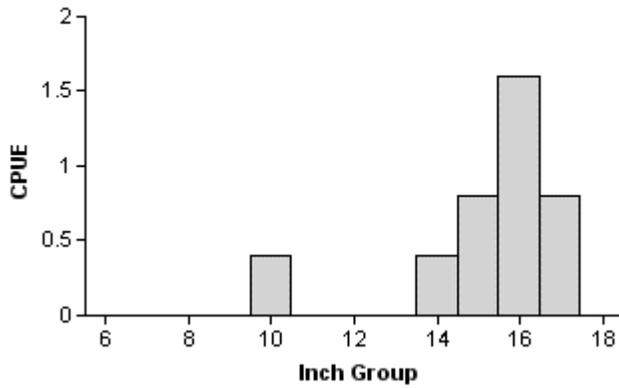
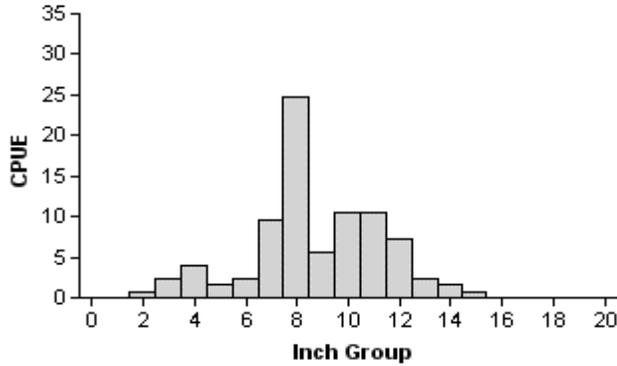


Figure 6. Number of white bass caught per net night (CPUE) and population indices (RSE and N for CPUE are in parentheses) for spring gill net surveys, Cisco Reservoir, Texas, 2004 and 2008.

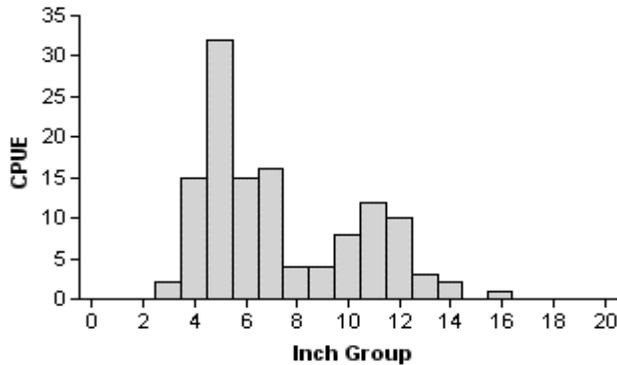
Largemouth Bass

2003



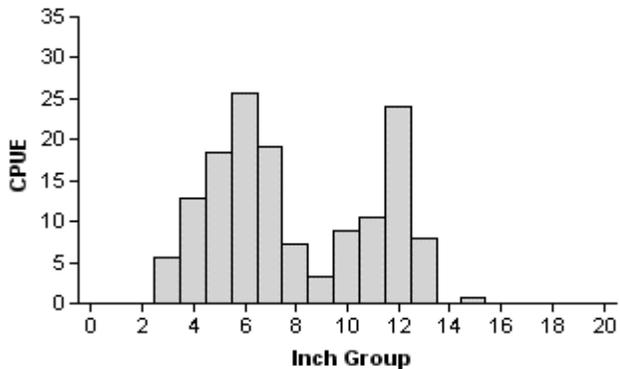
Effort = 1.3
 Total CPUE = 84.0 (11; 105)
 Stock CPUE = 63.2 (15; 79)
 CPUE-14 = 2.4 (53; 3)
 PSD = 19 (5)
 PSD-14 = 4 (2)

2005



Effort = 1.0
 Total CPUE = 124.0 (12; 124)
 Stock CPUE = 44.0 (18; 44)
 CPUE-14 = 3.0 (72; 3)
 PSD = 36 (9)
 PSD-14 = 7 (5)

2007



Effort = 1.3
 Total CPUE = 144.0 (13; 180)
 Stock CPUE = 62.4 (16; 78)
 CPUE-14 = 0.8 (100; 1)
 PSD = 53 (6)
 PSD-14 = 1 (1)

Figure 7. Number of largemouth bass caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Cisco Reservoir, Texas, 2003, 2005, and 2007.

Largemouth Bass

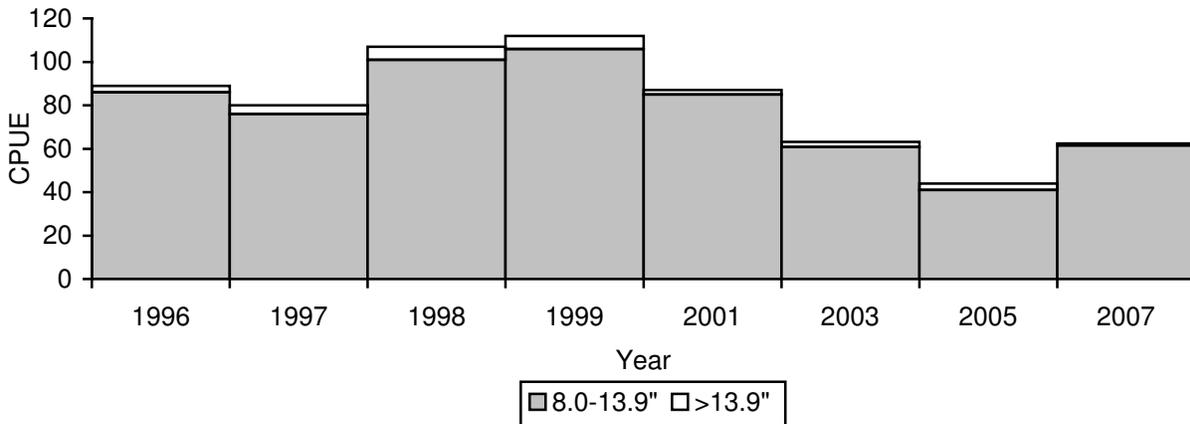


Figure 8. Catch per unit effort (CPUE) of largemouth bass from fall electrofishing surveys, Cisco Reservoir, Texas, 1996-2007.

Table 4. Mean age at length of largemouth bass at 12 inches and 14 inches collected from fall electrofishing surveys in Cisco Reservoir, Texas, in 1999, 2003, and 2007. Sample size for each estimate is in parentheses.

Year	Mean age at length	
	12" (11.0"-12.9")	14" (13.0"-14.9")
1999	2.3 (10)	3.2 (5)
2003	3.6 (16)	5.0 (5)
2007	1.9 (28)	2.4 (12)

Table 5. Average relative weight of 8.0-11.9-inch and 12.0-14.9-inch largemouth bass from 2003, 2005, and 2007 at Cisco Reservoir, Texas. Sample size for each estimate is in parentheses.

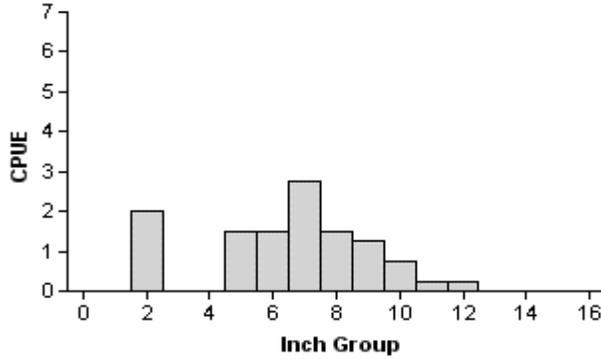
Year	Mean Wr	
	8.0-11.9	12.0-14.9
2003	79 (64)	74 (14)
2005	90 (28)	87 (15)
2007	95 (37)	97 (40)

Table 6. Results of genetic analysis of largemouth bass collected by fall electrofishing, Cisco Reservoir, Texas, 1993, 1996, 1999, and 2005. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass.

Year	Sample size	Genotype			% FLMB alleles	% FLMB genotype
		FLMB	Intergrades	NLMB		
1993	26	0	4	22	4.8	0.0
1996	27	1	19	7	37.0	3.7
1999	40	10	28	2	61.3	25.0
2005	30	1	26	3	45.5	3.0

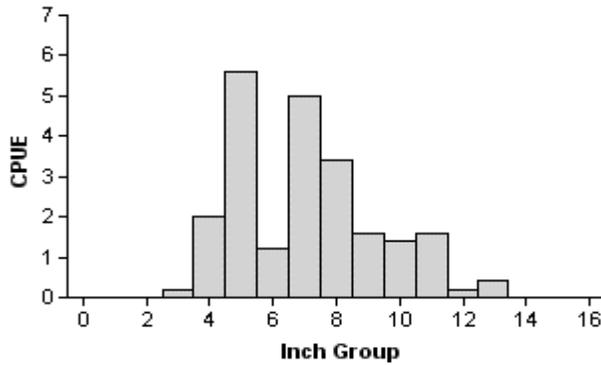
White Crappie

1999



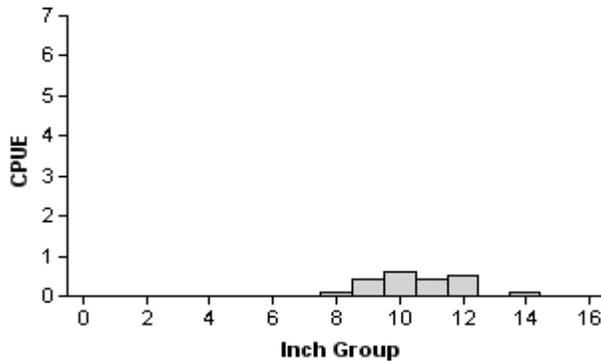
Effort = 4.0
 Total CPUE = 11.8 (68; 47)
 Stock CPUE = 9.8 (64; 39)
 CPUE-10 = 1.3 (50; 5)
 PSD = 41 (5)
 PSD-10 = 13 (3)

2003



Effort = 5.0
 Total CPUE = 22.6 (25; 113)
 Stock CPUE = 20.4 (24; 102)
 CPUE-10 = 3.6 (47; 18)
 PSD = 42 (13)
 PSD-10 = 18 (9)

2007



Effort = 10.0
 Total CPUE = 2.1 (42; 21)
 Stock CPUE = 2.1 (42; 21)
 CPUE-10 = 1.6 (41; 16)
 PSD = 100 (0)
 PSD-10 = 76 (9)

Figure 9. Number of white crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Cisco Reservoir, Texas, 1999, 2003, and 2007.

Table 7. Proposed sampling schedule for Cisco 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.

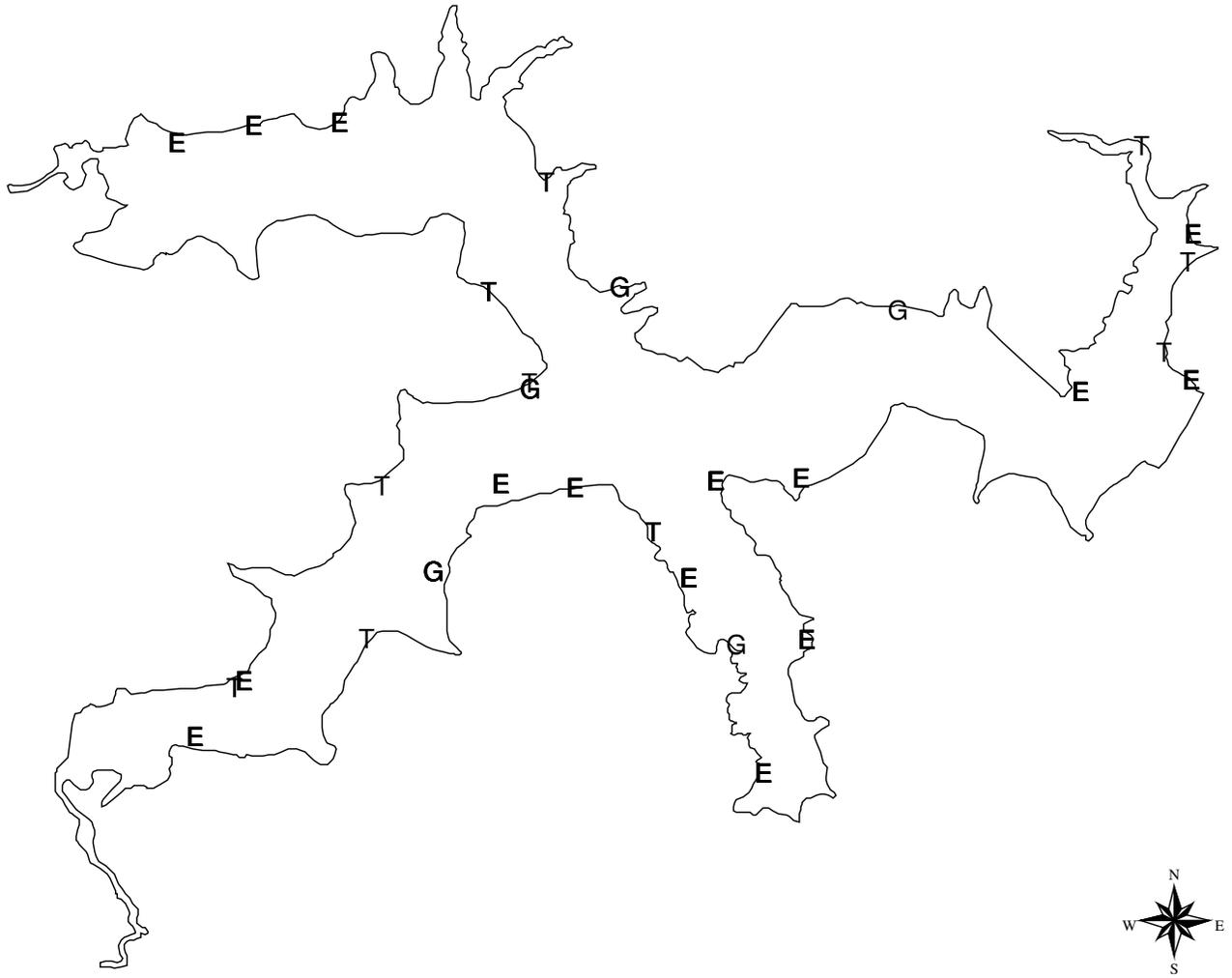
Survey Year	Electrofisher	Trap Net	Gill Net	Report
Fall 2008-Spring 2009				
Fall 2009-Spring 2010				
Fall 2010-Spring 2011				
Fall 2011-Spring 2012	S	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from Cisco Reservoir, Texas, 2007-2008.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					129	103.2
Channel catfish	5	1.0				
White bass	20	4.0				
Green sunfish					23	18.4
Warmouth					8	6.4
Bluegill					95	76.0
Longear sunfish					22	17.6
Redear sunfish					8	6.4
Largemouth bass					180	144.0
White crappie			21	2.1		

APPENDIX B



Location of sampling sites, Cisco Reservoir, Texas, 2007-2008. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively.