PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-2

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

Cisco Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Cisco Reservoir were surveyed in 2011 using electrofishing and trap nets and in 2012 using gill nets. This report summarizes survey results 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, in the Brazos River Basin, approximately 45 miles east of Abilene, Texas. Its primary function was municipal water supply. From 1999 to fall 2004, water level went from 11-feet low to 23-feet low. From late 2004 through 2005 water level increased 10 feet. Water level fell again in 2006 and 2007 before heavy rains in June and July 2007 increased water elevation by 15 feet. Since that time, however, water level steadily declined to nearly 20-feet low by the end of 2011. Fish habitat in 2011 consisted primarily of rock, scattered dead brush, and boat docks. 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. An attempt to introduce smallmouth bass in the 1990s was unsuccessful.

- **Fish Community**
  - **Prey species:** Prey fish consisted primarily of bluegill and gizzard shad. Low prey abundance had negative effects on some predator species.

  - **Catfishes:** Channel catfish abundance increased, and size of fish available to anglers was excellent; 73% of the channel catfish were at least 12 inches long, and some were as long as 23 inches. Blue catfish were present in low abundance, and size ranged from 21 to 26 inches in length.

  - **Temperate basses:** White bass numbers appeared to be increasing, and most of the fish collected were 11 inches long.

  - **Largemouth bass:** Small (< 14 in long) largemouth bass were abundant, but they were skinny and slow growing. Some big bass were available to anglers; a 14.72-lb lake record was caught in September 2011. Largemouth bass appeared to be negatively impacted by low-water conditions.

  - **White crappie:** Size and abundance of white crappie, in spite of slow growth, supported angling opportunities. White crappie appeared to be less affected by low-water conditions than largemouth bass.

- **Management Strategies:**
  Inform anglers of panfishing opportunities available at Cisco Reservoir. Stock Florida largemouth bass for two consecutive years to increase Florida influence, beginning in 2012. Educate the public about negative impacts of invasive species and how to prevent their spread. Conduct a low-frequency electrofishing survey to determine presence or absence of blue catfish reproduction. Continue biennial electrofishing and trap-net surveys and gill-net surveys every four years.

INTRODUCTION

This document is a summary of fisheries data collected from Cisco Reservoir in 2011-2012. 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 2011-2012 data for comparison.

Reservoir Description

Cisco Reservoir, located approximately 45 miles east of Abilene, Texas, is a 1,050-acre impoundment constructed on Sandy Creek. It is located in the Brazos River Basin and primarily functions as a municipal water supply. Water recreation is also important.

Water level declined from 1999 to the end of 2004 and from 2006 to mid 2007 (Figure 1). In 2005 there was a 10-foot increase in water level and heavy rains in June and July 2007 increased water elevation by 15 feet (Figure 1). Water level was approximately 20 feet low at the end of 2011. Littoral habitat consisted primarily of rock and scattered brush.

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.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Dumont 2008) included:

1. Conduct geo-referenced habitat survey.
   Action: A geo-referenced habitat survey was conducted in 2011.
2. Conduct spring bass-only electrofishing survey in 2012.
   Action: Results from the spring bass-only electrofishing survey in 2012 were similar to the fall 2011 survey with the exception that spring electrofishing caught a few more bigger bass.

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

Stocking history: Threadfin shad have not been collected in Cisco Reservoir since their introduction in 1983. Blue catfish, stocked in 1980 and 2001, first showed up in a gill-net survey in 2004. A lake record blue catfish, 24.56-pounds, was caught in 2008. Over 100,000 smallmouth bass were stocked from 1994 to 1997. Although smallmouth bass failed to establish a viable population and fishery, a 4.82-pound smallmouth bass was caught in 2010, suggesting that a remnant population may exist. 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 management history: Cisco Reservoir has no significant vegetation/habitat management history.

Water Transfer: There are currently no interbasin transfers.

METHODS

Fishes were collected by electrofishing (1.5 hours at 18 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). Largemouth bass genetics were determined with Microsatellite DNA analysis in 2005 and 2011 and electrophoresis in the 1990s. A random sample of largemouth bass (no size or age of fish excluded) was used for Microsatellite DNA analysis in 2011; prior to 2011, random samples included only age-0 or age-1 largemouth bass. All survey sites were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Substrate habitat composition was determined by assessing presence or absence of each substrate type in the water, within 10 feet of the shoreline, at 103 random sites selected on the 1,501 foot contour line (19 feet below conservation pool and the approximate water level elevation at the time of the survey) of a digitized bathymetric map. Substrate was categorized using the Wentworth scale as soft (clay, silt, or sand), pebble (diameter 0.2-2.5 in), cobble (diameter 2.5-10 in), or boulder (diameter >10 in) (Wentworth 1922). Water-column habitat composition was determined by assessing presence or absence of habitat (excluding substrate) in the water column at 211 random sites in the reservoir. Percent occurrence was determined for each habitat type, and 95% confidence intervals were calculated with 1,000 resamples of the original data (with replacement) by the percentile method.

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by 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 and white crappie were determined using otoliths. Mean age of 12- and 14-inch largemouth bass was determined from ages of largemouth bass 11.0-12.9 inches long and 13.0-14.9 inches long, respectively. Mean age of 10-inch long white crappie was determined from ages of white crappie 9.0-10.9 inches long. Source for water level data was the United States Geological Survey website (http://waterdata.usgs.gov/tx/nwis/).

RESULTS AND DISCUSSION

Habitat: The prevalent substrate was cobble and boulder (Table 4). Water-column habitats were primarily open water, dead brush, and boat docks (Table 4).

Prey species: Electrofishing CPUE was 78.7/h for gizzard shad and 83.3/h for bluegill. The gizzard shad IOV from 2003-2011 was 30-38, indicating most gizzard shad were too big for most game fish to consume (Figure 2). This is typical for gizzard shad at Cisco Reservoir; the average IOV from 13 electrofishing surveys dating back to 1987 was 38. Relative abundance of gizzard shad is historically low (mean CPUE = 163.4; 1999-2011), especially compared to the district mean (mean CPUE = 422.5; 1996-2011). The bluegill population, since 2003, has been similar and composed of small fish with low relative abundance (Figure 3). Electrofishing CPUE of redear sunfish was 97.3/h and 12% were at least 7 inches long (Figure 4). The quality size of redear sunfish collected in 2011 indicated the potential for a redear sunfish fishery.

Blue catfish: Four blue catfish, from 12 to 13 inches long, were caught in the 2004 gill-net survey. These fish likely originated from the 2001 stocking. Blue catfish were not collected in 2008. In 2012, five blue catfish were caught, ranging in length from 21 to 26 inches. The absence of smaller fish suggests little, if any, natural reproduction has occurred.

Channel catfish: Gill net CPUE of channel catfish was 5.2/nn in 2012, much higher than catch rates in previous years (Figure 5). Channel catfish ranged in length from 6 to 23 inches, and 73% were at least 12 inches long.

Flathead catfish: Flathead catfish were present (0.8/nn).

White bass: Gill net CPUE of white bass was 7.6/nn in 2012. Since their presence in the reservoir was first documented in a 2004 gill-net survey, catch rates of white bass have increased (Figure 6). The length frequency mode for white bass collected in 2012 was 11 inches long, compared to 14 inches in 2004 and 16 inches in 2008 (Figure 6). Lack of forage and low-water conditions may have caused the shift in size structure.

Largemouth bass: Electrofishing CPUE of stock-size largemouth bass was higher in 2011 (101.3/h), compared to 2005 and 2007 (Figure 7). Catch of sub-stock largemouth bass was lower in 2011, a low and declining water-level year, and high in 2005 and 2007, both increasing water-level years (Figures 1 and 7). Cisco Reservoir consistently has above average relative abundance of largemouth bass 8.0-13.9 inches long, including an increasing trend from 2005 through 2011, but few fish over 13.9 inches long were collected in fall electrofishing surveys (Figure 8). Largemouth bass relative abundance and size structure from a 2012 spring electrofishing survey was similar to the fall 2011 survey, with the exception that a few more larger fish were collected in the spring survey (Figure 9). Poor size structure, at least in 2003 and 2011, may be attributed to slow growth. Mean age of largemouth bass at 14 inches was 5.0 years in 2003 and 4.0 years in 2011 (sample size only 2 fish). During low-water years, 1999-2003 and 2009-2011, largemouth bass may have stockpiled under the 14-inch size limit; mean age at 12 inches long was at least 3.5 years in 2003 and 2011 (Table 5). Growth was considerably better in 2007 following two years with large water level increases (2005 and 2007): fish reached 12 inches in 1.9 years and 14 inches in 2.4 years. Body condition followed the same pattern; relative weight was 74-79 in drought years (1999-2003 and 2009-2011) and 87-97 in non-drought years (2005-2007) (Table 6). There appeared to be major drought-related effects on the largemouth bass population. Nevertheless, reported catches of big largemouth bass have been frequent, and the lake record has been broken three times since 2003, topped by the current record of 14.72 pounds, caught in September 2011. Increased trophy catches may have resulted from stockings of Florida largemouth bass in the early to mid 1990s. The proportion of Florida largemouth bass alleles was 4.8% in 1993, and a steady increase in Florida largemouth bass alleles and genotype was observed through 1999 (Table 7). Florida largemouth bass alleles have since stabilized at 45-52%, but the proportion of fish with Florida largemouth bass genotypes declined from 3% in 2005 to 0% in 2011 (Table 7).

White crappie: Trap net CPUE of white crappie was 9.5/nn in 2011, considerably higher than the catch rate in 2007 (Figure 10). Catch rate of preferred-size fish from 2003 to 2011 was similar, ranging from 1.6 to 3.6 fish/nn (Figure 10). Size structure in low-water years (2003 and 2011) was composed of a wide size range of fish and an acceptable proportion of preferred-size fish (PSD-10 = 18-27). In 2007, however, following large water level increases in 2005 and 2007, the survey either failed to collect smaller crappie, crappie recruitment was poor in 2006 and 2007, or crappie grew extremely fast and smaller crappie were absent. Fast growth was unlikely because there was no historical evidence of fast growth: mean age of 10-inch white crappie was 3.9 years (N = 19; range = 2-7 years; 79% were age 4) in 2011, 3.6 years in 2003 (N = 14; range = 2-7 years), and 4.5 years in 1999 (N = 8; range = 3-8 years). Poor recruitment in 2007 was unlikely, too, as 79% of the 9.0- to 10.9-inch white crappie collected in 2011 were from the 2007 year class. In spite of drought conditions since 2009, white crappie appeared to be sustaining its fishery potential.

Prepared – July 2012.

ISSUE 1: Quality redear sunfish are available to anglers, but there is no indication that a fishery exists for this species.

MANAGEMENT STRATEGY

1. Write an Abilene Reporter News article on panfishing at Cisco Reservoir and expand distribution of the article to Cisco-area newspapers.

ISSUE 2: Florida influence has declined in recent years. Cisco reservoir has trophy largemouth bass potential.

MANAGEMENT STRATEGIES

1. Stock Florida largemouth bass when conditions are optimal for survival of stocked fingerlings. Optimal conditions include either a large increase in flooded terrestrial vegetation after a prolonged low-water period or an adequate presence and distribution of aquatic vegetation, or both.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Contact and educate marina owners and controlling authority about invasive species, and provide them with posters, literature, etc. so that they can in turn educate their customers and post appropriate signage at access points around the reservoir if necessary.
2. Educate the public about invasive species through the use of media and the internet.
3. Make a speaking point about invasive species when presenting to constituent and user groups.
4. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

Cisco Reservoir has been sampled intensively with electrofishing gear over the last 15 years. Biennial trap net and electrofishing surveys would be beneficial to further document effects of water level on forage, largemouth bass, and white crappie populations. A low-frequency electrofishing survey is necessary to determine presence or absence of blue catfish reproduction. A sampling schedule is in Table 8.

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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.

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Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. Fisheries 32(7): 348.

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Quarterly Water Level

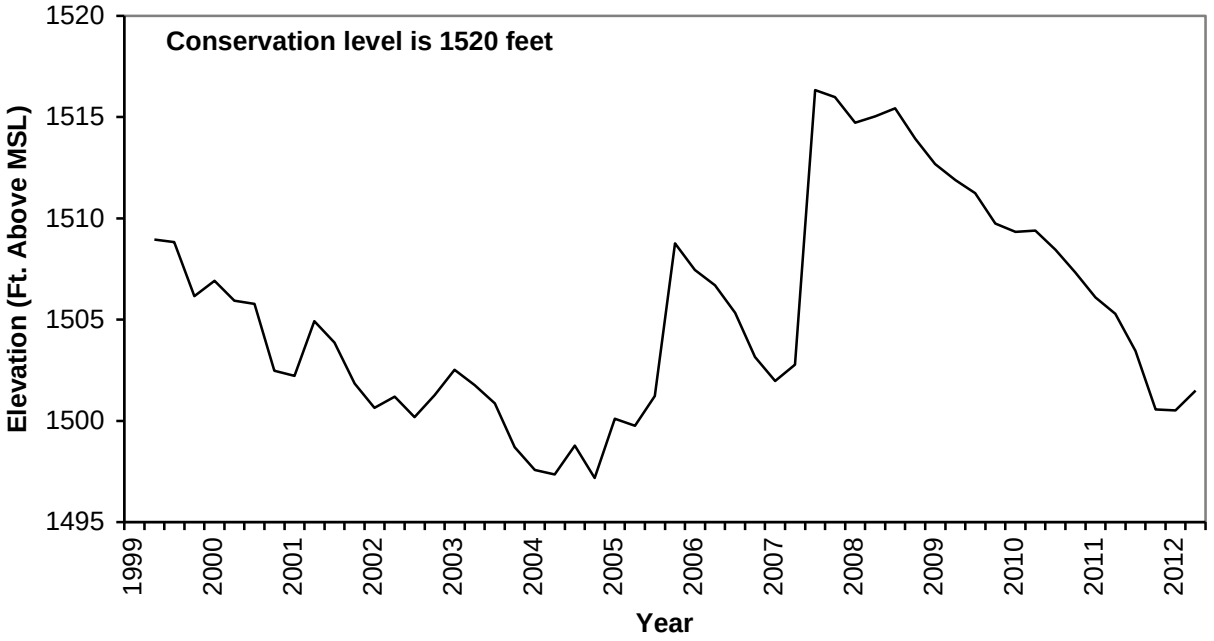


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) for Cisco Reservoir, Texas, 1999-2012.

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 (SDI)	4.99
Conductivity	305 umhos/cm

Table 2. Harvest regulations for Cisco 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, largemouth	5	14 – No Limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 – No Limit

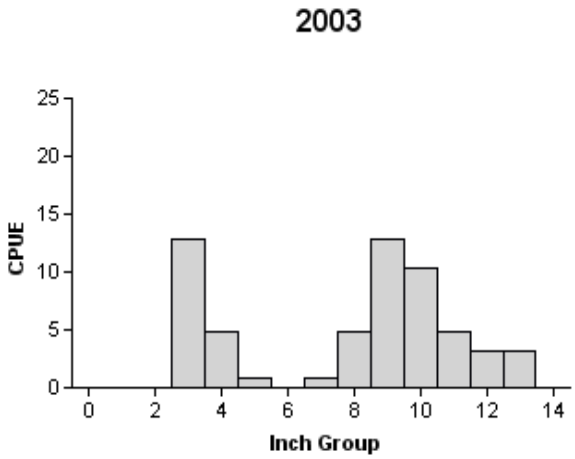
Table 3. Stocking history of Cisco Reservoir, Texas. Size categories are: FRY = < 1 inch, FGL = 1-3 inches and ADL = adults.

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	

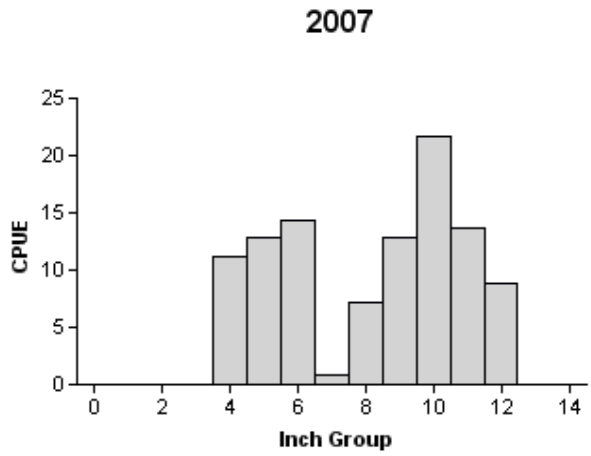
Table 4. Percent occurrence and 95% confidence intervals (C.I.) of substrate habitat (103 random sites) and water-column habitat (211 random sites) in Cisco Reservoir, Texas, 2011.

Habitat Type	Percent Occurrence	95 % C. I.
Substrate		
Clay, silt, sand	33	24 – 43
Pebble (0.2- 2.5”)	34	25 – 42
Cobble (2.5-10”)	54	45 – 64
Boulder (> 10”)	74	65 – 82
Water-column		
Open water	64	58 – 70
Dead brush	25	19 – 31
Boat dock	10	6 – 14
Standing timber	4	2 – 7
Bulkhead	< 1	0 – 1

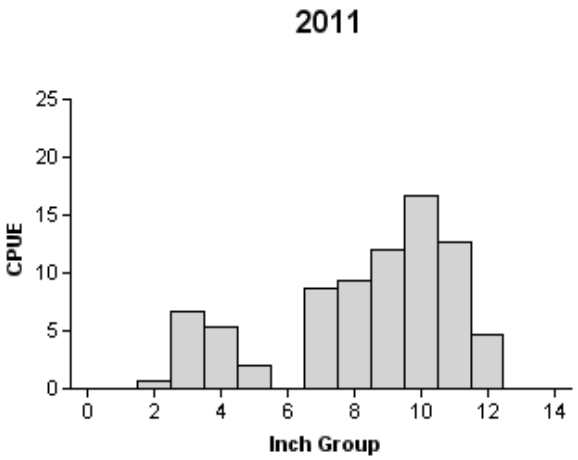
Gizzard Shad



Effort =	1.3
Total CPUE =	58.4 (21; 73)
Stock CPUE =	40.0 (29; 50)
IOV =	33 (9)



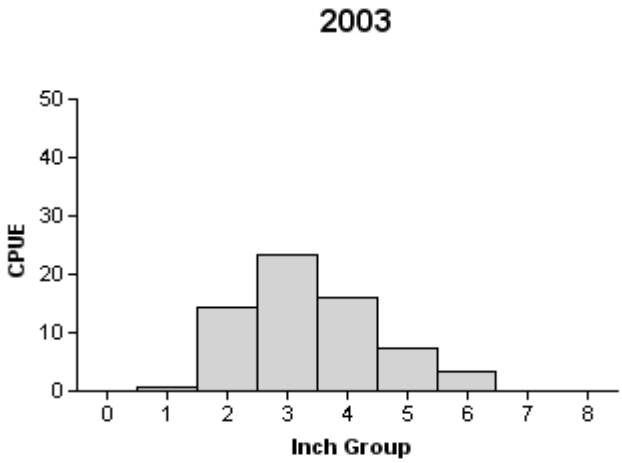
Effort =	1.3
Total CPUE =	103.2 (29; 129)
Stock CPUE =	64.8 (20; 81)
IOV =	38 (9)



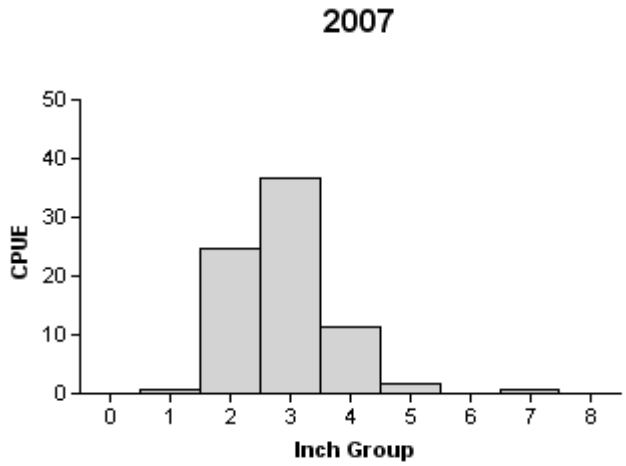
Effort =	1.5
Total CPUE =	78.7 (24; 118)
Stock CPUE =	64.0 (26; 96)
IOV =	30 (7)

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, Cisco Reservoir, Texas, 2003, 2007, and 2011.

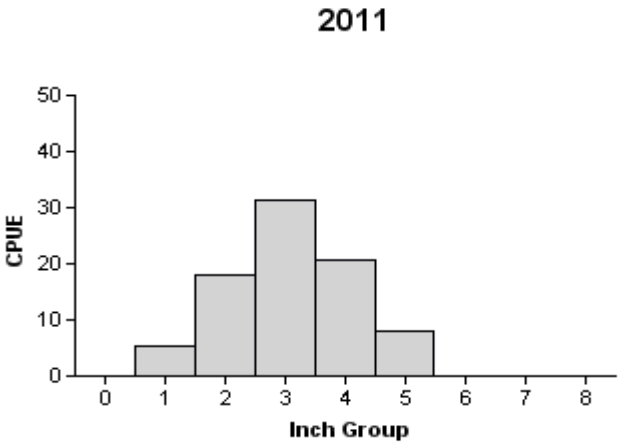
Bluegill



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



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



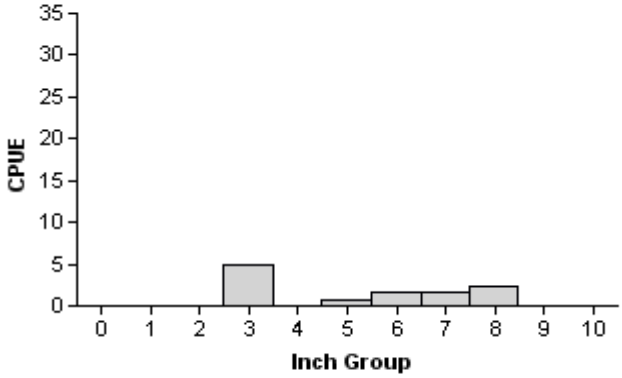
Effort = 1.5
Total CPUE = 83.3 (20; 125)
PSD = 0

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, Cisco Reservoir, Texas, 2003, 2007, and 2011.

Redear sunfish

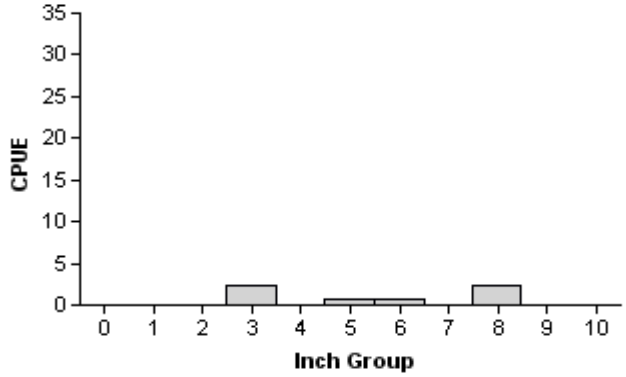
2003

Effort = 1.3
Total CPUE = 11.2 (27; 14)



2007

Effort = 1.3
Total CPUE = 6.4 (44; 8)



2011

Effort = 1.5
Total CPUE = 97.3 (21; 146)

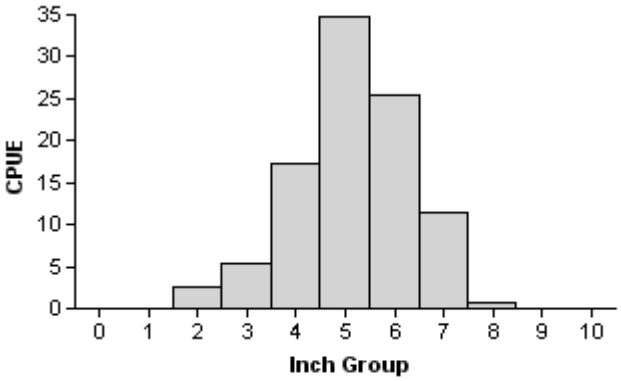
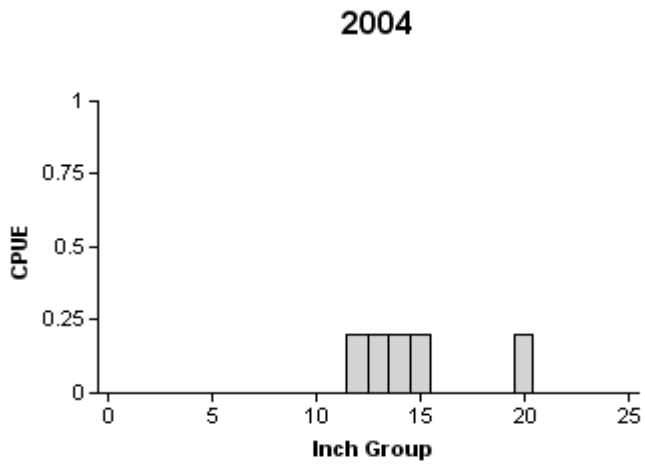
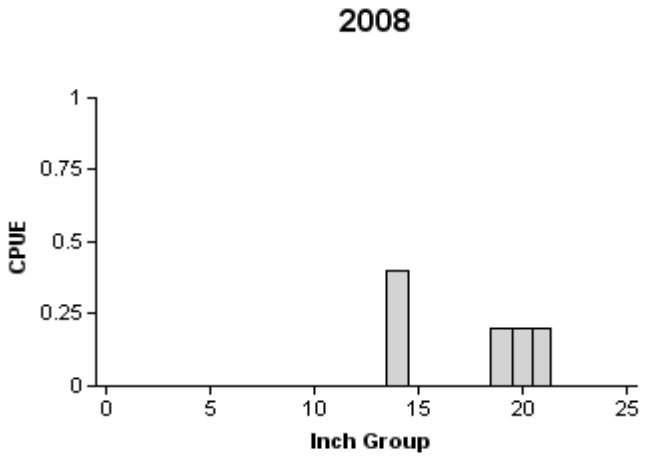


Figure 4. Number of redear sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Cisco Reservoir, Texas, 2003, 2007, and 2011.

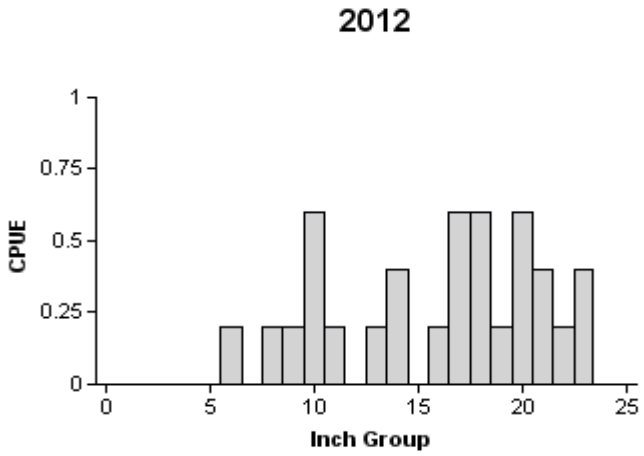
Channel Catfish



Effort = 5.0
Total CPUE = 1.0 (32; 5)
CPUE-12 = 1.0 (32; 5)



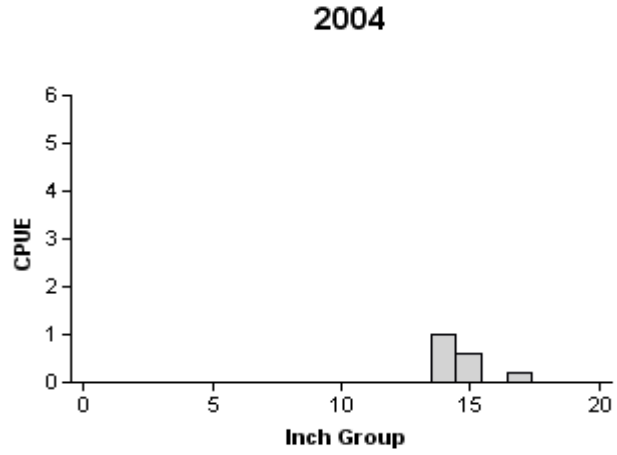
Effort = 5.0
Total CPUE = 1.0 (45; 5)
CPUE-12 = 1.0 (45; 5)



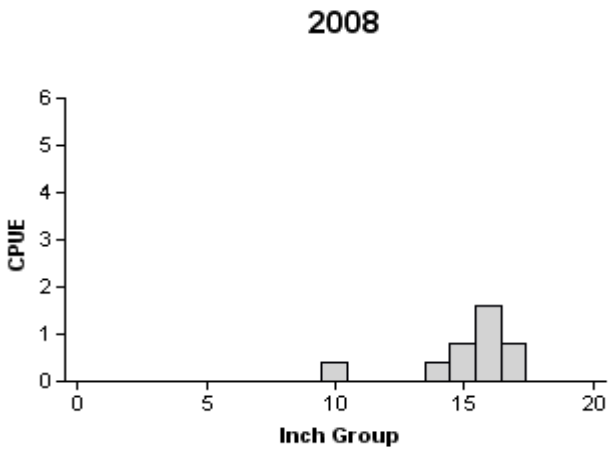
Effort = 5.0
Total CPUE = 5.2 (19; 26)
CPUE-12 = 3.8 (32; 19)

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, 2004, 2008, and 2012.

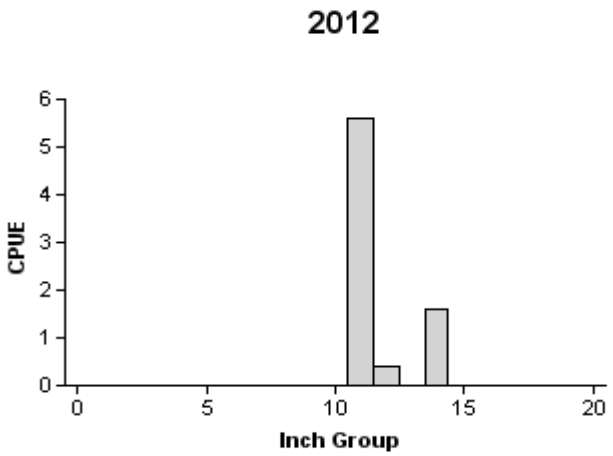
White Bass



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



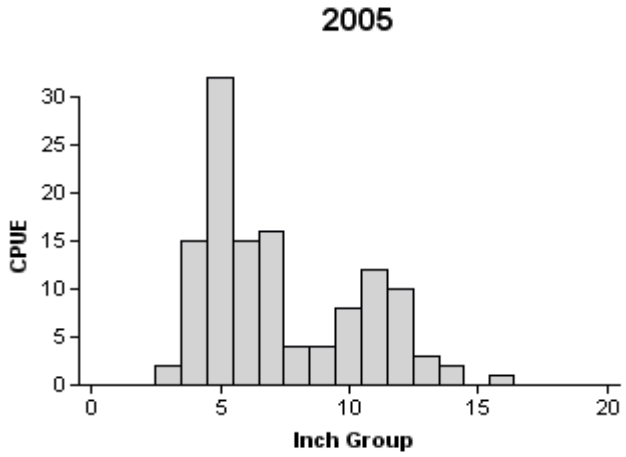
Effort = 5.0
Total CPUE = 4.0 (52; 20)
CPUE-10 = 4.0 (52; 20)



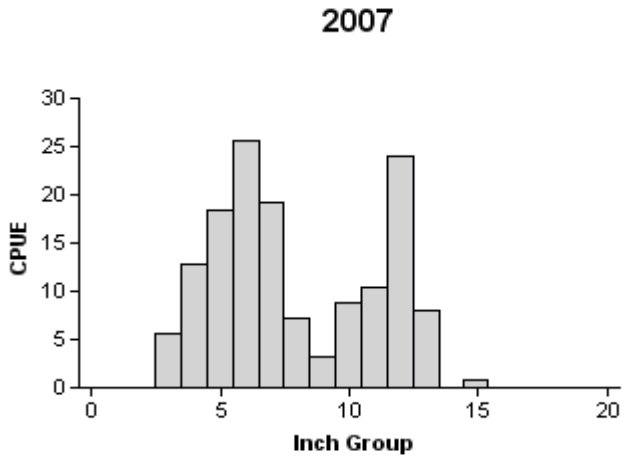
Effort = 5.0
Total CPUE = 7.6 (58; 38)
CPUE-10 = 7.6 (52; 20)

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, 2008, and 2012.

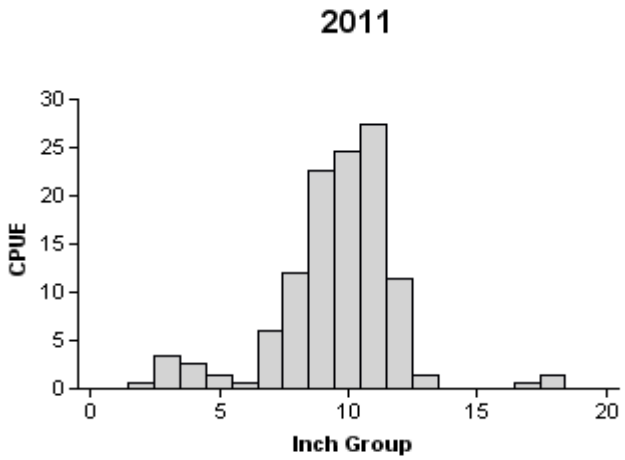
Largemouth Bass



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)



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)



Effort =	1.5
Total CPUE =	116.0 (12; 174)
Stock CPUE =	101.3 (14; 152)
CPUE-14 =	2.0 (54; 3)
PSD =	14 (3)
PSD-14 =	2 (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, 2005, 2007, and 2011.

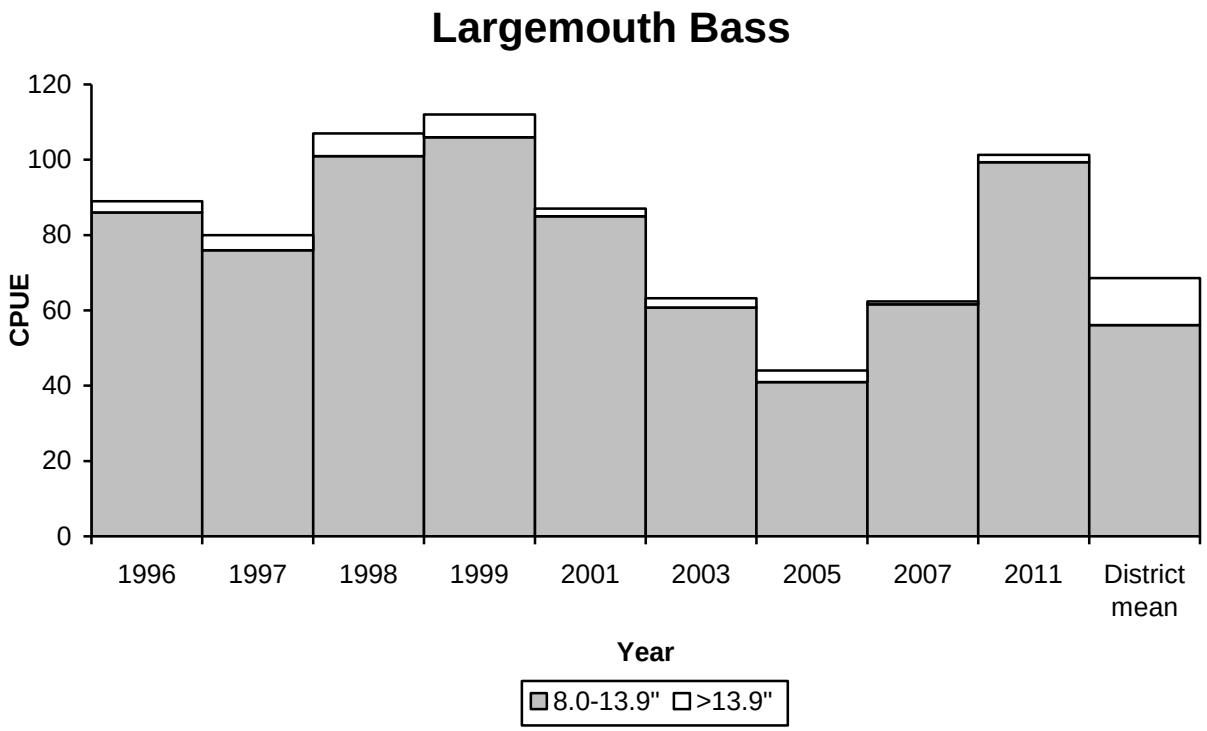
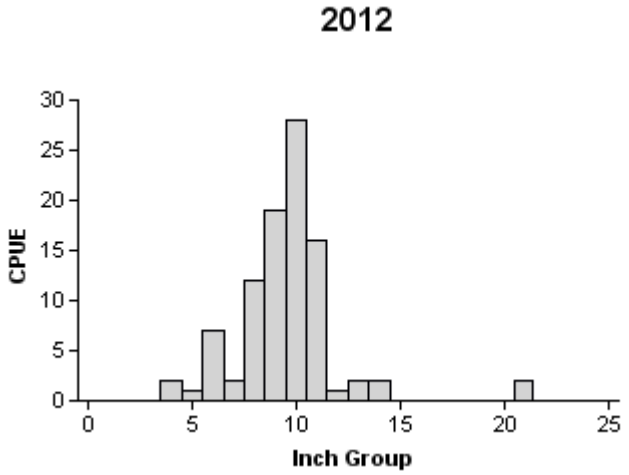


Figure 8. Catch per unit effort (CPUE) of largemouth bass from fall electrofishing surveys, Cisco Reservoir, Texas, 1996-2011.



Effort =	1.0
Total CPUE =	94.0 (14; 94)
Stock CPUE =	82.0 (14; 82)
CPUE-14 =	4.0 (43; 4)
PSD =	9 (3)
PSD-14 =	5 (2)

Figure 9. 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 a spring electrofishing survey, Cisco Reservoir, Texas, 2012.

Table 5. 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, 2007, and 2011. Sample size for each estimate is in parentheses.

	Mean age at length	
Year	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)
2011	3.5 (19)	4.0 (2)

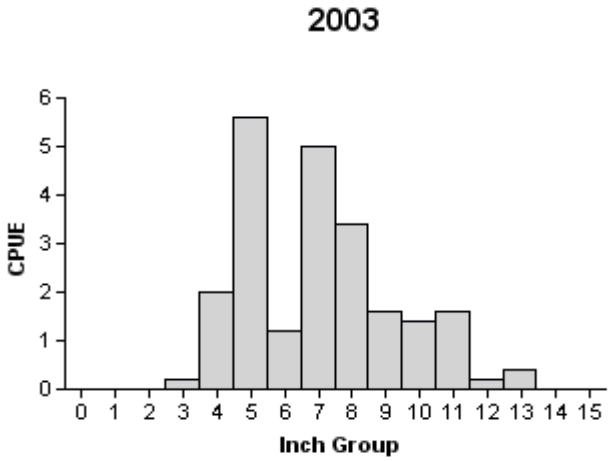
Table 6. Average relative weight of 8.0-11.9-inch and 12.0-14.9-inch largemouth bass from 2003, 2005, 2007, and 2011 at Cisco Reservoir, Texas. Sample size for each estimate is in parentheses.

	Mean Wr	
Year	8.0-11.9	12.0-14.9
2003	79 (64)	74 (14)
2005	90 (28)	87 (15)
2007	95 (37)	97 (40)
2011	78 (130)	75 (19)

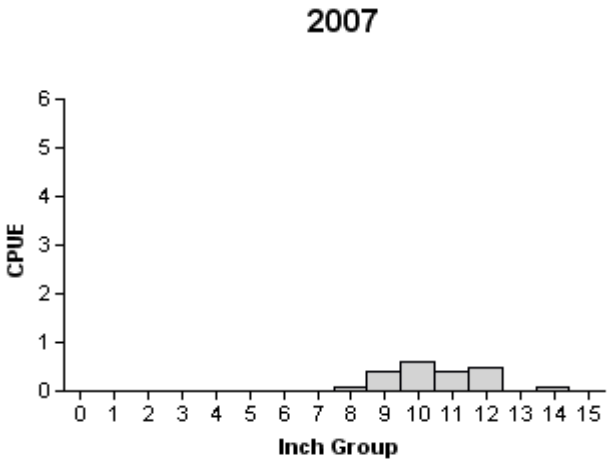
Table 7. Results of genetic analysis of largemouth bass collected by fall electrofishing, Cisco Reservoir, Texas, 1993-2011. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass.

		Genotype				
Year	Sample size	FLMB	Intergrades	NLMB	% FLMB alleles	% FLMB genotype
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
2011	30	0	30	0	52.0	0.0

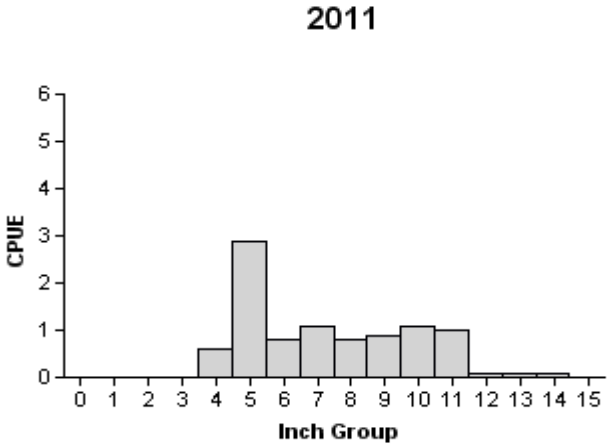
White Crappie



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)



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)



Effort =	10.0
Total CPUE =	9.5 (36; 95)
Stock CPUE =	8.9 (33; 89)
CPUE-10 =	2.4 (35; 24)
PSD =	46 (12)
PSD-10 =	27 (9)

Figure 10. 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, 2003, 2007, and 2011.

Table 8. 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	Vegetation	Access	Report
Fall 2012-Spring 2013	A*					
Fall 2013-Spring 2014	A	A				
Fall 2014-Spring 2015						
Fall 2015-Spring 2016	S	S	S	S	S	S

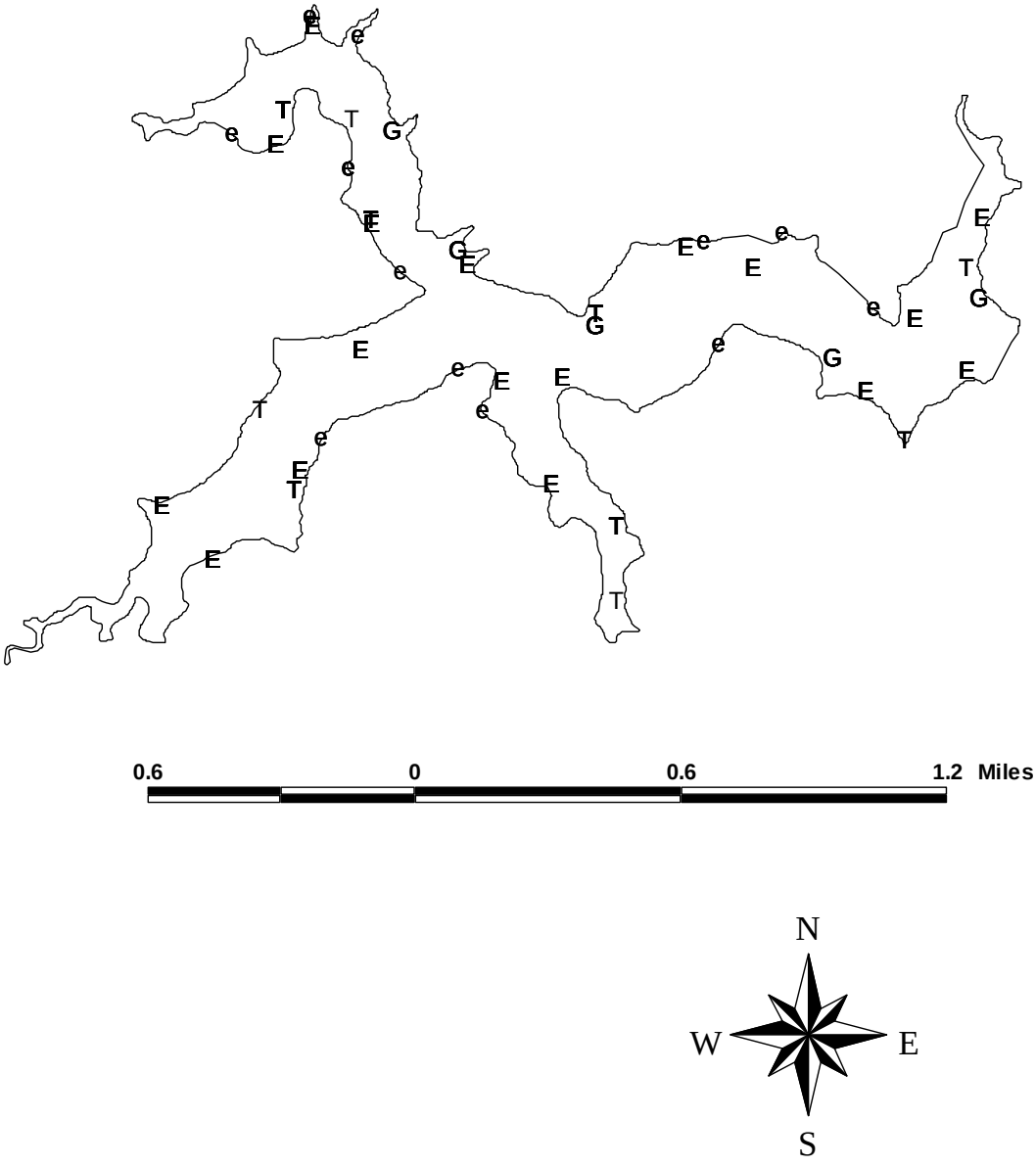
*Low frequency for blue catfish

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types in Cisco Reservoir, Texas, 2011-2012.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					118	78.7
Blue catfish	5	1.0				
Channel catfish	26	5.2				
Flathead catfish	4	0.8				
White bass	38	7.6				
Green sunfish					32	21.3
Warmouth					5	3.3
Bluegill					125	83.3
Longear sunfish					40	26.7
Redear sunfish					146	97.3
Largemouth bass					174	116.0
White crappie			95	9.5		

APPENDIX B



Location of sampling sites, Cisco Reservoir, Texas, 2011-2012. Trap net, gill net, electrofishing, and spring electrofishing stations are indicated by T, G, E, and e, respectively. Water level was approximately 18-19 feet below conservation level at time of sampling.

APPENDIX C

Type, location, size, capacity, American Disability Act (ADA) accessibility, and needed improvements of boat ramps (BR) at Cisco Reservoir, Texas, 2011. Latitude and Longitude are reported as decimal degrees.

Facility Type	Location	Latitude	Longitude	Fee	# of BR Lanes	BR Parking Capacity	Size of FP or J	ADA Accessible (FP or J)	Needed Improvements
BR	--	32.437439	-99.001790	Y	2	15	NA	NA	