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FEDERAL AID PROJECT F-30-R-33

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2007 Survey Report

Weatherford Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Weatherford Reservoir were surveyed in 2007 using an electrofisher and trap nets and in 2008 using gill nets. Habitat was surveyed in 2007. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Weatherford Reservoir is a 1,158-acre impoundment on the Clear Fork Trinity River in Parker County. Water level was below conservation level (896 ft-msl) from April 2005 until June 2007. The reservoir waters are extremely rich in nutrients because of domestic habitation in the watershed; hence, high productivity. Habitat features consisted mainly of bulkhead, rip-rap, and native emergent aquatic vegetation.

- **Management history:** Important sport fish include channel catfish, white bass, largemouth bass, and white crappie. The management plan for the 2004 survey report included a recommendation to encourage the City of Weatherford to construct access and facilities compliant with the American Disabilities Act, and update the web page on the TPWD web site. In 1961 through 1970, 100,415 advanced channel catfish fingerlings were stocked. In 1962 through 1971, 267,000 largemouth bass fingerlings were stocked. Approximately 15,000 paradise bass were stocked in 1977; 2,790 adult threadfin shad in 1981 and 1984; 4.9 million walleye fry 1982–1984; and 346,329 Florida largemouth bass fingerlings in 1988, 1991, and 1997. In 1990, 1,101 triploid grass carp were stocked.

- **Fish community**

  - **Prey species:** Electrofishing catch rate of gizzard shad was high, but lower than some historical catches. The relative abundance of prey-size gizzard shad (≤7-inches) was very high. This was indicative of high nutrient levels in the reservoir. High electrofishing catch rates of bluegill and a modest catch rate of threadfin shad indicated the prey base was more than adequate.

  - **Channel catfish:** Gill net catch rate of channel catfish was higher than previous surveys. Most of the population was legal size and in good condition. Growth was fair and recruitment was evident.

  - **White bass:** Gill net catch rate of white bass was low, but higher than in 2004. No legal-size white bass were collected this year or in 2004; however, most of the population was made up of legal-size and large white bass in 1999. Recruitment was evident and perhaps the white bass population is rebounding following several years of low inflow.

  - **Largemouth bass:** Electrofishing catch rate of largemouth bass was at its lowest since 1999. Recruitment was evident, but lower than in previous surveys. Largemouth bass were in average condition compared to previous surveys. No pure Florida largemouth bass were collected, but there was 45.5% Florida largemouth bass alleles within the population. Growth was good; 14 inches in 2 years and 6% of the sample population was 14 inches and longer.

  - **White crappie:** Trap net catch rate of white crappie was high and overall body condition was good. They grew to 10 inches in one year and over 30% of the sample population was 10 inches and larger.

- **Management strategies:** Based on current information, Weatherford Reservoir should continue to be managed with existing fish harvest regulations. Management strategies identified in the 2004 Fisheries Management Plan were communicated to the City of Weatherford and improvements are ongoing. Communicating with constituents via web site and news release is ongoing.

INTRODUCTION

This document is a summary of fisheries data collected from Weatherford 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

Weatherford Reservoir, a 1,158-acre impoundment on the Clear Fork Trinity River, is located northeast of Weatherford in Parker County. It was constructed in 1957 by the City of Weatherford for municipal and industrial uses. Current uses include steam electric generating plant cooling and recreation. The reservoir drains approximately 109 square miles and has a shoreline 6 miles long. Approximately 45% of the reservoir is $\leq$15 feet deep. Water level was below conservation level (896 ft-msl) from April 2005 until June 2007. With a TSI chl–*a* of 55.22, Weatherford Reservoir was eutrophic and borderline hypereutrophic (Texas Commission on Environmental Quality 2008). A TSI chl-*a* >45 and <55 is considered eutrophic, >55 is considered hypereutrophic; hence, the reservoir is rich in nutrients with high productivity. The average depth is 17 feet with a maximum depth of 39 feet. Habitat features consisted mainly of bulkhead, rip-rap, and boat docks. Boat access consisted of one public boat ramp with parking, boarding pier, and ample illumination and two primitive boat ramps with scant amenities. Much of the perimeter of Weatherford Reservoir is privately owned, occupied homes, with boat docks; however, there is an interspersion of bank access, especially adjacent the boat ramps. Further information about Weatherford Reservoir and its facilities can be obtained by visiting the Texas Parks and Wildlife Department (TPWD) web site at www.tpwd.state.tx.us and navigating within the fishing link. Other descriptive characteristics for Weatherford Reservoir are in Table 1.

Management History

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

1. Encourage the City of Weatherford to construct access and facilities compliant with American Disabilities Act.
   Action: Some improvements have been made to access and facilities at the south boat ramp and are still ongoing.
2. Update the Weatherford Reservoir web page as required.
   Action: Updates were made. News releases were written and distributed to local media outlets.

Harvest regulation history: Sport fishes in Weatherford Reservoir are currently managed with statewide regulations (Table 2).

Stocking history: Weatherford Reservoir was last stocked with fingerling Florida largemouth bass in 1997 at 100/acre. It was stocked with fingerling Florida largemouth bass at the same rate in 1988 and 1991. The earliest stocking was with channel catfish fingerlings in 1961, 1962, 1964 and 1970 at 88/acre. Next some 267,000 native largemouth bass fingerlings were stocked in 1962, 1967, and 1971. In 1981 and 1984 2,790 adult threadfin shad were stocked. Two most notable stockings included paradise bass (yellow bass X striped bass; 15,000 fingerlings in 1977) and walleye (5 million fry from 1982 through 1984). In 1990 1,101 adult triploid grass carp were stocked. Stocking history since 1961 is detailed in Table 3.

Vegetation/habitat history: Weatherford Reservoir supported emergent aquatic vegetation (Table 4). Historically, native floating and emergent aquatic vegetation was more abundant, but not problematic (Hysmith and Moczygemba 2004). Habitat consisted mainly of bulkhead and rip-rap.

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 caught 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 2006).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [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 for creel statistics and SE was calculated for structural indices and IOV. Ages were determined using Category 2 protocol according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2006). The manual specifies procedures for largemouth bass only, but we adapted the protocol to channel catfish and white crappie for identifying the number and size(s) of target fish to sample. The source for water level data was the United States Geological Survey (USGS) website.

Fin tissue samples from 30 age-0 largemouth bass were collected, preserved, and transported for electrophoretic analysis according to Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2006).

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of rocky shoreline, bulkhead, dead trees, and native emerged and native submerged vegetation (Table 4).

Prey species: Electrofishing CPUE of gizzard and bluegill were 289.0/h and 303.0/h, respectively (Figures 2 and 3). Index of vulnerability (IOV) for gizzard shad was high, indicating 92% of gizzard shad were available to existing predators; IOV estimates have historically been high (Figure 2). The CPUE of bluegill remained high and 51% of the sample population was $\leq$4 inches (Figure 3). Total CPUE for threadfin shad was 53.0/h which served to augment the prey base (Appendix D).

Channel catfish: Gill net CPUE of channel catfish was 12.0/nn, higher than in previous surveys (Figure 4 and Appendix D). Relative weights of stock size channel catfish tended to increase with size, averaging 93.4 with a range of 80 to 150. Growth was fair; 12 inches in 3 years (N = 6; range = 3 – 6 years). Recruitment was evident and 82% of the sample population was legal size and larger.

White bass: Gill net CPUE of white bass was 1.2/nn (Figure 5), higher than the CPUE of 2004, but lower than the reservoir average (Appendix D). As was the case in 2004, there were no legal-size white bass collected. This was a drastic change from 1999 when most of the catch was legal-size and larger. Recruitment was evident and relative weight of the sampled fish averaged 91.2 (range = 87.3 – 94.1).

Largemouth bass: Electrofishing CPUE for largemouth bass (78.0/h) has declined consistently since 1999 (Figure 6). While PSD (38) was good, when considered with a declining total CPUE, a very low stock CPUE (16.0/h), down from stock CPUE (38.0/h) in 2003, the largemouth bass population was poor. Relative weights by inch-class varied from 70 to 100 and only 6% of the sample population was $\geq$14 inches long. Growth was good; 14 inches in 2 years (N = 3; range = 2 – 3 years). However, there was excellent recruitment of sub-stock largemouth bass which indicated an improved population in the future. The fate of the sub-stock population could be documented by supplemental electrofishing.

White crappie: Trap net catch rate of white crappie (15.0/nn) was much improved since 1996 (Figure 7 and Appendix D). Relative weights of stock fish tended to increase with size, averaging 94.9 (range = 85.6 – 104.4), and 33% of the sample population was ≥10 inches. Growth was good as demonstrated by all 13 sampled crappie growing to 10 inches in 1 year (N = 13; all = 1 year).

Fisheries management plan for Weatherford Reservoir, Texas

Prepared – July 2008.

ISSUE 1: Electrofishing CPUE of largemouth bass was low and has declined drastically since 1999 and relative weight was variable. However, growth was good and the prey base was excellent. Recruitment of sub-stock largemouth bass was also successful.

MANAGEMENT STRATEGY

1. Conduct supplemental electrofishing survey in the fall of 2009 to monitor the largemouth bass population.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule consists of supplemental electrofishing during the fall of 2009 and mandatory monitoring in 2011/2012 (Table 6).

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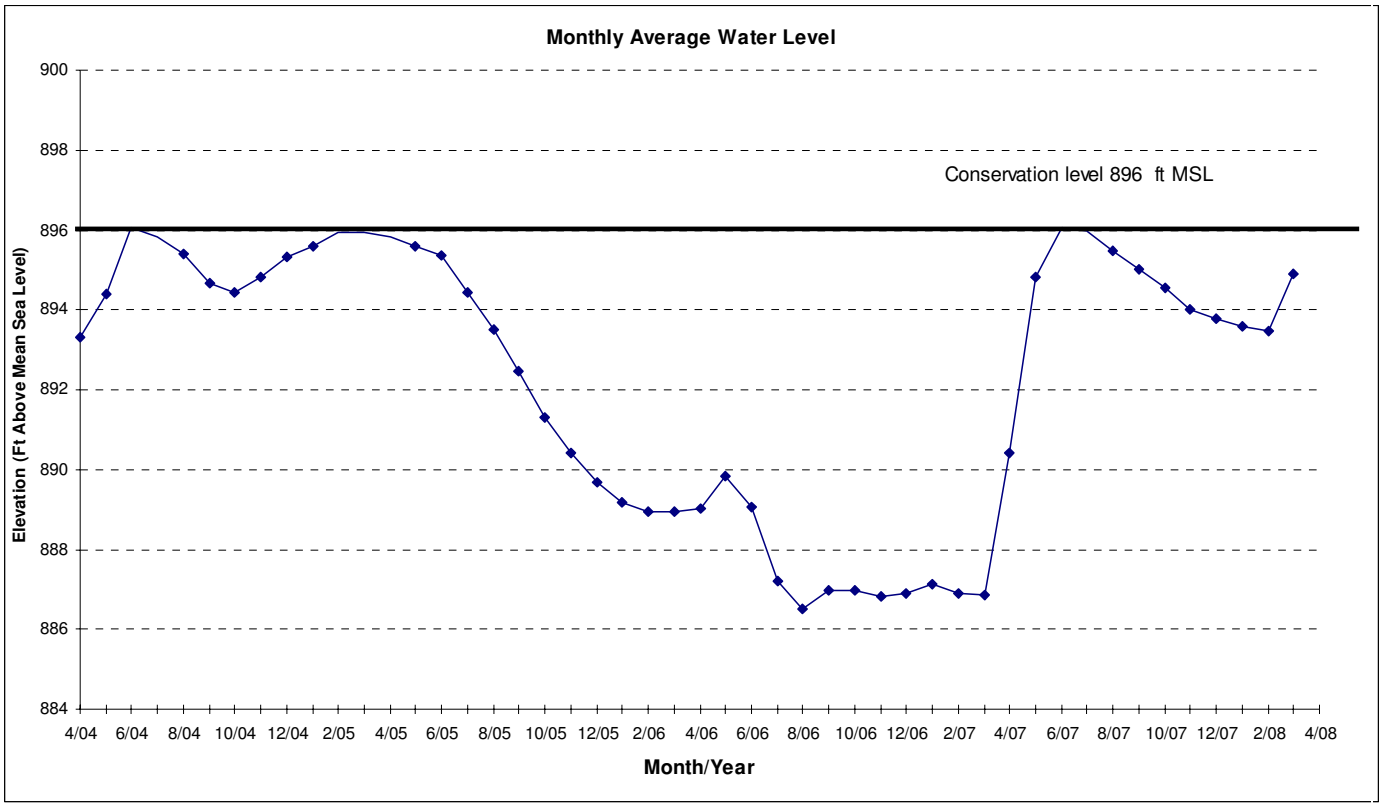


Figure 1. Monthly average water level elevations in feet above mean sea level (MSL) recorded for Weatherford Reservoir, Texas, April 2004 – March 2008.

Table 1. Characteristics of Weatherford Reservoir, Texas.

Characteristic	Description
Year constructed	1957
Controlling authority	City of Weatherford
County	Parker
Reservoir type	Mainstream
Shoreline development index	1.3
Conductivity	572 µmhos/cm

Table 2. Harvest regulations for Weatherford Reservoir.

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

Table 3. Stocking history of Weatherford, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

Species	Year	Number	Life Stage	Mean TL (in)
Channel catfish	1961	18,850	AFGL	7.9
	1962	22,540	AFGL	7.9
	1964	31,025	AFGL	7.9
	1970	28,000	AFGL	7.9
	Total	100,415		
Florida Largemouth bass	1988	114,400	FRY	1.0
	1991	36,392	FGL	1.5
	1991	81,087	FRY	0.9
	1997	114,450	FGL	1.7
	Total	346,329		
Largemouth bass	1962	233,000	UNK	UNK
	1967	14,000	UNK	UNK
	1971	20,000	UNK	UNK
	Total	267,000		
Paradise bass (Yellow bass X Striped bass)	1977	14,997		UNK
	Total	14,997		
Threadfin shad	1981	1,790	AFGL	2.9
	1984	1,000	AFGL	3.0
	Total	2,790		
Triploid grass carp	1990	1,101		14.4
	Total	1,101		
Walleye	1982	755,550	FRY	0.2
	1983	1,730,000	FRY	0.2
	1984	2,500,000	FRY	0.2
	Total	4,985,550		

Table 4. Survey of littoral zone and physical habitat types, Weatherford Reservoir, Texas, July 2007. 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
Riprap	0.9	15.0		
Rocky shoreline	0.2	3.3		
Bulkhead	3.0	50.0		
Flooded dead terrestrial vegetation	0.5	8.3		
Flooded live terrestrial vegetation	0.5	8.3		
Native emergent	0.1	1.6	0.1	<0.1
Boat docks	0.6	10.0		
Featureless	0.2	3.3		

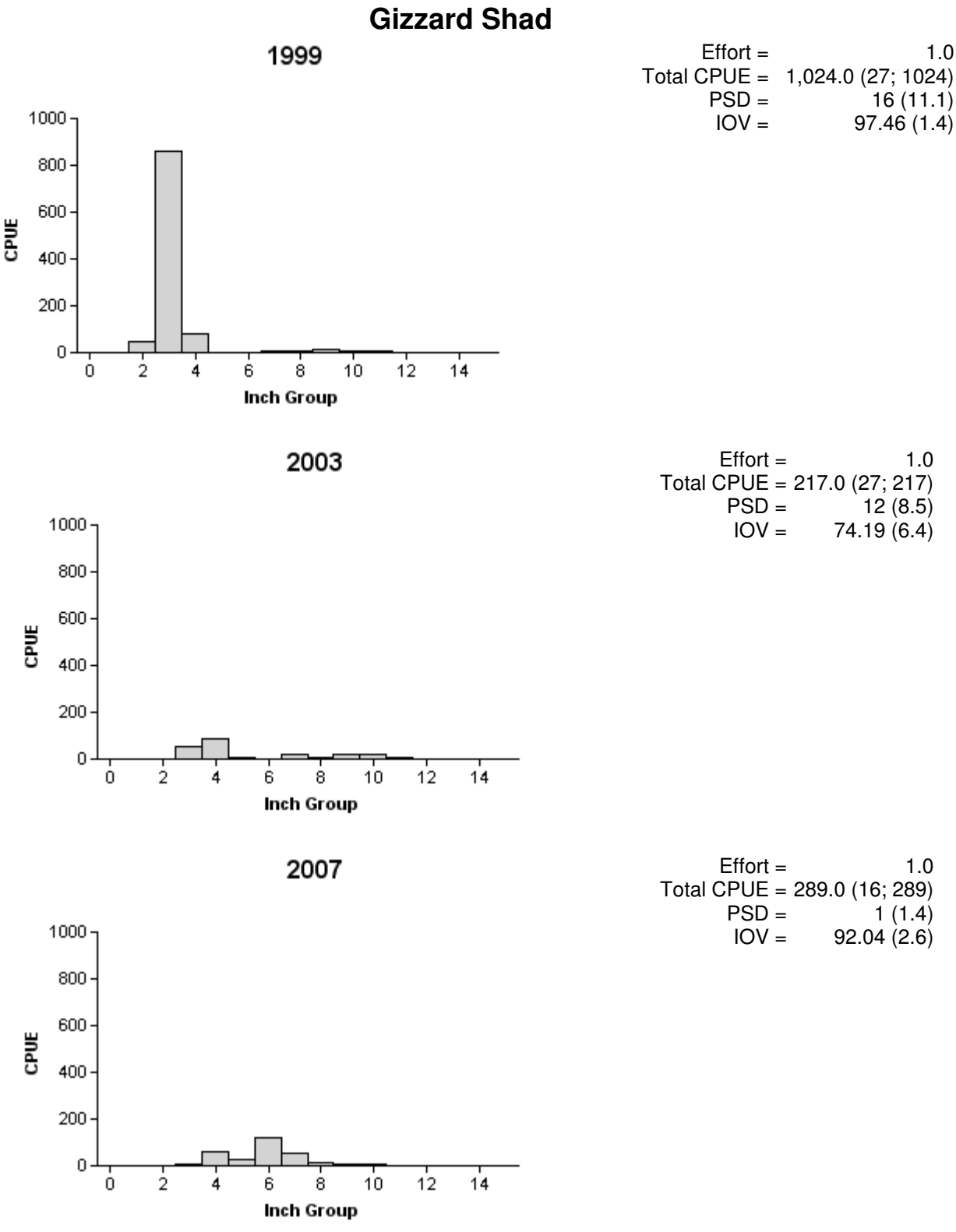


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Weatherford Reservoir, Texas 1999, 2003, and 2007.

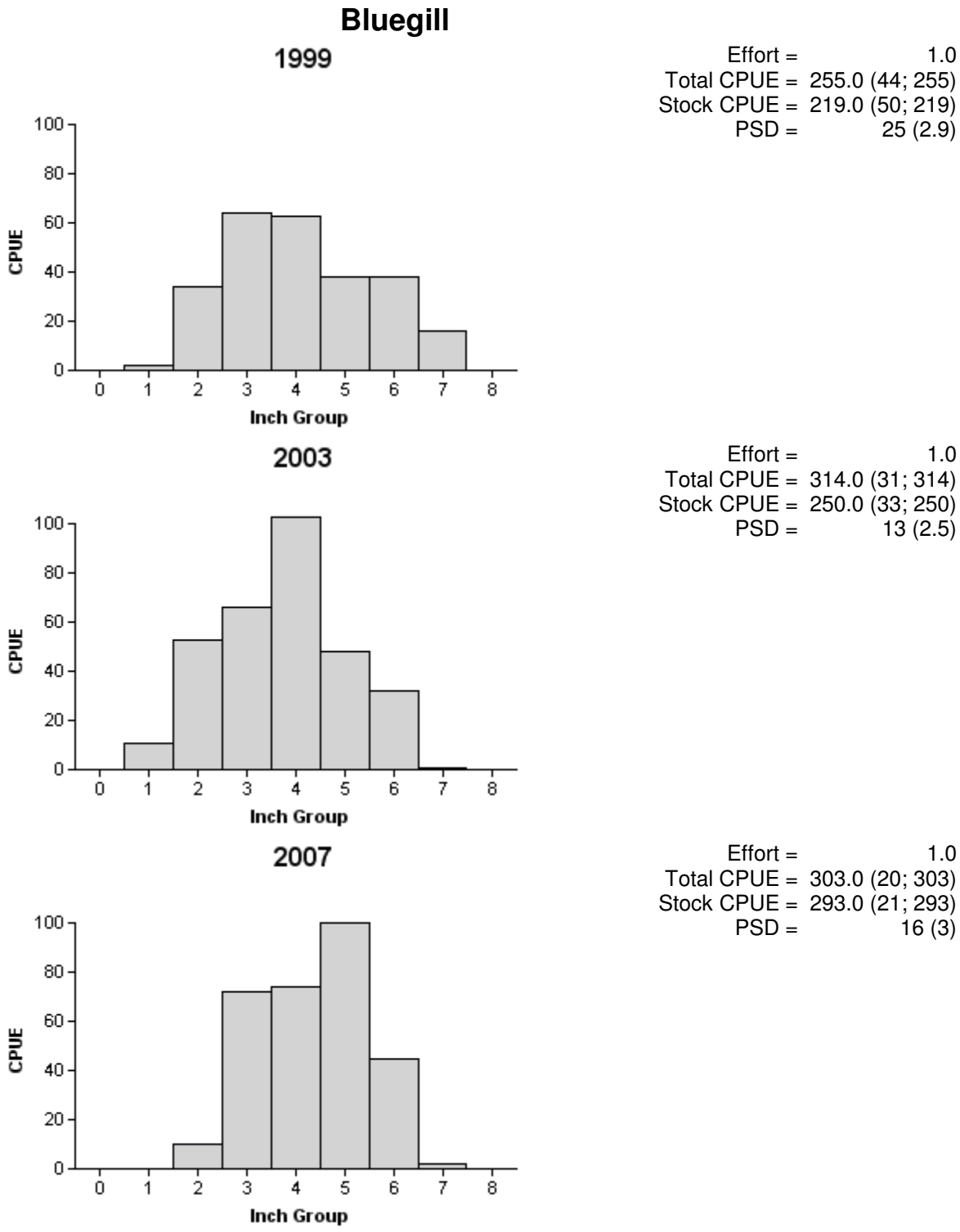


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Weatherford Reservoir, Texas, 1999, 2003, and 2007.

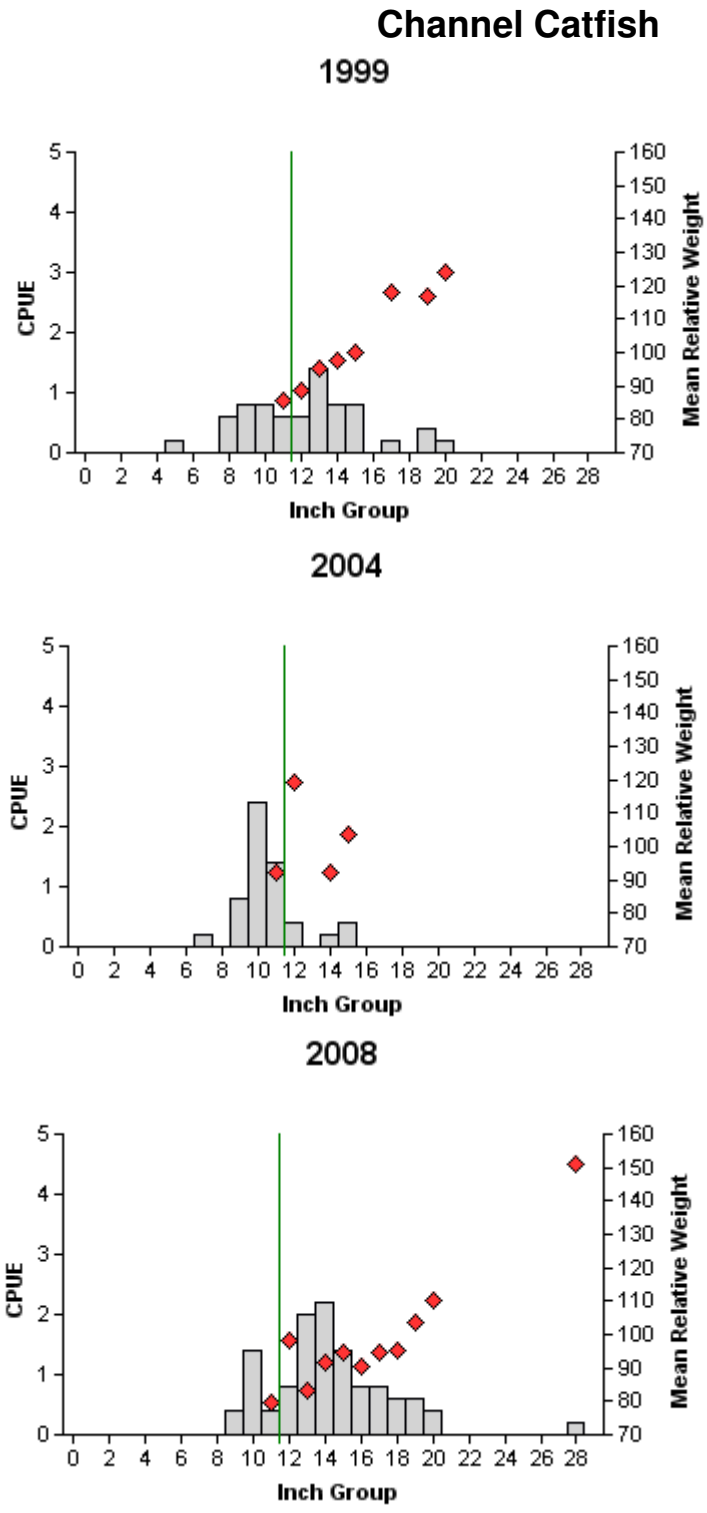


Figure 4. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Weatherford Reservoir, Texas, 1999, 2004, and 2008. Vertical lines represent length limit at time of collection.

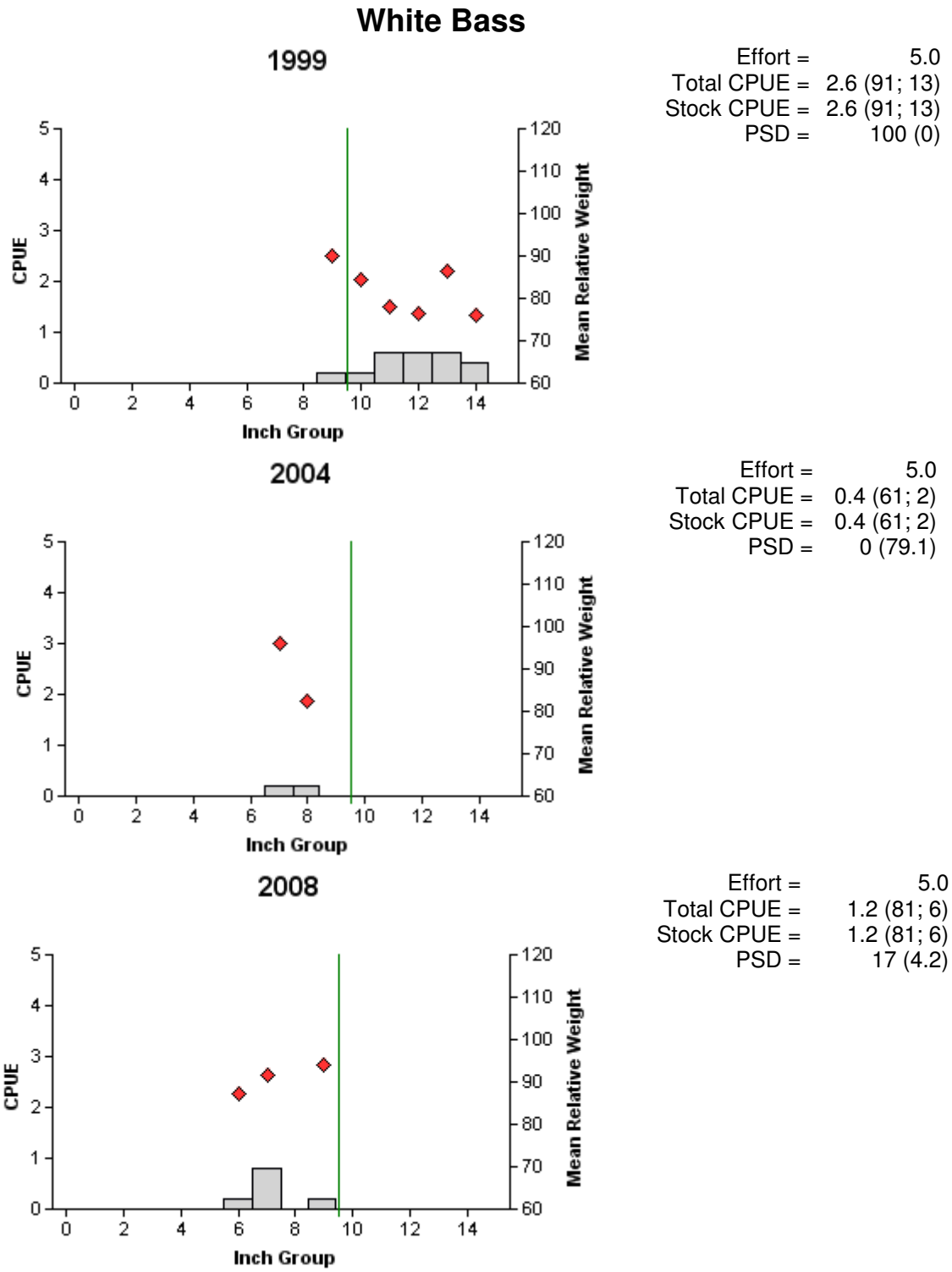


Figure 5. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Weatherford Reservoir, Texas, 1999, 2004, and 2008. Vertical lines represent length limit at time of collection.

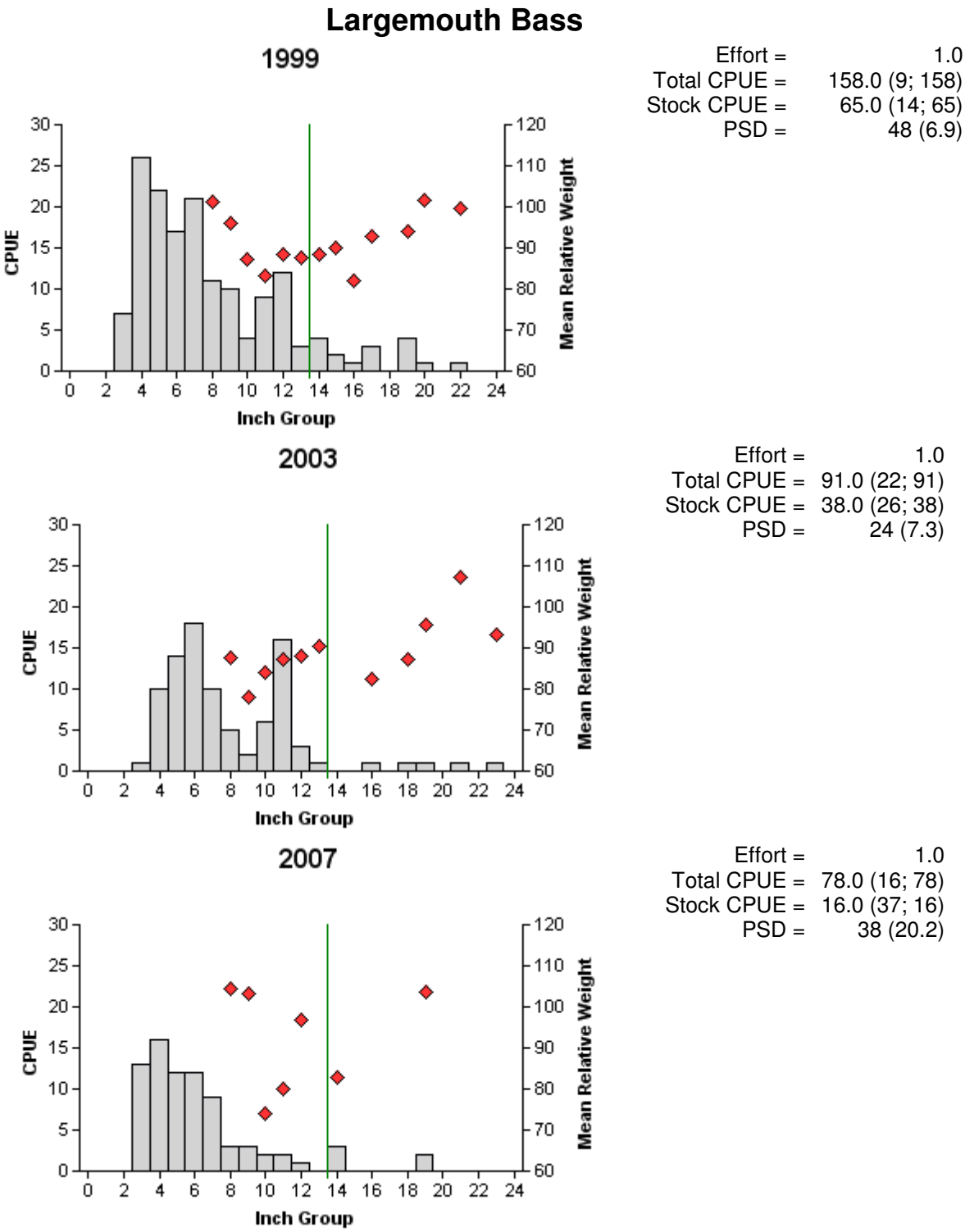


Figure 6. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Weatherford Reservoir, Texas, 1999, 2003, and 2007. Vertical lines represent length limit at time of collection.

Table 5. Results of genetic analysis of largemouth bass collected by fall electrofishing, Weatherford Reservoir, Texas, 1989, 1996, 1999, 2003, and 2007. FLMB = Florida largemouth bass, NLMB = Northern largemouth bass, Hybrids = cross between a FLMB and a NLMB.

		Genotype				
Year	Sample size	FLMB	Hybrids	NLMB	% FLMB alleles	% pure FLMB
1989	31	0	3	28	2.4	0.0
1996	37	2	31	4	35.7	4.8
1999	40	3	0	37	41.9	7.5
2003	30	3	25	2	58.3	10.0
2007	30	0	29	1	45.5	0.0

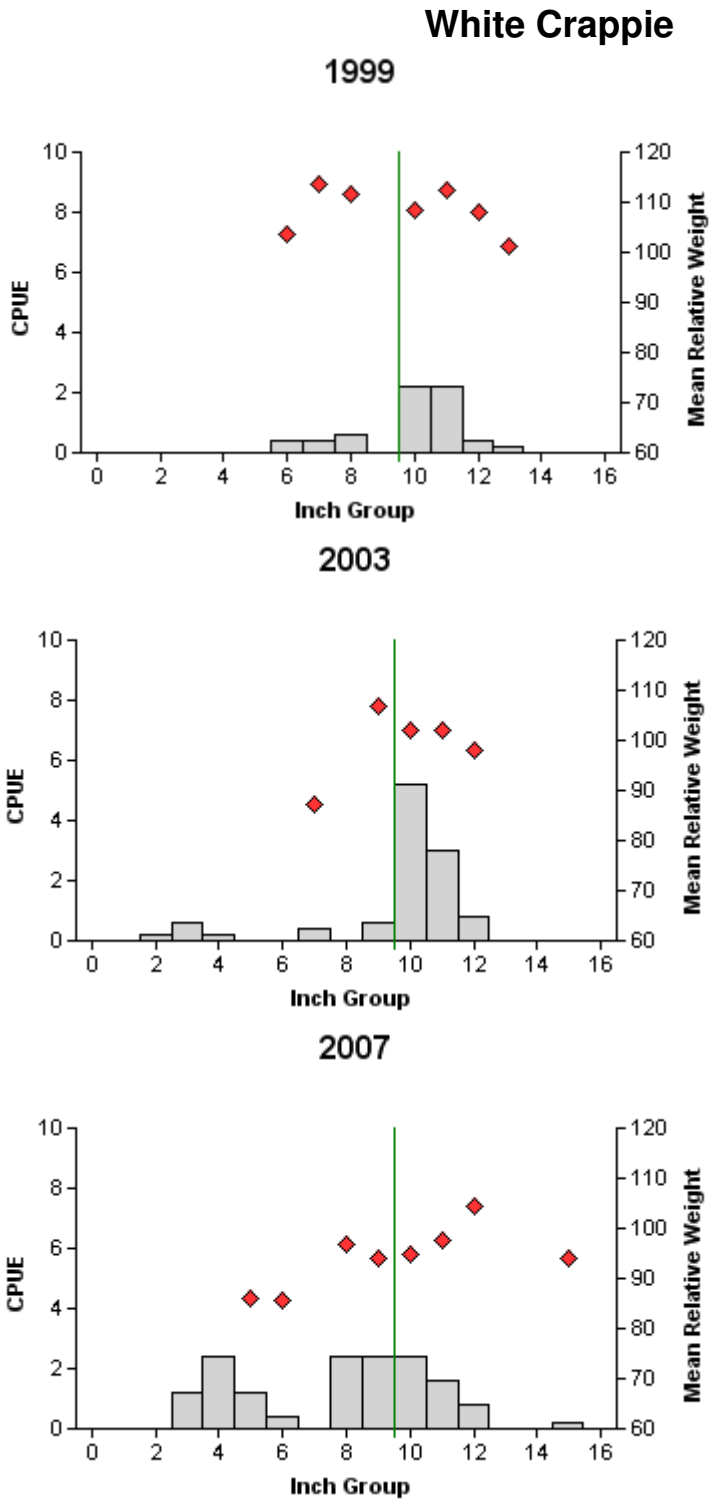


Figure 7. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Weatherford Reservoir, Texas, 1999, 2003, and 2007. Vertical lines represent length limit at time of collection.

Table 6. Proposed sampling schedule for Weatherford Reservoir, Texas. Electrofishing and trap netting surveys are conducted in the fall, while gill netting surveys are conducted during the following spring. Standard survey denoted by S. Additional survey denoted by A.

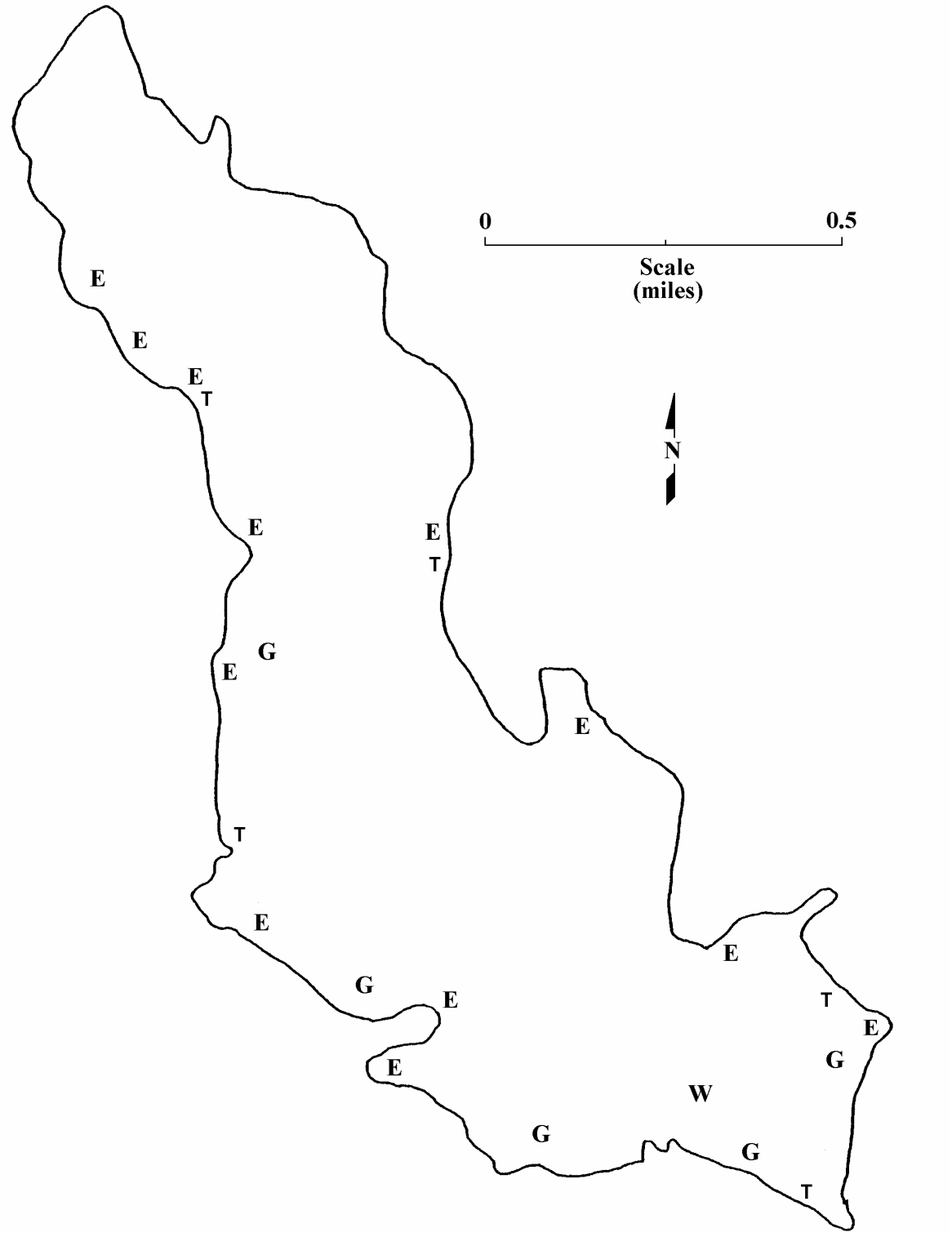
Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Report
Fall 2008-Spring 2009					
Fall 2009-Spring 2010	A				
Fall 2010-Spring 2011					
Fall 2011-Spring 2012	S	S	S		S

Appendix A

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

	Gill Netting		Trap Netting		Electrofishing	
Species	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					289	289.0
Threadfin shad					53	53.0
Channel catfish	60	12.0				
Flathead catfish	1	0.2				
White bass	6	1.2				
Green sunfish					5	5.0
Warmouth					5	5.0
Bluegill					303	303.0
Longear sunfish					112	112.0
Redear sunfish					4	4.0
Largemouth bass					78	78.0
White crappie			75	15.0		

APPENDIX B



Location of sampling sites, Weatherford Reservoir, Texas, 2007–2008. Trap netting, gill netting, electrofishing, and water stations are indicated by T, G, E, and W respectively. Water level was 1.5 feet below conservation for electrofishing, 2 feet below conservation for trap netting, and 1 foot below conservation level during gill netting.

APPENDIX C

Water sample parameters for Weatherford Reservoir, Texas, July 25, 2007. Sample station located at dam site.

Depth (m)	Temp. (°C)	D.O. (ppm)	Chlorides (ppm)	Conductivity (µmhos/cm)	Alkalinity (ppm)	Total dissolved solids(ppm)	pH
S	28.6	7.8	17	335.5	88	218	8.1
1.0	28.4	7.3					
2.0	28.0	6.8					
3.0	27.9	6.4					
4.0	27.7	6.0	15	335.0	85	218	8.0
5.0	27.6	5.7					
6.0	27.1	0.6	16	338.0	89	220	7.9
7.0	24.9	0.0					
8.0	23.9	0.0					
9.0	23.0	0.0					
10.0	22.6	0.0	12	354.4	101	230	7.7

APPENDIX D

Catch rates (CPUE) of targeted species by gear type for Weatherford Reservoir, Texas, 1986, 1989, 1993, 1996, 1999, 2003, 2004, 2007, and 2008.

		Year								
Gear	Species	1986[a, b]	1989[c]	1993[c]	1996[d]	1999[e]	2003[e]	2004[e]	2007[e]	2008[e]
Gill Net	Channel catfish		13.4	5.0	10.8	7.4		5.8		12.0
(fish/net night)	Flathead catfish		0.8	0.2	0.0	0.6		0.0		0.2
	White bass		0.0	9.2	34.0	2.6		0.4		1.2
Electrofisher	Gizzard shad	20.5	84.7	99.3	103.3	1,024.0	217.0		289.0	
(fish/hour)	Threadfin shad	8,045.5	97.3	27.3	0.0	235.0	151.0		53.0	
	Green sunfish	22.0	19.3	11.3	24.7	11.0	12.0		5.0	
	Warmouth	2.5	16.0	4.0	2.7	3.0	7.0		5.0	
	Bluegill sunfish	177.5	640.0	132.0	430.0	255.0	314.0		303.0	
	Longear sunfish	104.0	63.3	84.0	193.3	65.0	310.0		112.0	
	Redear sunfish	22.0	72.7	24.7	17.3	12.0	4.0		4.0	
	Spotted bass	0.0	0.0	0.0	0.7	0.0	0.0		0.0	
	Largemouth bass	36.5	112.7	107.3	159.3	158.0	91.0		78.0	
Trap Net	White crappie	24.4	2.2	22.8	1.5	6.4	11.0		15.0	
(fish/net night)										

[a] Electrofishing in 1986 was conducted with a Coffelt VVP-15 (Variable Voltage Pulsator). Electrofishing in 1989, 1993, 1996, 1999, and 2003 was conducted with a Smith-Root 5.0 GPP (Gas Powered Pulsator). Electrofishing in 2007 was conducted with a Smith-Root 7.5 GPP (Gas Powered Pulsator).

[b] Electrofishing and trap netting sampling sites were subjectively selected.

[c] Electrofishing, gill netting, and trap netting sampling sites were subjectively selected

[d] Electrofishing sampling sites were subjectively selected. Gill netting and trap netting sampling sites were randomly selected.

[e] Electrofishing, gill netting, and trap netting sampling sites were randomly selected.