PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-221-M-2

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

Weatherford Reservoir

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TABLE OF CONTENTS

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Weatherford Reservoir were surveyed in 2011 using an electrofisher and trap nets and in 2012 using gill nets. Habitat was surveyed in 2011. 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 elevation (896 ft-msl) for most of the period between May 2008 and April 2012. Extremely rich reservoir waters were probably enhanced by runoff from domestic habitation in the watershed. Habitat features consisted mainly of bulkhead and rocky and natural shoreline.

- **Management history:** Important sport fish included channel catfish, white bass, largemouth bass, and white crappie. The management plan for the 2008 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. 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 high. This was indicative of high nutrient levels in the reservoir. Moderate electrofishing catch rates of bluegill and the highest catch rate of threadfin shad since 1986 indicated the prey base was more than adequate.

  - **Channel catfish:** Gill net catch rate of channel catfish dropped back to 2004 levels. Recruitment was evident and 40% of the sample population was legal size and larger. Growth was slow, but channel catfish were in very good condition.

  - **Temperate basses:** Gill net catch rate of white bass has steadily declined over the past four surveys from a high in 1996. This year no white bass were collected for the first time since they were first observed in 1993. Never before collected, yellow bass were observed during trap and gill netting surveys. They probably came through the water transfer line from Lake Benbrook.

  - **Largemouth bass:** Electrofishing catch rate of largemouth bass declined from previous surveys. Recruitment to the higher inch classes was evident indicating an improvement in the largemouth bass size structure. Largemouth bass were in great condition. Growth was average; 14 inches in 2 years for some of the sampled fish.

  - **White crappie:** Trap net catch rate of white crappie was high as in 2007 and overall body condition was great. They grew to 10 inches in two years and 57% 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. The improvements in the largemouth bass population should be communicated to constituents via TPWD social media and news releases. The public boat ramp should be improved to allow better access during low water conditions. Inform the City of Weatherford about new exotic species threats to Texas waters, and work with them to display appropriate signage, educate constituents, and understand appropriate enforcement actions.

INTRODUCTION

This document is a summary of fisheries data collected from Weatherford 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

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. The reservoir also provides recreation for boaters and anglers. The reservoir drains approximately 109 square miles and has a shoreline 6 miles long. Approximately 45% of the reservoir is ≤15 feet deep. Water level was generally below conservation level (896 ft above msl) as much as 8 feet (Figure 1). With a TSI chl–*a* of 55.26, Weatherford Reservoir was eutrophic and borderline hypereutrophic (Texas Commission on Environmental Quality 2011). 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 and rocky and natural shoreline. Boat access consisted of one public boat ramp with parking, boarding pier, and ample illumination. During low water level conditions, as experienced in 2011, boaters cannot safely use this ramp. 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 ramp. 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 2008) included:

Conduct supplemental electrofishing survey in the fall of 2009 to monitor the largemouth bass population because of declines in CPUE over the past surveys.

Action: A bass-only electrofishing survey was conducted in the fall of 2009. The largemouth bass CPUE was 79.0/h, only a slight improvement of the 78.0/h observed in 2007. However, the stock CPUE went from 16.0/h in 2007 to 38.0/h in 2009. The PSD also increased from 38 to 53, indicating an improvement in the largemouth bass size structure for Weatherford Reservoir.

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: The summer drought of 2011 produced low water conditions at

Weatherford Reservoir to the point where only rocky shoreline, bulkhead, gravel, and natural shoreline were the shoreline and littoral habitats (Table 4). Historically, native floating and emergent aquatic vegetation was more abundant, but not problematic (Hysmith and Moczygemba 2008).

Water Transfer: Weatherford Reservoir is primarily used for municipal water supply, recreation, and to a lesser extent, flood control. Water is pumped into Weatherford Reservoir from Benbrook Reservoir. A by-product of this transfer from Benbrook Reservoir has been the introduction of yellow bass, which were not present during the last survey.

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). A supplemental bass-only electrofishing (1 hour at 12 5-min stations) survey was conducted in fall 2009. 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 2011). Habitat, vegetation, and access surveys were also conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Size Distribution (PSD)] as defined by Guy et al. (2007) and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Ages were determined using Category 2 protocol according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). 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.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of bulkhead and natural and rocky shoreline (Table 4).

Prey species: Electrofishing CPUE of gizzard and bluegill were 226.0/h and 170.0/h, respectively (Figures 2 and 3). Index of vulnerability (IOV) for gizzard shad was high, indicating 74% 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 ≤4 inches (Figure 3). Total CPUE for threadfin shad was 3993.0/h, the highest since 1986, which served to augment the prey base (Appendix C).

Channel catfish: Gill net CPUE of channel catfish was 6.0/nn, down from 2008 but about the same as the 2004 survey (Figure 4 and Appendix C). Average relative weights of stock -size channel catfish were near 90 or above for all size classes with a range of 89 to 107. Growth was slow; 12 inches, on average, in 6 years (N = 6; range = 3 – 7 years). Reproduction was evident and 40% of the sample population was legal size and larger.

Temperate basses: White bass were first recorded in the reservoir in 1993 when a gill net CPUE of 9.2/nn was recorded. The CPUE peaked at 34.0/nn in 1996 and has been very sporadic since. This year no white bass were collected (Figure 5).

Yellow bass were observed for the first time during trap (2.6/nn) and gill netting (0.3/nn) surveys. They were probably a by-product of the water transfer pipeline from Lake Benbrook. Although not managed as a game fish, yellow bass may provide some angling recreation at Weatherford Reservoir.

Largemouth bass: Electrofishing total CPUE for largemouth bass (59.0/h) was below the total CPUE observed in 2009 and 2007 (Figure 6). Although the total CPUE was almost the same at 79.0/h in 2007 and 2009, the stock CPUE increased from 16.0/h to 38.0/h, indicating the adult largemouth bass population was improving. This trend continued in 2011, when the stock CPUE increased to 54.0/h (Figure 6). A PSD of 50 also indicated an improving largemouth bass size structure when compared to previous surveys. Average relative weights by inch-class varied from 75 to 100 with most inch classes above 90. Growth was adequate; average age at 14 inches (14 to 14.7 inches) was 2.5 years (N= 4; range = 2 – 3 years). Apparently the improved size structure may have been a product of the excellent recruitment of the 2007 and 2009 year classes.

White crappie: Trap net catch rate of white crappie (14.0/nn) was about the same as in 2007 (Figure 7 and Appendix C). Average relative weights of stock fish were above 100 for most stock sizes, averaging 104.6 (range = 85 – 110), and 57% of the sample population was $\geq$10 inches. Growth was good as demonstrated by 12 of the 13 sampled crappie growing to 10 inches in 2 years (N = 13; range = 1 – 2 years).

Fisheries management plan for Weatherford Reservoir, Texas

Prepared – July 2012.

ISSUE 1: The sport fishery in Weatherford Reservoir, especially largemouth bass, has continued to improve.

MANAGEMENT STRATEGY

1. Promote these improvements through news releases and TPWD social media.

ISSUE 2: The public ramp on Weatherford Reservoir is not safe to use during periods of low water levels.

MANAGEMENT STRATEGY

1. Encourage the City of Weatherford to apply for TPWD boat ramp maintenance grant funding.

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

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule consists of mandatory monitoring in 2015/2016 (Table 6).

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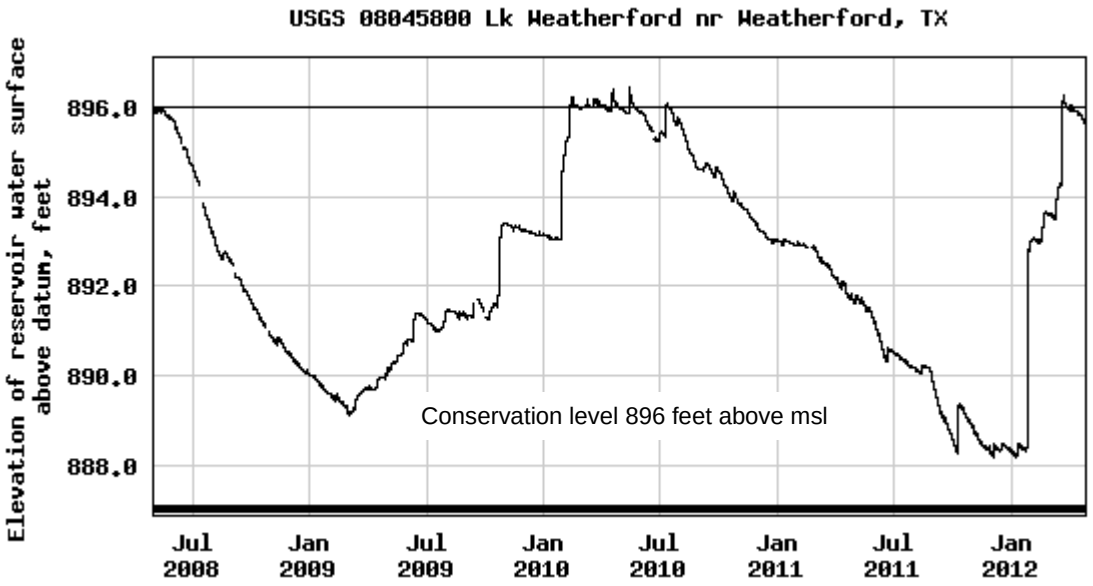


Figure 1. Daily mean average water level elevations in feet above mean sea level (MSL) recorded for Weatherford Reservoir (U.S. Geological Survey. 2012. USGS real time water data for USGS 08045800 Lk Weatherford near Weatherford, Texas. http://waterdata.usgs.gov/nwis/dv), Texas, May 2008-April, 2012.

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, Texas.

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 Reservoir, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), 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 shoreline habitat and littoral and pelagic habitat types, Weatherford Reservoir, Texas, 2011. A linear shoreline distance (miles) and percent of total was recorded for each shoreline habitat type found. Surface area (acres) and percent of total was determined for each type of littoral and pelagic habitat type found.

	Shoreline distance		Surface area	
	Miles	% of total	Coverage (acres)	% of total
Shoreline habitat type				
Bulkhead	3.0	50.0		
Gravel	0.0	0.0		
Natural shoreline	1.9	32.0		
Rocky shoreline	1.1	18.0		
Littoral and pelagic habitat type				
Standing timber, stumps			0.0	
Native emergent			0.0	
Native submersed			0.0	
Open water			1155.8	99.8
Piers, boat docks, marinas			2.2	0.2

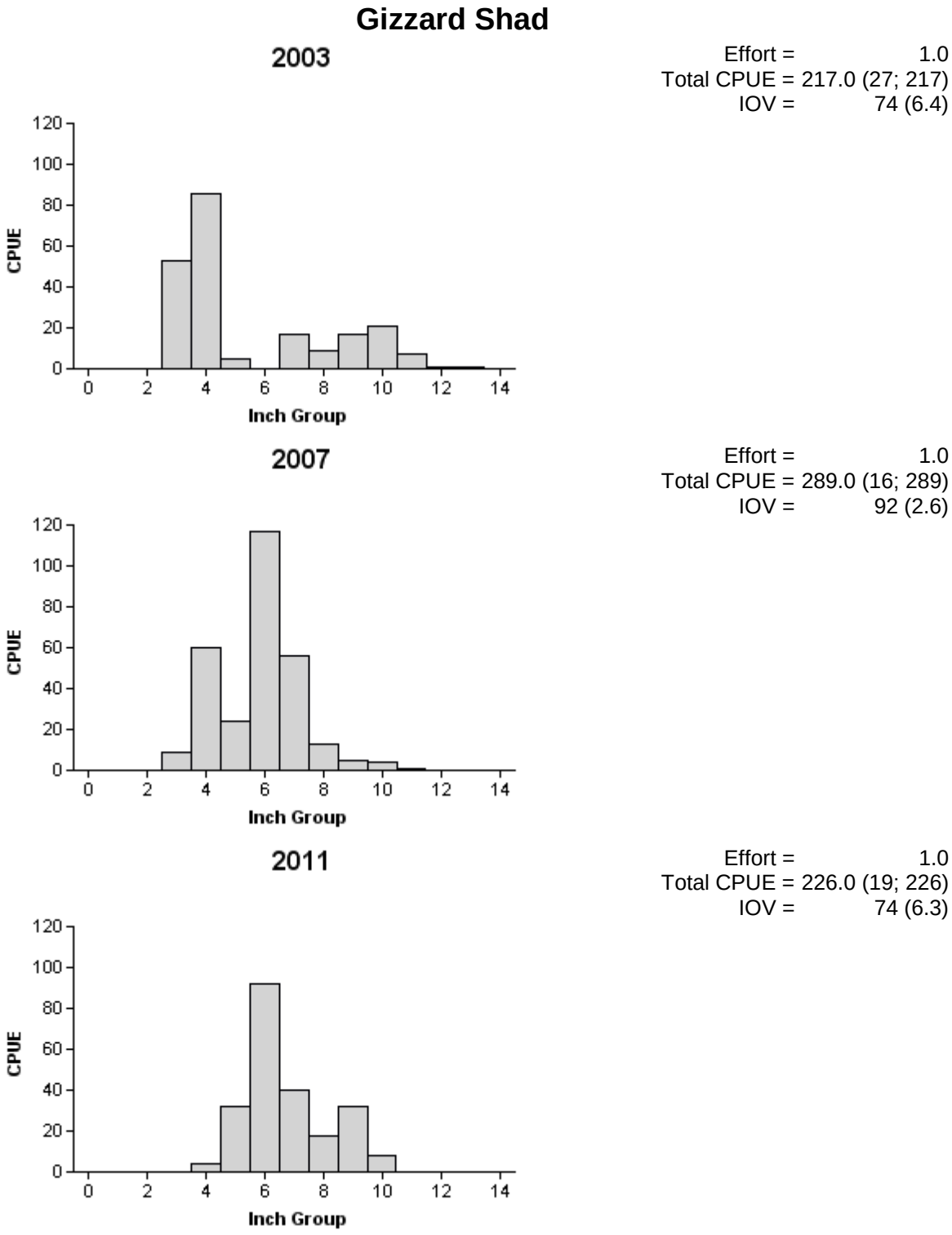


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Weatherford Reservoir, Texas, 2003, 2007, and 2011.

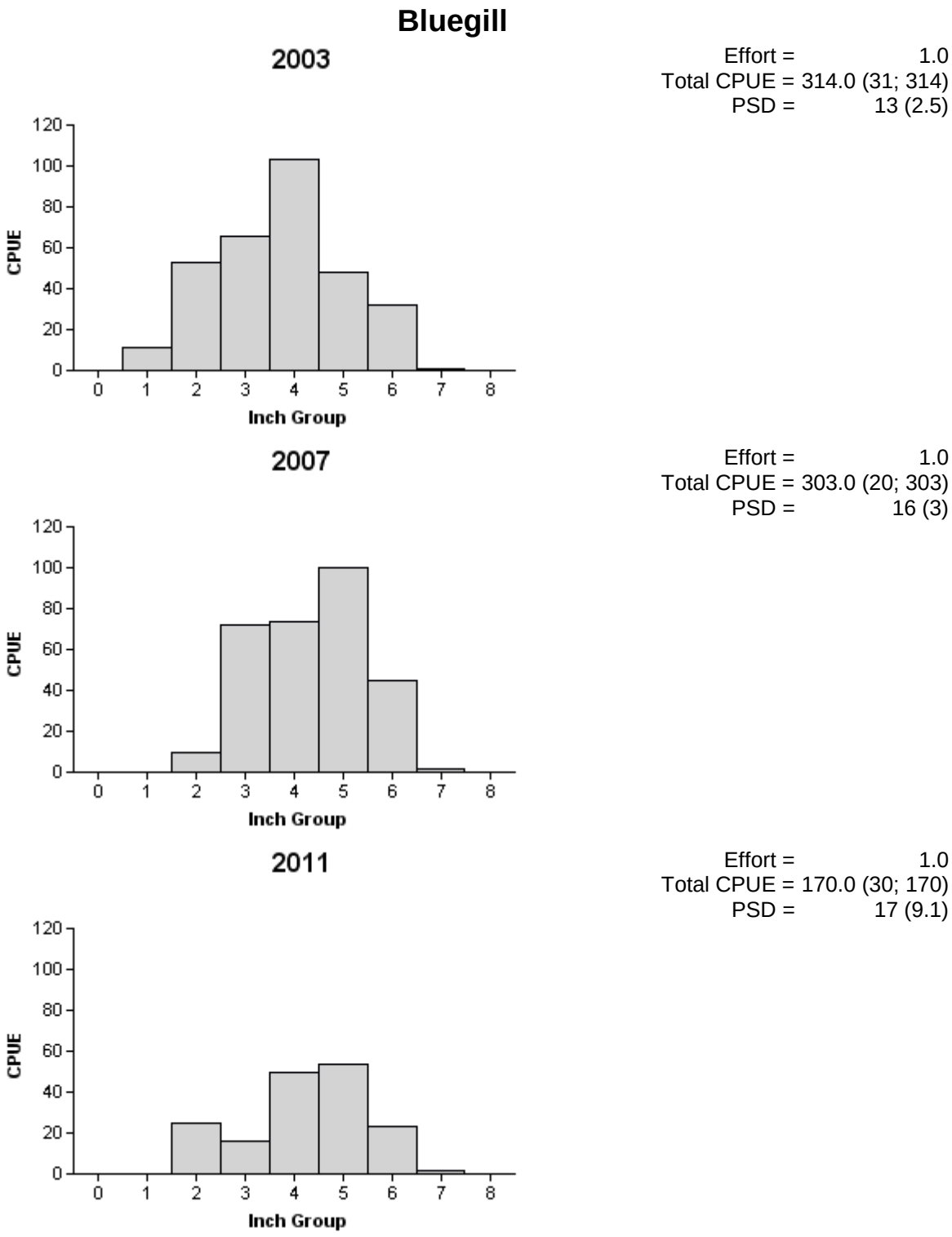
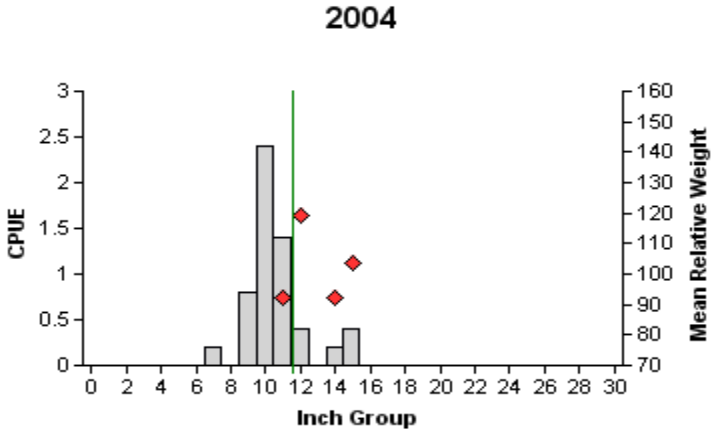
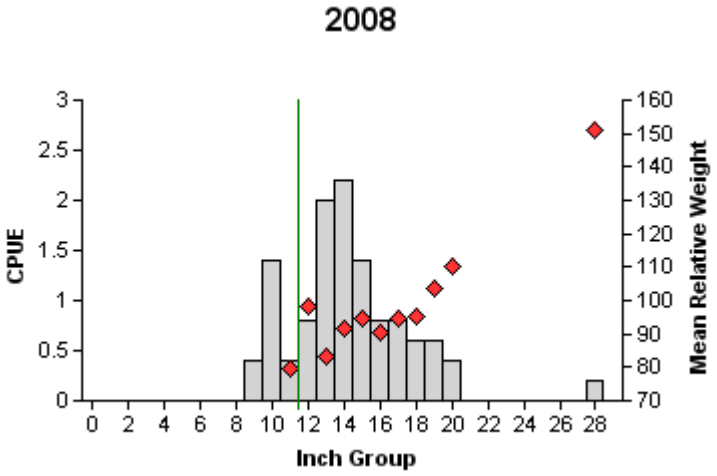


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Weatherford Reservoir, Texas, 2003, 2007, and 2011.

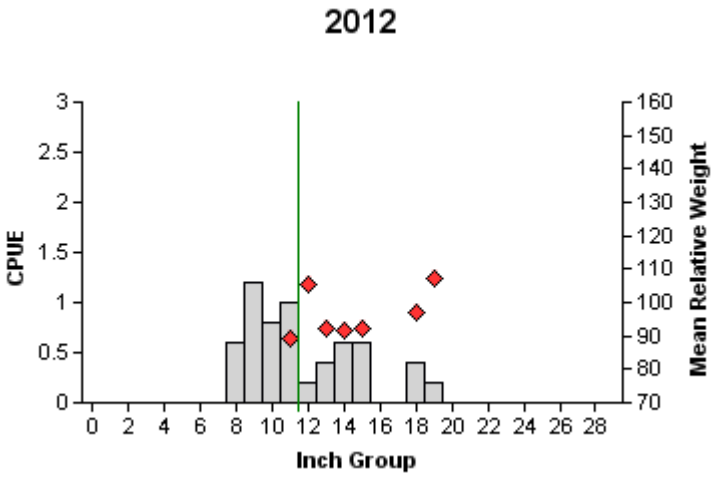
Channel Catfish



Effort = 5.0
Total CPUE = 5.8 (30; 29)
Stock CPUE = 2.4 (17; 12)
PSD = 0 (141)



Effort = 5.0
Total CPUE = 12.0 (28; 60)
Stock CPUE = 10.2 (25; 51)
PSD = 33 (7.9)



Effort = 5.0
Total CPUE = 6.0 (24; 30)
Stock CPUE = 3.4 (30; 17)
PSD = 18 (4.7)

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, 2004, 2008, and 2012. Vertical lines represent length limit at time of collection.

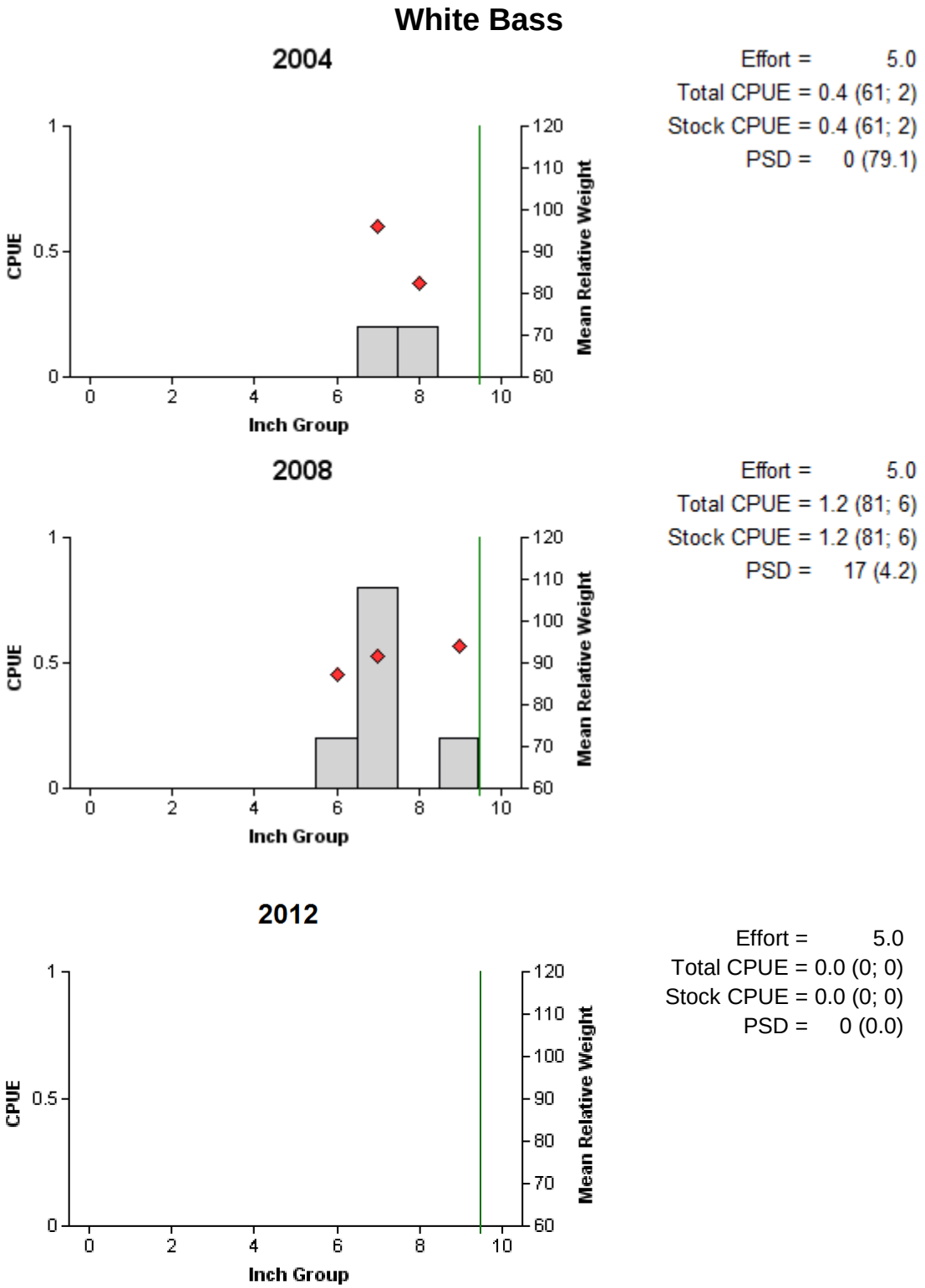


Figure 5. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Weatherford Reservoir, Texas, 2004, 2008, and 2012. Vertical lines represent length limit at time of collection.

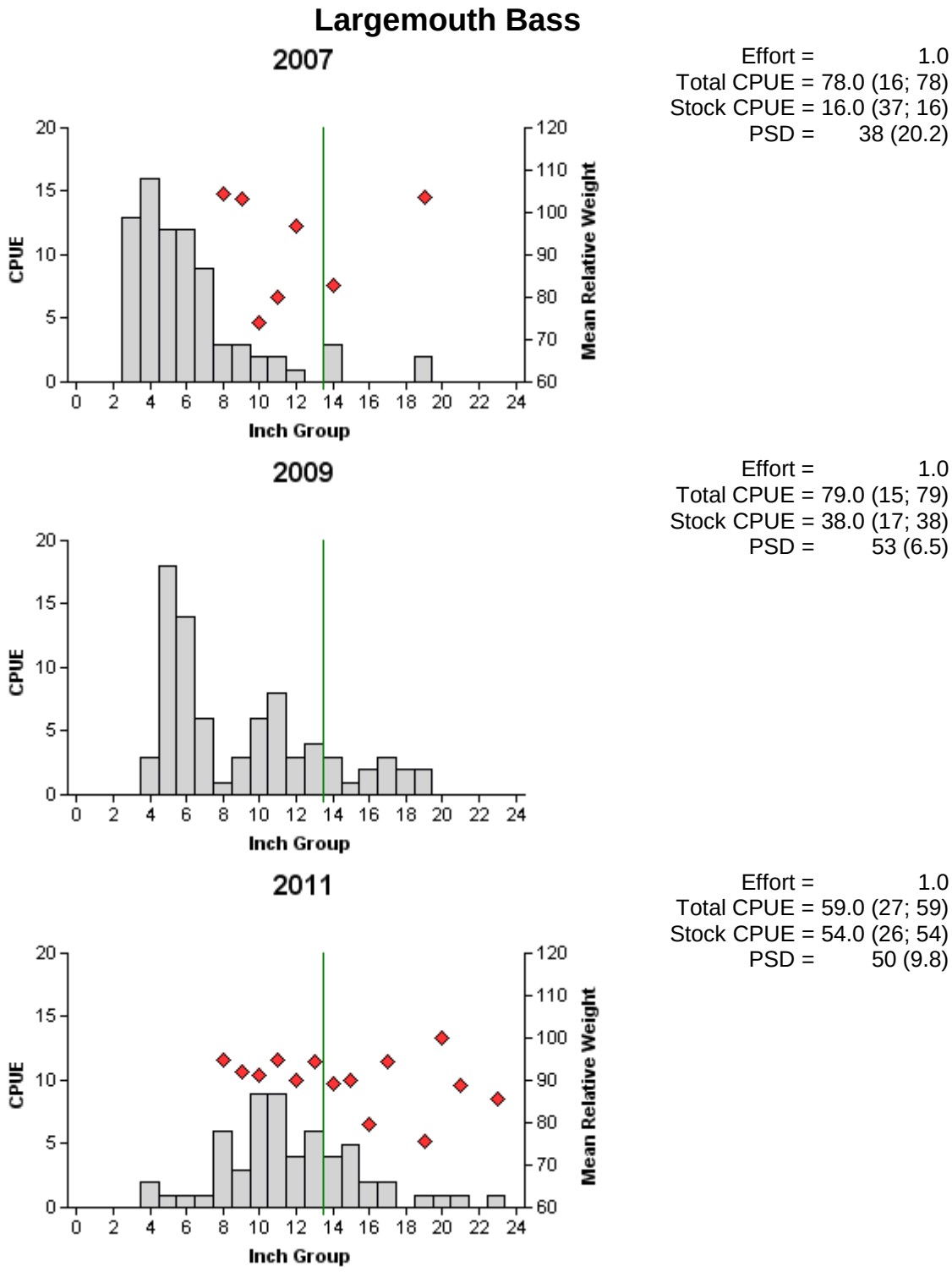


Figure 6. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (except 2009; diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Weatherford Reservoir, Texas, 2007, 2009, and 2011. Vertical lines represent length limit at time of collection.

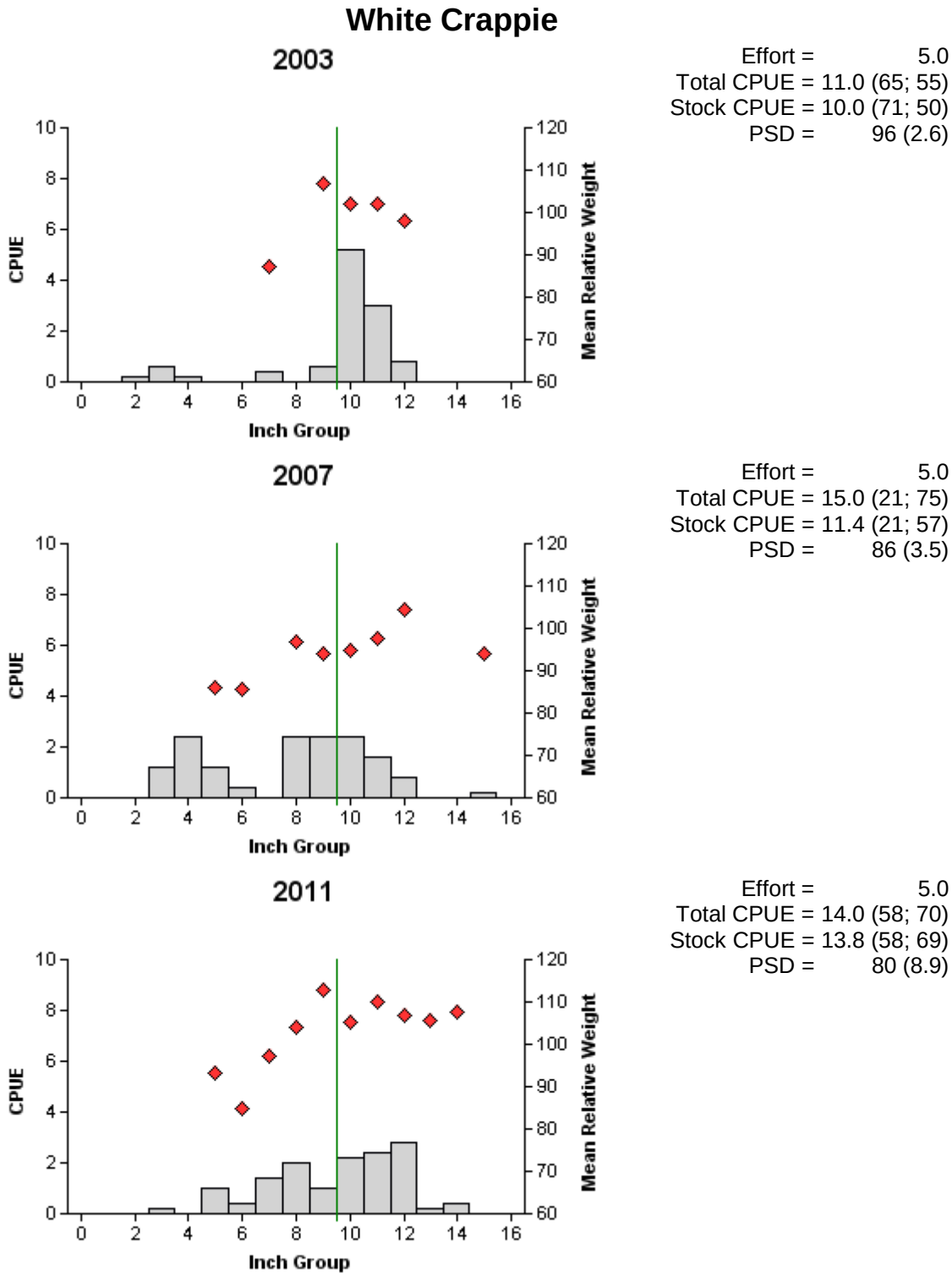


Figure 7. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Weatherford Reservoir, Texas, 2003, 2007, and 2011. Vertical lines represent length limit at time of collection.

Table 5. 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	Vegetation Survey	Access Survey	Report
Fall 2012-Spring 2013							
Fall 2013-Spring2014							
Fall 2014-Spring 2015							
Fall 2015-Spring 2016	S	S	S		S	S	S

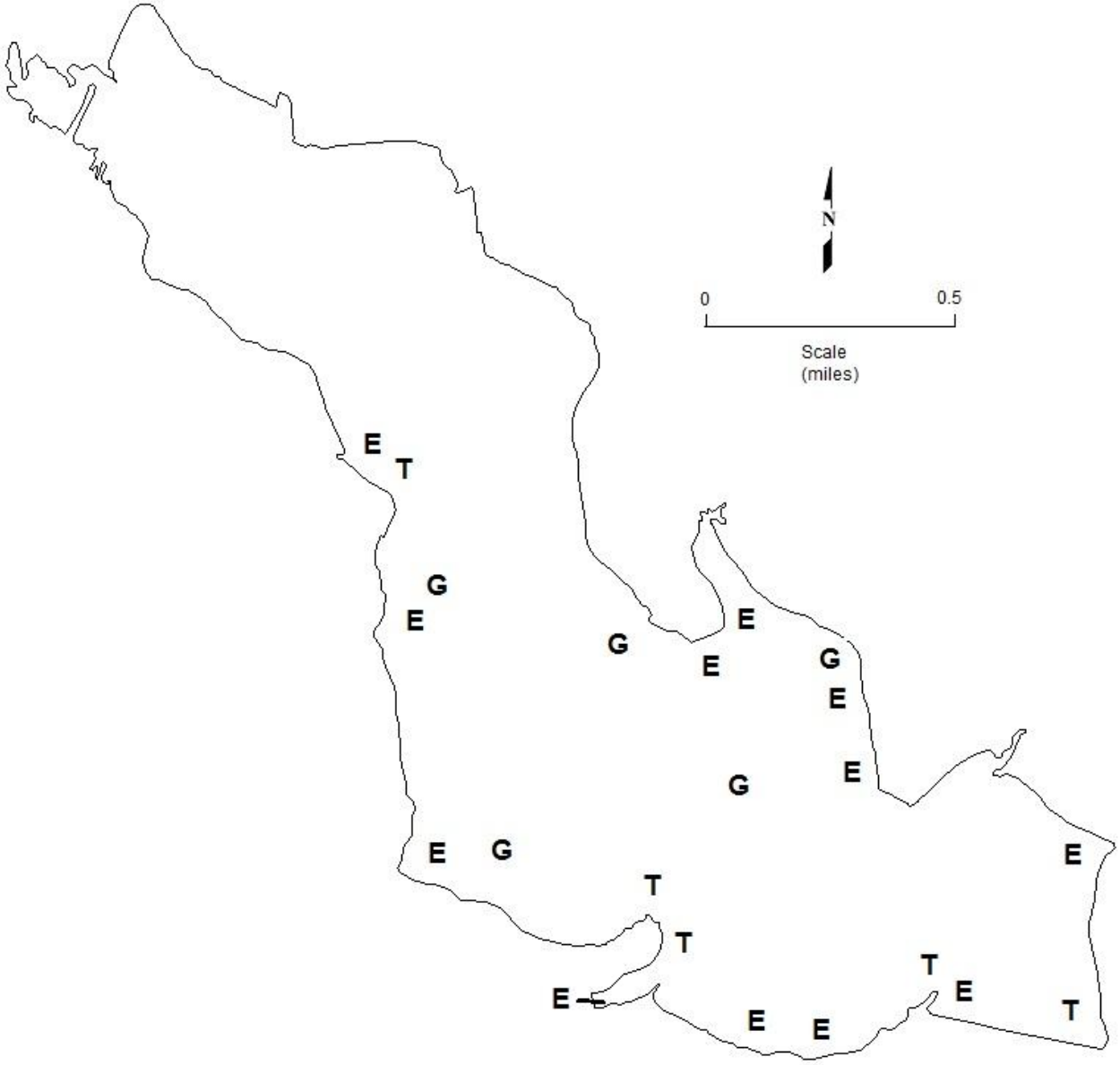
APPENDIX A

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

	Gill Netting		Trap Netting		Electrofishing	
Species	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					226	226.0
Threadfin shad					3993	3993.0
Channel catfish	30	6.0				
Flathead catfish	1	0.1				
Yellow bass[1]	3	0.3	13	2.6		
Green sunfish					1	1.0
Warmouth					2	2.0
Bluegill					170	170.0
Longear sunfish					43	43.0
Redear sunfish					6	6.0
Spotted bass					5	5.0
Largemouth bass					59	59.0
White crappie			70	14.0		
Black crappie			2	0.4		

[1] First year yellow bass were collected.

APPENDIX B



Location of sampling sites, Weatherford Reservoir, Texas, 2011–2012. Trap netting, gill netting, electrofishing, and water stations are indicated by T, G, and E, respectively. Water level was 6.8 feet below conservation for electrofishing, 7.6 feet below conservation for trap netting, and at conservation level during gill netting.

APPENDIX C

Catch rates (CPUE) of targeted species by gear type for Weatherford Reservoir, Texas, 1986, 1989, 1993, 1996, 1999, 2003, 2004, 2007, 2008, 2009, 2011, and 2012.

		Year											
Gear	Species	1986[a, b]	1989[a,c]	1993[a,c]	1996[a,d]	1999[a,e]	2003[a,e]	2004[e]	2007[a,e]	2008[e]	2009[a,e]	2011[a,e]	2012[e]	**Avg**
Gill Net	Channel catfish		13.4	5.0	10.8	7.4		5.8		12.0			6.0	**8.7**
(fish/net night)	Flathead catfish		0.8	0.2	0.0	0.6		0.0		0.2			0.1	**0.3**
	White bass		0.0	9.2	34.0	2.6		0.4		1.2			0.0	**6.8**
Electrofisher	Gizzard shad	20.5	84.7	99.3	103.3	1,024.0	217.0		289.0			226.0		**258.0**
(fish/hour)	Threadfin shad	8,045.5	97.3	27.3	0.0	235.0	151.0		53.0			3993.0		**1575.3**
	Green sunfish	22.0	19.3	11.3	24.7	11.0	12.0		5.0			1.0		**13.3**
	Warmouth	2.5	16.0	4.0	2.7	3.0	7.0		5.0			2.0		**5.3**
	Bluegill sunfish	177.5	640.0	132.0	430.0	255.0	314.0		303.0			170.0		**302.7**
	Longear sunfish	104.0	63.3	84.0	193.3	65.0	310.0		112.0			43.0		**121.9**
	Redear sunfish	22.0	72.7	24.7	17.3	12.0	4.0		4.0			6.0		**20.4**
	Spotted bass	0.0	0.0	0.0	0.7	0.0	0.0		0.0			5.0		**0.7**
	Largemouth bass	36.5	112.7	107.3	159.3	158.0	91.0		78.0		79.0	59.0		**100.2**
Trap Net	White crappie	24.4	2.2	22.8	1.5	6.4	11.0		15.0			14.0		**12.2**
(fish/net night)	Black crappie	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.4		**<0.1**

[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, 2009, and 2011 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.