PERFORMANCE REPORT

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FEDERAL AID PROJECT F-30-R-34

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2008 Survey Report

Bonham City Reservoir

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July 31, 2009

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Bonham City Reservoir were surveyed in 2008 using an electrofisher and trap nets and in 2009 using gill nets. Habitat was surveyed in 2004. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Bonham City Reservoir, a 1,020-acre impoundment on Timber Creek a tributary to Bois d'Arc Creek which is tributary to Red River in Fannin County Texas. Mean water level was 563 ft-msl, only 2 feet below conservation level (565 ft-msl) from June 2005 until May 2009. The reservoir has high nutrient productivity. Habitat features consisted of bulkhead, rip-rap, and native submerged and emergent aquatic vegetation.

- **Management history:** Important sport fish include blue and channel catfish, largemouth bass, and black and white crappie. The management plan for the 2004 survey report included supplemental sampling for blue and channel catfish and largemouth bass. In 1969 and 1994, 51,634 advanced channel catfish fingerlings were stocked. In 1978 25,486 blue catfish were stocked and from 1996 through 1998 309,430 Florida largemouth bass fingerlings were stocked.

- **Fish community**

  - **Prey species:** Electrofishing catch rate of gizzard shad was high. The relative abundance of prey-size gizzard shad (≤7-inches) was high and much improved from 2004. Threadfin shad catch remains high. Bluegill catch rate remained excellent.

  - **Catfishes:** Gill net catch rate of blue catfish was modest and indicated very little change over the past eight years. All of the sample population was legal size and in good condition. Growth was slow and there was no recruitment.

    Gill net catch rate of channel catfish was good, but has declined over the previous eight years. Most of the sample population was legal size and in good condition. Growth was slow, but there was recruitment.

  - **Largemouth bass:** Electrofishing catch rate of largemouth bass was excellent. Most of the sample population was sublegal, growth was slow, but the bass were in good condition and recruitment was high.

  - **Crappie:** Trap net catch rate of white crappie was very low and has declined over the past four years. Condition was excellent for most individuals.

    The trap net catch rate of black crappie was also low, but exceeded white crappie and was consistent with previous years. Condition was excellent for most individuals.

- **Management strategies:** Based on current information, Bonham City Reservoir should continue to be managed with existing fish harvest regulations. Stock blue catfish fingerlings annually from 2009 through 2011. Conduct supplemental trap netting in the fall of 2010 to monitor the crappie population. Notify controlling authority of excessive terrestrial growth on dam. Conduct general monitoring with electrofisher, trap nets, and gill nets in 2012-2013.

INTRODUCTION

This document is a summary of fisheries data collected from Bonham City Reservoir in 2008–2009. 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 2008–2009 data for comparison.

Reservoir Description

Bonham City Reservoir, a 1,020-acre impoundment on Timber Creek, is located northeast of Bonham in Fannin County. It was constructed in 1969 by the City of Bonham for municipal and industrial uses. The reservoir drains approximately 29 square miles and has a shoreline 18 miles. Approximately 65% of the reservoir is $\leq$15 feet deep. Water level fluctuation from June 2005 until May 2009 is presented in Figure 1 (conservation elevation 565 ft-msl). With a TSI (Secchi Disc; SD) of 48.17, Bonham City Reservoir was eutrophic (Texas Commission on Environmental Quality 2008). A TSI (SD) >45 and <55 is considered eutrophic; hence, the reservoir is rich in nutrients with high productivity. The average depth is 13 feet with a maximum depth of 30 feet. Habitat features consisted mainly of bulkhead, rip-rap, and native submerged and emergent aquatic vegetation. Boat access consisted of two public boat ramps with lighted parking. Much of the perimeter of Bonham City Reservoir is privately owned, occupied homes with boat docks. However, there is an interspersion of bank access, especially adjacent the public boat ramps. Further information about Bonham City 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 web page. Other descriptive characteristics for Bonham City Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Hysmith and Moczygemba 2005) included:

1. Conduct supplemental sampling in the spring of 2007 to determine population structure of blue and channel catfish. Collect otoliths from blue and channel catfish for category- two age analysis to determine number of years to reach legal size.
   Action: Conducted supplemental gill netting [5 net nights (nn)] and jug lining (25 jugs); collected otoliths from both blue and channel catfish. Attempted low amp electrofishing (1 h), but was unsuccessful.
2. Conduct supplemental largemouth-bass-only electrofishing in the fall of 2006 to collect otoliths for category-two age analysis to augment historical age and growth data.
   Action: Conducted supplemental electrofishing (1 h) and collected otoliths from largemouth bass.

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

Stocking history: Bonham City Reservoir was stocked with fingerling Florida largemouth bass from 1996 to 1998 at 100/acre (Table 3). Channel catfish fingerlings were stocked in 1969 at 49/acre. The reservoir was last stocked with channel catfish fingerlings in 1994 at 2/acre. Blue catfish and palmetto bass were stocked in 1978 at 25/acre each. Northern largemouth bass were last stocked in 1969.

Vegetation/habitat history: Bonham City Reservoir supported native submerged and emergent aquatic vegetation (Table 4). Other habitat features consisted mainly of bulkhead and rip-rap.

METHODS

Fishes were collected by electrofishing (1 hour at 12 5-min stations), gill netting (5 nn at 5 stations), and trap netting (5 nn 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 2008).

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. Otoliths, for aging blue catfish, channel catfish, largemouth bass, white crappie and black crappie, were extracted from the auditory capsules in the neurocranium, washed to remove all adhering tissues, dried, and stored for further analysis. Ages were determined using Category 2 protocol according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2008). The manual specifies procedures for largemouth bass only, but we adapted the protocol to channel and blue catfish and white and black 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 website.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of rocky shoreline, bulkhead, dead trees, and native emerged and native submerged vegetation (Table 4). Excessive growth of young trees was observed on the dam and may compromise dam safety in the future.

Prey species: Electrofishing CPUE of gizzard shad and bluegill was 180.0/h and 776.0/h, respectively (Figures 2 and 3). Index of vulnerability (IOV) for gizzard shad was high, indicating 72% of the gizzard shad sample was available to existing predators; IOV estimates have historically shown 50% to 78% of the gizzard shad population was vulnerable to predation (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 1,962.0/h which augmented the prey base (Appendices A & C).

Catfishes: Gill net CPUE of blue catfish was 4.2/nn (Figure 4). Relative weight was fair to good for all sizes. Growth was slow; 16 to 22 inches in 12-17 years (N = 11). There has been no evidence of recruitment of sublegal size fish since 1997 (Figure 4 and Hysmith and Moczygemba 2005). The youngest cohort identified from age and growth samples collected by jug lines in 2007 was 1995.

Gill net CPUE of channel catfish was 6.8/nn, the lowest in recent years (Figure 5 and Appendix C). Body condition was good. Based on a sample size of three fish, growth was good. Approximately 79% of the sample population was legal size and larger.

Largemouth bass: Electrofishing CPUE for largemouth bass (119.0/h) has declined since the 2004 sample (Figure 6). Stock CPUE has remained stable since 2000. Relative weight indicated good condition and varied from 90 to 100. The sample population showed 8% were $\geq$14 inches. Growth was good; 14 inches in 3 to 4 years (N = 9).

Crappie: Trap net catch rate of white crappie (2.8/nn) was the lowest on record (Figure 7 and Appendix C). Body condition was excellent for most white crappie. The disparity in CPUE from 2004 and 2008 may represent a “typical boom/bust crappie population”.

Trap net catch rate of black crappie (3.0/nn) was less than CPUE in 2004 (Figure 8), but historically has not changed (Appendix C). Relative weight was good to excellent for most sizes. Based on a sample size of 5 fish, growth was good.

Fisheries management plan for Bonham City Reservoir, Texas

Prepared – July 2009.

ISSUE 1: There has been no evidence of recruitment of sublegal size blue catfish since 1997.

MANAGEMENT STRATEGY

1. Stock blue catfish fingerlings annually at 25/acre from 2009 - 2011.
2. Assess recruitment during mandatory monitoring in 2013.

ISSUE 2: Trap net CPUE of white crappie was lowest on record. There were too few fish for meaningful relative weight and age and growth.

MANAGEMENT STRATEGY

1. Conduct supplemental trap netting (10 nn) in the fall of 2010 to monitor the crappie population.

ISSUE 3: Dam safety may be threatened due to excessive terrestrial vegetation.

MANAGEMENT STRATEGY

1. Advise the City of Bonham to remove vegetation.
2. Install removed vegetation into reservoir as fish habitat.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule consists of supplemental trap netting in the fall of 2010 and mandatory monitoring in 2012/2013 (Table 5).

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DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.

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Texas Commission on Environmental Quality. 2008. Reservoir and lake use support assessment report. 15 pp.

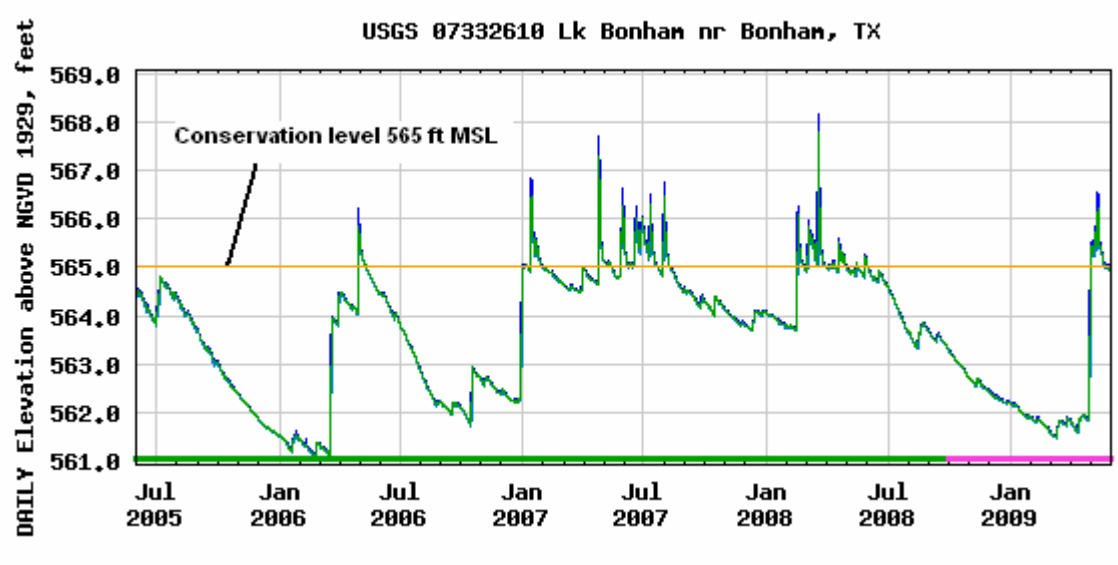


Figure 1. Monthly average water level elevations in feet above mean sea level (MSL) recorded for Bonham City Reservoir, Texas, June 2005 - May 2009.

Table 1. Characteristics of Bonham City Reservoir, Texas.

Characteristic	Description
Year constructed	1969
Controlling authority	Bonham Municipal Water Authority
County	Fannin
Reservoir type	Offstream
Shoreline development index	4.1
Conductivity	143 µmhos/cm

Table 2. Harvest regulations for Bonham City 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, 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 Bonham City Reservoir, 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**	**Numbe**	**Life Stage**	**Mean TL (in)**
Blue catfish	1978	25,48	UNK	UNK
	Total	25,48		
Channel catfish	1969	50,00	AFGL	7.9
	1994	1,63	AFGL	7.4
	Total	51,63		
Florida Largemouth bass	1996	101,90	FGL	1.5
	1997	104,20	FGL	1.4
	1998	103,32	FGL	1.4
	Total	309,43		
Largemouth bass	1969	200,00	UNK	UNK
	Total	200,00		
Palmetto Bass (striped X white bass hybrid)	1978	26,31	UNK	UNK
	Total	26,31		

Table 4. Survey of littoral zone and physical habitat types, Bonham City Reservoir, Texas, 2004. 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	1.5	8.2		
Rocky shore	0.9	4.9		
Eroded bank	1.5	8.2		
Bulkhead	3.1	16.9		
Native submerged vegetation	7.0	38.3	99.6	9.8
Native emergent	4.1	22.4	100.7	9.9
Boat docks	0.2	1.1	0.8	<0.1

Gizzard Shad

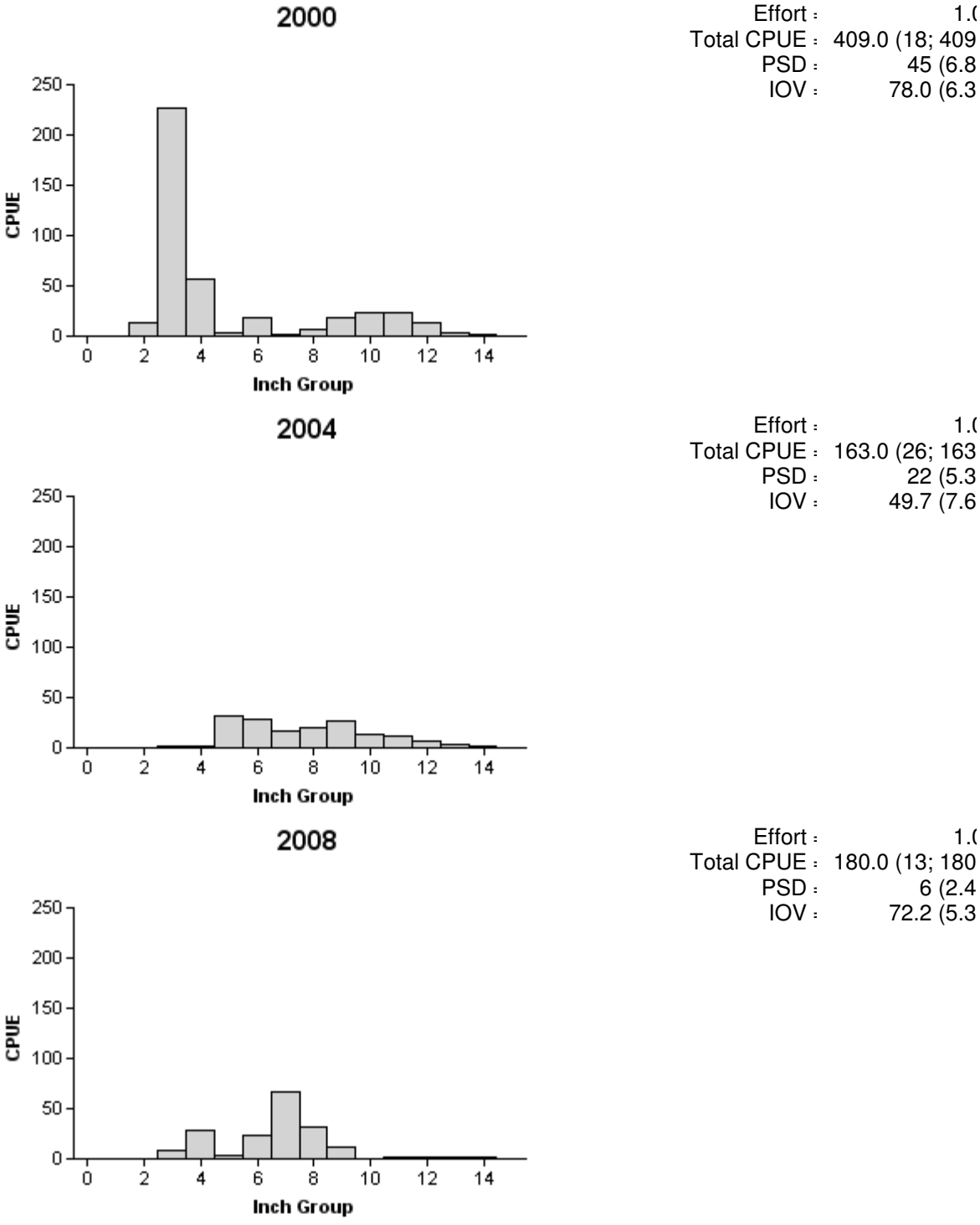


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Bonham City Reservoir, Texas 2000, 2004, and 2008.

Bluegill

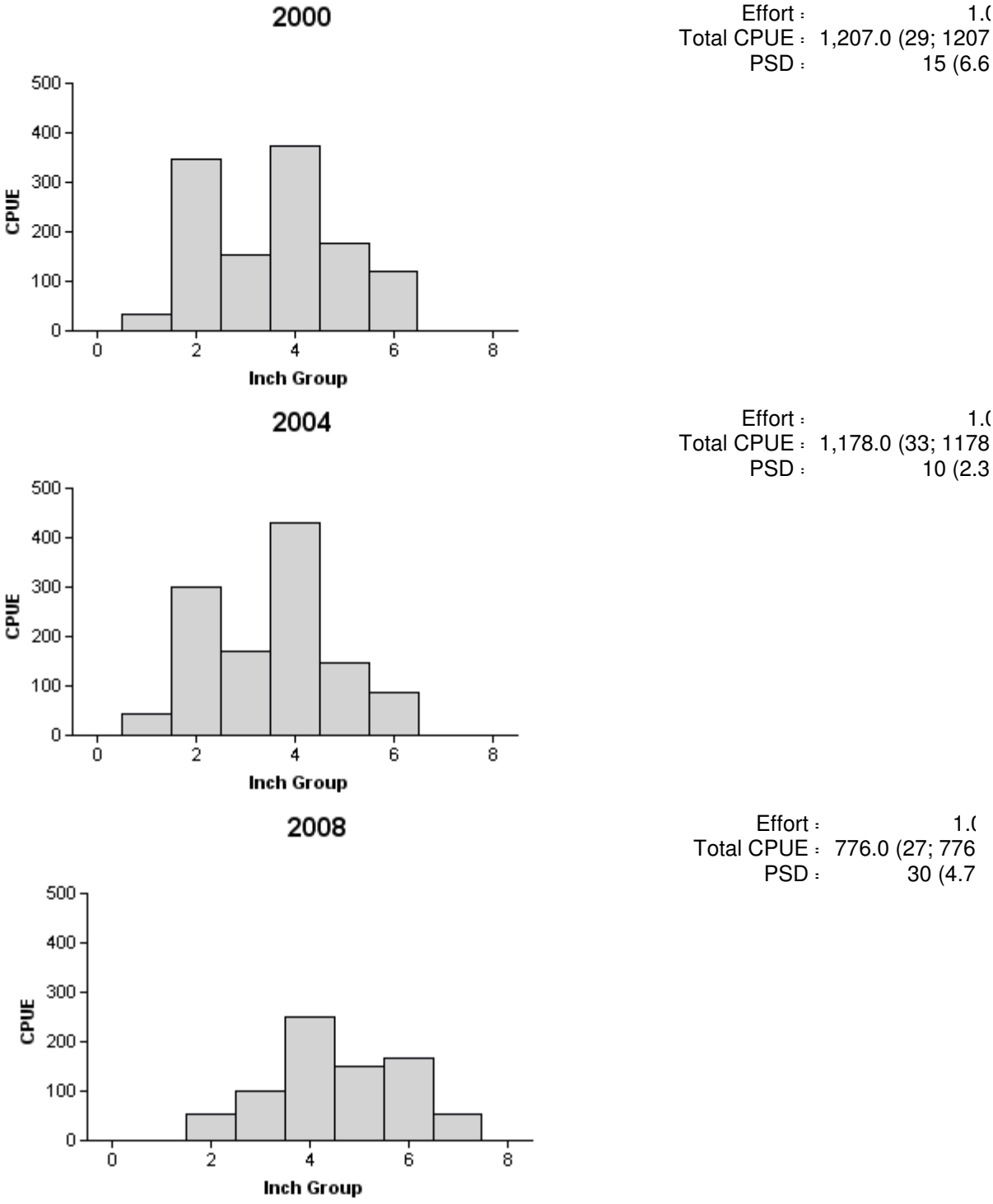


Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bonham City Reservoir, Texas, 2000, 2004, and 2008.

Blue Catfish

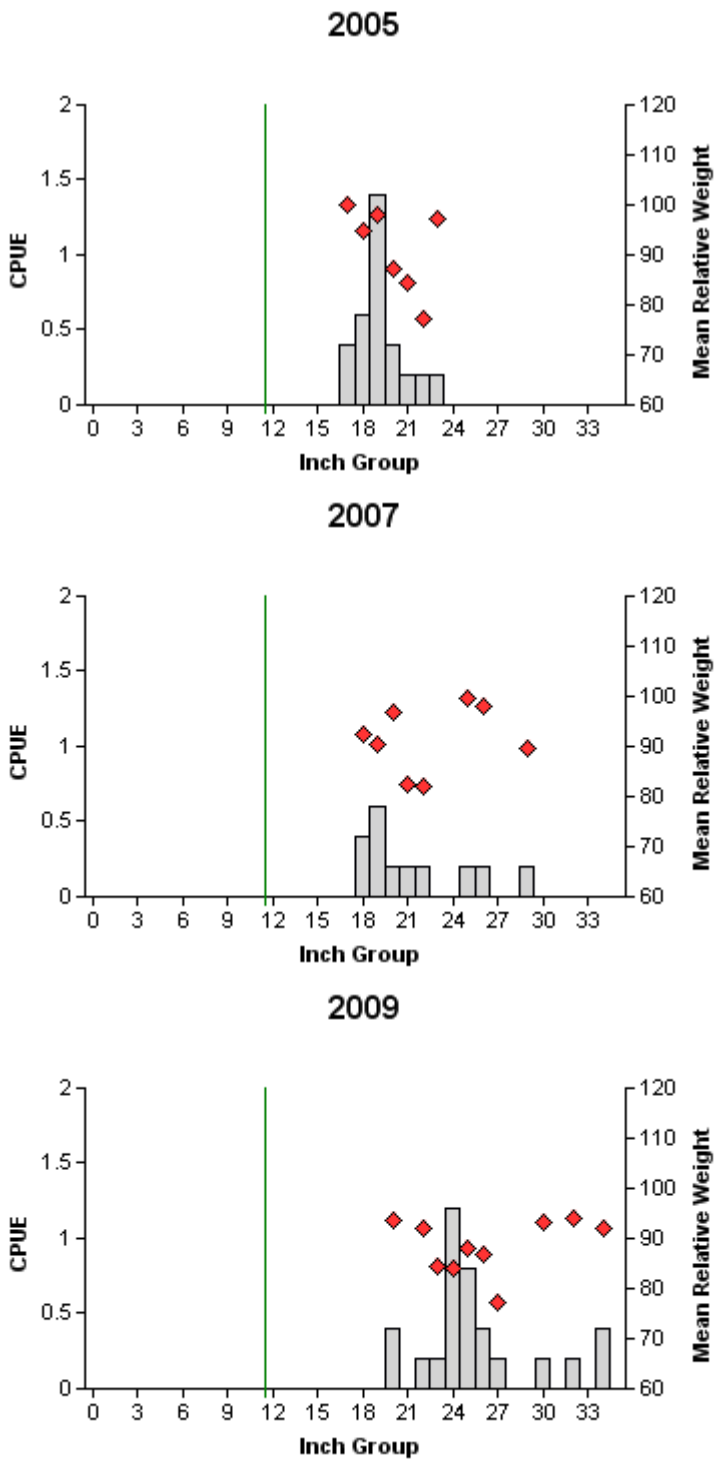
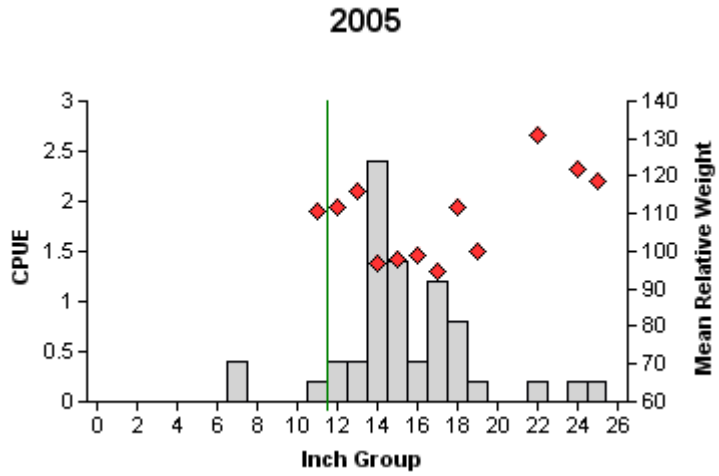
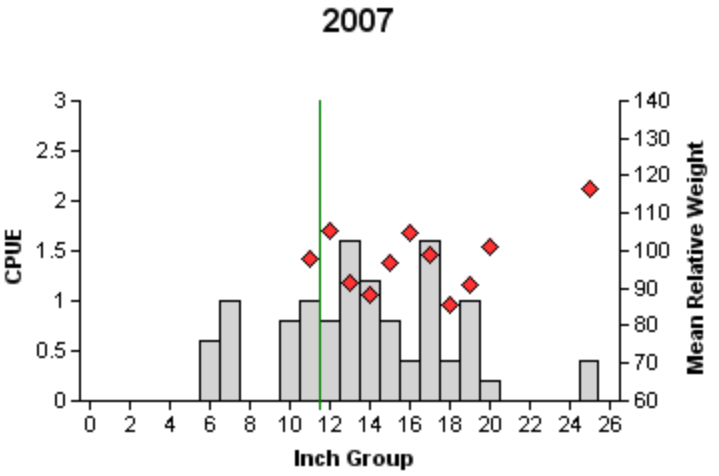


Figure 4. Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Bonham City Reservoir, Texas, 2005, 2007, and 2009. Vertical lines represent length limit at time of collection.

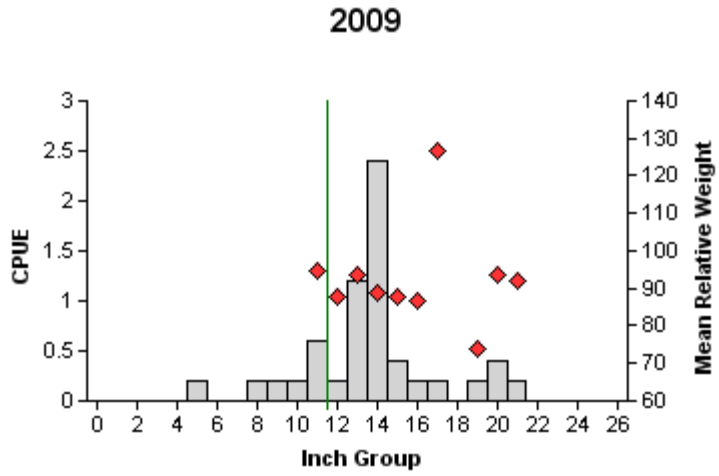
Channel Catfish



Effort : 5.(
Total CPUE : 8.4 (30; 42
Stock CPUE : 8.0 (31; 40
PSD : 40 (4.6



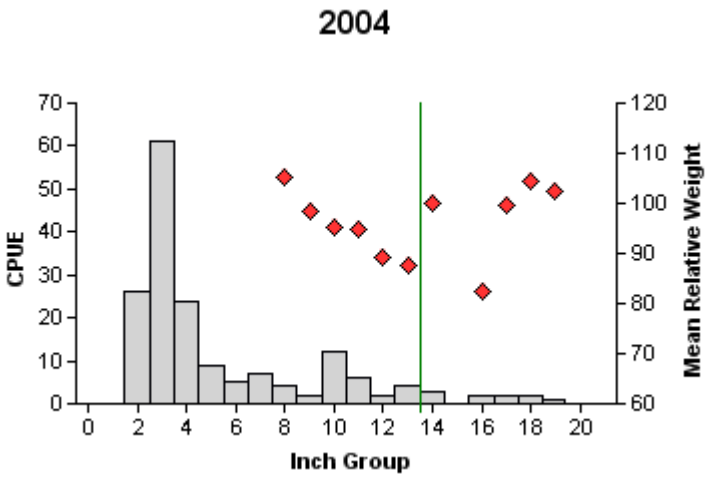
Effort : 5.(
Total CPUE : 11.8 (26; 59
Stock CPUE : 9.4 (31; 47
PSD : 43 (9.1



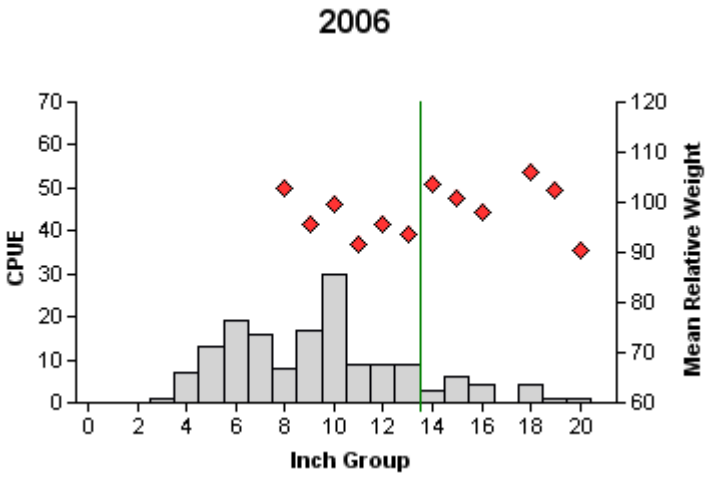
Effort : 5.(
Total CPUE : 6.8 (17; 34
Stock CPUE : 6.0 (22; 30
PSD : 20 (6.4

Figure 5. 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, Bonham City Reservoir, Texas, 2005, 2007, and 2009. Vertical lines represent length limit at time of collection.

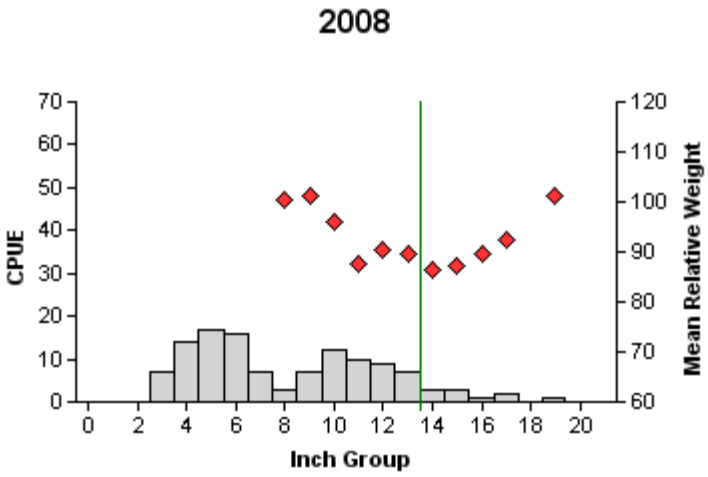
Largemouth Bass



Effort : 1.(
Total CPUE : 172.0 (28; 172
Stock CPUE : 40.0 (21; 40
PSD : 40 (9.3



Effort : 1.(
Total CPUE : 157.0 (10; 157
Stock CPUE : 101.0 (11; 101
PSD : 37 (4.6



Effort : 1.(
Total CPUE : 119.0 (22; 119
Stock CPUE : 58.0 (16; 58
PSD : 45 (7.9

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, Bonham City Reservoir, Texas, 2004, 2006, and 2008. Vertical lines represent length limit at time of collection.

White Crappie

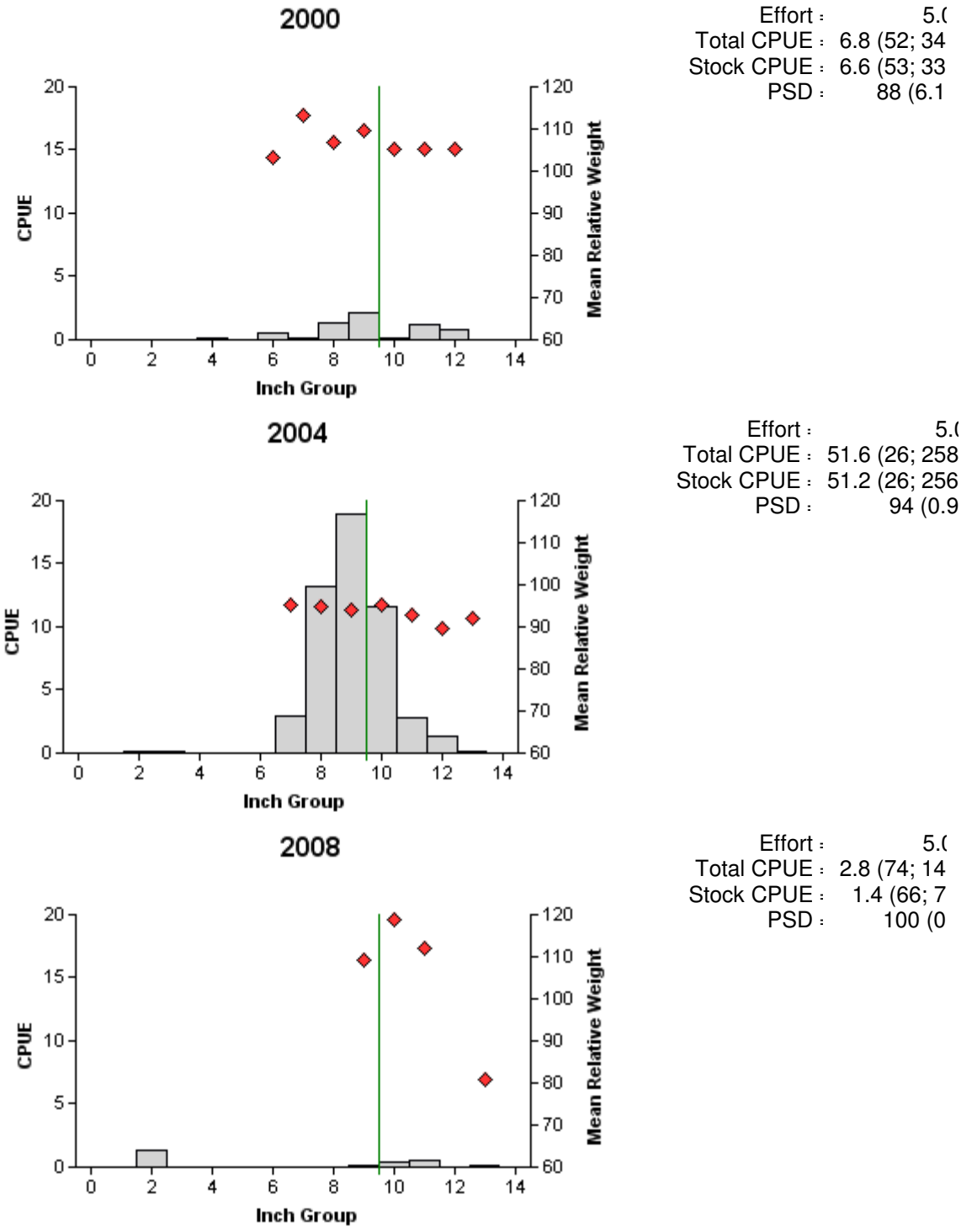


Figure 7. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Bonham City Reservoir, Texas, 2000, 2004, and 2008. Vertical lines represent length limit at time of collection.

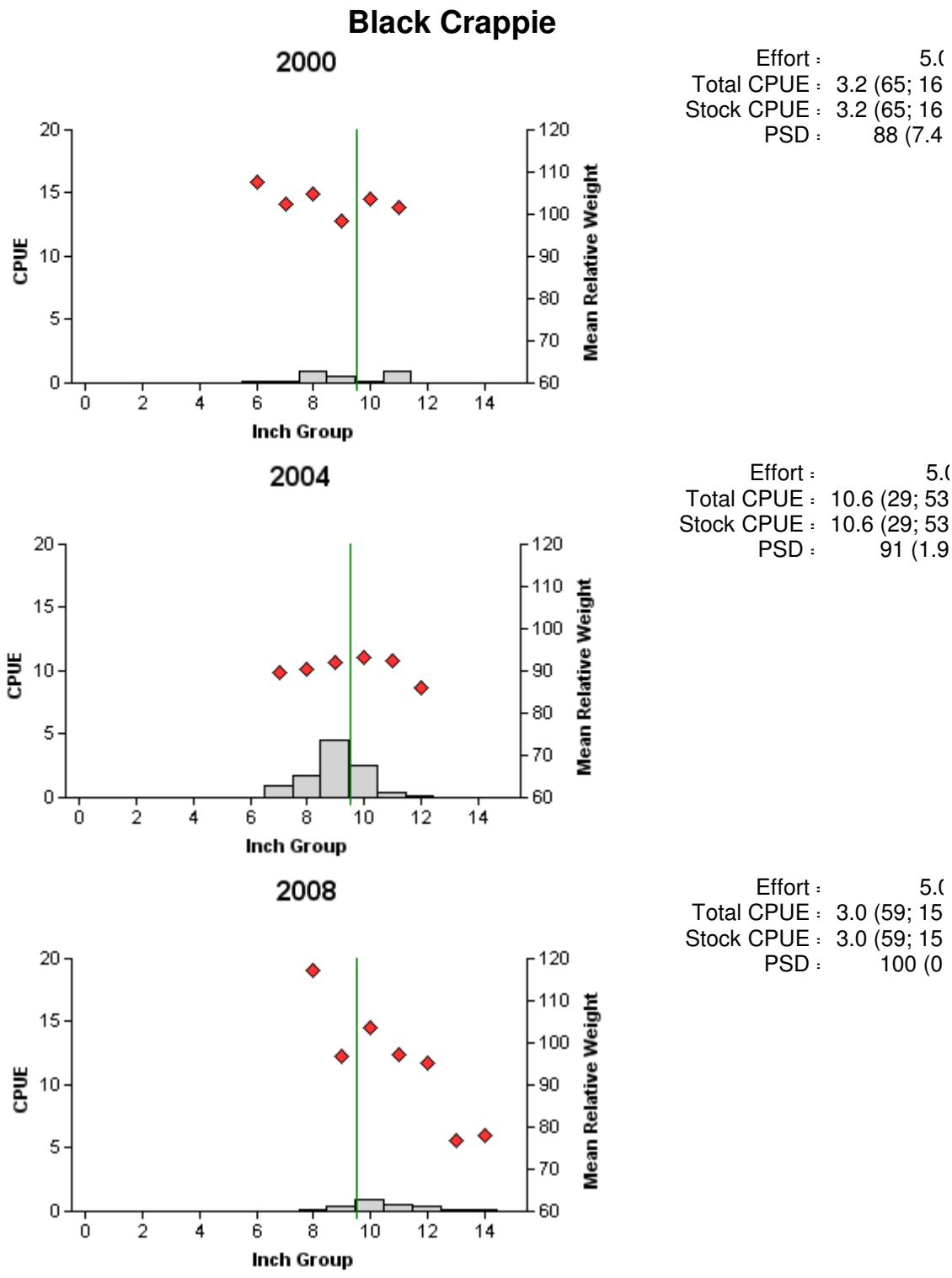


Figure 8. Number of black crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Bonham City Reservoir, Texas, 2000, 2004, and 2008. Vertical lines represent length limit at time of collection.

Table 5. Proposed sampling schedule for Bonham City 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.

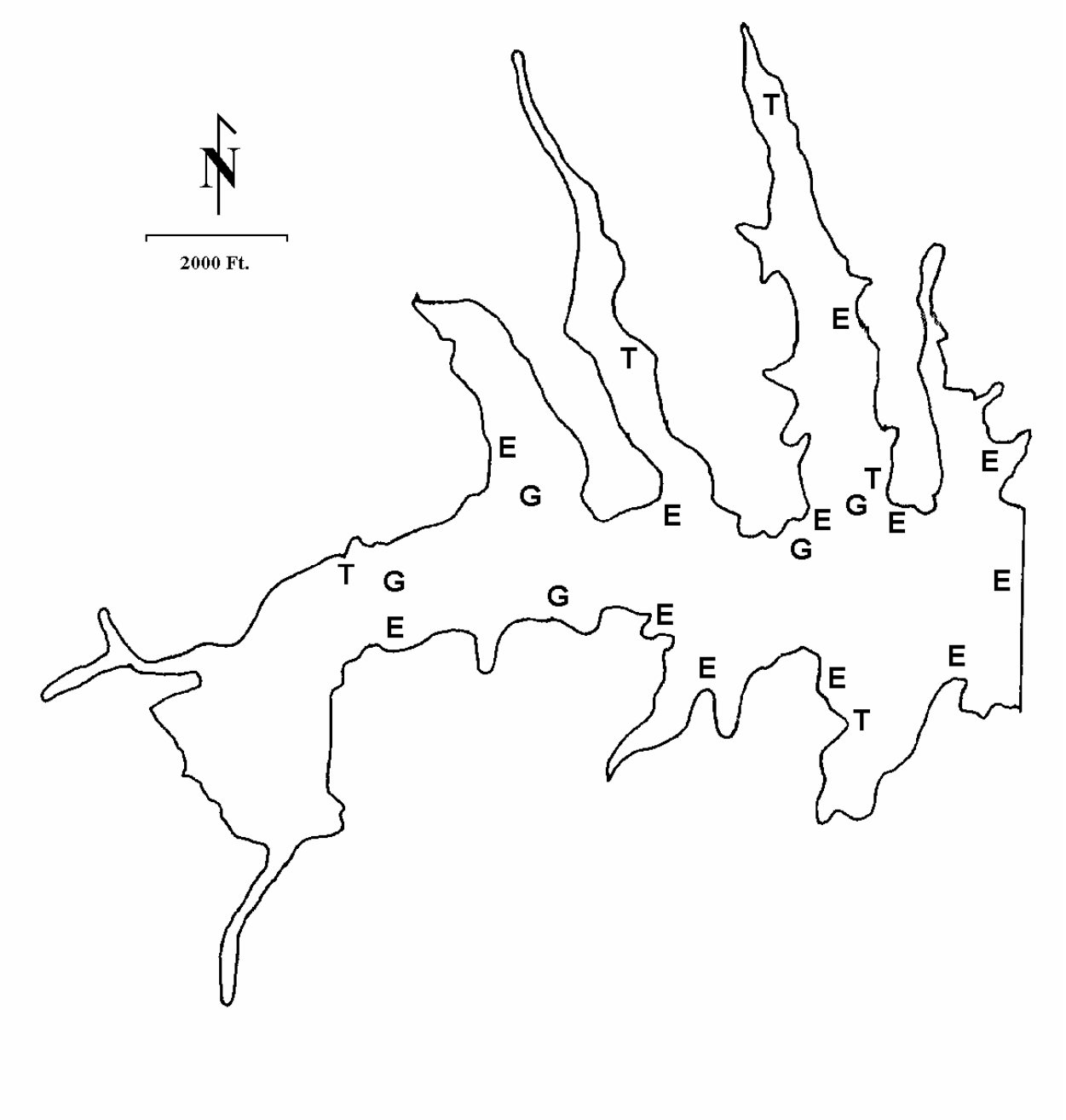
Survey Year	Electrofisher	Trap Net	Gill Net	Creel Survey	Report
Fall 2009-Spring 2010					
Fall 2010-Spring 2011		A			
Fall 2011-Spring 2012					
Fall 2012-Spring 2013	S	S	S		S

Appendix A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Bonham City Reservoir, Texas, 2008-2009.

	Gill Netting		Trap Netting		Electrofishing	
Species	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					180	108.0
Threadfin shad					1,962	1,962.0
Blue catfish	21	4.2				
Channel catfish	34	6.8				
Green sunfish					2	2.0
Bluegill					776	776.0
Longear sunfish					112	112.0
Redear sunfish					109	109.0
Spotted bass					2	2.0
Largemouth bass					119	119.0
White crappie			14	2.8		
Black crappie			15	3.0		

Appendix B



Location of sampling sites, Bonham City Reservoir, Texas, 2008–2009. Trap netting, gill netting, and electrofishing are indicated by E, G, and T, respectively. Water level was 1.65 feet below conservation level for electrofishing, 3.15 feet below conservation level during gill netting, and 2.22 feet below conservation level for trap netting.

APPENDIX C

Catch rates (CPUE) of targeted species by gear type for Bonham City Reservoir, Texas, 1990, 1994, 1997, 2000, 2001, 2004, 2005, 2006, 2007, 2008, and 2009.

Gear	Species	Year										
		1990[a]	1994[a]	1997[b]	2000[b]	2001[b]	2004[b]	2005[b]	2006[b,c]	2007[a]	2008[b,d]	2009[b]
Gill Net	Blue catfish	0.2	11.0	9.0		5.0		3.4		2.2		4.2
(fish/net night)	Channel catfish	5.8	5.0	16.0		9.2		8.4		11.8		6.8
	Palmetto bass	0.4	0.0	0.0		0.0		0.0		0.0		0.0
Electrofisher	Gizzard shad	222.7	215.3	123.3	409.0		163.0				108.0	
(fish/hour)	Threadfin shad	0.0	57.3	392.7	777.0		3486.0				1962.0	
	Green sunfish	0.0	9.3	0.7	0.0		2.0				2.0	
	Warmouth	14.7	38.7	12.0	28.0		35.0				0.0	
	Orangespotted sunfish	0.0	40.0	0.0	0.0		0.0				0.0	
	Bluegill	509.3	352.0	3647.0	1207.0		1178.0				776.0	
	Longear sunfish	98.7	56.7	137.3	197.0		589.0				112.0	
	Redear sunfish	19.3	1.3	13.3	131.0		154.0				109.0	
	Spotted bass	0.0	0.7	6.7	12.0		7.0		10.0		2.0	
	Largemouth bass	74.0	143.3	124.0	79.0		172.0		157.0		119.0	
Trap Net	White crappie	69.6	25.4	28.8	6.8		51.6				2.8	
(fish/net night)	Black crappie	0.2	0.0	0.6	3.2		10.6				3.0	

[a] All sampling stations for all gear were subjectively selected.
[b] All sampling stations for all gear were randomly selected.
[c] Bass only electrofishing survey.
[d] Electrofishing survey was conducted using a 7.5 Smith-Root GPP (Gas Powered Pulsator). Electrofishing surveys prior to 2007 were conducted using a Smith-Root 5.0 GPP.