

PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-30-R-34

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2008-09 Survey Report

**Wichita Reservoir**

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## SURVEY AND MANAGEMENT SUMMARY

Fish populations in Wichita Reservoir were surveyed in 2008 using dual-cod trap nets and electrofisher and in 2009 using gill nets. This report summarizes the results of the surveys and contains a reservoir management plan based on those findings.

- **Reservoir Description:** Wichita Reservoir is a 1,224-acre municipal reservoir owned and operated by the City of Wichita Falls for flood control and recreation. The dam and most of the reservoir is in Wichita County and the southern portion is in Archer County. The reservoir was built in 1901, impounding Holliday Creek, a tributary to the Wichita River. Mean depth is 4.5 feet and maximum depth is 9.5 feet. Angler and boat access is adequate when reservoir elevation is within 1 foot of conservation pool. Habitat includes large stands of native emergent vegetation. In March of 2004 a toxic golden alga event killed approximately 7,700 fish of which 93% were non-game fish. In March of 2007 another event occurred with an estimated 15,000 fish dying, almost all were non-game species. In February of 2009 a golden alga event killed an estimated 201,000 fish, severely impacting certain species populations.
- **Management history:** Historically important sport fish include channel catfish, white and palmetto bass, and white crappie. The 2005 management plan recommended continuing habitat improvement projects including maintaining existing cypress trees, introduction of water willow *Dianthera americana*, and placement of brush piles near the dam which were all completed. Palmetto bass fingerlings were stocked every year at the rate of 15 fingerlings per acre. Northern largemouth bass fingerlings were stocked at 50 per acre in 2005 and 2006.
- **Fish Community**
  - **Prey species:** The gizzard shad electrofishing catch rate was near the historical average for the reservoir, but the population included many fish too big for most predators to consume. The CPUE for bluegill was the highest since 1997. Sizes of bluegill ranged from 3 to 7 inches. After the February 2009 golden alga fish kill, no gizzard shad were found in a gill net survey or in a spring electrofishing survey that also showed few sunfish.
  - **Catfishes:** Channel catfish abundance decreased slightly since the 2007 survey indicating they survived the golden alga fish kill relatively unaffected. A length range of 13-25 inches was sampled in May 2009. Flathead catfish have historically been present in the reservoir but were not sampled during the 2009 gill net survey.
  - **White bass:** White bass have not been sampled in the last two gill net surveys. This absence is possibly caused by poor recruitment from lack of suitable spawning habitat.
  - **Palmetto bass:** No palmetto bass were sampled in 2009 after the February golden alga fish kill which included many palmetto bass mortalities.
  - **Largemouth bass:** Largemouth bass had the highest electrofishing catch rate recorded since the reservoir's elevation was lowered in 1995 but was still far below district averages. Only three bass were sampled compared to one bass sampled in the last three surveys combined.
  - **White crappie:** The dual-cod trap net catch rate of white crappie decreased from a similar survey completed in 2007. This reduction is largely caused by the lack of young of the year crappie sampled in 2008 which indicates poor reproduction/recruitment.
- **Management Strategies:** Conduct additional monitoring using dual-cod trap (2009), gill nets and spring electrofishing (2010). Stock threadfin shad and bluegill to build the prey base during 2009, along with fingerling largemouth bass.

## INTRODUCTION

This document is a summary of fisheries data collected from Wichita 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 is presented with the 2008-2009 data for comparison.

### *Reservoir Description*

Wichita Reservoir is a 1,224-acre municipal reservoir owned and operated by the city of Wichita Falls for flood control and recreation. The dam is on the city limit line for Wichita Falls in Wichita County and a portion of the reservoir is in Archer County. The reservoir was built in 1901, impounding Holliday Creek, a tributary to the Wichita River. Originally, the lake was 2,200 acres and was built as a municipal water supply reservoir. After alternative water supplies were developed, Wichita Falls initiated a project with the Corps of Engineers to control flooding below the reservoir. This project culminated in a new spillway being completed in August 1995 which is 4.7 feet lower than the original one. This reduced the surface acreage to 1,224 acres, mean depth to 4.5 feet and maximum depth to 9.5 feet. In an effort to sustain recreational use, the City of Wichita Falls diverts water from the local irrigation district to maintain elevation at or near spillway level. Angler and boat access were improved with the opening of a new boat ramp in 2000. However, there is no designated handicapped access. Habitat includes relatively large stands of native emergent vegetation. In March of 2004 a toxic golden alga event killed approximately 7,700 fish of which 93% were non-game fish. In March of 2007 another event occurred with an estimated 15,000 fish, almost all non-game species dying. In February of 2009, a much larger golden alga kill occurred killing well over 200,000 fish including many game fish. This kill devastated the populations of palmetto bass, white bass, largemouth bass, crappie and gizzard shad. Channel catfish, carp, smallmouth buffalo, longnose gar, green sunfish, bluegill and black bullhead populations remain at reduced levels. Other descriptive characteristics for Wichita Reservoir are in Table 1.

### *Management History*

**Previous management issues and actions:** Management issues and actions from the previous survey report (Howell and Mauk 2005) included:

1. Because of the 4.7 feet reduction in spillway elevation in 1995; large areas of littoral habitat were lost resulting in a loss of largemouth bass and crappie juvenile recruitment to the fishery.

**Action:** Continued to maintain existing plantings of cypress trees. Placed brush piles near the dam to improve angler catch rates and provide additional littoral habitat. After coordination with the City of Wichita Falls controlling authority, attempted an introduction of native water willow (*Dianthera americana*). Introduction occurred in late summer of 2005 along selected littoral areas in the lower part of the reservoir.

2. Palmetto bass have historically provided a quality fishery. Annual fingerling stockings have occurred from 2002 through 2005 at the rate of 15/acre. An abundant forage base existed that could readily support annual palmetto bass stockings. Sub-legal harvest has been observed to be a problem during district creel surveys.

**Action:** Conducted an angler attitude and opinion survey from March – November 2005 to determine level of angler satisfaction with the palmetto bass stocking program. Continued stocking palmetto bass fingerlings every year at the rate of 15 fingerlings per acre in response to opinion survey. Maintained regulatory signs about the palmetto bass

size limit and how to distinguish them from white bass in order to reduce sublegal harvest.

3. The largemouth bass population had suffered a decline since the spillway elevation was lowered in 1995. Very few largemouth bass have been sampled or caught by anglers since that time. Current habitat improvements should help improve survival opportunity for juvenile largemouth bass.

**Action:** Stocked northern largemouth bass fingerlings at the rate of 50/acre in 2005 and 2006.

**Harvest regulation history:** Sport fish species in Wichita Reservoir are currently managed under statewide regulations (Table 2).

**Stocking history:** Palmetto bass were stocked annually except in 2006 when they were not available. Northern largemouth bass were stocked during 2005 and 2006 and advanced fingerling white crappie were captured from overpopulated Community Fishing Lakes at Petrolia, TX and stocked in 2000 and 2001 to bolster reduced fish populations caused by the lowering of the reservoir elevation in 1995. The complete stocking history is shown in Table 3.

## METHODS

Fishes were collected by electrofishing (one hour at 12 five-minute stations), gill netting (10 net nights at 10 stations), and dual-cod trap netting (5 net nights at 5 stations). Catch per unit effort for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and for gill and dual-cod trap nets, as the number of fish caught per net night (fish/nn). All survey sites were randomly selected and the surveys were conducted according to standardized 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 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. Palmetto bass and white crappie ages were determined from 2007 surveys using otoliths from 5 fish per centimeter group.

## RESULTS AND DISCUSSION

**Habitat:** A physical habitat survey was conducted August 19, 2008 and indicated the littoral zone habitat consisted primarily of emergent native vegetation (81.7% of shoreline) with some rocky shoreline, (Table 4). The previous physical habitat survey was conducted in 2004 (Howell and Mauk 2005). There were few if any observed manmade changes to the physical habitat during the four year period.

**Prey species:** Electrofishing catch rates of gizzard shad and bluegill were 155.0/h and 134.0/h, respectively. Index of vulnerability for gizzard shad was 58, considerably lower than the previous two surveys that ranged from 96 to 99. Relative abundance was near the Wichita historical average of 159.8/hr (Figure 1). Total CPUE of bluegill in 2008 was the highest recorded since 1997 and well over the historical average of 60.2/hr (Figure 2). Sizes of bluegill ranged from 3 to 7 inches. After the large golden alga fish kill that occurred in February, 2009, no gizzard shad was observed during a 10 nn gill net survey or during a short, non-standard, spring electrofishing survey. A few sunfish were electrofished.

**Channel catfish:** Channel catfish abundance decreased during the 2009 gill net survey to 0.7/nn compared to 1.0/nn in 2007 (Figure 3). This provides some indication that channel catfish were not heavily impacted by the 2009 golden alga fish kill. A length range from 13 to 25 inches was sampled.

**Flathead catfish:** Flathead catfish have historically been present in the reservoir but, none were sampled in the 2009 gill net survey.

**White bass:** The gill net catch rate for white bass was 0.0/nn in 2009, which was the same as the 2007 catch rate (Figure 4). In 2005, the catch rate was 11.5/nn. What has become of the population is unknown at this time. Poor recruitment is suspected since little spawning habitat exists. Direct competition with palmetto bass could have also been a factor. Some white bass mortalities were observed during the February 2009 fish kill.

**Palmetto bass:** The gill net catch rate for palmetto bass was 0.0/nn (Figure 5). The February, 2009 golden alga fish kill severely impacted this population which had a catch rate of 18.1/nn during the 2007 gill net survey.

**Largemouth bass:** The largemouth bass electrofishing CPUE of 3.0/h in 2008 (Figure 6), was the highest recorded since random sampling began in 1997. It was the first time bass have been sampled since 1997 when a single 19 inch bass was caught. Size ranged from 12 to 13 inches and the bass were all 2 year old fish which corresponds to the last stocking. Body condition, as measured by relative weight was over 100 for both inch groups.

**White crappie:** The dual-cod trap net catch rate of white crappie was 7.8/nn in 2008 which was down from the 2007 catch rate of 41.7/nn. This reduction was primarily caused by the lack of age-0 crappie which indicates poor reproduction/recruitment during 2008 (Figure7). All of the crappie inch classes showed desirable relative weights near 90 or above. Dual-cod trap nets were used instead of the traditional trap net sets because in 2007 they proved effective at capturing a high abundance of crappie across a broad size range. Wichita is a very shallow reservoir with gradually sloping banks with few sites that allow a standard trap net to be completely submerged. Using dual-cod trap nets, set off shore, allowed for many more suitable random sampling sites.

## Fisheries management plan for Wichita Reservoir, Texas

Prepared – July 2009

**ISSUE 1:** Lake Wichita was hit by a devastating golden alga induced fish kill in February 2009. Most game fish populations, as well as the gizzard shad forage base, were severely impacted. No gizzard shad were observed in the 2009 gill net survey or a subsequent spring electrofishing sample.

### MANAGEMENT STRATEGY

1. Rebuild the prey base by stocking at least 1,000 adult threadfin shad in 2009. These fish can be relocated by district 2E management staff and moved from Arrowhead Reservoir.
2. Further supplement the prey base by stocking up to 123,000 bluegill fingerlings in 2009.

**ISSUE 2:** Significant populations of channel catfish and carp survived as documented during the May 2009 gill net survey. No other game fish species were observed.

### MANAGEMENT STRATEGY

1. Stock Florida largemouth bass fingerlings at the rate of 100/acre to help control the burgeoning carp population and to reestablish the largemouth bass population in 2009.
2. Stock up to 110,000 channel catfish fingerlings to supplement remaining catfish population from which poor reproduction is expected in 2009.

**ISSUE 3:** Uncertainty exists as to whether or not threadfin shad populations can be successfully reintroduced and survive the winter of 2009-10. Threadfin shad are known to winter kill if water temperatures are cold enough.

### MANAGEMENT STRATEGY

1. If significant populations of threadfin or gizzard shad are not documented during an early March 2010 electrofishing survey, then consider restocking with both gizzard and threadfin shad by transporting from Arrowhead Reservoir at the rate of 10/acre in late March 2010.

**ISSUE 4:** White crappie and palmetto bass have historically done well at Lake Wichita and are important to anglers. The 2009 fish kill has severely depressed the abundance of both species.

### MANAGEMENT STRATEGY

1. Assuming a successful rebuilding of the shad prey base, stock palmetto bass at the rate of 14/acre in 2010.
2. Assuming a successful rebuilding of the shad prey base, stock advanced fingerling white crappie by moving as many as practical from Community Fishing Lakes located near Petrolia, Texas.

**ISSUE 5:** Golden alga had devastating effects on Wichita fish populations in February 2009.

### MANAGEMENT STRATEGIES

1. Work with TPWD's Golden Alga Task Force to consider the reservoir as a golden alga research site. The relatively small and shallow reservoir is not a potable water source and is high in phosphorus and low in organic nitrogen. Some research suggests that reducing the ratio by adding organic nitrogen could possibly prevent golden alga outbreaks.

**SAMPLING SCHEDULE JUSTIFICATION:**

March 2010 electrofishing will be conducted to assess whether gizzard and threadfin shad populations have been successfully reestablished. A spring 2010 gill netting survey will be conducted to sample the channel catfish population and a fall 2010 trap net survey using dual cod end trap nets will be completed if crappie are restocked in early spring of 2010. Routine monitoring will be conducted in 2012-2013 to continue monitoring species population trends. Additional sampling could take place if future identified issues support it (Table 7).

## LITERATURE CITED

- 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, 2<sup>nd</sup> 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.
- Howell, M. and R. Mauk. 2005. Statewide freshwater fisheries monitoring and management program survey report for Wichita Reservoir, 2004. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-30, Austin, Texas.
- Prentice, J. A. 1987. Length-weight relationships and average growth rates of fishes in Texas. Inland Fisheries Data Series No. 6. Texas Parks and Wildlife Department, Inland Fisheries Division. Austin.

Table 1. Characteristics of Wichita Reservoir, Texas.

Characteristic	Description
Year constructed	1901
Controlling authority	City of Wichita Falls
County	Wichita
Reservoir type	Tributary
Shoreline development index (SDI)	2.5
Conductivity	2,800 $\mu$ mhos/cm
Secchi disc reading	25 cm

Table 2. Harvest regulations for Wichita Reservoir.

Species	Bag Limit	Length Limit (inches)
Catfish: Channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 minimum
Flathead catfish	5	18 minimum
White bass	25	10 minimum
Palmetto bass	5	18 minimum
Largemouth bass	5	14 minimum
White crappie	25	10 minimum

Table 3. Stocking history of Wichita, 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.

<b>Species</b>	<b>Year</b>	<b>Number</b>	<b>Life Stage</b>	<b>Mean TL (in)</b>
Channel catfish	1969	10,000	AFGL	7.9
	1971	50,000	AFGL	7.9
	1972	22,000	AFGL	7.9
	1990	22,319	FGL	2.5
	1995	67,000	FGL	2.0
	Total	171,319		
Florida Largemouth bass	1977	20,800	FRY	0.7
	1995	122,000	FGL	1.2
	Total	142,800		
Largemouth bass	1966	80,000	UNK	UNK
	1967	75,000	UNK	UNK
	1997	120,000	FGL	1.2
	1998	125,415	FGL	1.4
	2000	131,875	FGL	1.7
	2005	62,271	FGL	1.6
	2006	63,078	FGL	1.7
	Total	657,639		
Palmetto Bass (striped X white bass hybrid)	1977	50,000	UNK	UNK
	1984	66,000	FGL	2.0
	1986	33,000	FRY	1.0
	1987	65,925	FRY	1.0
	1988	11,705	FGL	2.0
	1988	55,700	FRY	1.0
	1989	54,359	FGL	1.4
	1994	15,947	FGL	1.7
	1996	18,407	FGL	1.1
	1998	12,374	FGL	1.3
	1999	12,646	FGL	1.5
	2000	14,180	FGL	1.5
	2002	18,447	FGL	1.5
	2003	18,381	FGL	1.6
	2004	19,843	FGL	1.4
	2004	1,169,624	FRY	0.2
	2005	18,666	FGL	1.5
	2007	103	AFGL	7.2
	2007	18,401	FGL	1.4
	2008	9,003	FGL	1.4

10

	Total	<u>1,682,711</u>	
White crappie	2000	3,783	AFGL
	2001	<u>310</u>	AFGL
	Total	4,093	

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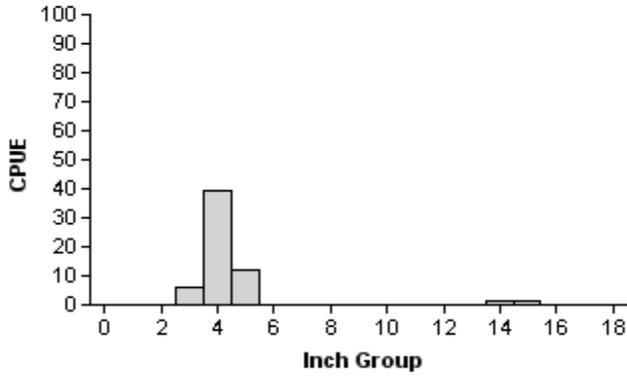
Table 4. Survey of littoral zone and physical habitat types for Wichita Reservoir in 2008. A linear shoreline distance (miles) was recorded for each habitat type found. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation found.

Shoreline habitat type	Shoreline Distance		Surface Area	
	Miles	Percent of total	Acres	Percent of reservoir surface area
Rocky shore	0.8	6.3		
Riprap	1.1	8.7		
Bulkhead	0.2	1.6		
Eroded bank	0.3	2.4		
Native emerged vegetation	8.9	70.6		
Flooded terrestrial	1.3	10.3		
<b>Vegetation</b>				
Native emergent vegetation	10.2	81.7	10.2	<0.1
<b>Habitat adjacent to shoreline</b>				
Boat docks			0.5	<0.1

# Gizzard Shad

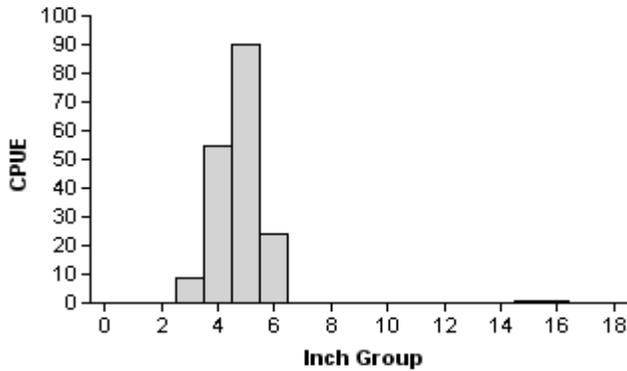
2000

Effort = 1.0  
 Total CPUE = 50.0 (23; 50)  
 IOV = 96 (2.9)



2004

Effort = 1.0  
 Total CPUE = 180.0 (67; 180)  
 IOV = 98 (1.3)



2008

Effort = 1.0  
 Total CPUE = 155.0 (31; 155)  
 IOV = 58 (9.5)

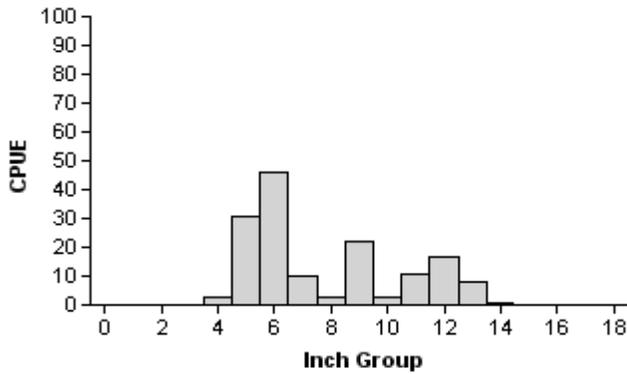


Figure 1. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Wichita Reservoir, Texas, 2000, 2004, and 2008.

# Bluegill

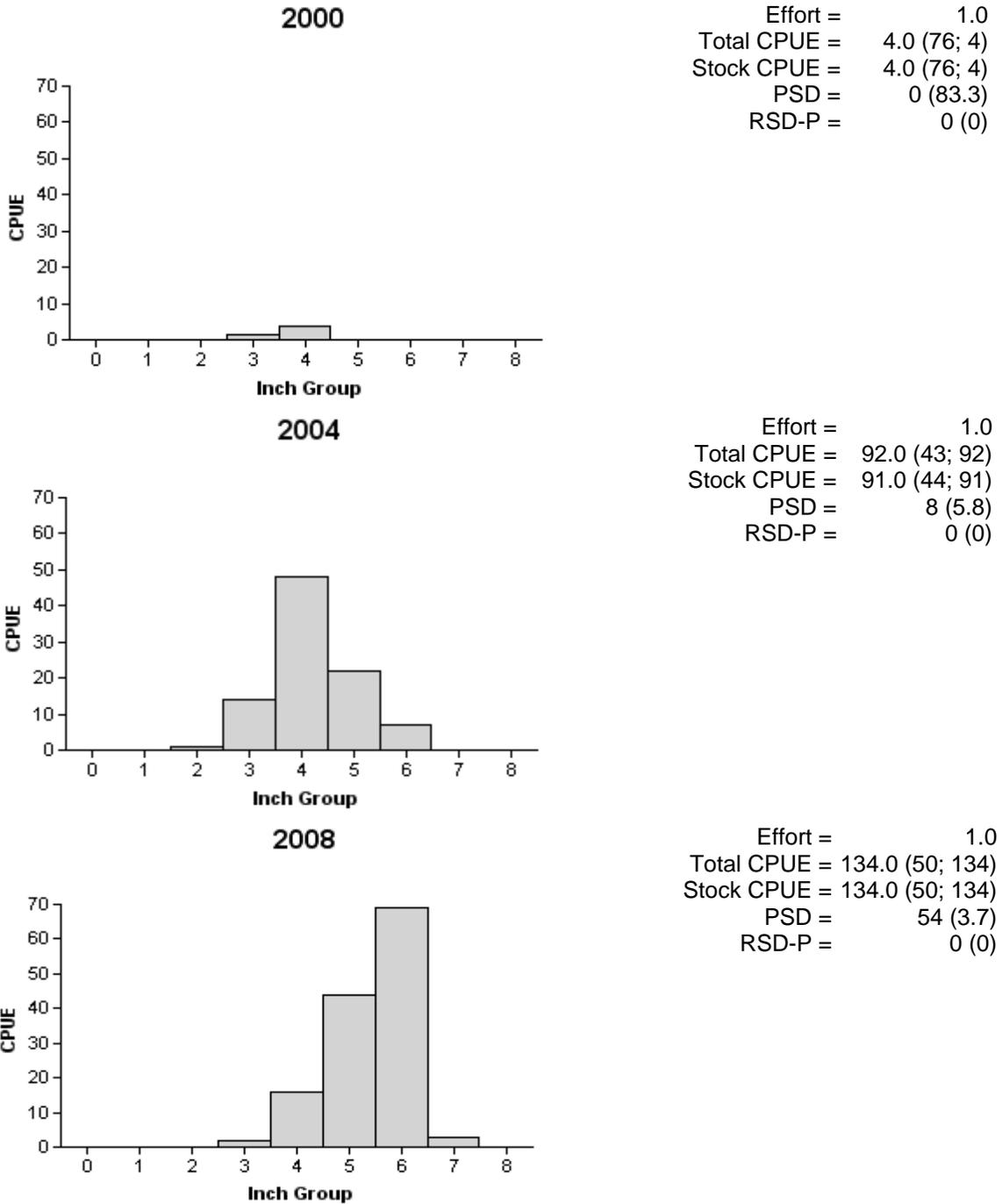


Figure 2. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Wichita Reservoir, Texas, 2000, 2004, and 2008.

# Channel Catfish

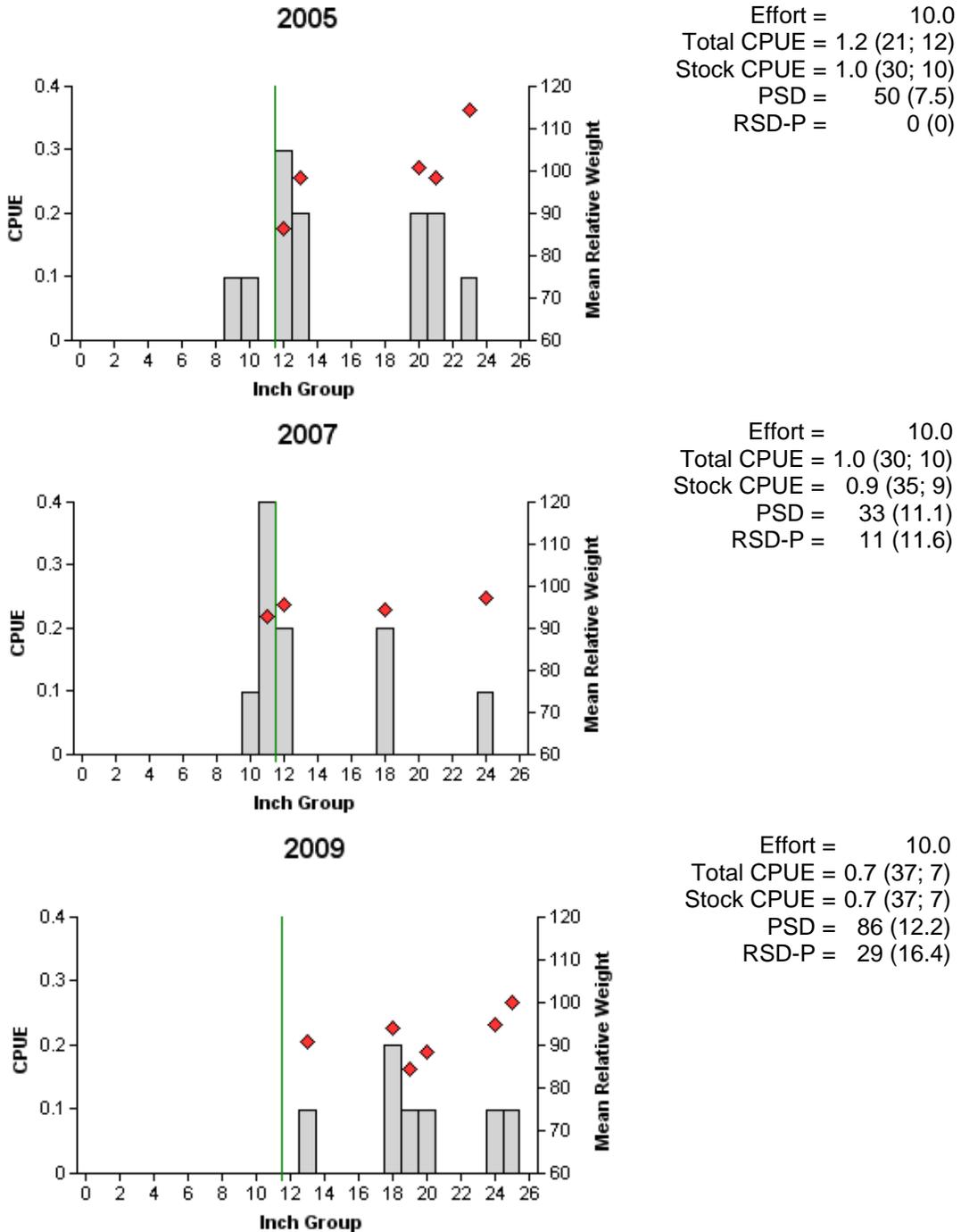


Figure 3. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Wichita Reservoir, Texas, 2005, 2007, and 2009. Line indicates minimum size limit at time of sampling.

# White Bass

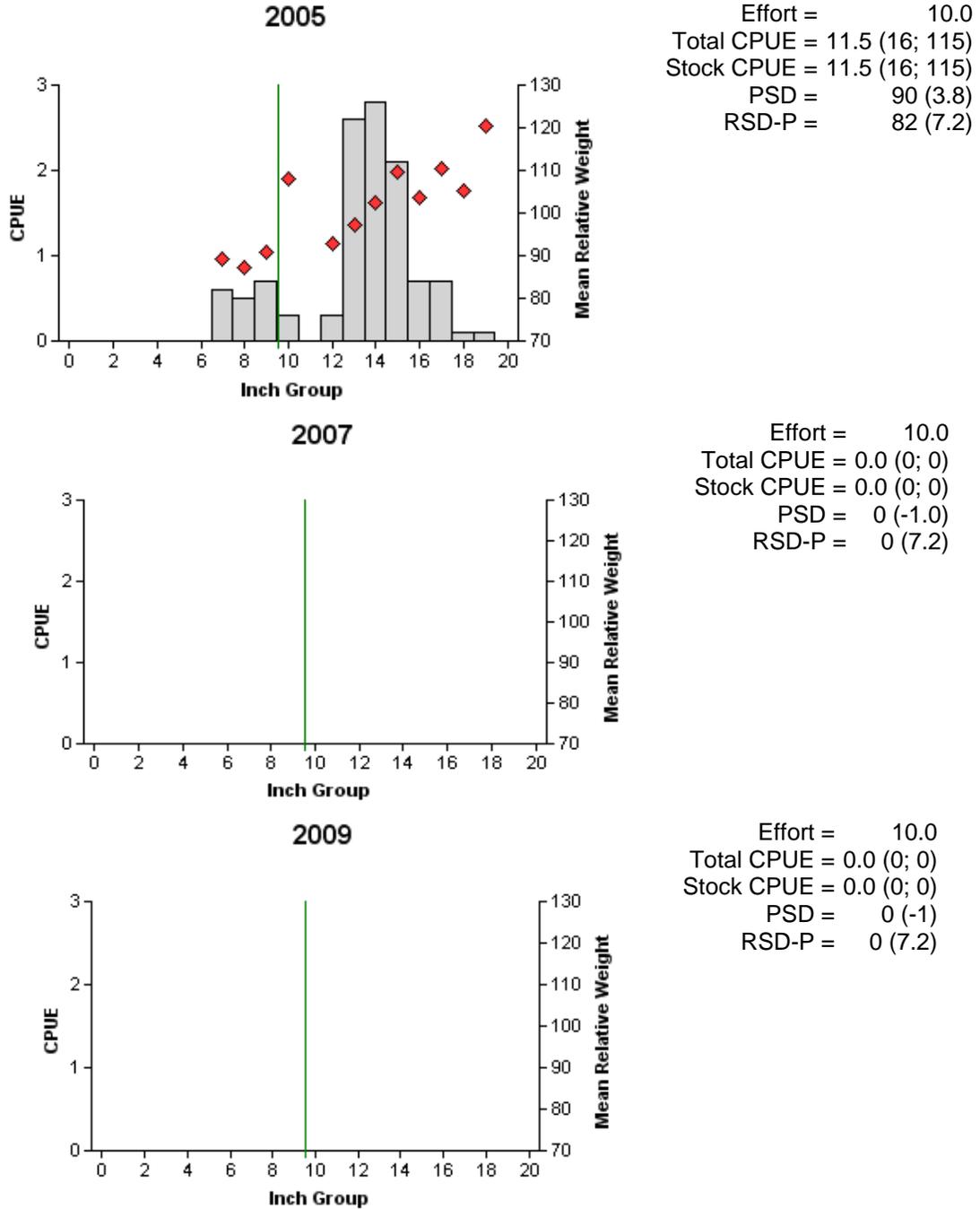


Figure 4. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Wichita Reservoir, Texas, 2005, 2007, and 2009. No white bass were sampled in 2007 and 2009. Line indicates minimum size limit at time of sampling.

## Palmetto Bass

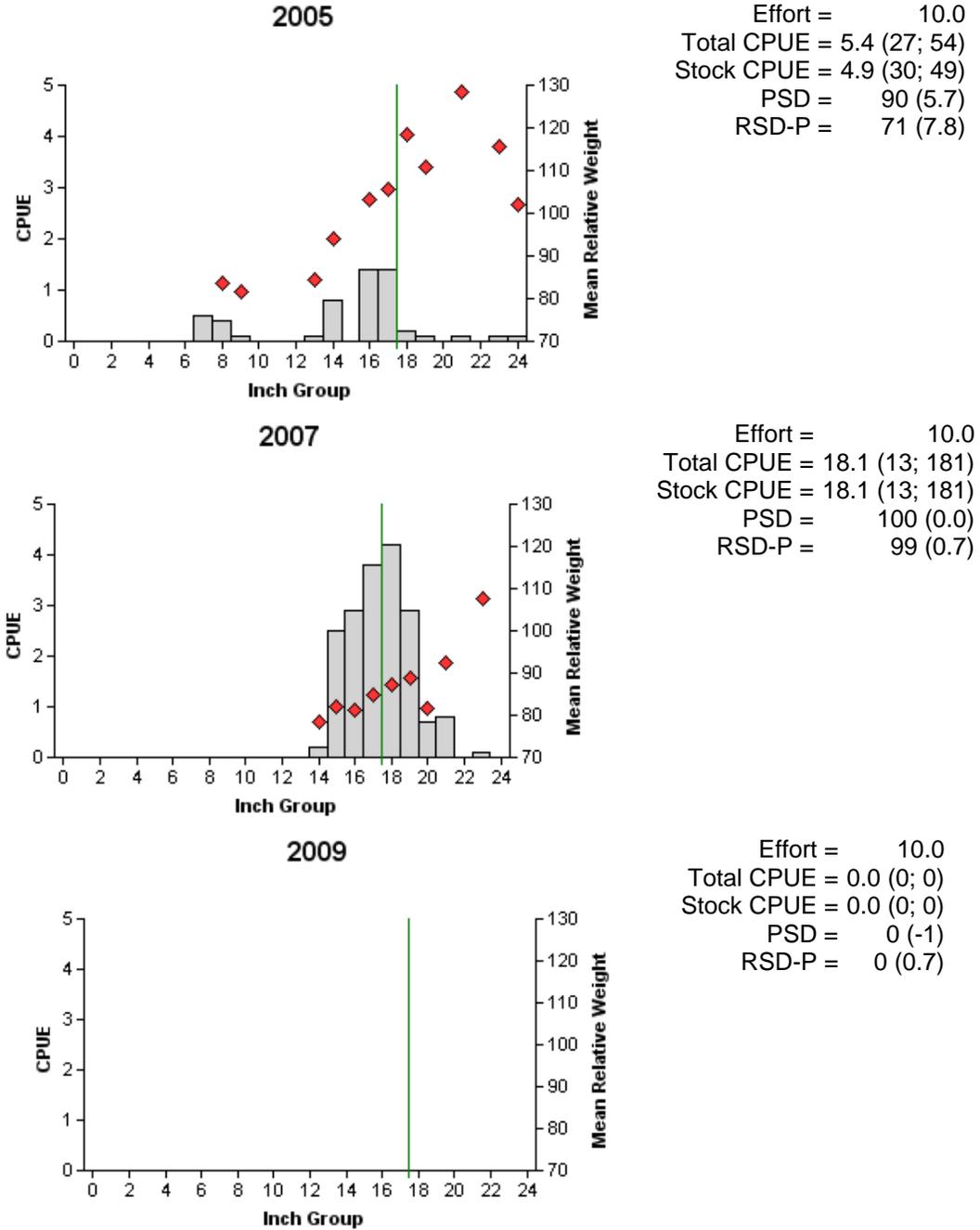


Figure 5. Number of palmetto bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Wichita Reservoir, Texas, 2005, 2007, and 2009. No palmetto bass were sampled in 2009. Line indicates minimum size limit at time of sampling.

Table 5. Average length at capture for palmetto bass (sexes combined) collected by spring gill netting surveys at Wichita Reservoir, Texas, 2001, 2003, 2005, and 2007 compared to ecological region averages. Lengths are followed by the sample size in parentheses (N).

Year	Length (inches) at age						
	1	2	3	4	5	6	7
2001	9.1(1)	14.9(5)	13.9(4)				18.1(1)
2003			19.6(12)	21.2(7)	22.6(1)		
2005	8.3(5)	16.5(15)	18.1(2)			23.9(2)	
2007		15.4(9)	19.0(27)	22.5 (2)			
Averages <sup>a</sup>	13.4	17.2	20.2	22.5	24.3	25.8	27.0

<sup>a</sup>Ecological region 5 averages from Prentice (1987); lengths derived for April 1.

## Largemouth Bass

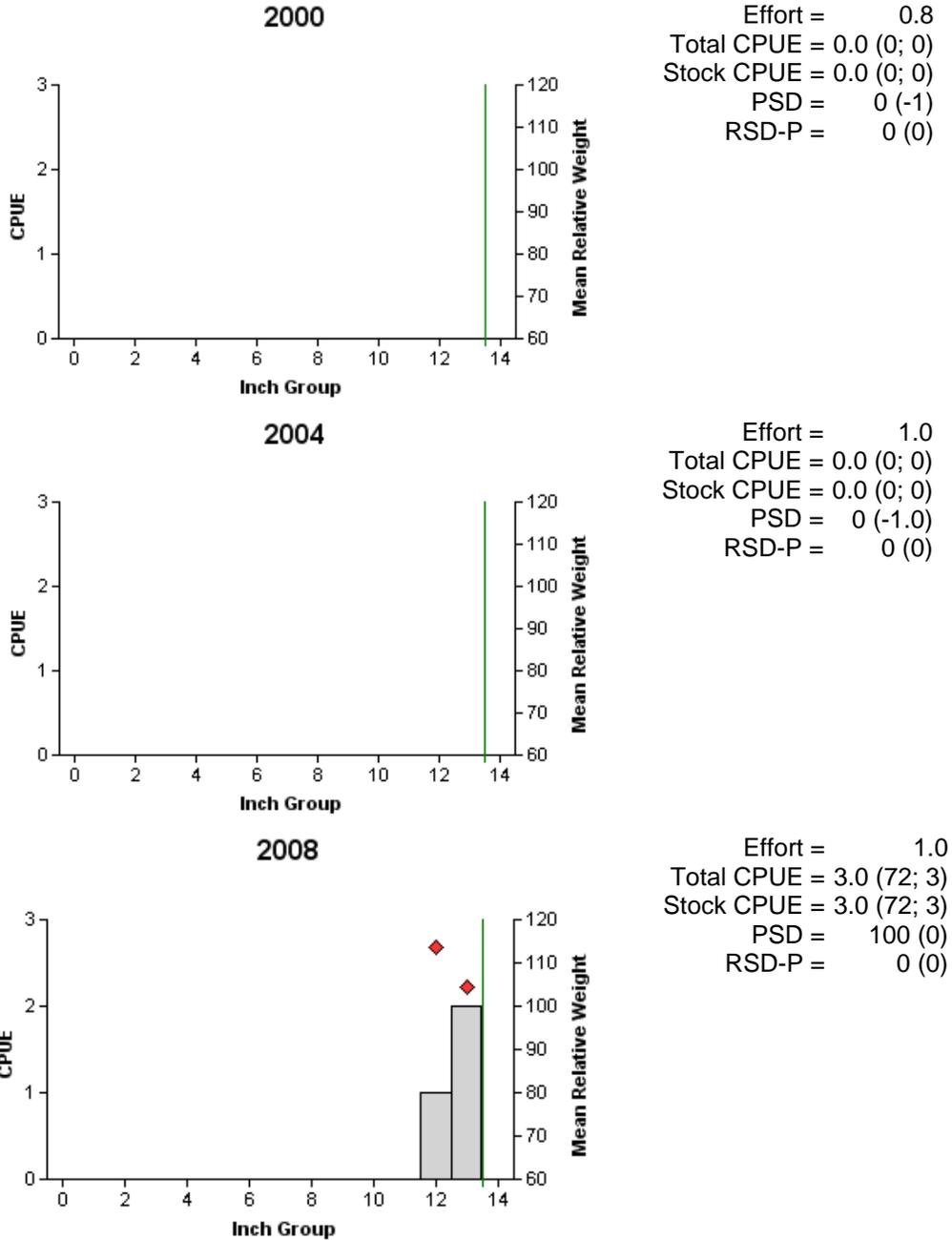


Figure 6. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Wichita Reservoir, Texas, 2000, 2004, and 2008. No largemouth bass were sampled in 2000 and 2004. Line indicates minimum size limit at time of sampling

# White Crappie

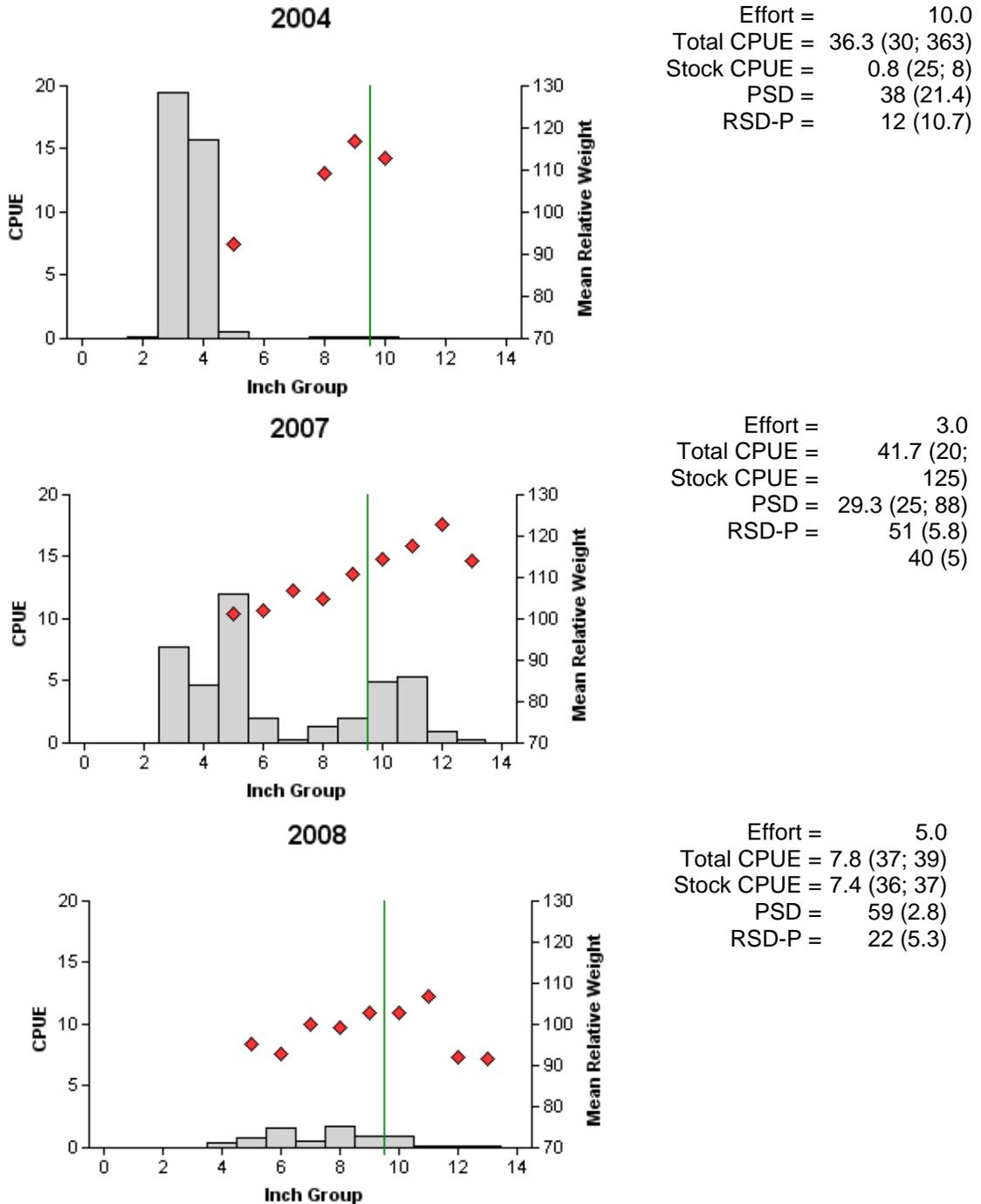


Figure 7. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for single-cod trap netting survey (2004) and dual-cod trap netting surveys, Wichita Reservoir, Texas, 2007 and 2008. Line indicates minimum size limit at time of sampling.

Table 6. Average length at capture for white crappie (sexes combined) collected by fall trap netting surveys at Wichita Reservoir, Texas, 1994, 1997, 2000, and 2007 compared to ecological region averages. Lengths are followed by the sample size in parentheses (N).

Year	Length (inches) at age					
	1	2	3	4	5	6
1994	7.4(13)	9.6(17)	12.8(6)	13.0(7)	13.3(2)	14.8(2)
1997	6.5(7)	10.6(11)	11.1(1)	12.6(5)	13.6(3)	13.0(1)
2000	9.5(14)	10.2(8)	11.9(1)			
2007	10.5(32)	9.9(2)	11.8(4)			
Averages <sup>a</sup>	6.9	8.9	10.3	11.3	11.9	12.4

<sup>a</sup>Ecological region 5 averages from Prentice (1987); lengths derived for November 15.

Table 7. Proposed sampling schedule for Wichita Reservoir, Texas. Gill net surveys are conducted in the spring, while electrofishing and trap net surveys are conducted in the fall. S denotes standard survey, A denotes an additional survey.

Survey Year	Electrofishing	Dual-cod Trap Net	Gill Net	Creel	Report
Fall 2009-Spring 2010	A*		A		
Fall 2010-Spring 2011		A			
Fall 2011-Spring 2012					
Fall 2012-Spring 2013	S	S	S		S

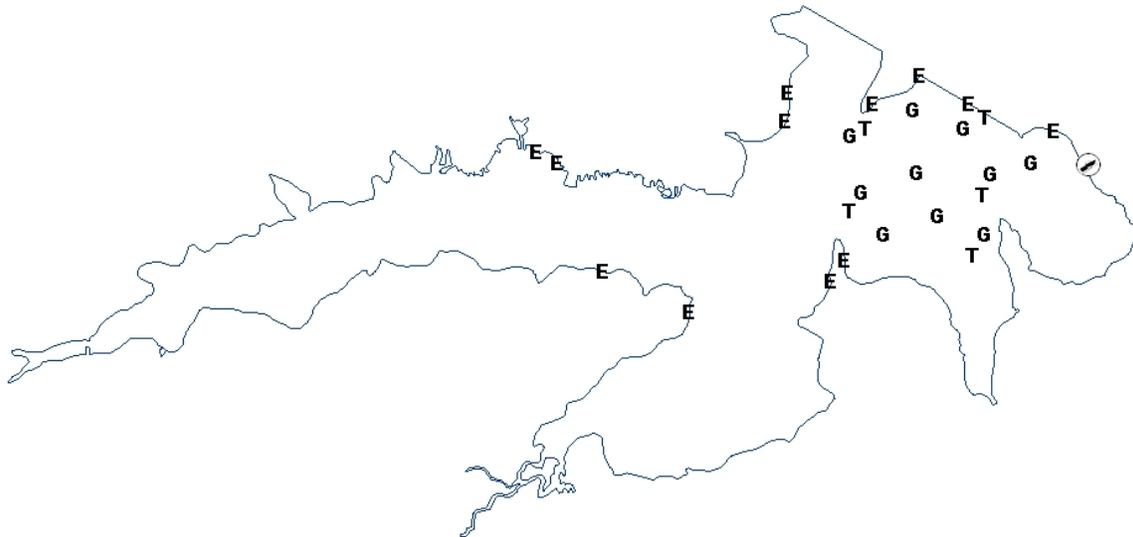
\*Spring 2010 electrofishing

## APPENDIX A

Number (N) and catch rate (CPUE) for species collected from gill nets (2009), dual-cod trap nets (2008) and electrofishing (2008) from Wichita Reservoir, Texas.

Species	Gill Nets		Dual-cod Trap Nets		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose gar	3	0.3				
Gizzard shad			18	3.6	155	155.0
Common carp	8	0.8				
River carpsucker			2	0.4		
Smallmouth buffalo			1	0.2		
Black bullhead	3	0.3				
Channel catfish	7	0.7				
Green sunfish					18	18.0
Warmouth					1	1.0
Bluegill			3	0.6	134	134.0
Longear sunfish					20	20.0
Largemouth bass					3	3.0
White crappie			39	7.8		
Freshwater drum			10	2.0		

APPENDIX B



Location of sampling sites, Wichita Reservoir, Texas, 2008-2009. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively.