

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2010 Survey Report

Oak Creek Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Oak Creek Reservoir were surveyed in 2010 using electrofishing gear and trap nets, and in 2011 using gill nets. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Oak Creek Reservoir is a 2,375-acre impoundment at conservation pool and is located 45 miles north of San Angelo in the northeast corner of Coke County, Texas, in the Colorado River drainage basin. Primary uses included municipal water supply, recreation, and until 2002, cooling water for a power plant. Water level declined 31 feet from January 1998 to April 2003, severely limiting fish production and angler use. Reservoir water level rebounded by October 2007, when it was less than a foot below conservation level. The reservoir was about 9 feet below conservation pool at the time of sampling. Habitat features consisted of natural and rocky shoreline with standing timber and flooded terrestrial vegetation. There were three public boat ramps available.
- **Management History:** Important sport fish included largemouth bass, white crappie, catfishes, and white bass. A variety of fish species have been stocked in the reservoir including threadfin shad, channel and blue catfishes, largemouth bass, and smallmouth bass.
- **Fish Community**
 - **Prey species:** Threadfin shad continue to maintain a population in the reservoir with a catch rate of 49.0/hr in fall 2010. Electrofishing catch of gizzard shad was high (385.0/h) with 42% of the fish available as prey to most sport fish. Electrofishing catch of bluegill was low (52.0/h), and most were between 4 and 5 inches in length.
 - **Catfishes:** Blue catfish were relatively abundant and exhibited the broadest size distribution compared to other catfishes. Channel catfish catch rate was low and has declined since the previous survey. Flathead catfish were present in low numbers.
 - **White bass:** White bass abundance was moderate (4.2/h); some large fish (14-15 inches) were captured.
 - **Largemouth bass:** Largemouth bass abundance was low (64.0/h) compared to previous surveys. However, catch rate of harvestable-size fish had improved. Body condition and growth of largemouth bass was adequate.
 - **White crappie:** Abundance of white crappie had increased compared to the last two surveys. Size distribution and body condition of white crappie were good.
- **Management Strategies:** Sportfish should continue to be managed with statewide regulations. Conduct electrofishing and trap net surveys in 2012 and 2014. Conduct standard gill netting survey in 2015 and additional gill netting in 2013 to complement additional low frequency electrofishing surveys in 2013 and 2015. Conduct access survey in 2014.

INTRODUCTION

This document is a summary of fisheries data collected from Oak Creek Reservoir in 2010-2011. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. Although 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 2010-2011 data for comparison.

Reservoir Description

Oak Creek Reservoir is a 2,375-acre impoundment constructed in 1952. Located in Coke County approximately 45 miles north of San Angelo, the reservoir is operated and controlled by the City of Sweetwater. Primary uses included municipal water supply, recreation, and until 2002, cooling water for a power plant. Oak Creek Reservoir was hypereutrophic with a mean TSI chl-*a* of 55.56, (Texas Commission on Environmental Quality 2008). Habitat at time of sampling consisted of natural and rocky shoreline with standing timber and flooded terrestrial vegetation. Water level declined 31 feet from January 1998 to April 2003 and then increased to within one foot of conservation level by fall 2007. However, it has been in a downward trend since then (Figure 1). Water level was about 9 feet below conservation pool at the time of sampling and the reservoir was at about 57% capacity with a surface area of 1,475 acres. Three boat ramps were available. Under frequent low-water-level conditions when no ramps are functional, it is possible to launch a boat from the dam. Bank fishing access was limited. Other descriptive characteristics for Oak Creek Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Bonds and Scott 2007) included:

1. Conduct electrofishing surveys in 2007, 2008, and 2010 to monitor largemouth bass growth and body condition and CPUE of small (<6 inches) shad. Stock threadfin shad in April 2008 if largemouth bass less than 15 inches exhibit average relative weight less than 85 and if small shad (<6 inches) electrofishing CPUE is less than 100/h.
Action: In 2007, average W_r for bass <15 inches was 92.3 and CPUE of all shad <6 inches was 144/h therefore no threadfin shad were stocked. In 2008, average W_r for bass <15 inches was 78.6 and CPUE of all shad <6 inches was 11/h, but since some threadfin shad were present it was thought that numbers could rebound without stocking. In 2010, average W_r for bass <15 inches was 86.8 and CPUE of all shad <6 inches was 199/h therefore no threadfin shad were stocked.
2. Promote the blue catfish fishery through appropriate media outlets and educate anglers on specific angling techniques for targeting this species.
Action: The blue catfish fishery has been promoted through general interactions with the public, and at outdoor shows and other outreach events. Also, an article on blue catfish was written by staff and published in the San Angelo Standard-Times newspaper.

Harvest regulation history: Sportfishes in Oak Creek Reservoir are currently and have historically been managed with statewide regulations (Table 2) except for smallmouth bass. From 1994 through 2001, smallmouth bass were managed with an 18-inch minimum length limit and 3-fish bag. This regulation was rescinded after failing to increase smallmouth bass abundance.

Stocking history: Channel and blue catfish were stocked multiple times in the 1970s and again in 2003 (blue catfish) and 2004 (channel catfish). Smallmouth bass were stocked in 1984 and 1985 but failed to produce a fishery. Florida largemouth bass were introduced in 1980 and stocked in 1986, 1987, 2003, 2004, and 2008. The complete stocking history is in Table 3.

Vegetation/habitat history: Oak Creek Reservoir has no vegetation/habitat management history. In recent years, the reservoir has not supported aquatic vegetation due to considerable water level fluctuation.

Water Transfer: Oak Creek Reservoir is primarily used for municipal water supply and recreation. Water is pumped to the cities of Roby, Trent and Bronte for municipal water supply. The City of Sweetwater also sells water to Bitter Creek Water Supply which provides water for rural communities.

METHODS

Fish were collected by electrofishing (1.0 hour at 12, 5-min stations), gill netting (5 net nights at five stations), and trap netting (5 net nights at five stations). Additional bass-only electrofishing was conducted to collect sufficient largemouth bass for category 2 age and growth analysis. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). All survey sites were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009).

Sampling statistics (CPUE for various length categories), 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. We collected 13 largemouth bass between 13.0 and 14.9 inches to calculate mean age at 14-inches. We also collected 7 white crappie between 9.0 and 10.9 inches to calculate mean age at 10-inch length. Age determination was carried out using otoliths. A littoral habitat survey was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2009). Source for water level data was the United States Geological Survey (USGS) website.

RESULTS AND DISCUSSION

Habitat: Oak Creek Reservoir supported no aquatic vegetation species. Natural and rocky shoreline accounted for 86.5% of the littoral zone. Offshore habitat was dominated by standing timber and flooded terrestrial vegetation (83.3%) (Table 4).

Prey species: In 2010, the CPUE for threadfin shad was 49.0/h. Catch rates from previous surveys show considerable variation, but indicate that the population is being maintained (2008 = 4.0/h, 2007 = 86.0/h, 2006 0.0/h, 2004 = 5.0/h, 2003 = 88.0/h). Electrofishing catch rates of gizzard shad and bluegill were 385.0/h and 52.0/h, respectively. Total CPUE of gizzard shad was greater compared to 2007 and 2008 (Figure 2). Gizzard shad IOV was 42 and was greater than that recorded in 2008 (IOV = 3). Total CPUE of bluegill (52.0/h) has shown a declining trend since 2007 (370.0/h) (Figure 3). Bluegill size structure in 2010 was dominated by 4 to 5-inch fish.

Blue catfish: Blue catfish were last stocked in 2003 following a substantial water level rise. Stocking may have assisted in boosting blue catfish numbers from 1.4/nn in 1997 to 9.4/nn in 2007. However, by 2011, blue catfish CPUE had declined to 3.2/nn. Size structure, as indicated by PSD, had declined since 2007, although larger fish (up to 25 inches) were present (Figure 4). Average W_r was 89 with a range of 80 to 104.

Channel catfish: The gill net catch rate of channel catfish in 2011 (0.6/nn) was poor and much lower than in 2007 (5.8/nn) and 1997 (6.8/nn) (Figure 5).

Flathead catfish: Flathead catfish were present in low numbers (0.4/nn). Only one 19-inch and one 23-inch fish were captured in the 2011 gill net survey.

White bass: The gill net catch rate of white bass was 4.2/nn in 2011 which was higher than in 2007 (1.2/nn) (Figure 6). Some large fish, up to 15 inches in length, were captured. The sample size was insufficient to determine average age at 10 inches.

Largemouth bass: Florida largemouth bass were last stocked in 2008. Total CPUE in 2010 (64.0/h) was much less than that recorded in 2008 (104.0/h) and 2007 (139.0/h). However, electrofishing catch rate of fish greater than 14 inches (21.0/h) had improved over 2008 (6.8/h) and 2007 (3.0/h) surveys. Similarly, size structure had also improved (PSD = 79, RSD-P = 48) (Figure 7). Growth of largemouth bass was moderate. Average age at 14 inches was 2.6 years (N = 13, range = 1 – 3 years). Average W_r of largemouth bass was 86 with a range of 74 to 93.

White crappie: The trap net catch rate of white crappie was 5.0/nn in 2010, which was higher than in 2008 (1.0/nn) and 2007 (0.6/nn). The catch rate of harvestable-size fish (2.6/nn in 2010) has improved since 2008 (0.8/nn) and 2007 (0.2/nn) (Figure 8). Average age at 10 inches was 1.6 years (N = 7, range = 1 – 3 years) in 2010 compared to 2.3 years (N = 16, range 2 – 4 years) in 2006. Average W_r (98) was good and ranged from 91 to 102.

Fisheries management plan for Oak Creek Reservoir, Texas

Prepared – July 2011.

ISSUE 1: Blue catfish have become the most numerous catfish species in the reservoir and offer anglers a broader range of sizes available to harvest compared to channel catfish. The use of additional sampling gear(s) is necessary to monitor and develop the fishery since gill netting alone may not adequately describe the blue catfish population, especially with regard to trophy fish.

MANAGEMENT STRATEGY

1. Conduct low frequency electrofishing surveys and consider using other sampling techniques as appropriate.

ISSUE 2: 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 the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc... so that they can in turn educate their customers.
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 includes electrofishing and trap netting surveys in 2012, and mandatory monitoring in 2014/2015 (Table 5). Electrofishing surveys are necessary to collect largemouth bass growth and body condition information. Trap net sampling is necessary to monitor white crappie population changes. Additional gill netting in 2013 will complement additional low frequency electrofishing in 2013 and 2015 to better gauge the blue catfish population.

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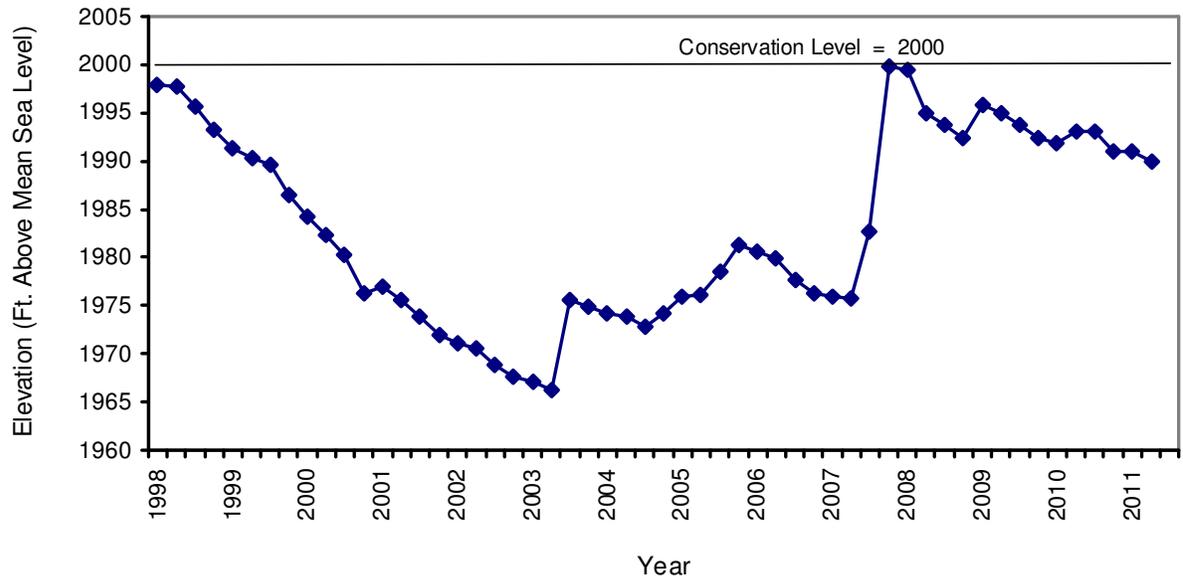


Figure 1. Quarterly water level elevations in feet above mean sea level recorded for Oak Creek Reservoir, Texas (1998-2011).

Table 1. Characteristics of Oak Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1952
Controlling authority	City of Sweetwater
County	Coke
Reservoir type	Offstream
Shoreline Development Index	4.72
Conductivity	1,150 $\mu\text{mhos/cm}$

Table 2. Harvest regulations for Oak Creek Reservoir, Texas.

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

Table 3. Stocking history of Oak Creek Reservoir, Texas. Size categories are: FRY = ≤ 1 inch; FGL = 1-3 inches; ADL = adults; UNK = Unknown.

Species	Year	Number	Size
Threadfin shad	1980	2000	UNK
Golden shiner	1980	59	UNK
Blue catfish	1976	43,000	UNK
	1977	29,600	UNK
	1978	26,000	UNK
	1979	26,446	UNK
	2003	77,124	FGL
	Total	202,170	
Channel catfish	1971	16,750	UNK
	1974	15,000	UNK
	1975	20,000	UNK
	2004	42,399	FGL
	Total	94,149	
Smallmouth bass	1984	5,000	FGL
	1985	12,000	FGL
	Total	17,000	
Largemouth bass	1973	30,000	UNK
Lake Fork largemouth bass	1994	180	ADL
Florida largemouth bass	1980	495,845	FRY
	1986	1,920,593	FGL
	1987	633	ADL
	2003	50	ADL
	2004	31,496	FGL
	2008	121,278	FGL
	Total	444,655	

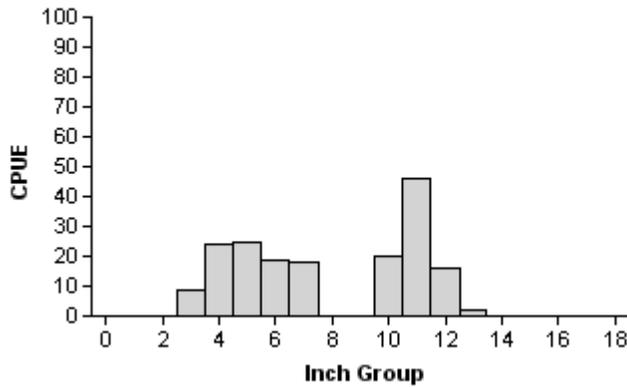
Table 4. Results of a structural habitat survey (shoreline and offshore) conducted at Oak Creek Reservoir, Texas, in August, 2010. Linear distance (miles) was estimated for each habitat type for the 47 miles of shoreline using 126 randomly selected sample points.

Habitat type	Linear distance	Percent	Lower 95% CL	Upper 95% CL
Rocky Shoreline	13.8	29.4	21.4	37.3
Natural Shoreline	26.9	57.1	48.5	65.8
Rocky Bluff	4.8	10.3	5.0	15.6
Bulkhead	1.1	2.4	0.3	5.1
Standing Timber	22.8	48.4	39.7	57.2
Flooded Terrestrial Veg.	16.4	34.9	26.6	43.3
Piers, Docks, and Marinas	6.7	14.3	8.2	20.4

Gizzard Shad

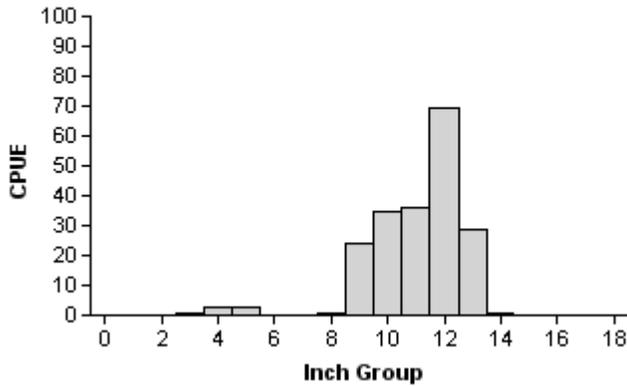
2007

Effort = 1.0
 Total CPUE = 179.0 (18; 179)
 IOV = 53 (10)



2008

Effort = 1.0
 Total CPUE = 202.0 (15; 202)
 IOV = 3 (2)



2010

Effort = 1.0
 Total CPUE = 385.0 (15; 385)
 IOV = 42 (9)

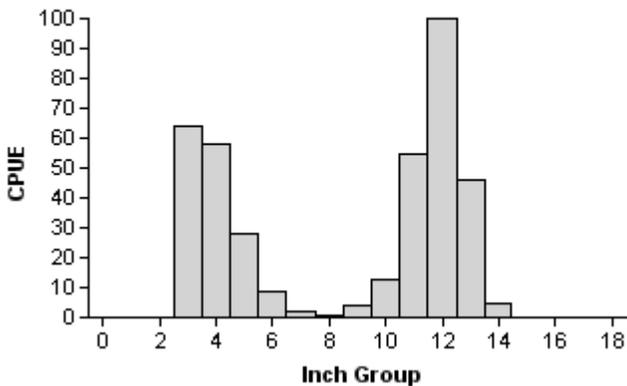
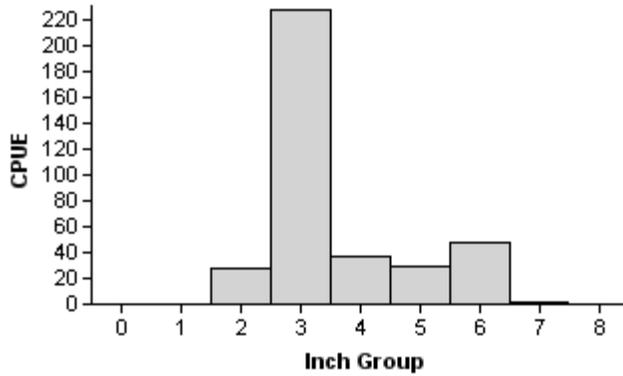


Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Oak Creek Reservoir, Texas, 2007, 2008, and 2010.

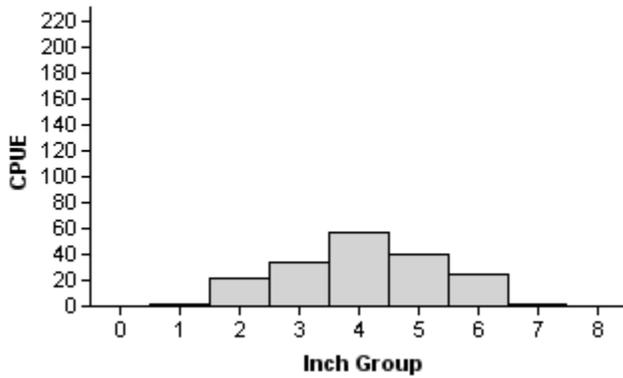
Bluegill

2007



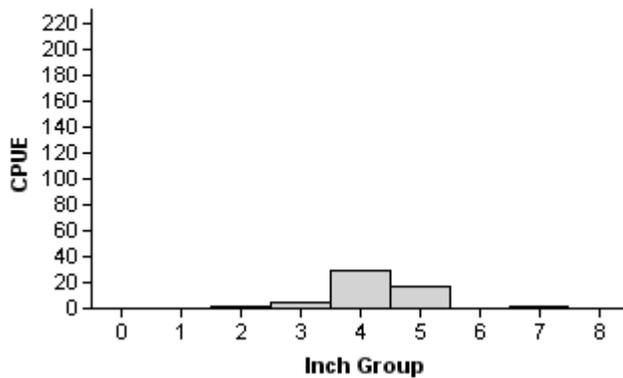
Effort = 1.0
 Total CPUE = 370.0 (20; 370)
 Stock CPUE = 342.0 (20; 342)
 PSD = 14 (8)

2008



Effort = 1.0
 Total CPUE = 179.0 (16; 179)
 Stock CPUE = 156.0 (14; 156)
 PSD = 17 (5)

2010



Effort = 1.0
 Total CPUE = 52.0 (20; 52)
 Stock CPUE = 51.0 (19; 51)
 PSD = 2 (2)

Figure 3. Number of bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure) for fall electrofishing surveys, Oak Creek Reservoir, Texas, 2007, 2008, and 2010.

Blue Catfish

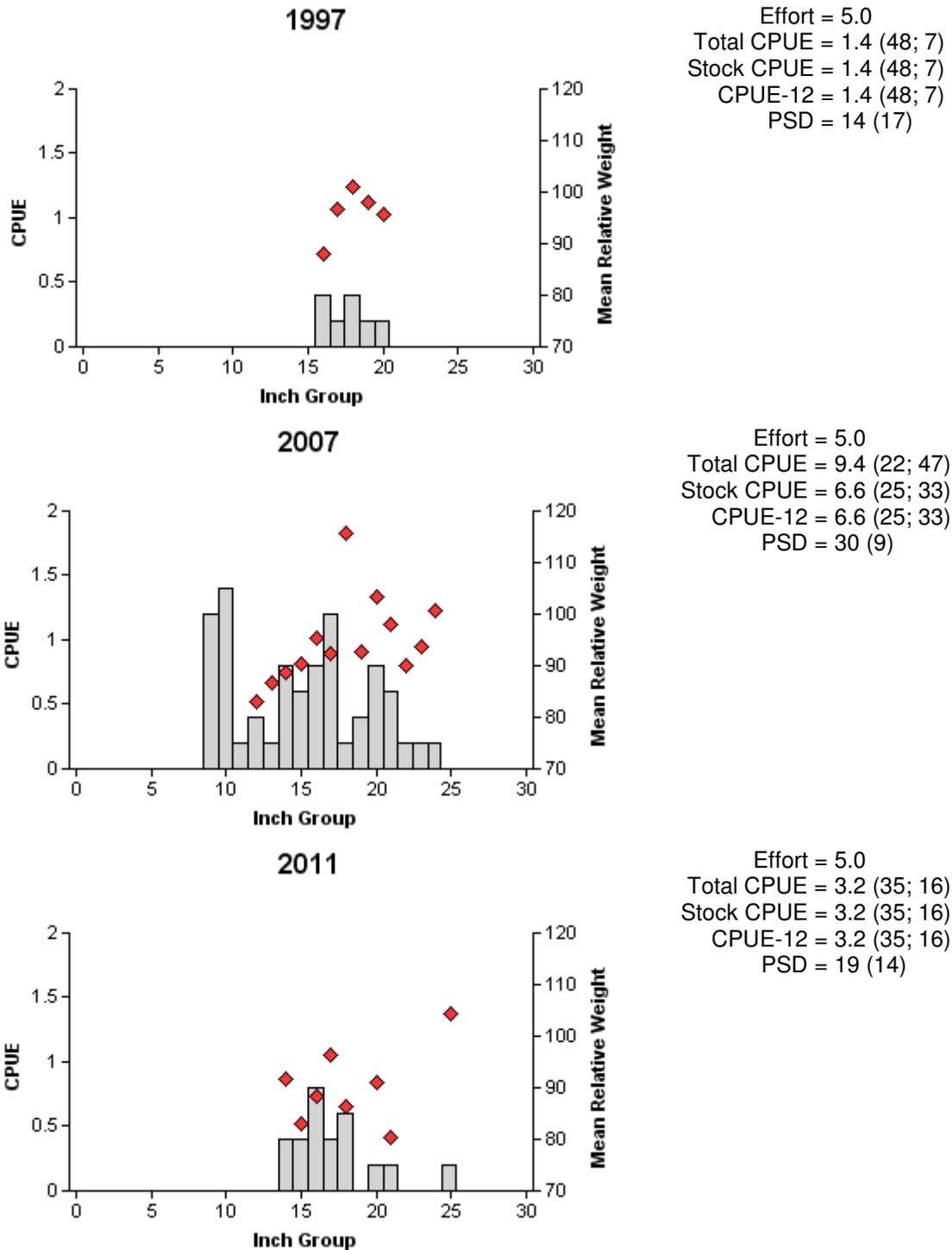


Figure 4. Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Oak Creek Reservoir, Texas, 1997, 2007, and 2011.

Channel Catfish

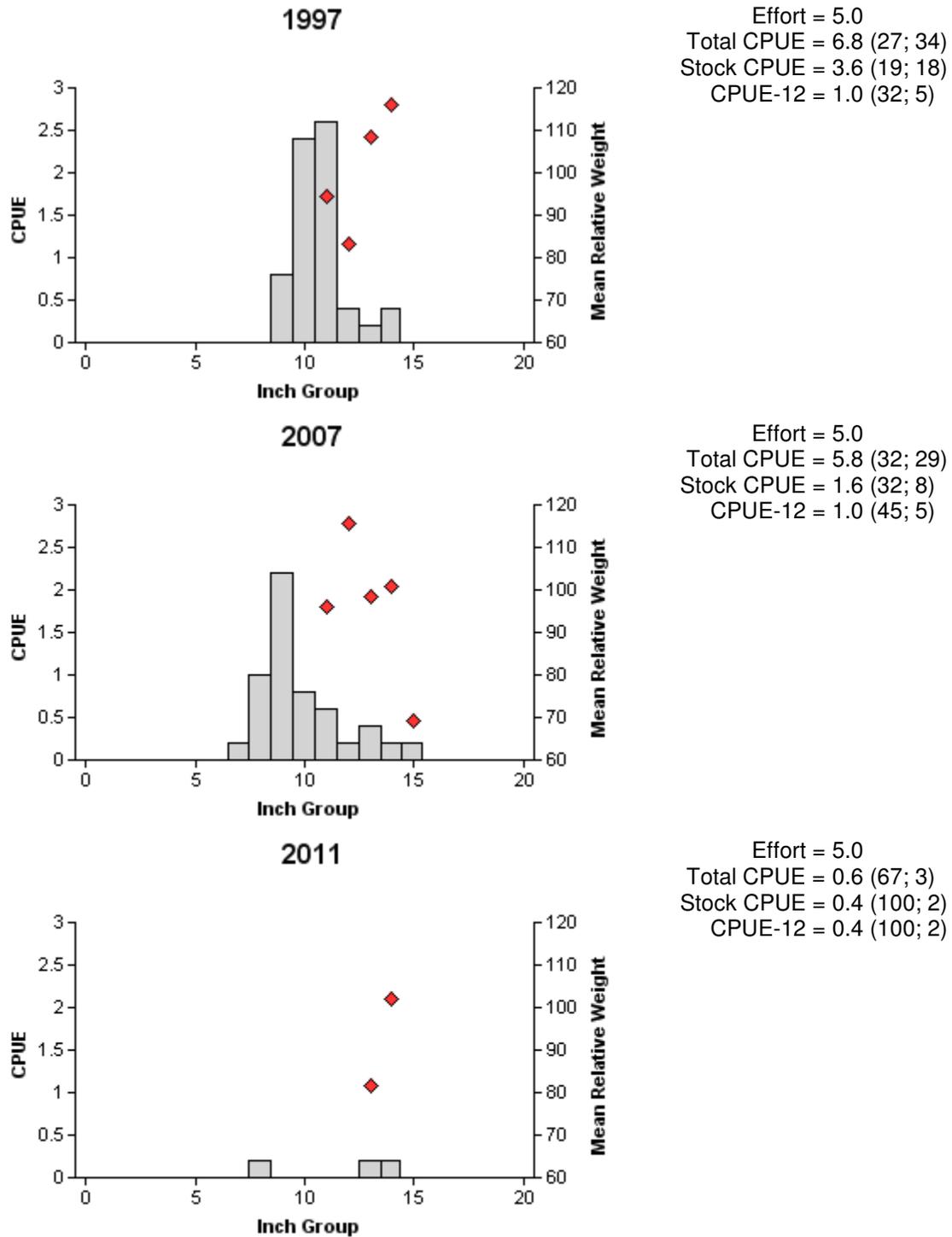


Figure 5. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE are in parentheses) for spring gill net surveys, Oak Creek Reservoir, Texas, 1997, 2007, and 2011.

White Bass

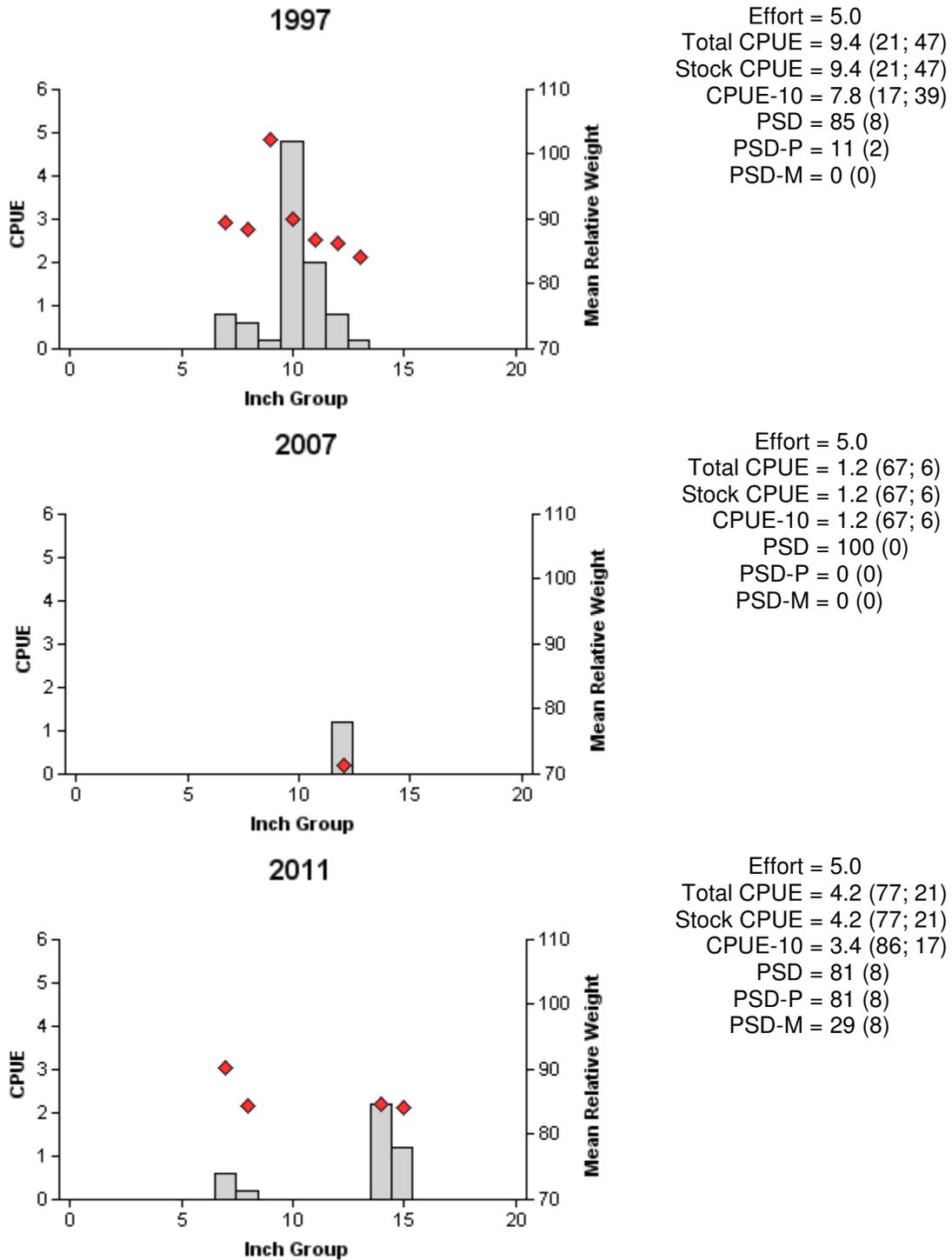


Figure 6. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Oak Creek Reservoir, Texas, 1997, 2007, and 2011.

Largemouth Bass

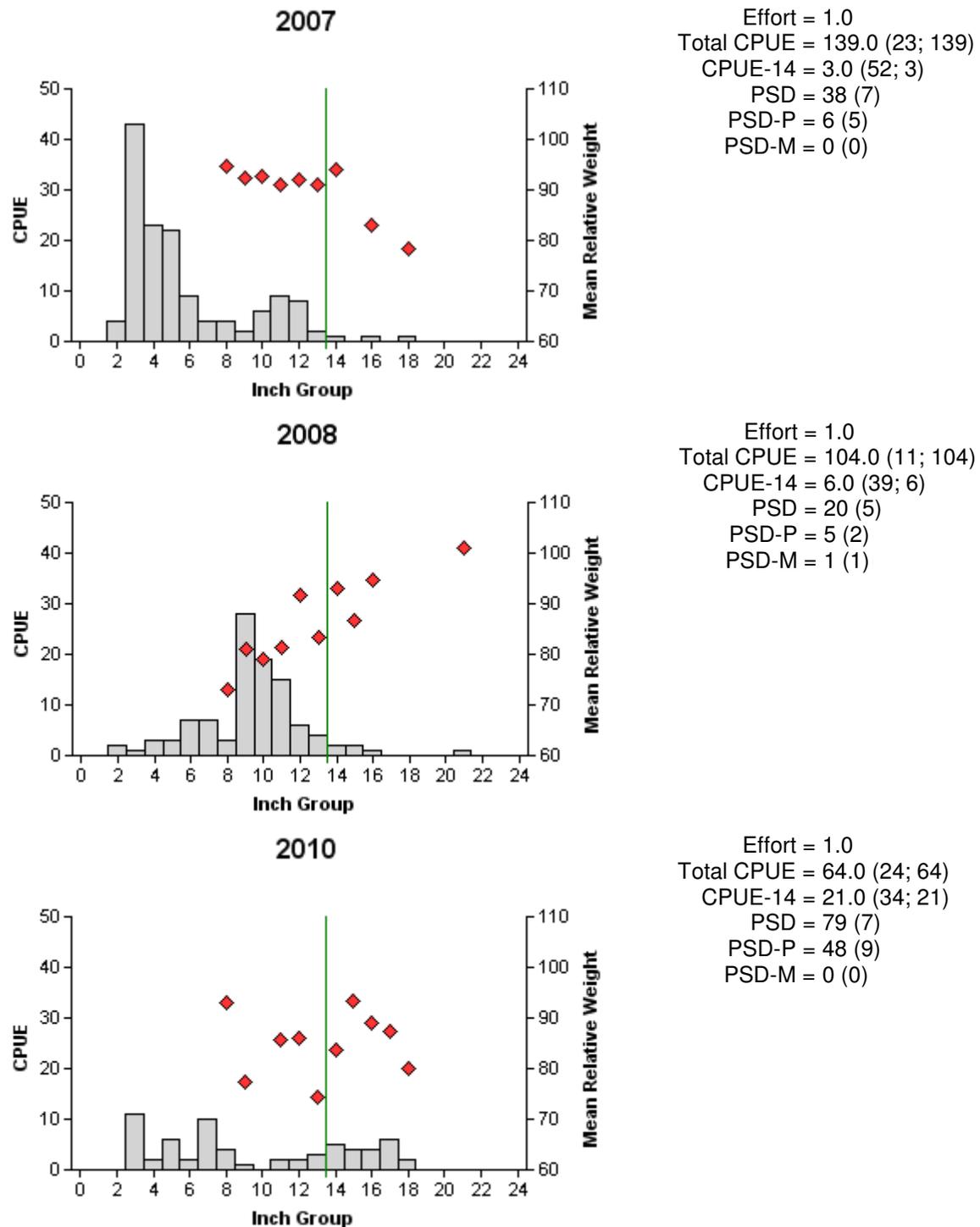


Figure 7. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Oak Creek Reservoir, Texas, 2007, 2008, and 2010. Vertical line represents the minimum length limit for harvestable-size fish.

White Crappie

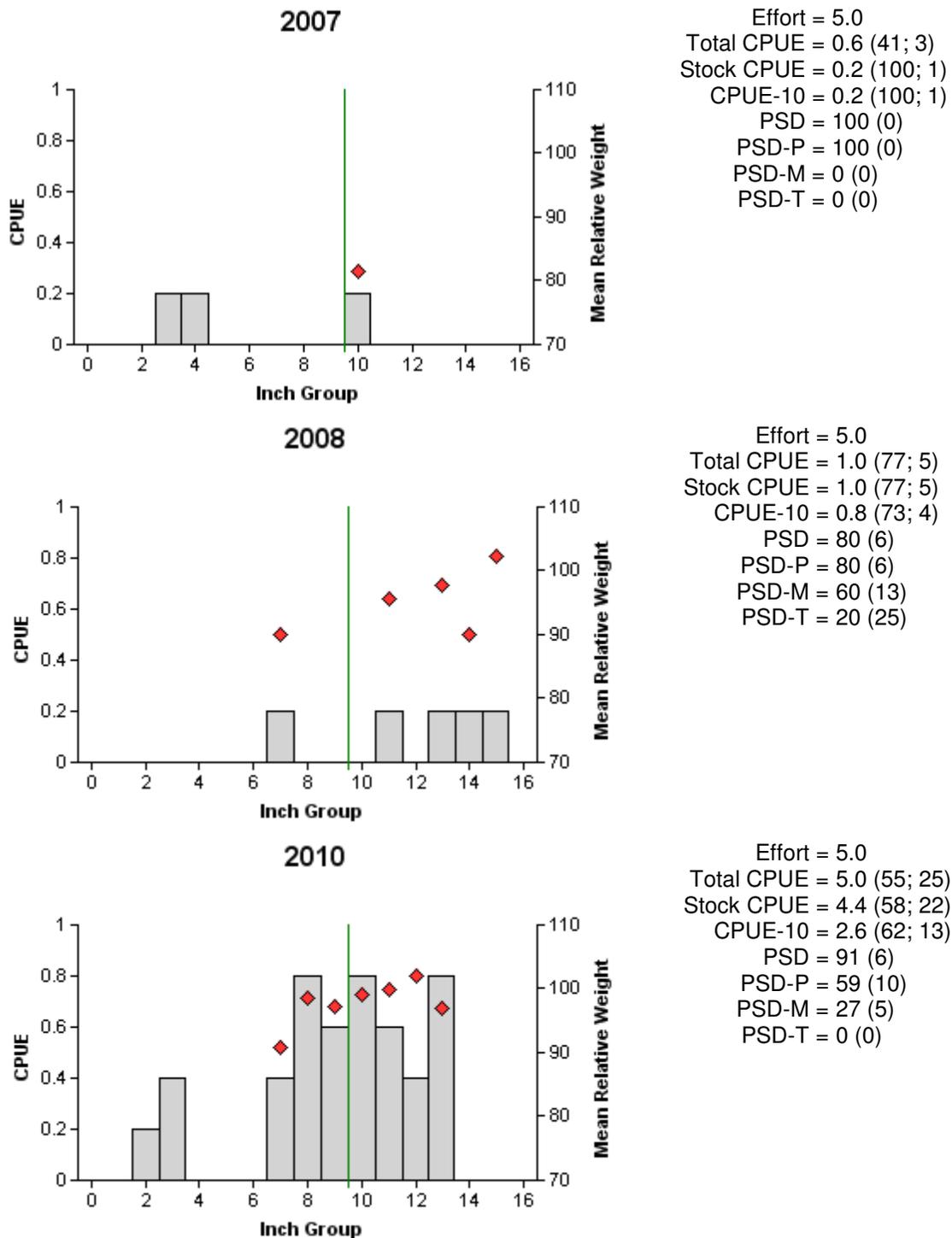


Figure 8. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Oak Creek Reservoir, Texas, 2007, 2008, and 2010. Vertical line represents the minimum length limit for harvestable-size fish.

Table 5. Proposed sampling schedule for Oak Creek Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Low frequency (LF) electrofishing is conducted in summer. Standard surveys denoted by S and additional surveys denoted by A.

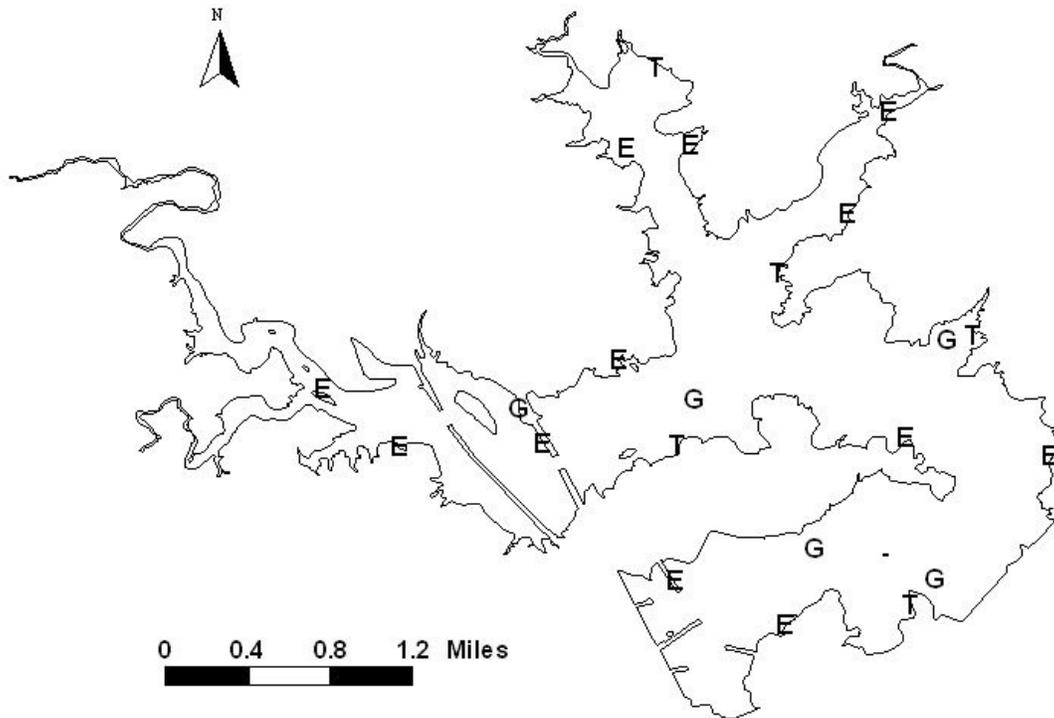
Survey Year	Electro-fisher	Trap Net	Gill Net	LF Electro-fisher	Vegetation Survey	Access Survey	Report
Fall 2011-Summer 2012							
Fall 2012-Summer 2013	A	A	A	A			
Fall 2013-Summer 2014							
Fall 2014-Summer 2015	S	S	S	A	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected by all standard gear types from Oak Creek Reservoir, Texas, 2010-2011.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad	113	22.6	6	1.2	385	385.0
Threadfin shad					49	49.0
Common carp	28	5.6				
River carpsucker	6	1.2				
Blue catfish	16	3.2				
Channel catfish	3	0.6				
Flathead catfish	2	0.4				
White bass	21	4.2	1	0.2		
Redbreast sunfish			1	0.2	59	59.0
Green sunfish					3	3.0
Warmouth			3	0.3	6	6.0
Bluegill	3	0.6	8	40.0	52	52.0
Longear sunfish			3	0.6	10	10.0
Largemouth bass	4	0.8	2	0.4	64	64.0
White crappie	8	1.6	25	5.0		

APPENDIX B



Location of sampling sites, Oak Creek Reservoir, Texas, 2010-2011. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was approximately 9 feet below conservation pool at time of sampling and reservoir surface area was 62.1% (1,475 acres) of that at conservation level.