

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2014 Fisheries Management Survey Report

Oak Creek Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Oak Creek Reservoir were surveyed in 2012 and 2014 using electrofishing and trap netting, and in 2013 and 2015 using gill netting. Historical data are presented with the 2014-2015 data for comparison. 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, then steadily declined again. The reservoir was about 26 feet below conservation pool at the time of sampling, and was approximately 423 acres. Habitat consisted of featureless bank and rocky shoreline with standing timber and flooded terrestrial vegetation. There were three public boat ramps available, but none were useable during the sampling period.
- **Management History:** Important sport fish included Largemouth Bass, White Crappie, catfishes, and White Bass. Smallmouth Bass were managed under restrictive harvest regulations for seven years, then rescinded after it was found to be ineffective. 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 were not collected in the most recent surveys although they were present in past samples. Gizzard Shad catch rate declined, especially for larger shad. Several species of sunfish were present but catch rates were low.
 - **Catfishes:** Blue Catfish, Channel Catfish, and Flathead Catfish were moderately abundant and provided anglers with good numbers of legal-sized fish and some large fish.
 - **White Bass:** Catch rate of White Bass was low; this species may have been negatively impacted by recent low water levels and reduced inflows.
 - **Largemouth Bass:** Largemouth Bass catch rate was consistent throughout the past four years and the population had good size structure. Body condition was somewhat poor, but recent reproduction was evident.
 - **White Crappie:** Relative abundance of White Crappie increased, and size structure and body condition were very good.
- **Management Strategies:** Sportfish should continue to be managed with statewide regulations. Promote catfish fishery that includes three target species. Discuss boat ramp improvements with owner of Sportsman's Lodge. Spread awareness of invasive species threats. Conduct electrofishing, trap netting, and gill netting surveys in 2016/2017. Conduct additional springtime creel and low frequency electrofishing surveys in 2017/2018. Conduct vegetation and access surveys as well as general monitoring with electrofishing, trap nets and gill nets in 2018/2019.

INTRODUCTION

This document is a summary of fisheries data collected from Oak Creek Reservoir in 2014-2015. 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 2014-2015 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 trophic state index (TSI) chl-a of 55.58, a 14-point increase over the last decade (Texas Commission on Environmental Quality 2011). Habitat consisted of featureless bank 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 (Figure 1). Water level was about 26 feet below conservation pool at the time of sampling and the reservoir had a surface area of 423 acres. Other descriptive characteristics for Oak Creek Reservoir are in Table 1.

Angler Access

There are two private boat ramps and one public boat ramp at Oak Creek Reservoir, but none were useable in 2014 because of the low water level. Extension of the boat ramp is feasible at Sportsman's Lodge. 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 to the campground near Sportsman's Lodge boat ramp. Additional boat ramp characteristics are in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Farooqi and Scott 2011) included:

1. Use low-frequency electrofishing to obtain complementary data on the Blue Catfish fishery.
Action: We attempted a low-frequency electrofishing survey in 2012 and jug-line sampling in 2013; neither was successful in capturing meaningful data on Blue Catfish. However, valuable data on Flathead Catfish were collected during low-frequency electrofishing.
2. Encourage public awareness of invasive species and preventing spread of those species to new water bodies.
Action: News releases, posters, and signs were distributed throughout the district.

Harvest regulation history: Sportfishes in Oak Creek Reservoir are managed with statewide regulations. From 1994 through 2001, Smallmouth Bass were managed with an 18-inch minimum length limit and 3-fish bag. However, this regulation was rescinded after failing to increase Smallmouth Bass abundance. Current regulations are found in Table 3.

Stocking history: Channel and Blue Catfish were stocked multiple times in the 1970s. Blue Catfish were stocked in 2003, and Channel Catfish were stocked in 2004. 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 4.

Vegetation/habitat management 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. No interbasin transfers are known to occur.

METHODS

Fish were collected by electrofishing (1 hour at 12, 5-min stations), gill netting (10 net nights at 10 stations), and trap netting (10 net nights at 10 stations). Additionally, we conducted daytime low-frequency electrofishing (1 hour at 20, 3-min 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 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 2014).

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 ($RSE = 100 \times SE$ of the estimate/estimate) was calculated for all CPUE statistics and standard error (SE) was calculated for structural indices and IOV.

We collected 5 White Crappie between 9.0 and 10.9 inches to calculate mean age at 10-inch length. Age determination was performed using otoliths. A vegetation survey was conducted in 2014 using the digital shapefile method. An access survey was conducted in 2014. All survey methods were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2014), except that we were not able to capture the 13 fish required for Category 2 age determination. Source for water level data was the United States Geological Survey (USGS 2015).

RESULTS AND DISCUSSION

Habitat: Oak Creek Reservoir supported no aquatic vegetation at the time of the survey. The last structural habitat survey was conducted in 2010 (Farooqi and Scott 2011).

Prey species: Although Threadfin Shad have been present in the reservoir's history, they were not observed during this sampling period. Gizzard Shad catch rate declined from 385.0/h in 2010 to 194.0/h in 2012 and 116.0/h in 2014 (Figure 2). Vulnerability to predators increased over the same time period, as shown by increasing IOV values. Relative abundance of large shad (9-14 inches) decreased while relative abundance of smaller shad remained about the same over time. Electrofishing catch rate of Bluegill declined over the study period as well (Figure 3). Other sunfish species (Redbreast Sunfish, Green Sunfish, Warmouth, and Longear Sunfish) were present and provided additional sources of prey.

Blue Catfish: This population maintained similar relative abundance from 2011 to 2013 (around 3.2/nn in 2011 and 3.6/nn in 2013; Figure 4), but catch rate increased in 2015 (5.6/nn). Few individuals were quality-size or larger (≥ 20 inches), but in 2015 there was one 34-inch Blue Catfish collected. All fish in the samples were of legal-size and available for angler harvest. Relative weights averaged between 90 and 100, indicating good body condition.

Channel Catfish: The gill net catch rate of Channel Catfish in 2015 was 3.8/nn, which was greater than in 2011 (0.6/nn), but slightly less than in 2013 (5.2/nn, Figure 5). This population provided good numbers of legal-sized fish to anglers in 2013, but by 2015 size structure had shifted and fewer quality-sized fish were available to anglers.

Flathead Catfish: Low-frequency electrofishing revealed an abundant Flathead Catfish population; catch rate was 30.0/h (Figure 6). Size structure was excellent, shown by PSD=50 and several fish in the preferred and memorable size categories were captured. Body condition was also good, especially for fish above the legal size limit of 18-inches. In 2015, gill netting catch rate for Flathead Catfish was 0.4/nn. Greater numbers of fish and a better representation of the size distribution were achieved with low-frequency electrofishing compared to gill netting which may warrant continued use of low-frequency electrofishing for future monitoring of Flathead Catfish in Oak Creek Reservoir.

White Bass: In 2015, gill net catch rate of White Bass was 1.3/nn. In the 2013 gill net survey, zero White Bass were collected. The 2015 gill net catch was lower than in 2011 (4.2/nn). White Bass recruitment has likely been adversely affected by lack of inflows and low water level attributed to drought. The adults remaining in Oak Creek Reservoir should be able to repopulate the lake when water level rises.

Largemouth Bass: This species maintained a moderately abundant population from 2010 (CPUE=64.0/h) through 2014 (CPUE=56.0/h) (Figure 7) despite extreme drought and water level fluctuations. Size structure was good (PSD=47) with some individuals in the 14- to 21-inch range during each sampling year. Relative weights were generally below 90, indicating poor body condition. Reproduction appears to be occurring throughout the drought as well, since there were fish <6 inches in length collected in each year.

White Crappie: The trap net catch rate of White Crappie increased from around 5.0/nn in 2010 to 10.8/nn in 2014 (Figure 8). Both size structure (PSD=71) and body condition (average W_r between 95 and 110) were excellent. Presence of small (<3-inch) crappie indicated recent reproduction. All five of the 10-inch crappie sampled for age and growth were 2 years old, indicating good growth. This population was doing well despite drought conditions.

Fisheries management plan for Oak Creek Reservoir, Texas

Prepared – July 2015.

ISSUE 1: No creel data exist for Oak Creek Reservoir.

MANAGEMENT STRATEGY

1. Conduct year-long creel to collect baseline data on angler usage, target species, and catch and harvest rates.

ISSUE 2: Alternative-gear catfish sampling revealed an abundant Flathead Catfish population and a potentially underutilized fishery.

MANAGEMENT STRATEGIES

1. Include alternative catfish sampling techniques in objective-based sampling plan for 2018-2019.
2. Promote overall catfish fishery at Oak Creek Reservoir, including Flathead Catfish, to the angling public through press releases and update to the TPWD website.

ISSUE 3: Boating access at the three public boat ramps was impeded in recent years due to low water level. Although boat launching is possible from the dam with 4-wheel-drive, extension of the Sportsman's Lodge Ramp would improve angler access to the reservoir.

MANAGEMENT STRATEGY

1. Discuss extension of boat ramp with owners of Sportsman's Lodge, including funding options like partnership with the City of Sweetwater.

ISSUE 4: 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 additional electrofishing, trap netting and gill netting surveys in 2016/2017, year-long creel survey and low-frequency electrofishing in 2017/2018, and general monitoring in 2018/2019 (Table 5). Additional sampling will allow us to closely monitor trend data and convey the status of these fisheries to the angling public. Adding low-frequency electrofishing will help us monitor relative abundance and size structure of Flathead Catfish.

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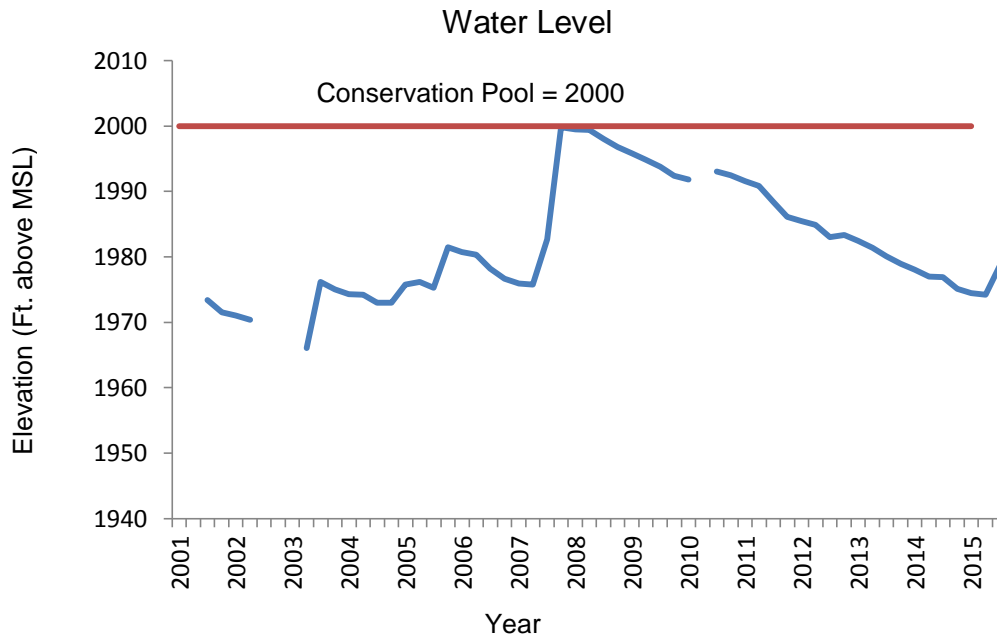


Figure 1. Quarterly water level elevations in feet above mean sea level recorded for Oak Creek Reservoir, Texas (2001-2015). Missing data points due to gauge malfunction.

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	1,688 $\mu\text{S}/\text{cm}$

Table 2. Boat ramp characteristics for Oak Creek Reservoir, Texas, August 2014. Reservoir elevation at time of survey was 1982 feet above mean sea level.

Boat Ramp Name	Latitude	Longitude (dd)	Public	Parking Capacity (N)	Elevation at end of boat ramp (ft)	Condition
Sportsman's Lodge	32.04062	-100.27035	N	15	1982	Out of water-extension is feasible
Hwy 70 Bridge	32.05437	-100.29823	Y	15	1984	Out of water-extension not feasible
Live Oak Lodge	32.05533	-100.29772	N	10	1982	Out of water-extension not feasible

Table 3. Harvest regulations for Oak Creek Reservoir, Texas.

Species	Bag Limit	Length limit
Catfish: Channel and Blue, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass: Largemouth and Smallmouth	5 (in any combination)	14-inch minimum
Crappie: White and Black, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Oak Creek Reservoir, Texas. FRY=<1 inch; FGL = fingerling; ADL = adults; UNK = Unknown.

Species	Year	Number	Size
Threadfin Shad	1980	2,000	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	47,702	FGL
	1985	48,096	FGL
	Total	95,798	
Largemouth Bass	1973	30,000	UNK
Lake Fork Largemouth Bass	1994	180	ADL
Florida Largemouth Bass	1980	40	ADL
	1986	199,500	FRY
	1987	90,000	FGL
	2003	71,789	FGL
	2004	62,048	FGL
	2008	121,278	FGL
	Total	444,655	

Gizzard Shad

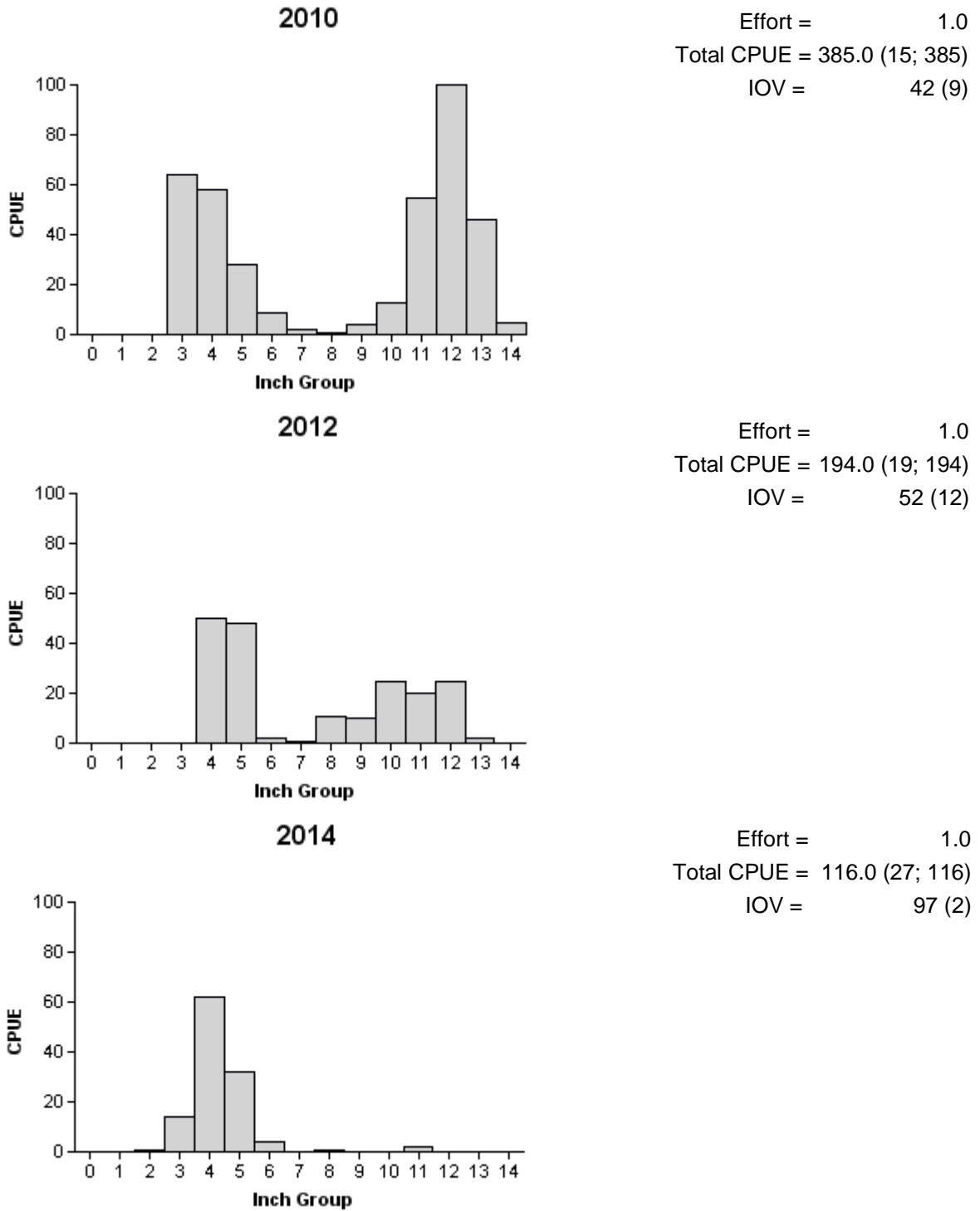


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Oak Creek Reservoir, Texas, 2010, 2012, and 2014.

Bluegill

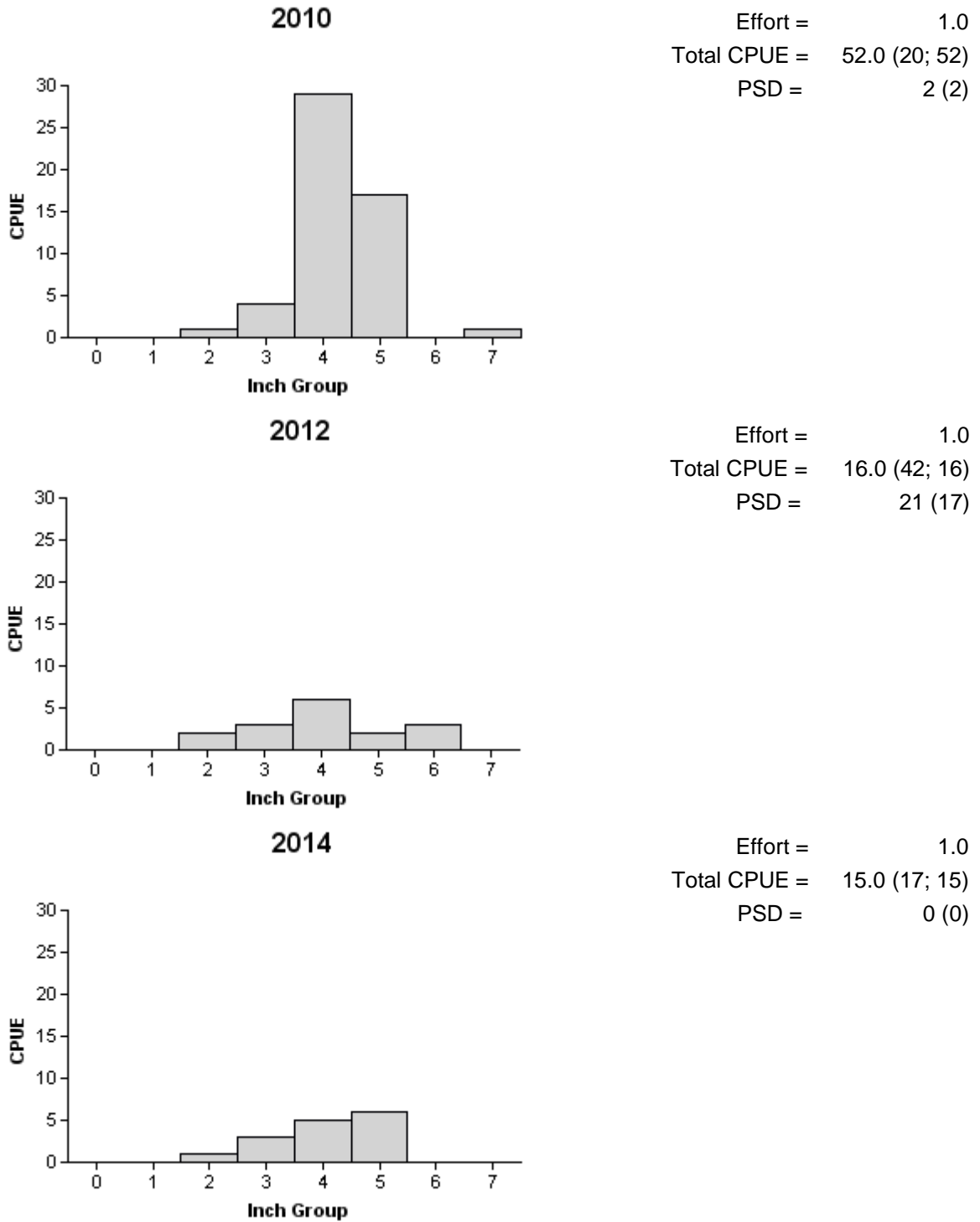


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Oak Creek Reservoir, Texas, 2010, 2012, and 2014.

Blue Catfish

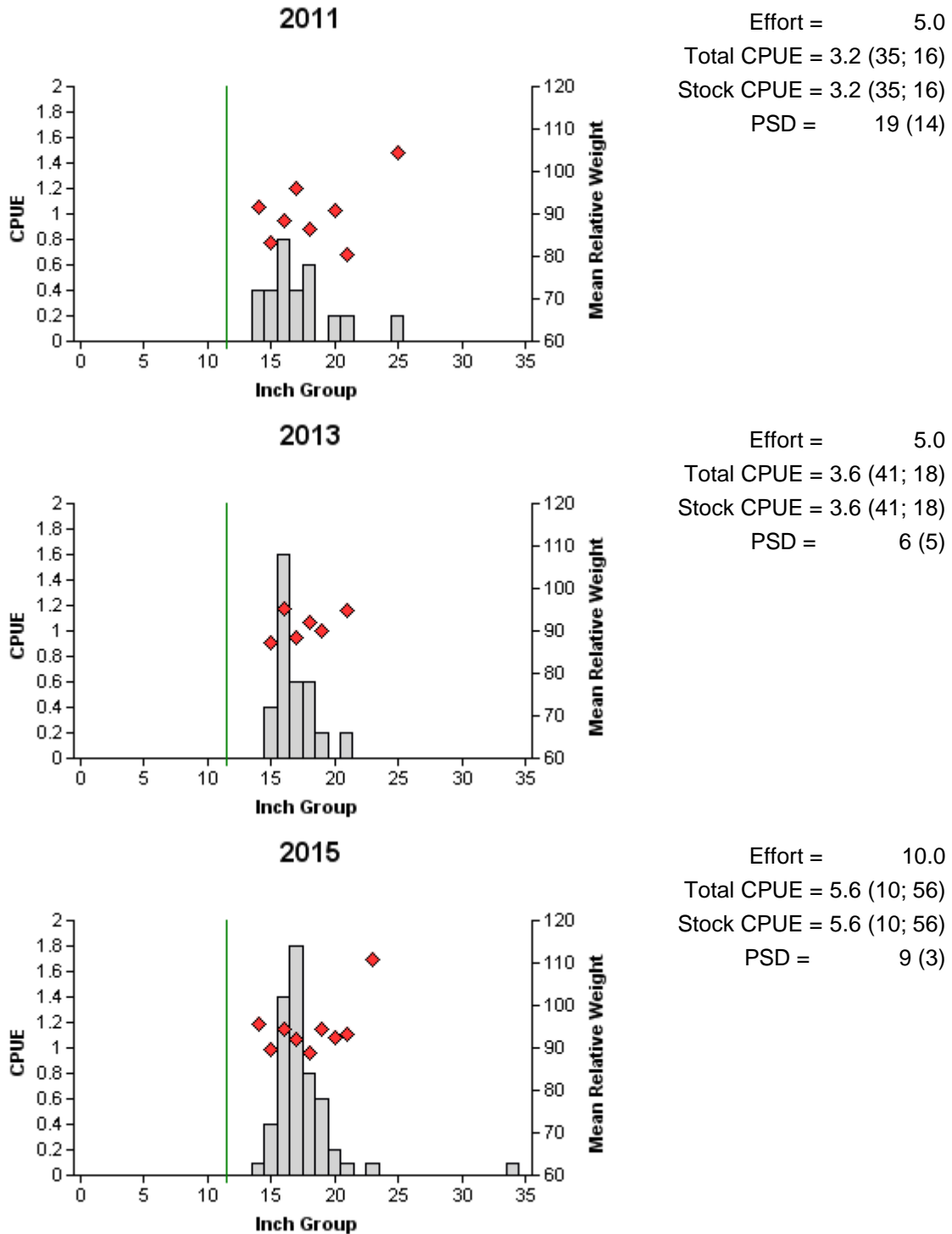


Figure 4. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Oak Creek Reservoir, Texas, 2011, 2013, 2015. Vertical line represents the minimum length limit for harvestable-sized fish.

Channel Catfish

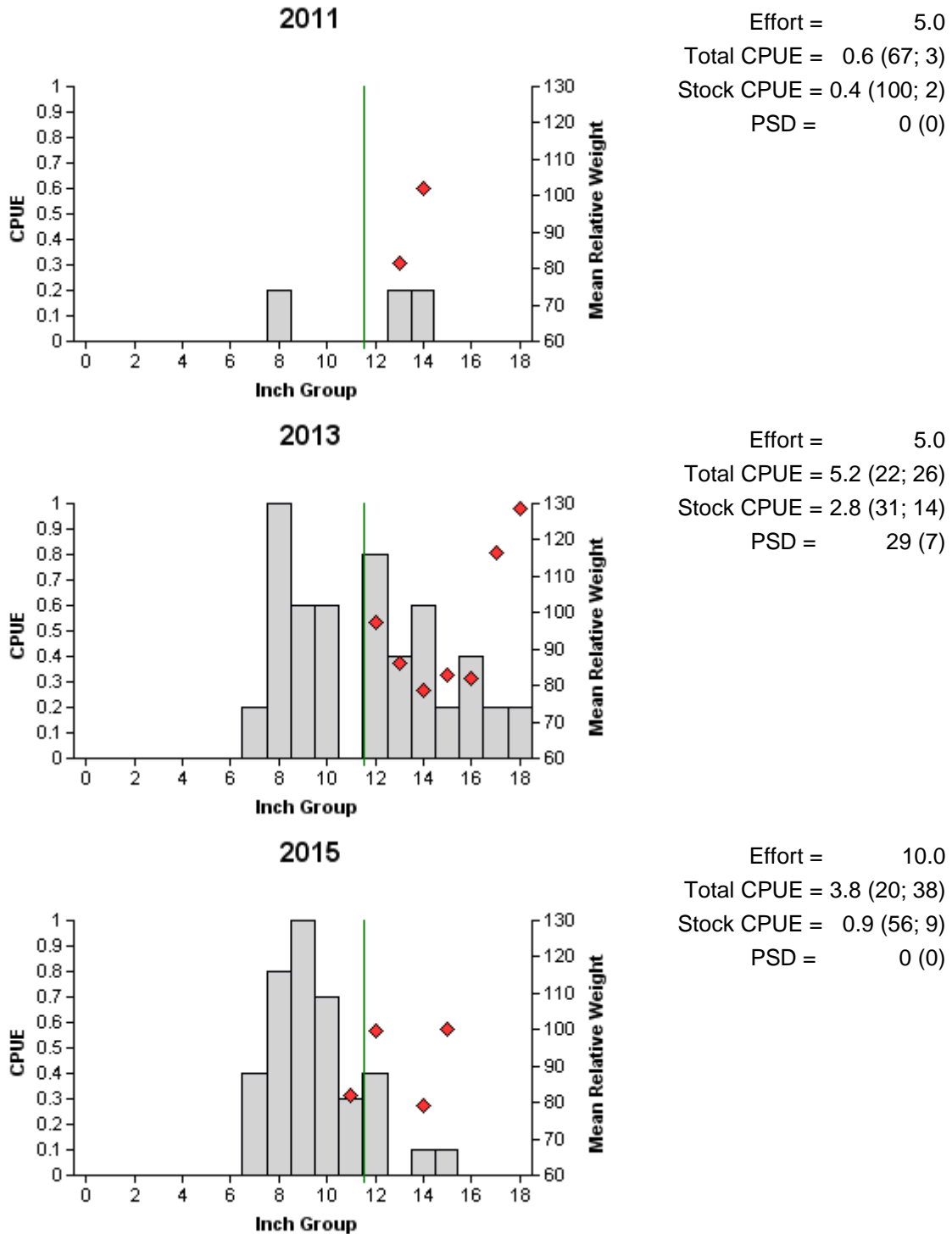


Figure 5. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE are in parentheses) for spring gill net surveys, Oak Creek Reservoir, Texas, 2011, 2013, and 2015. Vertical line represents the minimum length limit for harvestable-sized fish.

Flathead Catfish

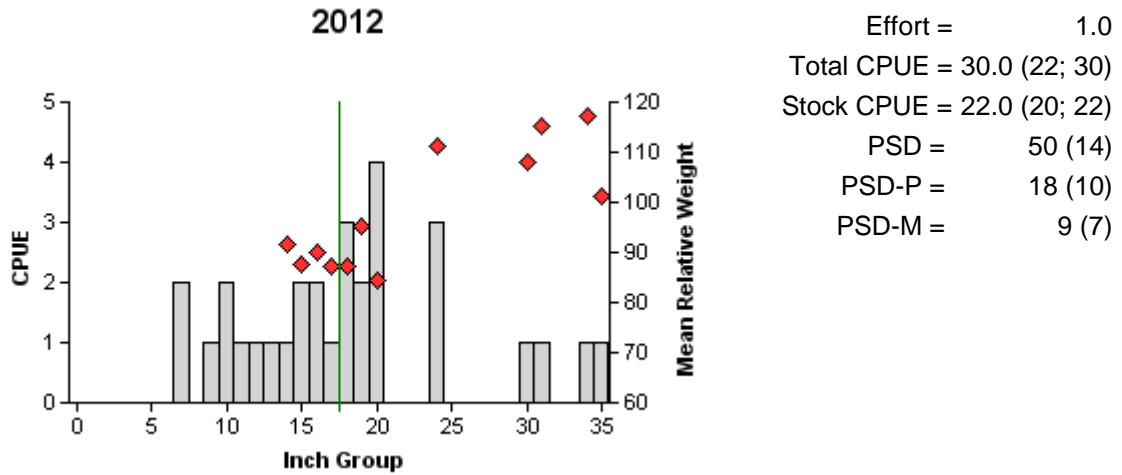


Figure 6. Number of Flathead Catfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE are in parentheses) for summer low-frequency electrofishing survey, Oak Creek Reservoir, Texas, 2012. Vertical line represents the minimum length limit for harvestable-sized fish.

White Bass

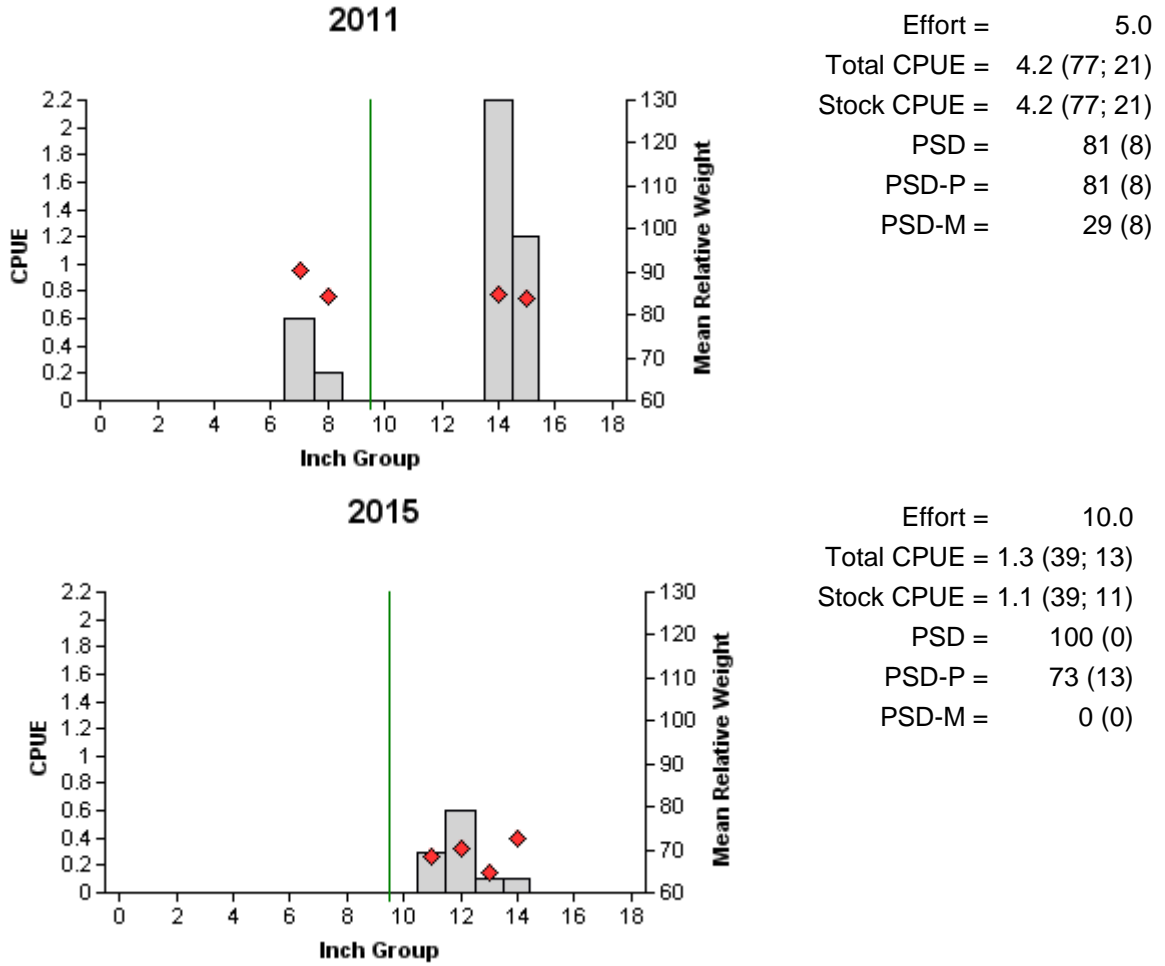


Figure 6. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Oak Creek Reservoir, Texas, 2011 and 2015. Zero White Bass were collected in 5 net-nights in 2013. Vertical line represents the minimum length limit for harvestable-sized fish.

Largemouth Bass

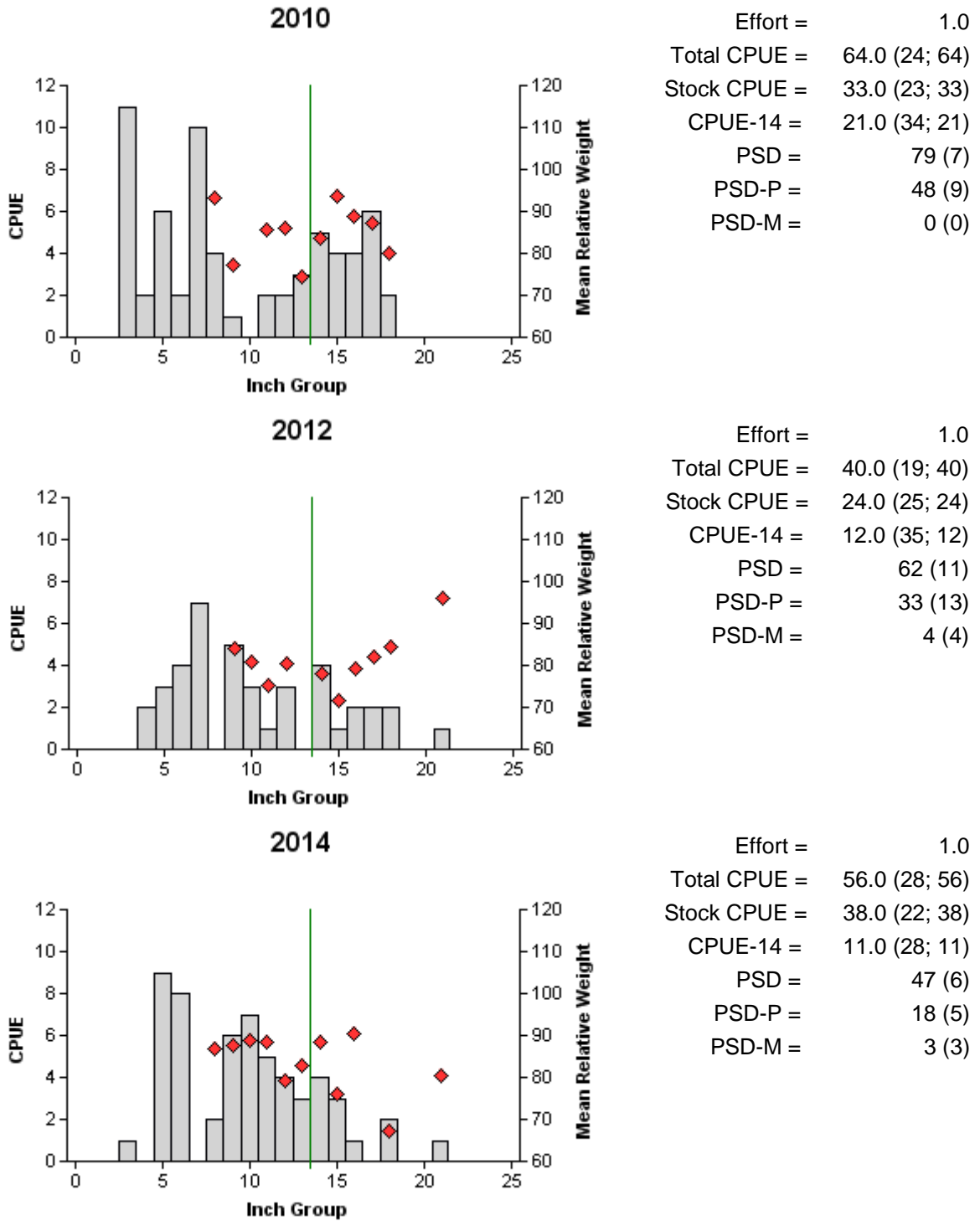


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Oak Creek Reservoir, Texas, 2010, 2012, and 2014. Vertical line represents the minimum length limit for harvestable-size fish.

White Crappie

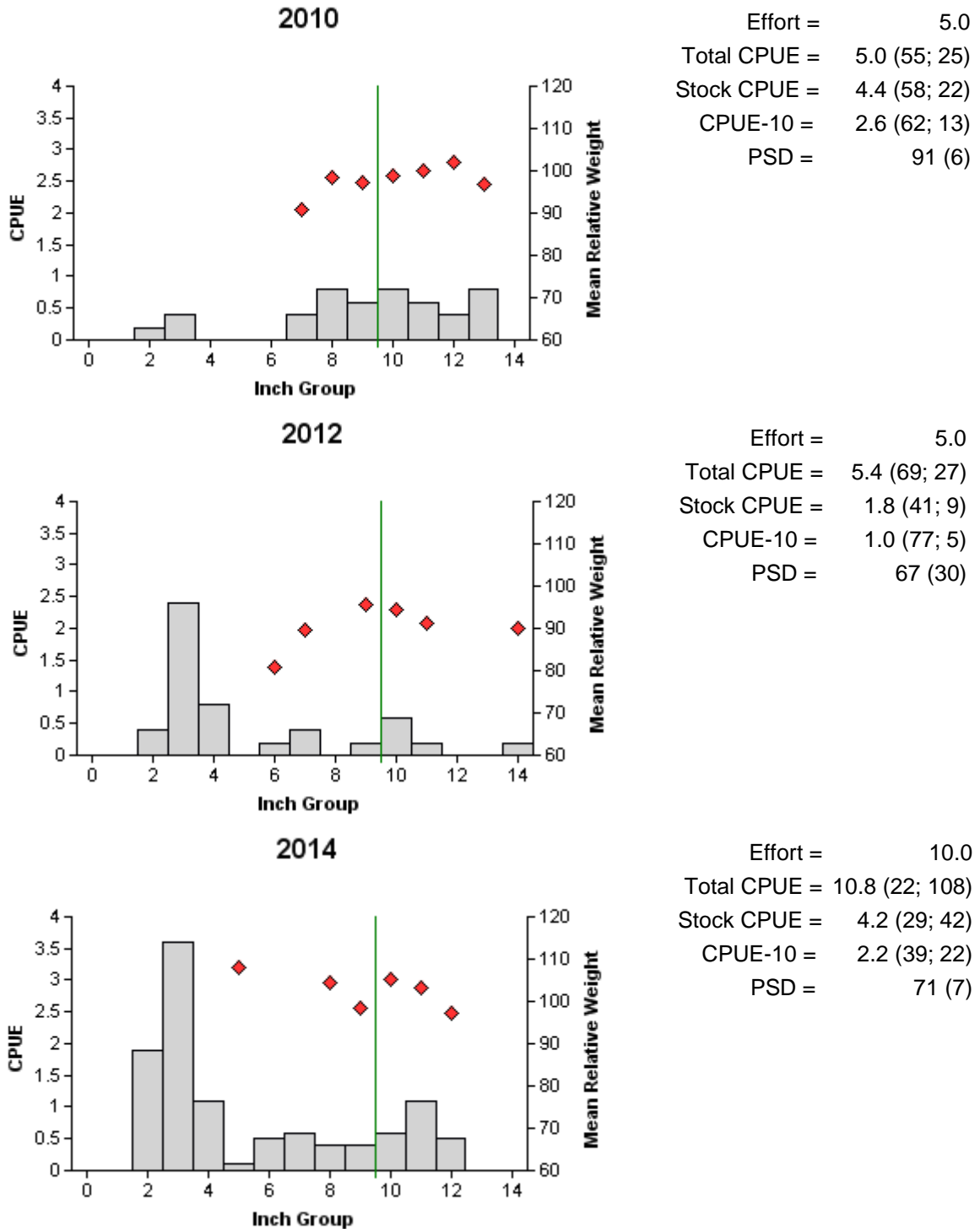


Figure 8. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Oak Creek Reservoir, Texas, 2010, 2012, and 2014. Vertical line represents the minimum length limit for harvestable-size fish.

Table 5. Proposed sampling schedule for Oak Creek Reservoir, Texas. Survey period is June through May. 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. The creel survey will be conducted in spring. Standard surveys denoted by S and additional surveys denoted by A.

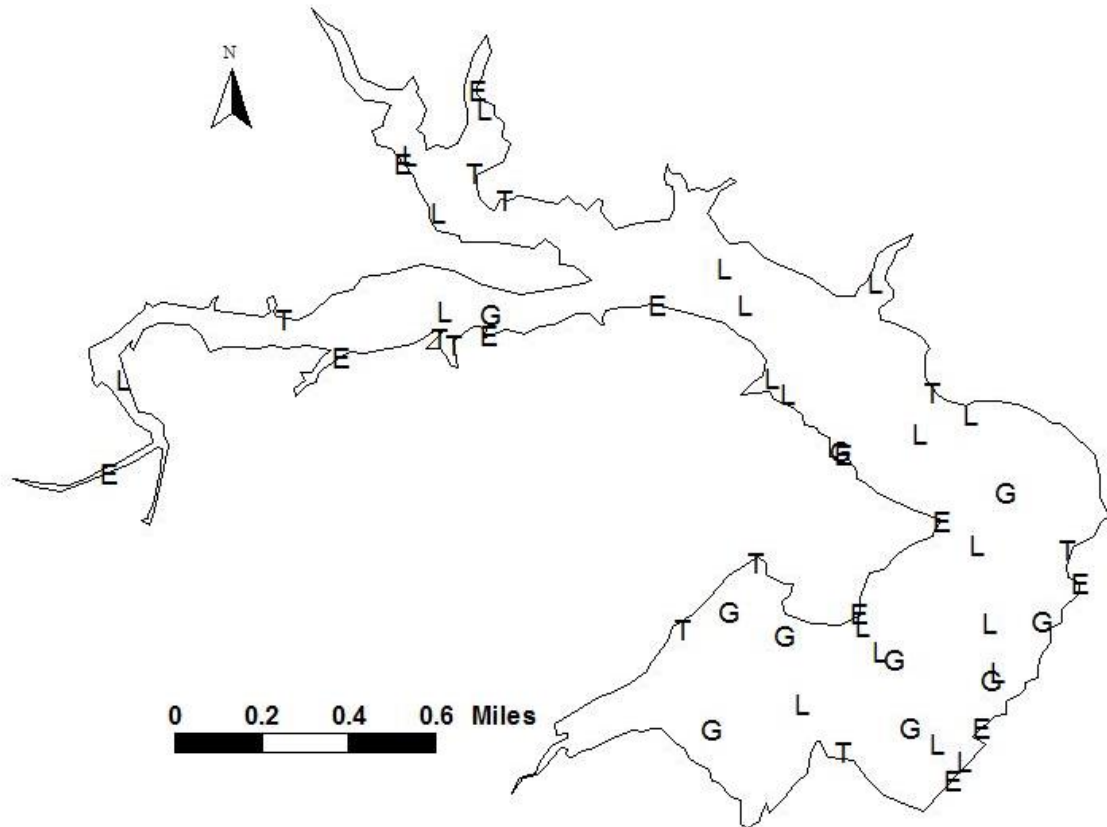
Survey year	Electrofishing	Trap net	Gill net	LF Electro-fish	Vegetation	Access	Creel survey	Report
2015-2016								
2016-2017	A	A	A					
2017-2018				A			A	
2018-2019	S	S	S		S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected by all standard gear types from Oak Creek Reservoir, Texas, 2014-2015. Sampling effort was 10 net-nights for gill netting, 10 net-nights for trap netting, and 1 hour for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad	209	20.9	248	24.8	116	116.0
Common Carp	86	8.6				
River Carpsucker	20	2.0				
Blue Catfish	56	5.6				
Channel Catfish	38	3.8				
Flathead Catfish	4	0.4				
White Bass	13	1.3	9	0.9		
Redbreast Sunfish			2	0.2	24	24.0
Green Sunfish	1	0.1			10	10.0
Warmouth			6	0.6		
Bluegill	4	0.4	98	9.8	15	15.0
Longear Sunfish	2	0.2	9	0.9	2	2.0
Largemouth Bass	1	0.1			56	56.0
White Crappie	5	0.5	108	10.8		

APPENDIX B



Location of sampling sites, Oak Creek Reservoir, Texas, 2014-2015. Trap net, gill net, electrofishing, and low-frequency electrofishing stations are indicated by T, G, E, and L, respectively. Water level was approximately 26 feet below conservation pool at time of sampling and reservoir surface area was 423 acres.