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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2016 Fisheries Management Survey Report

**Buffalo Creek Reservoir**

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## SURVEY AND MANAGEMENT SUMMARY

Fish populations in Buffalo Creek Reservoir were surveyed in 2016 using electrofishing and trap netting. Historical data are presented with the 2016 data for comparison. This report summarizes the results of the surveys and contains a management plan based on those findings.

- **Reservoir description:** Buffalo Creek Reservoir is a 1,577-acre impoundment located on the North Fork of Buffalo Creek in the Red River Basin approximately 20 miles west of Wichita Falls. At full pool, its shoreline is characterized as natural with some rocks. Buffalo Creek would be characterized as turbid. The reservoir was essentially dry in 2014 and has since filled up.
- **Management history:** Important sport fish include Largemouth Bass, White Crappie, and catfishes. Buffalo Creek has always been managed with statewide regulations. Stocking did not occur in 2015 because low dissolved oxygen. Florida Largemouth bass were stocked in 2016 and 2017 and Bluegill in 2016.
- **Fish Community**
  - **Prey species:** Small Gizzard Shad and Bluegill were present, but in low abundance.
  - **Catfishes:** Channel Catfish fingerlings were stocked in 2016. Black Bullhead are currently very abundant in the reservoir.
  - **Largemouth Bass:** Largemouth Bass were stocked in 2016, but few were sampled in the fall with electrofishing. Another stocking of fingerling Florida Largemouth bass occurred in 2017. About 90 retired broodstock bass were also stocked into the reservoir in 2017.
  - **White Crappie:** White Crappie were present, but in low abundance.
- **Management Strategies:** Monitor fish populations using trap nets, gill nets, and electrofishing in 2018-2019 and 2020-2021.

## INTRODUCTION

This document is a summary of fisheries data collected from Buffalo Creek Reservoir in 2016. 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 fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2016 data for comparison.

### *Reservoir Description*

Buffalo Creek Reservoir is a 1,577-acre impoundment constructed in 1964 on the North Fork of Buffalo Creek. It is located in Wichita County, approximately 20 miles west of Wichita Falls and is operated and controlled by the city of Iowa Park. The primary use is for recreation. Mean depth is 10 feet when the reservoir is at conservation pool. Other descriptive characteristics are in Table 1.

### *Angler Access*

Buffalo Creek Reservoir has a single two-lane public boat ramp which is unusable when the reservoir is more than 14 feet below conservation pool. Boat access was impeded from 2012-2015 because the end of the boat ramp was above the waterline. Extension of the ramp is not feasible. In 2015, after the reservoir filled, the ramp was again unusable because the ramp and the adjacent parking area were under water. The dirt road leading to the ramp becomes rutted after precipitation events making access difficult. Additional boat ramp characteristics are in Table 2. Shoreline access is available for much of the reservoir.

### *Management History*

**Previous management strategies and actions:** Management strategies and actions from the previous survey report (Lang and Mauk 2013) included:

1. Work with the City of Iowa Park to start and complete road improvement to the boat ramp. The city received a matching grant from the Boating Access Grant program. In the past, access to the reservoir by vehicle after rainfall events was restricted by the city of Iowa Park which leads to a decrease in usage.

**Action:** Worked with the city of Iowa Park to begin improving the road. For various reasons including that the boat ramp and parking area has been under water since 2015, no progress has been made.

2. In the past, we have cut mesquite trees on the dam and placed them in the reservoir as fish habitat. We have also half cut larger trees allowing them to fall into the reservoir. These practices were to continue.

**Action:** The reservoir went dry and terrestrial vegetation grew up from the dry lake bed. Once the reservoir filled up, there was no need for extra habitat so no habitat work has occurred the last few years.

3. Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. Therefore, the district office was vigilant for invasive species in the reservoir and erected signage about invasive.

**Actions:**

1. The district office monitored the reservoir for invasive species and erected signage on-site about them.

2. Made a speaking point about invasive species when presenting to constituent and user groups.
3. Keep track of existing and future inter-basin water transfers to facilitate potential invasive species responses.
4. The hatchery system is always looking for new locations to acquire northern Largemouth Bass broodstock. Since the reservoir went dry, northern Largemouth Bass would be requested to create another source for them.

**Action:** Requested a stocking of northern Largemouth Bass in 2015 but the reservoir lacked adequate dissolved oxygen when fish were ready to stock so no stocking occurred. In 2016 no northern Largemouth Bass were available to stock so Florida Largemouth Bass were stocked.

**Harvest regulation history:** Sport fish species in Buffalo Creek Reservoir have always been managed using statewide harvest regulations. Current regulations are found in Table 3.

**Stocking history:** In 2016, Florida Largemouth Bass, Channel Catfish, and Bluegill were stocked. In 2017, fingerling Florida Largemouth Bass and retired hatchery broodstock were stocked. The complete stocking history is in Table 4.

**Vegetation/habitat history:** Buffalo Creek has no significant aquatic vegetation management history. It has had habitat enhancement work completed in the past using mesquite trees growing on the dam that were cut and sunk as fish attractors. The resulting brush piles were popular with anglers. The work ceased when the reservoir nearly dried up in 2004. This enhancement work started up again in late 2009 continuing to 2012 when it once again ceased because of low reservoir elevations.

**Water transfer:** There is a functional water pumping station which can transfer water to other locations within the basin; but it is seldom operated, only enough to keep the pumps in operational condition. There are no interbasin transfers of water.

## METHODS

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Buffalo creek Reservoir (TPWD unpublished). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

*Electrofishing* – Largemouth Bass, Sunfishes, and Gizzard Shad were collected by electrofishing (1 hour at 12, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

*Trap netting* – Crappie were collected using trap nets (5 net nights at 5 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn).

*Statistics* – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified 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). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics.

*Habitat* – A structural habitat survey was conducted in 2016. Vegetation surveys were conducted in 1998, 2002, 2010, and 2016 to monitor presence/absence of aquatic vegetation. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

*Water level* – Source for water level data was the United States Geological Survey (USGS 2017).

## RESULTS AND DISCUSSION

**Habitat:** Littoral zone structural habitat consisted primarily of natural shoreline with some rocky habitat (Table 6). Native vegetation covered less than 1% of the reservoir (Table 7). Historically, vegetation has been absent to less than 1% coverage.

**Prey species:** The 2016 electrofishing Gizzard Shad CPUE was 65.0/h which was well below that in 2010 (383.0/h) and in 2006 (1,188.0/nn; Figure 2). Index of vulnerability was 100 for the current survey, an increase compared to 2010 when it was 57. Bluegill CPUE was 24.0/h in 2016, much lower than in 2010 when it was 93.0/h and similar to 2006 when it was 22.0/h (Figure 3). Trap net CPUE for Bluegill was 27.8/nn (Appendix A) so electrofishing may have underestimated Bluegill abundance.

**Channel Catfish:** Channel Catfish were stocked in 2016 as fingerlings. Gill netting did not occur in 2017 because stocked catfish were presumed to not yet be large enough to capture.

**Largemouth Bass:** Largemouth Bass electrofishing CPUE was 5.0/h in 2016, well below the 49.0/h in 2010 and 65.0/h in 2006 (Figure 4). Fish length ranged from 4 to 8 inches. Because of low relative abundance, another stocking of Florida Largemouth Bass occurred in 2017.

**White Crappie:** The trap net catch rate of White Crappie was 16.4/nn in 2016 compared to 1.0/nn and 131.9/nn in 2015 and 2010 respectively (Figure 5). Fish length ranged from 4 to 13 inches in length. In 2015, a Black Crappie was captured in a trap net, the first of this species documented in Buffalo Creek. It probably entered the reservoir from flooded ponds upstream of the reservoir.

## Fisheries management plan for Buffalo Creek Reservoir, Texas

Prepared – July 2017

**Issue 1:** After rainfall events, the dirt road leading to the boat ramp from the Burnet Ranch Road becomes deeply rutted and damaged by off-road enthusiasts. When the road dries out, it is almost impossible to navigate with a boat trailer or even a decent vehicle. This negatively impacts angler usage of the reservoir.

### MANAGEMENT STRATEGY

1. Work with the city of Iowa Park to make improvements to the road leading to the boat ramp. The city received a matching grant from the Boating Access Grant program. Currently the ramp and parking areas are under water but work can still be completed on the road to it.

**Issue 2:** The 2016 electrofishing survey found few Largemouth Bass indicating low stocked fish survival and natural reproduction. The bass sampled were all eight inches or below. While not aged, these are presumed to be from the 2016 stocking

### MANAGEMENT STRATEGY

1. A Florida Largemouth Bass stocking has been requested for 2017 to supplement the population.

**Issue 3:** Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, Zebra Mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

### MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Educate the public about invasive species through the use of media and the internet.
3. Make a speaking point about invasive species when presenting to constituent and user groups.
4. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

## **Objective-Based Sampling Plan and Schedule**

### Sport fish, forage fish, and other important fishes

Sport fishes in Buffalo Creek Reservoir have historically included Channel Catfish, Largemouth Bass, and White Crappie. The primary forage species has been Bluegill and Gizzard Shad.

### Low-density fisheries

Due to the reservoir going dry and not being restocked until 2016, all species would be considered negligible from a fisheries standpoint until they have had a chance to recruit to the fishery and become established.

### Survey objectives, fisheries metrics, and sampling objectives

Due to the extreme changes that have occurred at the reservoir, from going dry to completely filling, the current states of the fish populations are known to be in low abundance with most fish being sub-legal in length. Since the fish populations are rebounding, electrofishing, trap netting, and gill netting surveys will occur in 2018-2019 and again in 2020-2021 (Table 8). Minimal effort will initially be used to determine the status of the fisheries and will begin with 12 random electrofishing stations and 5 trap net and 5 gill net stations. Once fish populations are determined to be reestablished with multiple age classes being present, then a new objective based sampling plan will be completed.



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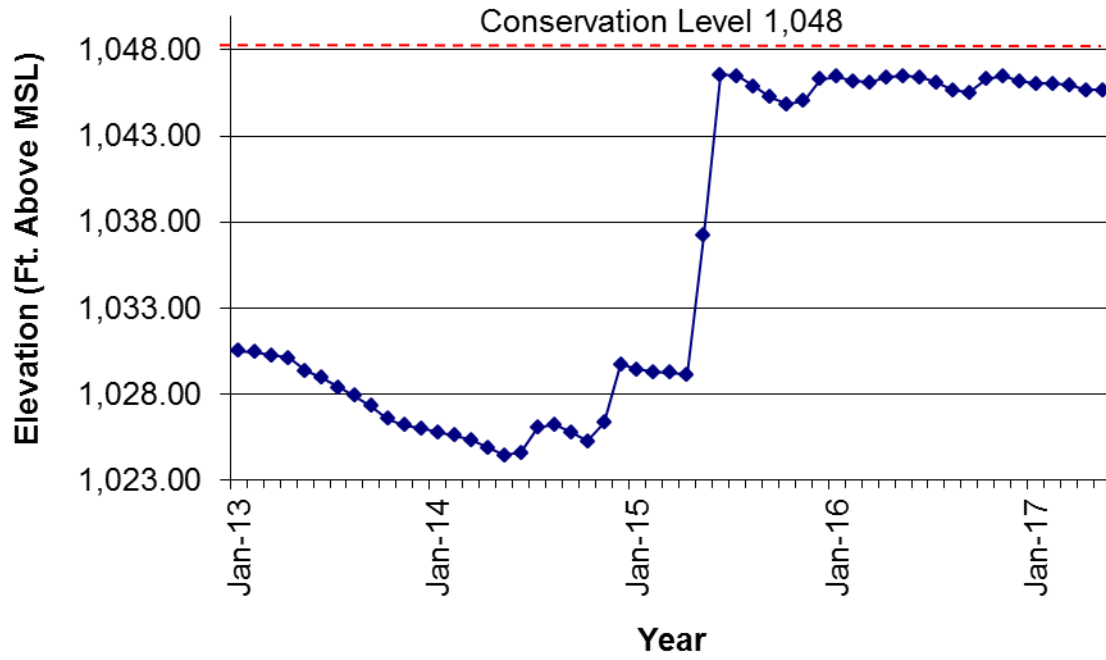


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Buffalo Creek Reservoir, Texas.

Table 1. Characteristics of Buffalo Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1964
Controlling authority	City of Iowa Park
County	Wichita
Reservoir type	Tributary
Shoreline Development Index (SDI)	3.7
Conductivity	365 $\mu\text{S}/\text{cm}$

Table 2. Boat ramp characteristics for Buffalo Creek Reservoir, Texas, August, 2016. Reservoir elevation at time of survey was 1,045.7 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Buffalo Creek boat ramp	33.98715 -98.76006	Y	30	1,034	Under water

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

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

Table 4. Stocking history for Buffalo Creek, Texas. FGL = fingerlings and AFGL = advanced fingerlings.

Species	Year	Number	Life Stage	Mean TL (in)
Bluegill	2016	63,306	AFGL	2.4
	Total	63,306		
Channel Catfish	2005	24,059	AFGL	9.9
	2016	157,665	FGL	3.1
	Total	181,724		
Florida Largemouth Bass	1993	139,987	FGL	1.2
	1999	141,148	FGL	1.4
	2008	165,989	FGL	1.7
	2016	156,908	FGL	1.8
	2017	172,141	FGL	1.5
	2017	89	ADULT	
Total	776,262			
Largemouth Bass	2005	38,460	FGL	1.6
	2006	48,070	FGL	1.9
	Total	86,530		

Table 5. Objective-based sampling plan components for Buffalo Creek Reservoir, Texas 2016.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Exploratory	Presence/absence	Practical effort
Bluegill	Exploratory	Presence/absence	Practical effort
Gizzard Shad	Exploratory	Presence/absence	Practical effort
Trap netting			
Crappie	Exploratory	Presence/absence	Practical effort

Table 6. Survey of structural habitat types, Buffalo Creek Reservoir, Texas, 2016. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Natural	18.6 miles	93.0
Rocky	1.4 miles	7.0

Table 7. Survey of aquatic vegetation, Buffalo Creek Reservoir, Texas, 1998, 2002, 2010, and 2016. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	1998	2002	2010	2016
Native submersed	0	0	1.0 (<0.1)	<0.1 (<0.1)
Native floating-leaved	0	0	0	<0.1 (<0.1)
Native emergent	0	0	0.2 (<0.1)	0

## Gizzard Shad

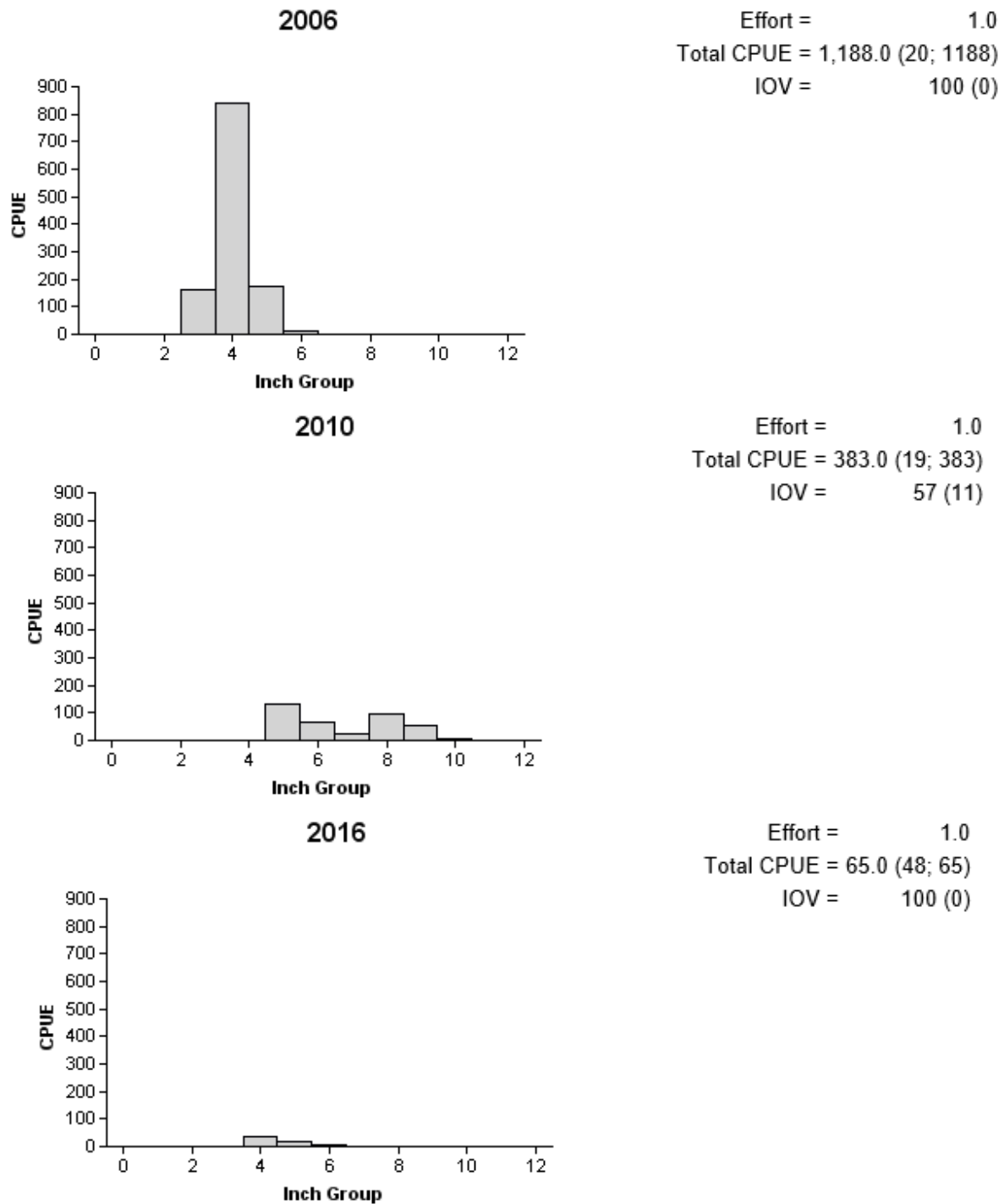


Figure 2. Number of Gizzard Shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Buffalo Creek Reservoir, Texas, 2006, 2010, and 2016.

## Bluegill

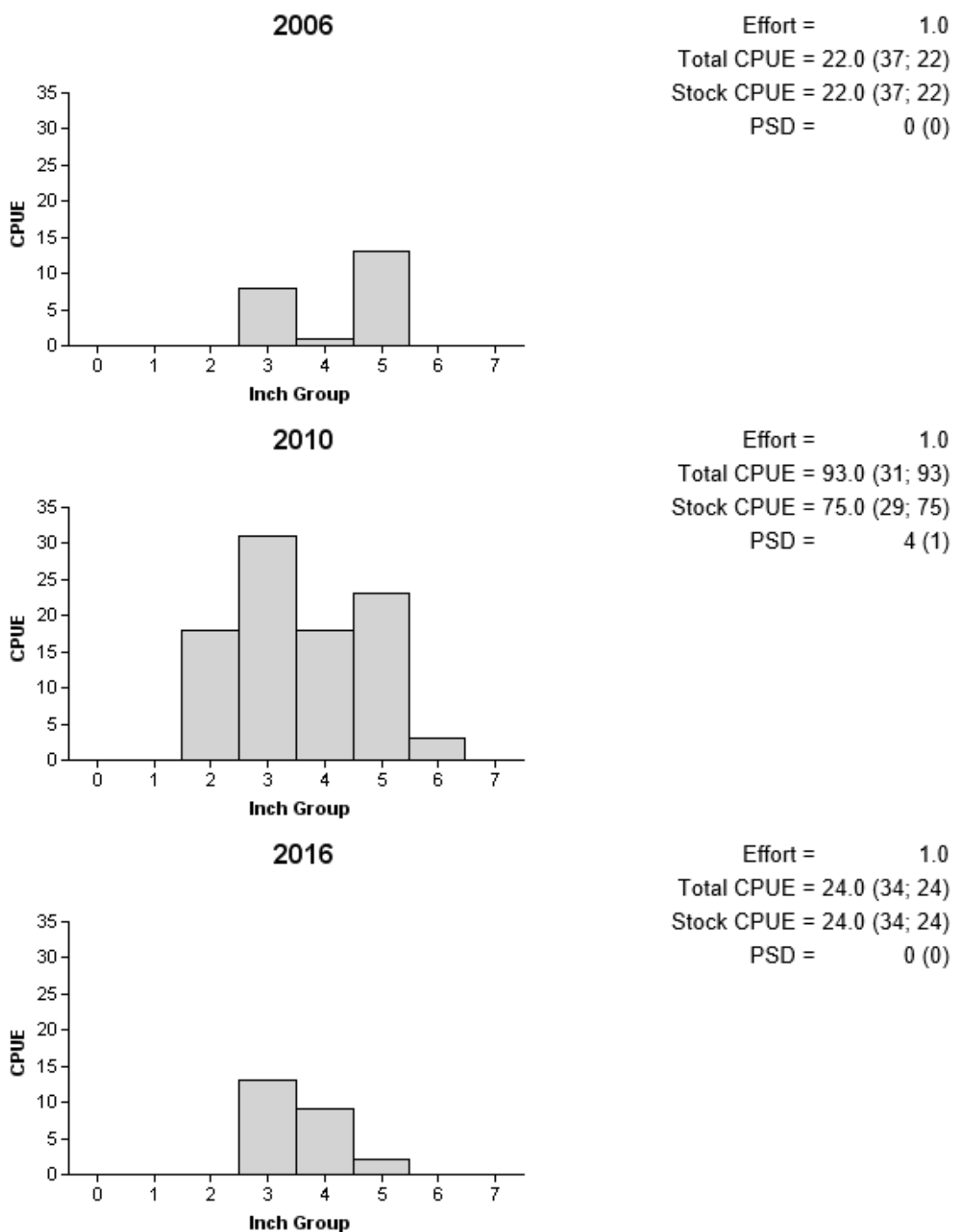


Figure 3. Number of Bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Buffalo Creek Reservoir, Texas, 2006, 2010, and 2016.

## Largemouth Bass

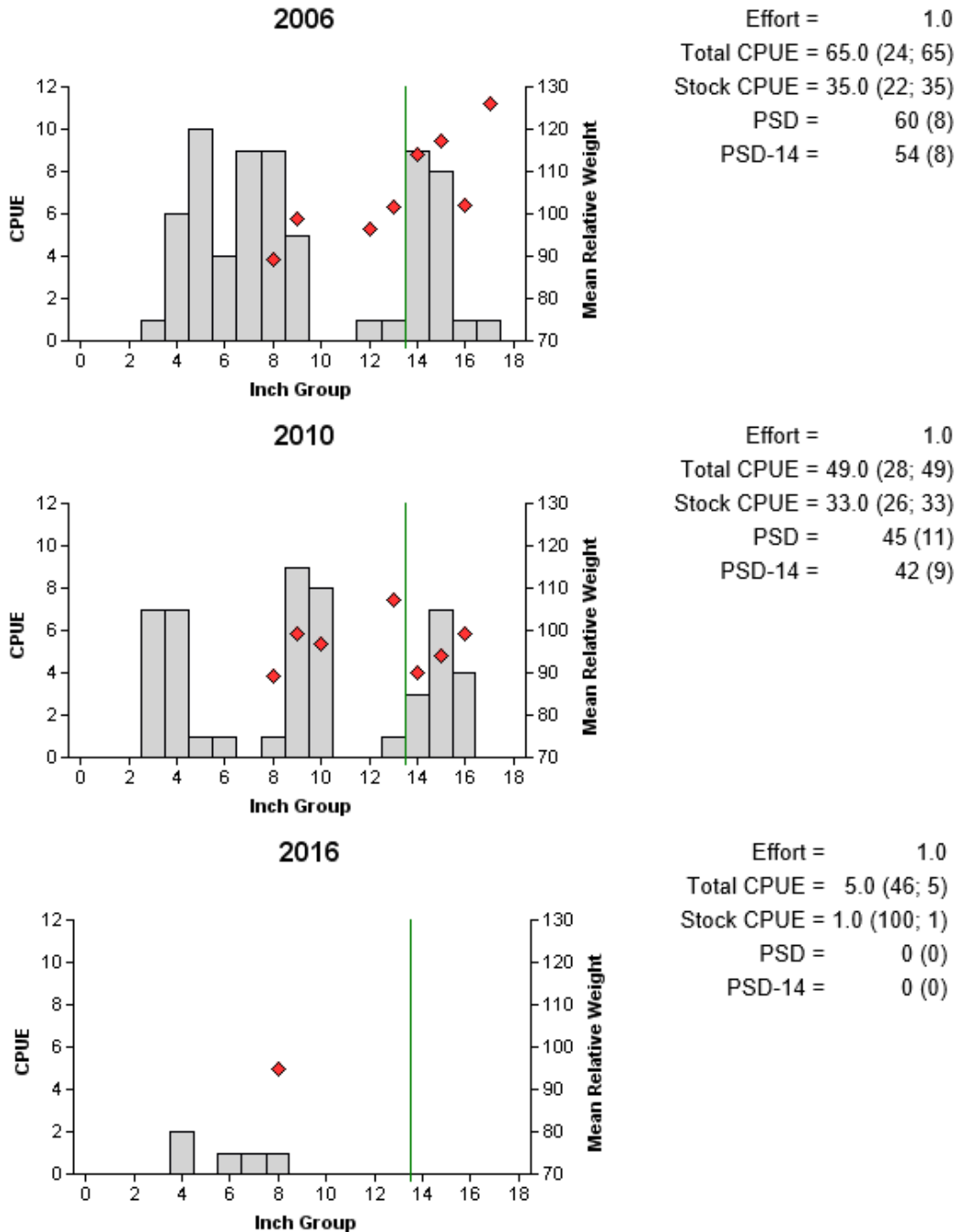


Figure 4. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Buffalo Creek Reservoir, Texas, 2006, 2010, and 2016. Vertical line indicates minimum length limit.



## White Crappie

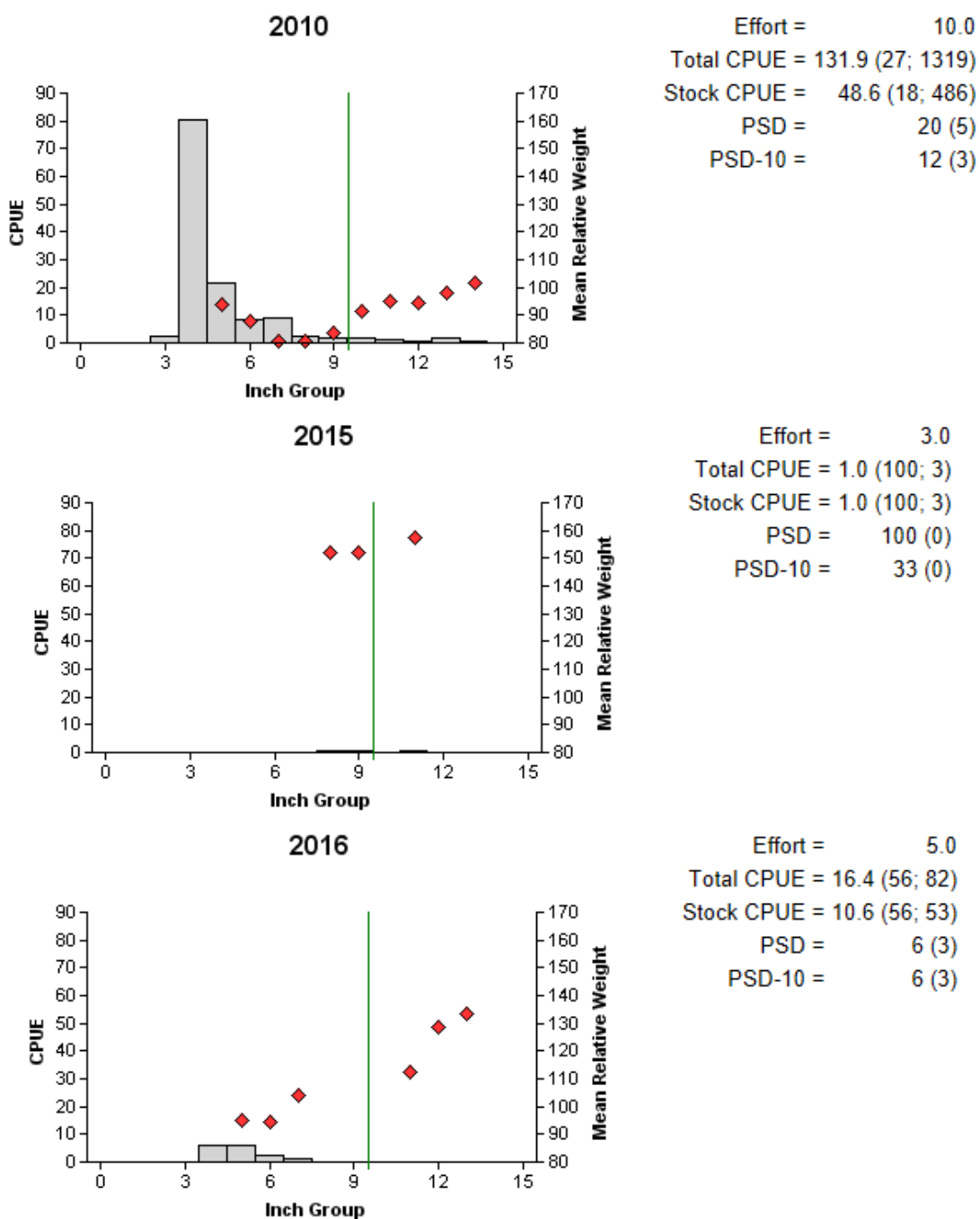


Figure 5. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Buffalo Creek Reservoir, Texas, 2010, 2015, and 2016. Vertical line indicates minimum length limit.

Table 8. Proposed sampling schedule for Buffalo 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. Standard survey denoted by S and additional survey denoted by A.

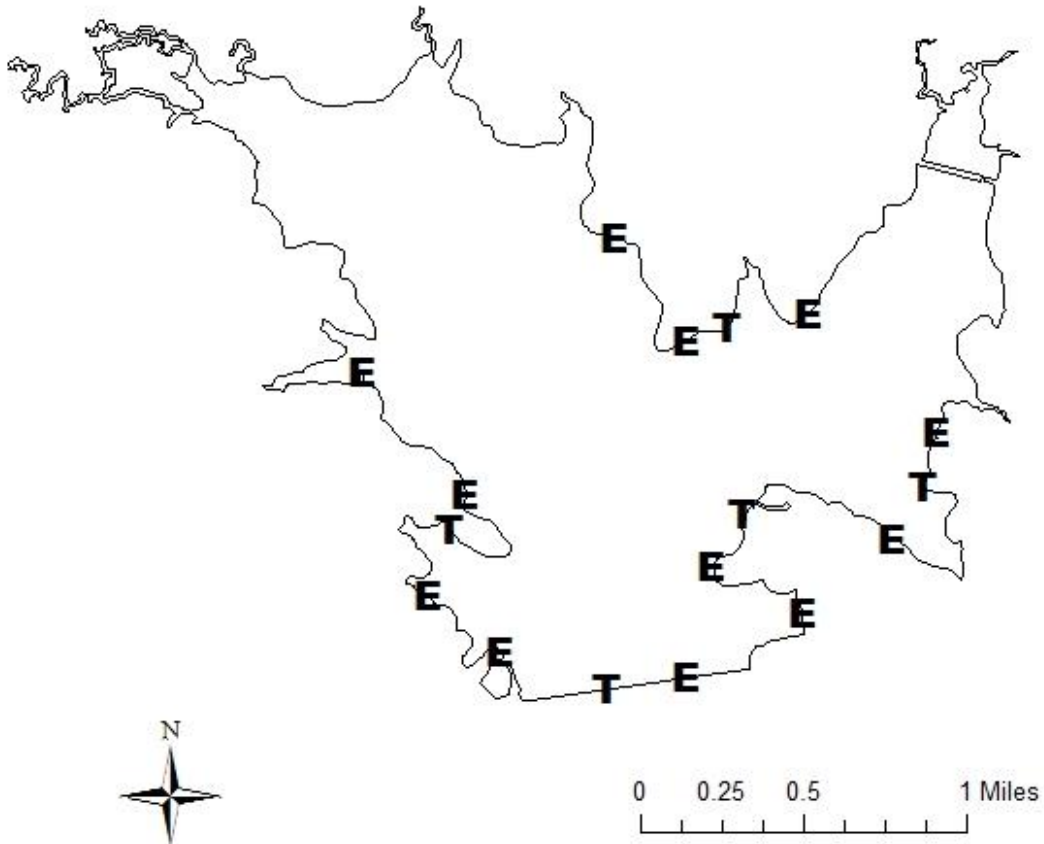
Survey year	Electrofishing Fall	Trap net	Gill net	Habitat			Creel survey	Report
				Structural	Vegetation	Access		
2017-2018								
2018-2019	A	A	A					
2019-2020								
2020-2021	S	S	S		S	S		S

**APPENDIX A**

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Buffalo Creek Reservoir, Texas, 2016. Sampling effort was 5 net nights for trap netting and 1.0 hour for electrofishing.

Species	Trap Nets		Electrofishing	
	N	CPUE	N	CPUE
Gizzard Shad	36	7.2	65	65.0
Black Bullhead	119	23.8		
Green Sunfish	85	17.0	8	8.0
Orangespotted Sunfish	13	2.6		
Bluegill	139	27.8	24	24.0
Longear Sunfish			2	2.0
Largemouth Bass	1	0.2	5	5.0
White Crappie	82	16.4		

## APPENDIX B



Location of sampling sites, Buffalo Creek Reservoir, Texas, 2016. Trap net and electrofishing stations are indicated by T and E, respectively. Water level was near full pool at time of sampling.