

# Buffalo Creek Reservoir

## 2020 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-4

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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## Survey and Management Summary

Fish populations in Buffalo Creek Reservoir were surveyed in 2019 and 2020 using electrofishing, 2018 and 2020 using trap netting, and in 2021 using gill netting. Historical data are presented with the 2018-2021 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 early 2015 and filled up after heavy precipitation that year. A reservoir wide White Crappie mortality event occurred in June of 2018.

**Management History:** Important sport fish include Largemouth Bass, White Crappie, and Channel Catfish. Buffalo Creek has always been managed with statewide regulations. Florida Largemouth Bass were stocked in 2016, 2017 and 2019. Bluegill and Channel Catfish were stocked in 2016 and Channel Catfish had an additional stocking in 2018.

### Fish Community

- **Prey species:** Gizzard Shad and Bluegill were present in high abundance. It was the highest electrofishing catch rate for Bluegill and third highest for Gizzard Shad with all being of a size easily consumed by predators.
- **Catfishes:** No Blue or Flathead Catfish were sampled, nor have they been restocked since the reservoir refilled. Channel Catfish fingerlings were stocked in 2016 and nine-inch Channel Catfish were stocked in 2018. The population is doing well with abundance being above the historical average. Good numbers of legal-length catfish are available to anglers and they have excellent body condition.
- **Largemouth Bass:** Florida strain Largemouth Bass were stocked in 2016 but few were sampled in the fall. Another stocking occurred in 2017 and again in 2019 after a springtime bass only electrofishing survey resulted in the capture of only six legal length bass. The 2020 survey found bass to be more numerous with a balanced population size structure. All bass exhibited healthy body condition that improved with size.
- **Crappie:** White and Black Crappie were present in the 2020 trap net survey. Black Crappie were first observed in 2015 after the reservoir refilled. They probably originated from small ponds within the watershed that over-flowed allowing them to escape and take up residence in the reservoir. By 2018, they were well established in the reservoir and are still present to this day, though not as prevalent as in 2018. White Crappie have rebounded nicely after a reservoir wide mortality event occurred in 2018 that involved only White Crappie. In 2020, abundance has rebounded with decent numbers of crappie existing in the reservoir.

**Management Strategies:** Request stockings of Blue and Flathead Catfish. Request a stocking of northern strain Largemouth Bass as they may be better suited to the reservoir conditions thus improving the bass populations. Monitor fish populations using electrofishing in 2022 and 2024, trap nets in 2024, and gill nets in 2025, and. Examine age and growth to the legal length limit for Largemouth Bass as well as the population genetics in 2024.

## Introduction

This document is a summary of fisheries data collected from Buffalo Creek Reservoir in 2018-2021. 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 2018-2021 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 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. The shoreline is classified as natural with some rocky shoreline present. The main littoral habitat is 335 acres of flooded terrestrial vegetation located in the northern portion of the reservoir. The reservoir went dry in 2015, then heavy precipitation filled the reservoir that year (Figure 1). This resulted in lots of inundated terrestrial vegetation that started decomposing creating a low oxygen problem. Because the oxygen was low in 2015, stocking could not occur until 2016. A reservoir wide blue-green algal bloom occurred in June of 2018 that resulted in a White Crappie only kill, with no other species mortalities observed. Other descriptive characteristics are in Table 1.

## Angler Access

Buffalo Creek Reservoir has a single two-lane public boat ramp which is submerged when the reservoir is at full pool until it is about 1.5 feet below full pool. It can be used at full pool, but tow vehicle tires will be in shallow water as will anyone trying to launch/load the boat at trailer wench. It is also unusable when the reservoir elevation approaches 14 feet below pool and ramp extension is not feasible. A dirt road leading to the ramp was paved in 2018 vastly improving boater access to the reservoir. 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 (Mauk and Lang 2016) included:

1. After rainfall events, the dirt road leading to the boat ramp from the Burnett Ranch Road became deeply rutted and damaged by off-road enthusiasts. When the road dried out, it was almost impossible to navigate with a boat trailer or even a decent vehicle. This negatively impacted angler usage of the reservoir.

**Action:** Worked with the city of Iowa Park to improve the road leading to the boat ramp. The city received a matching grant from the Boating Access Grant program. The entire road from Burnet Ranch Road to the ramp area was paved. The parking and turn around areas have been underwater, so those areas have not been paved.

2. Following the reservoir refilling in 2015, the reservoir was stocked with Florida strain Largemouth Bass in 2016. The fall 2016 electrofishing survey resulted in few Largemouth Bass collected indicating low survival.

**Action:** Florida strain Largemouth Bass stocking occurred in 2017 and 2019 and a bass only spring electrofishing survey took place in 2019 to monitor the population.

3. Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically.

**Action:** The district office monitored the reservoir for invasive species and erected signage on-site about them. Office personnel made a speaking point about invasive species when presenting to the public. Inter-basin water transfers that potentially could facilitate invasive species spread were monitored.

**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. Adult fingerling Channel Catfish were stocked in 2018. In 2019, fingerling Florida Largemouth Bass were stocked. The complete stocking history is in Table 4.

**Vegetation/habitat management history:** Buffalo Creek Reservoir 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. Half felled trees along the dam were also utilized for littoral habitat. In 2020, Christmas trees were deployed along the face of the dam to act as fish attractors for bank anglers. Additional Christmas trees were deployed offshore for boat anglers. The resulting brush piles were popular with bank and boat anglers.

**Water transfer:** There is a functional water pumping station which can transfer water to other locations (Iowa Park Reservoir and Gordon Reservoir) 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 (Mauk and Lang 2017). 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 2017).

**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. A spring bass-only electrofishing survey (0.5 hour at 6, 5-minute stations) was conducted in 2019.

**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). In 2018, an exploratory trap net survey (3 net nights at 3 stations) was completed in response to a White Crappie kill that occurred earlier in the year.

**Gill netting** – Channel Catfish were collected by gill netting (5 net nights at 5 stations). CPUE for gill 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 =  $100 \times \text{SE of the estimate/estimate}$ ) was calculated for all CPUE statistics.

**Habitat** – A structural habitat survey was conducted in 2016. Vegetation surveys were conducted in 1998, 2002, 2010, 2016, and 2020 to monitor presence/absence of aquatic vegetation. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

**Water level** – Source for water level data was the United States Geological Survey (USGS 2021).

## Results and Discussion

**Habitat:** Littoral zone structural habitat consisted primarily of natural shoreline with some rocky habitat and 335 acres of flooded terrestrial vegetation located in the northern portion of the reservoir (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 2020 electrofishing Gizzard Shad CPUE was 501.0/h which was well above catch rates in 2016 (65.0/h) and in 2010 (383.0.0/nn; Figure 2). The 2020 catch rate was near the historical average of 465.8/h. Index of vulnerability was 100 for the current survey, the same as in 2016, but an increase compared to 2010 when it was 57. Bluegill CPUE was 289.0/h in 2020, much above the 2016 and 2010 catch rates of 24.0/h and 93.0/h: respectively and well above the historical average of 118.5/h (Figure 3). This was the highest catch rate we have ever had at Buffalo Creek for Bluegill. Prey was not lacking at the time of the electrofishing survey.

**Blue and Flathead Catfish:** No Blue or Flathead Catfish were sampled nor have there been any reports of any being caught since the reservoir refilled. Not surprising since they have not been restocked, though Blue Catfish had been requested in 2020 but due to Covid-19 pandemic, the hatcheries did not produce any that year. Before the reservoir went dry, these two catfish species were quite numerous and popular with anglers (Howell and Mauk 2011). The 2003 - 2011 gill net catch rates ranged from 4.6 to 9.4/nn for Blue Catfish and 0.2 to 1.4/nn for Flathead Catfish. Catfish *spp.* made up 13.8% of the angling effort during a 6-month creel survey completed in 2009-2010 (Howell and Mauk 2011).

**Channel Catfish:** Channel Catfish were stocked in 2016 after the reservoir refilled in 2015 following a prolonged drought that caused the reservoir to dry out in early 2015. Nine-inch Channel Catfish were stocked in 2018 to ensure that anglers could catch fish that they might want to harvest. The 2020 gill net survey catch rate was 8.0/nn, (figure 4) above the historical average of 5.7/nn but lower than the previous 2011 survey which had a catch rate of 11.1/nn, the highest relative abundance rate we have documented. Relative weights were good to excellent, ranging from 92-124 with a general trend of increasing  $W_r$  with increasing length (Figure 4). Proportional stock density (PSD) in 2021 (35) increased over the 2007 (25) and 2011 (31) surveys indicating a higher proportion of the stock-length (11-inches) population was of quality length (>16-inches). Catfish from 6 to 25-inches were sampled which indicates good growth considering the reservoir was dry in 2015 and not restocked until 2016.

**Largemouth Bass:** Largemouth Bass electrofishing CPUE was 21.0/h in 2020, well below the 49.0/h in 2010 but above the 5.0/h in 2016 (Figure 5). The 2016 survey was completed after the initial 2016 stocking once the reservoir refilled and the few bass sampled ranged in length from 4 to 8-inches. The low catch rate indicated poor survival of the stocked bass. This resulted in an additional stocking request being made in 2017. In spring of 2019, an exploratory bass-only electrofishing survey occurred which found a low Largemouth Bass relative abundance (12/h) with all fish being between 16 to 19-inches (Figure 6). No smaller bass were sampled. To avoid having a missing year-class and to boost abundance, another stocking occurred in 2019. The 2020 survey resulted in an increase in the catch rate and an improved length frequency with bass from 3 to 19-inches being sampled. Relative weights were considered excellent, especially for legal-length bass. In 2021, a stocking request was made for northern strain Largemouth Bass which might be better suited for this reservoir being that the reservoir is in the cooler, northern portion of the state. Since the reservoir refilled, we have been stocking Florida strain Largemouth Bass. Genetics have not been performed for the reservoir since 2006 since we have not been able to capture the numbers needed for analysis. Further, age and growth analyses need to be conducted since the last age and growth assessment was conducted in 2002. Therefore, fin clips for genetic analysis and age and growth data will be collected during the 2024 survey.

**White Crappie:** The trap net catch rate of White Crappie was 11.6/nn in 2020 compared to 1.0/nn and 16.4/nn in 2018 and 2016 respectively (Figure 7). Fish length ranged from 3 to 14-inches in length. The 2016 survey were mostly small crappie from 4-7-inches in length. In June of 2018, there was a blue-green algal bloom that resulted in a reservoir wide White Crappie kill. White Crappie were the only observed species that was affected by this event. Our fall 2018 exploratory trap net survey found low relative abundance of White Crappie. The 2020 trap net survey has documented that abundance is once again increasing. There was a good mix of crappie ranging in length from 3 to 14-inches in length. Body condition as measured by  $W_r$  increased with size being excellent in legal-length fish.

**Black Crappie:** In 2015, a Black Crappie was captured in a trap net, the first of this species documented in Buffalo Creek. Black Crappie probably entered the reservoir from flooded ponds upstream of the reservoir. The 2016 trap net survey captured no Black Crappie, however; by the 2018 exploratory trap net survey, the population had evidently become established with a CPUE of 38.3/nn and lengths ranging from 4 to 11-inches. The 2020 trap net survey resulted in a CPUE a 16.4/nn and a length range of 4 to 15-inches. Body condition like the White Crappie increased with increasing length and was considered good to excellent for legal-length fish.

# Fisheries Management Plan for Buffalo Creek Reservoir, Texas

Prepared – July 2021

**ISSUE 1:** Blue and Flathead Catfish were quite numerous and popular at the reservoir until the reservoir went dry in 2015. After refilling, these species have not been reintroduced into the reservoir. Members of the angling public have requested these species be reintroduced. Blue Catfish were requested in 2020, but due to Covid-19, the hatcheries were unable to produce them for stocking.

## MANAGEMENT STRATEGY

1. Request a stocking of two-inch Blue Catfish in 2021 and 2022 at a rate of 100/acre.
2. Collect and move some Flathead Catfish from Lake Arrowhead to Buffalo Creek in 2021.

**ISSUE 2:** The 2020 electrofishing survey found Largemouth Bass in low abundance but CPUE has been improving since 2016. Florida strain Largemouth bass were stocked in 2017 and 2019 to increase abundance. While these stockings have helped improve abundance, the population is well below the abundance found before the reservoir went dry. Genetics might be limiting the population since in the past, the population had been stocked with some northern strain Largemouth Bass as well as Florida strain Largemouth Bass. Genetic analysis of the population has not been completed because of lack of fish during sampling.

## MANAGEMENT STRATEGIES

1. A northern strain Largemouth Bass stocking has been requested for 2021 to supplement the population. Request another stocking of northern strain Largemouth Bass for 2022.
2. An additional electrofishing survey will be conducted in 2022 to examine the population.
3. A genetic analysis of the population will be conducted in 2024 during the electrofishing survey.

**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 STRATEGY

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Educate the public about invasive species using 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 (2021–2024)

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 some species having never been reintroduced, Blue and Flathead Catfish can be considered no-to-low density until they are reintroduced into the reservoir.

Survey objectives, fisheries metrics, and sampling objectives

Many populations of fish species are still recovering from the drought that ended in 2015 and possibly the low oxygen conditions that occurred once the reservoir refilled. The Largemouth Bass population is still recovering in terms of abundance. The introduction of northern-strain Largemouth Bass will possibly alter the genetic make-up of the population and will hopefully increase abundance. An additional electrofishing survey (12 random sites) will be completed in 2022 (Table 9) for general monitoring for abundance with an objective of CPUE RSE at 25 or below. Because of the rather small size of the reservoir, no additional sites will be completed if the objective is not met. Bluegill and Gizzard Shad will also be collected to monitor abundance trends with no set RSE precision. Size structure will be examined by measuring a minimum of 50 stock-length fish of each species. In 2024, a general monitoring electrofishing survey will be completed for the report year and conducted as the 2022 additional survey discussed earlier (Table 9). Tissue samples from 30 Largemouth Bass will be collected for genetic analysis. It is anticipated that this will give the northern strain Largemouth Bass time to reproduce thus altering the current genetic make-up. Collect otoliths from 13 Largemouth Bass between 13.0 to 14.9-inches in 2024 for age and growth analysis.

General monitoring trap netting using seven nets will occur in 2024 (Table 9). It is anticipated that this will result in a CPUE RSE  $\leq 25$  for both, White and Black Crappie and a size structure of White and Black Crappie with 50 or more stock-length fish. No extra trap netting is planned if the objectives are not met.

General monitoring using five gill nets for catfish species will occur in 2024 (Table 9). Blue Catfish will have only been in the reservoir four years but should be recruited to the gear. This will only be a presence/absence survey to determine how the newly introduced Blue Catfish are doing. It is doubtful we will be able to determine much about Flathead Catfish at this time and we will monitor Channel Catfish.

## Literature Cited

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## Tables and Figures

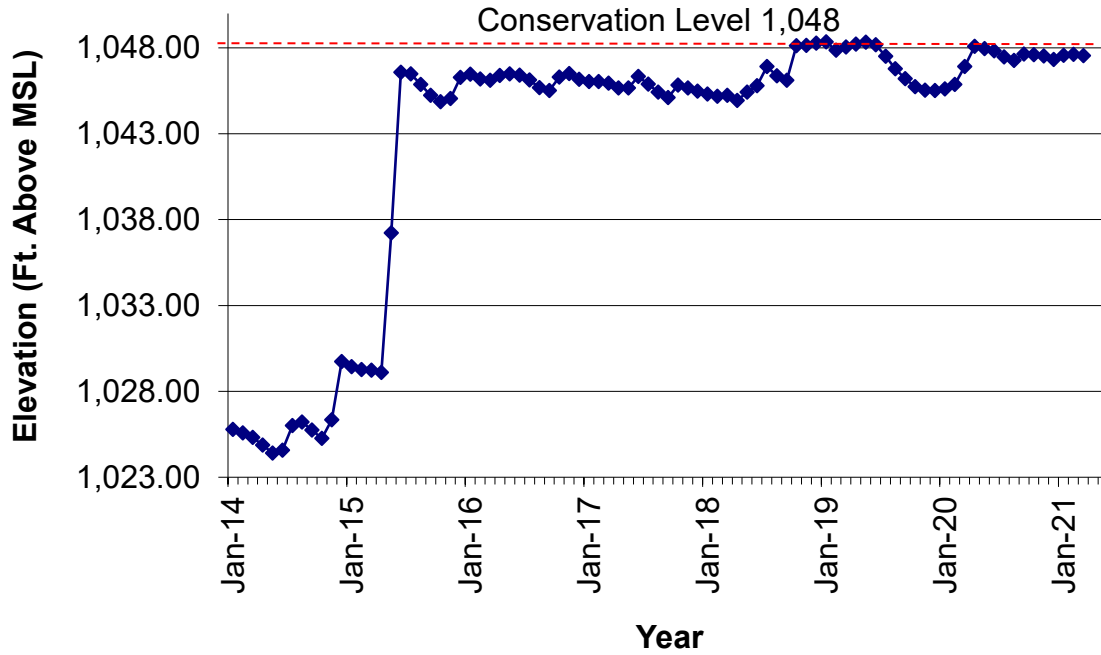


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Buffalo Creek Reservoir, Texas from 2014-2021.

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	3.7
Conductivity	631 $\mu$ S/cm

Table 2. Boat ramp characteristics for Buffalo Creek Reservoir, Texas, July 2020. Reservoir elevation at time of survey was 1,047.5 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 at time of report but can be used with getting shoes wet.

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
Catfish, Flathead	5	18-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black crappie, their hybrids, and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history for Buffalo Creek, Texas. Life stages fingerlings (FGL), advanced fingerlings (AFGL), and adults (ADL).

<b>Species</b>	<b>Year</b>	<b>Number</b>	<b>Life Stage</b>	<b>Mean TL (in)</b>
Blue Catfish	2021	92,447	FGL	2.2
	Total	92,447		
Bluegill	2016	63,306	AFGL	2.4
	Total	63,306		
Channel Catfish	2005	24,059	AFGL	9.9
	2016	157,665	FGL	3.1
	2018	6,709	AFGL	9.5
	Total	188,433		
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	89	ADL	17.7
	2017	172,141	FGL	1.5
	2019	108,900	FGL	1.6
	Total	885,162		
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 2019-2021.

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

<sup>a</sup> No additional effort will be expended to achieve an RSE  $\leq 25$  for CPUE of Bluegill and Gizzard Shad if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

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
Flooded terrestrial vegetation	335 acres	21.3

Table 7. Survey of aquatic vegetation, Buffalo Creek Reservoir, Texas, 1998–2020. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	1998	2002	2010	2016	2020
Native submersed			1.0 (<0.1)	<0.1 (<0.1)	
Native floating-leaved				<0.1 (<0.1)	
Native emergent			0.2 (<0.1)		<0.1 (<0.1)

### Gizzard Shad

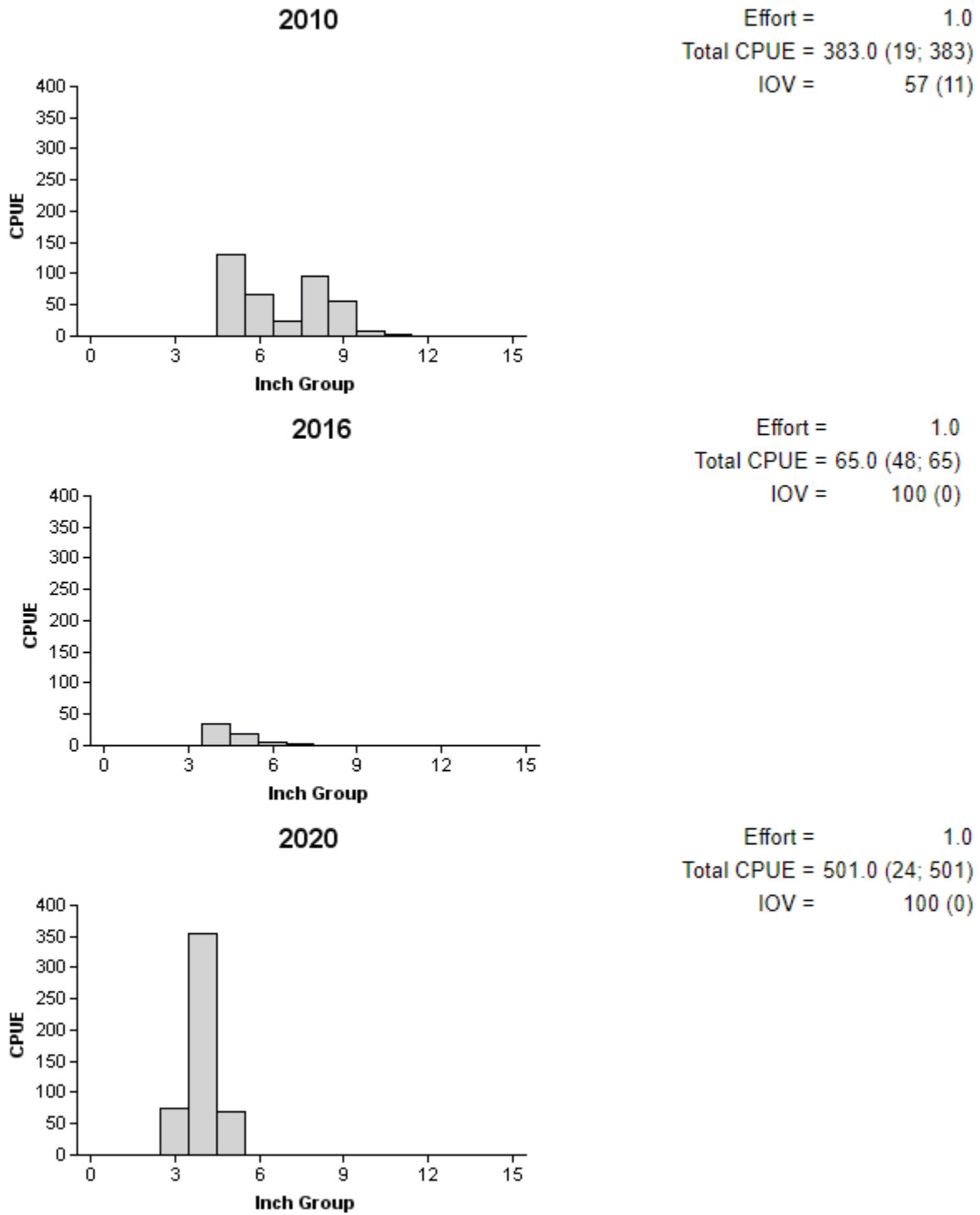


Figure 2. Number of Gizzard Shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Buffalo Creek Reservoir, Texas, 2010, 2016, and 2020.

## Bluegill

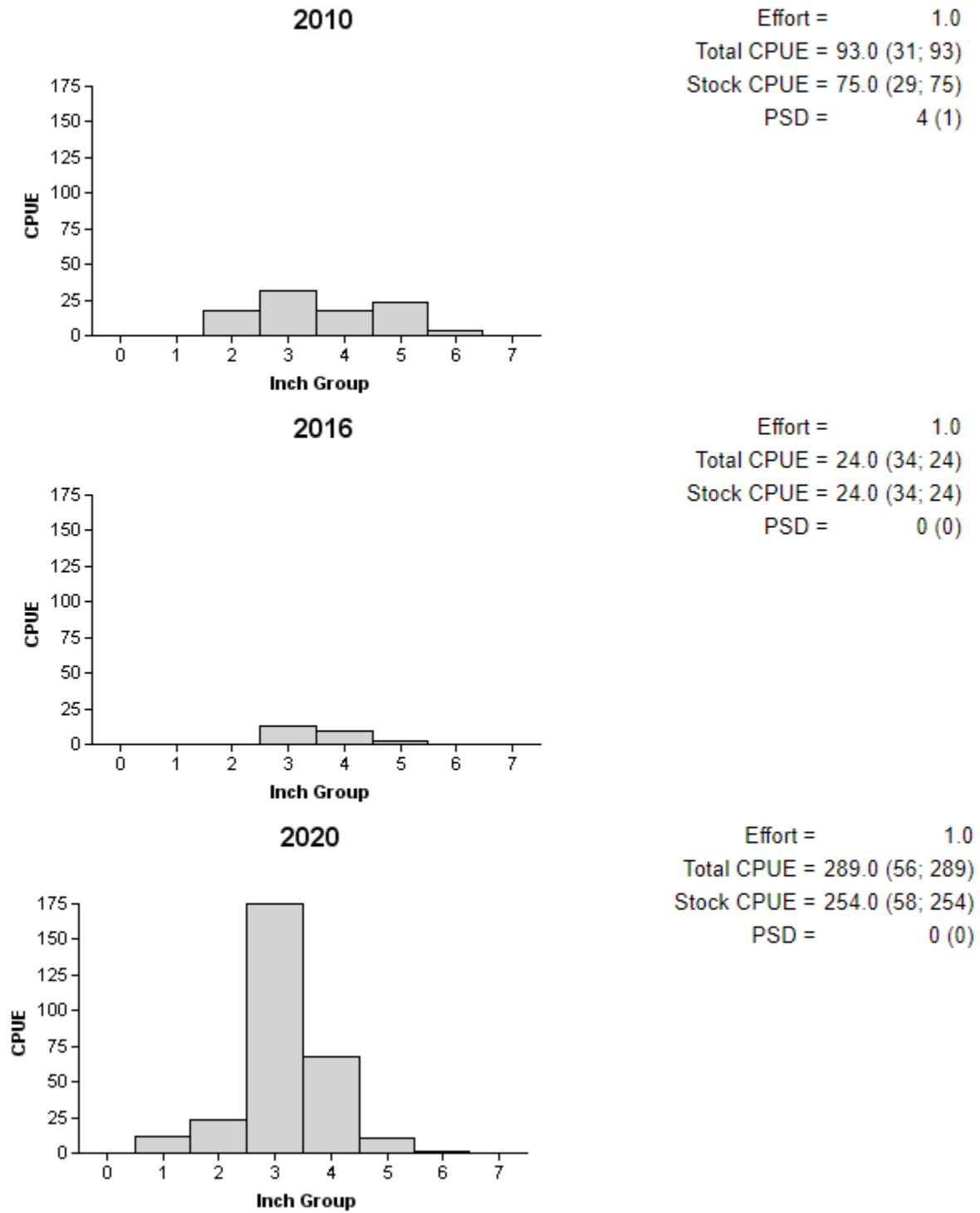


Figure 3. Number of Bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Buffalo Creek Reservoir, Texas, 2010, 2016, and 2020.



### Channel Catfish

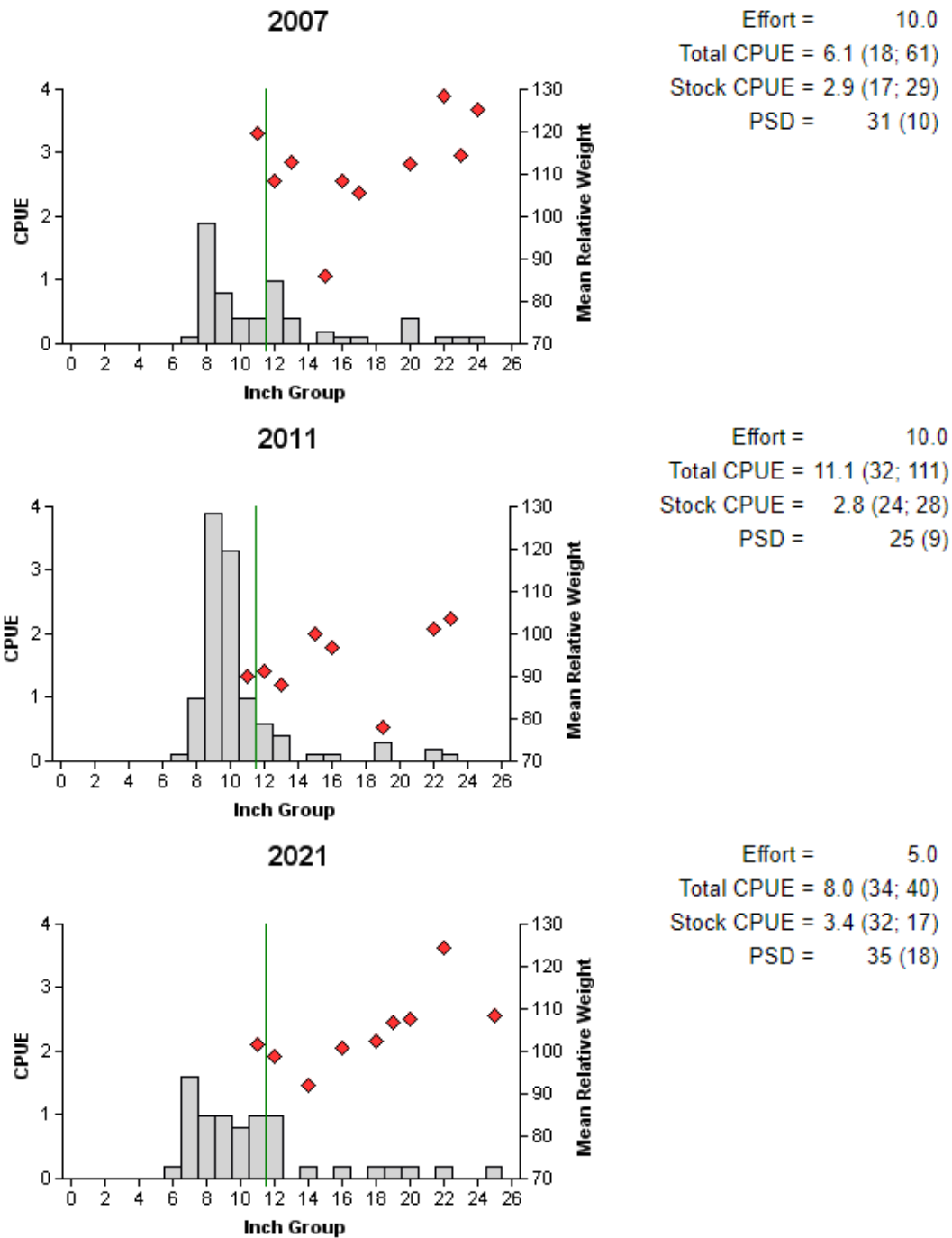


Figure 4. Number of Channel Catfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Buffalo Creek Reservoir, Texas, 2007, 2011, and 2021. Vertical line indicates minimum length limit.

### Largemouth Bass

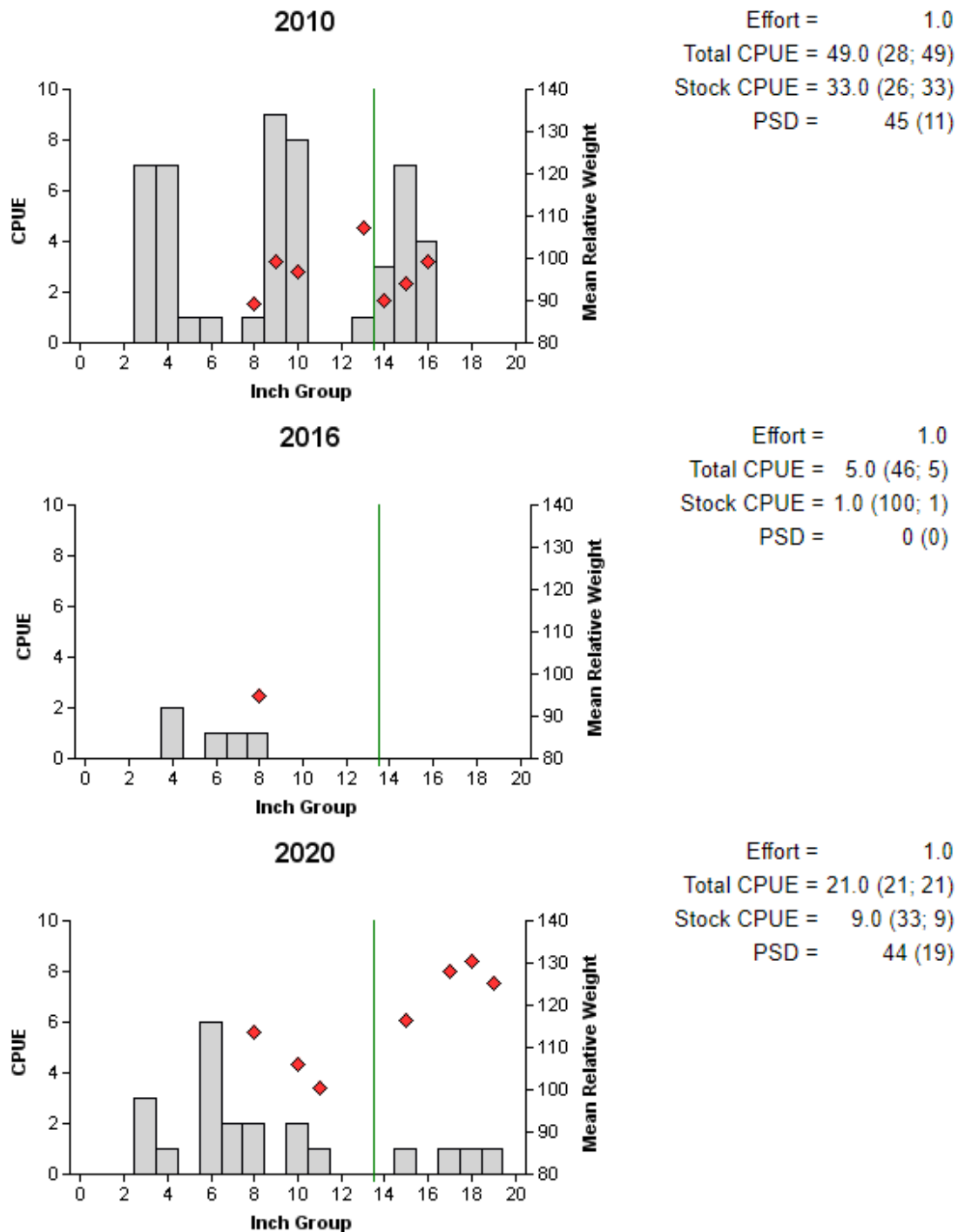


Figure 5. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Buffalo Creek Reservoir, Texas, 2010, 2016, and 2020. Vertical line indicates minimum length limit.

## Largemouth Bass

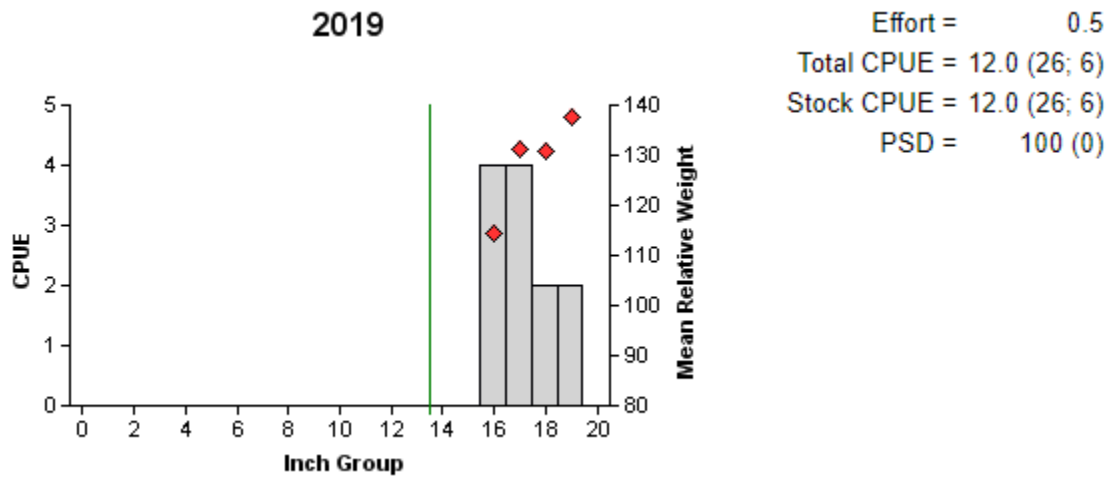


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring bass only electrofishing survey, Buffalo Creek Reservoir, Texas, 2019. Vertical line indicates minimum length limit.

### White Crappie

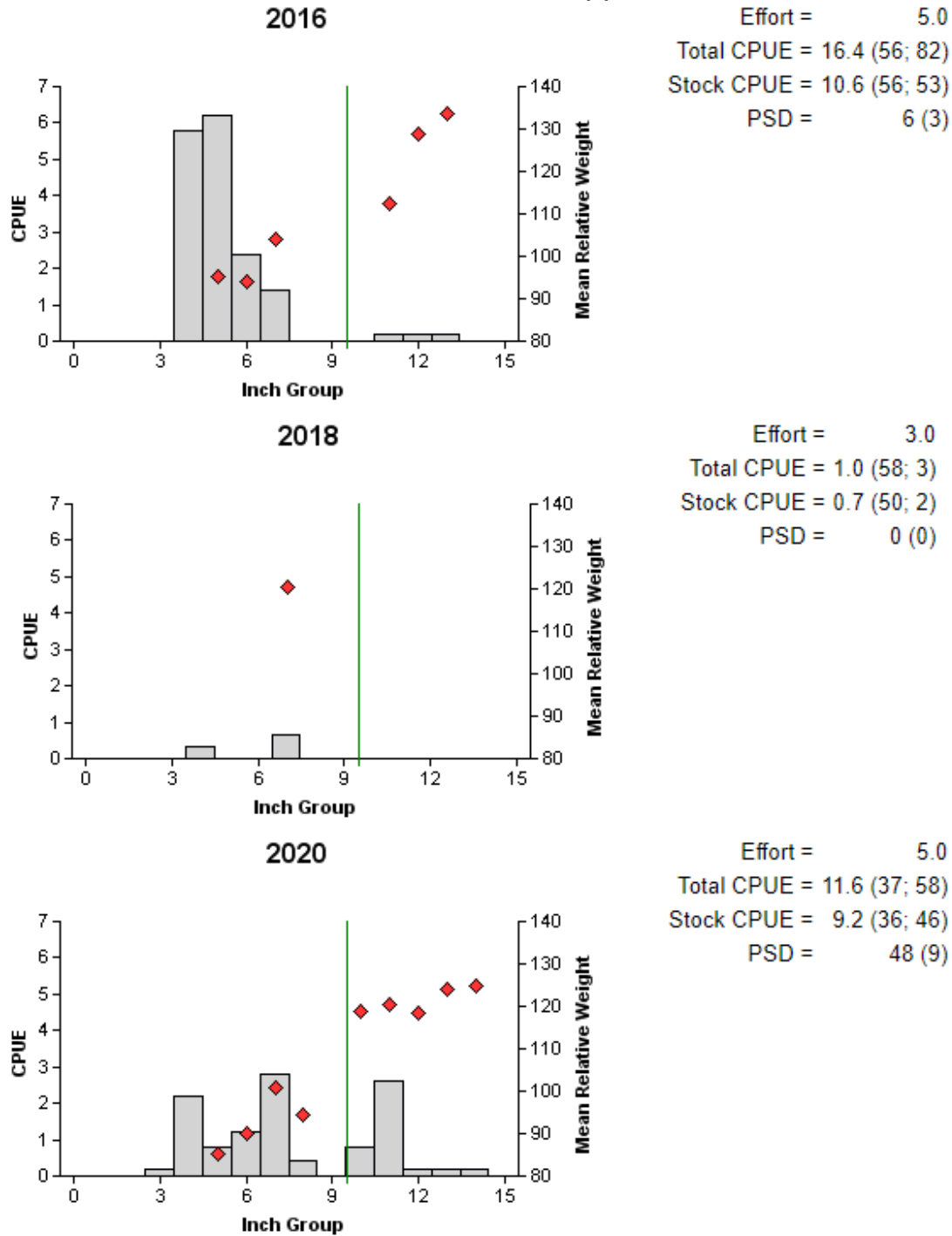


Figure 7. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Buffalo Creek Reservoir, Texas, 2016, 2018, and 2020. Vertical line indicates minimum length limit.

## Black Crappie

No Black Crappie sampled in 2016

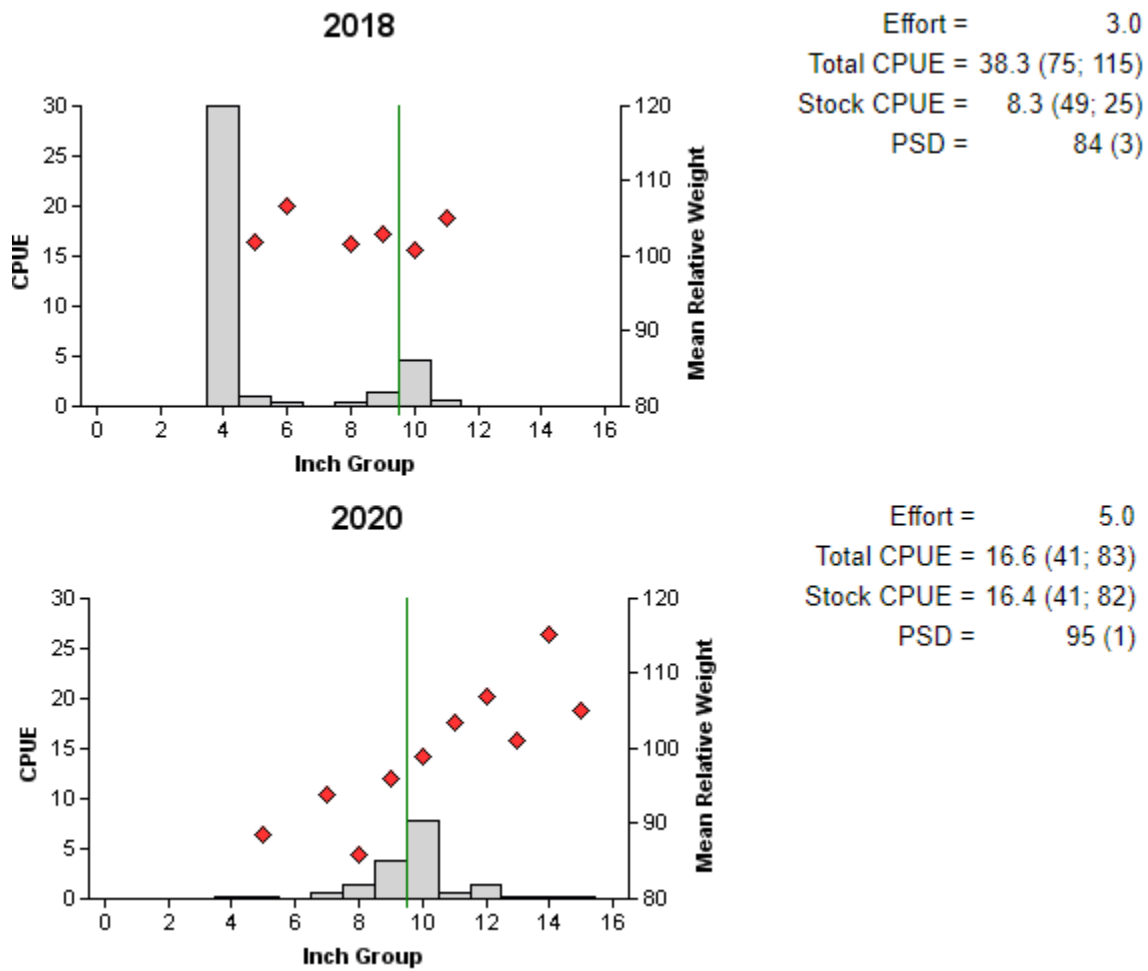


Figure 8. Number of Black Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Buffalo Creek Reservoir, Texas, 2016, 2018, and 2020. Vertical line indicates minimum length limit.

## Proposed Sampling Schedule

Table 9. Proposed sampling schedule for Buffalo Creek Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring. Electrofishing and trap netting surveys are conducted in the fall.

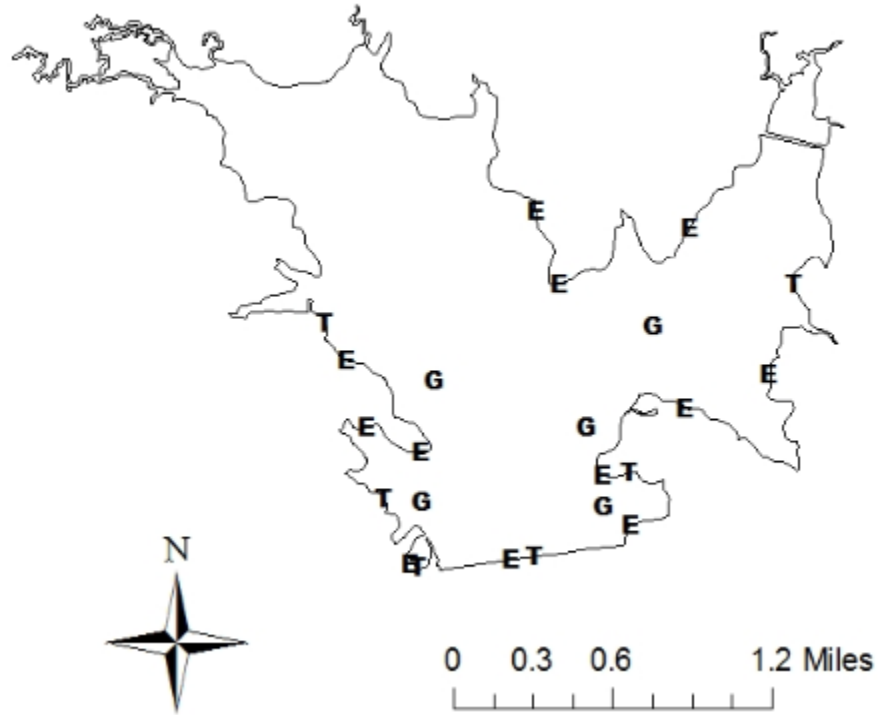
	Survey year			
	2021-2022	2022-2023	2023-2024	2024-2025
Angler Access				X
Structural Habitat				
Vegetation				X
Electrofishing – Fall		X		X
Electrofishing – Spring				
Electrofishing – Low frequency				
Trap netting				X
Gill netting				X
Baited tandem hoop netting				
Creel survey				
Report				X

## APPENDIX A – Catch rates for all species from all gear types

Number (N) and catch rate (CPUE) (RSE in parentheses) of all species collected from all gear types from Buffalo Creek Reservoir, Texas, 2020-2021. Sampling effort was 5 net nights for gill netting, 5 net nights for trap netting, and 1 hour for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad	7	1.4 (17)	496	99.2 (87)	501	501.0 (24)
Common Carp	55	11.0 (33)	2	0.4 (61)		
Black Bullhead	1	0.2 (100)	13	2.6 (100)		
Channel Catfish	8.0	40 (34)	250	50.0 (89)		
Green Sunfish			2	0.4 (100)	20	20.0 (55)
Bluegill			47	9.4 (53)	289	289.0 (56)
Redear Sunfish					1	1.0 (100)
Largemouth Bass					21	21.0 (21)
White Crappie			58	11.6 (37)		
Black Crappie	2	0.4 (61)	83	16.6 (41)		

## APPENDIX B – Map of sampling locations



Location of sampling sites, Buffalo Creek Reservoir, Texas, 2020-2021. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was near full pool at time of sampling.



## APPENDIX C – Historical catch rates of targeted species by gear type for Buffalo Creek Reservoir, Texas

Historical catch rates for targeted species by gear type for Buffalo Creek Reservoir, Texas.

Gear	Species	Year											Avg	
		1998	2002	2003	2005	2006	2007	2010	2011	2016	2018	2020		2021
Gill Netting (fish/net night)	Blue Catfish	12.0		4.6	1.3		4.7		9.4					6.4
	Channel Catfish	2.8		0.6	1.9		6.1		11.1				8.0	5.1
Electrofishing	Gizzard Shad	512.0	146.0			1188.0		383.0		65.0		501.0		465.8
	Green Sunfish	68.0	0.0			148.0		3.0		8.0		20.0		41.2
	Warmouth	8.0	0.0			0.0		0.0		0.0		0.0		1.3
	Bluegill	183.0	100.0			22.0		93.0		24.0		289.0		118.5
	Longear Sunfish	52.0	5.0			2.0		4.0		2.0		0.0		10.8
	Largemouth Bass	8.0	37.0			65.0		49.0		5.0		21.0		30.8
Trap Netting (fish/net night)	White Crappie	24.7	101.9			222.6		131.9		16.4	1.0	11.6		72.9
	Black Crappie									0.0	38.3	16.6		27.5



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