

# Lake Cypress Springs

## 2018 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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## Survey and Management Summary

Fish populations in Lake Cypress Springs were surveyed in 2018 using electrofishing and in 2019 using tandem hoop netting. Historical data are presented with the 2018-2019 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:** Lake Cypress Springs is a 3,461-acre impoundment located on Big Cypress Creek in the Cypress River Basin. The reservoir is in Franklin County. Habitat features consist of bulkhead, boat docks, rocky shoreline, riprap, and limited aquatic vegetation.

**Management History:** Important sport fish include Channel Catfish, Largemouth Bass, and crappie. All sport fish at Lake Cypress Springs have historically been managed with statewide harvest regulations. Florida Largemouth Bass were stocked in this reservoir in 1980 and 1992 to improve the quality of the Largemouth Bass fishery. Hydrilla, first discovered in the reservoir in the 1970s, has been absent since 2007. Triploid Grass Carp were stocked in 1997 and 2006 to control hydrilla. Additionally, a native aquatic plant restoration project was initiated by Franklin County Water District in 2003 to increase plant diversity and provide additional habitat. Environmental conditions and Grass Carp herbivory have resulted in unstable submersed aquatic plant coverage in the reservoir.

### Fish Community

- **Prey species:** Threadfin Shad were present in the 2018 survey. Bluegill and Gizzard Shad relative abundance has increased since previous surveys. Longear Sunfish and Redear Sunfish were also present in the 2018 survey.
- **Channel Catfish:** Tandem hoop nets were used in 2019 to survey the Channel Catfish population and to reduce the mortality of other species normally caught in gill nets. Hoop netting was successful in meeting sampling objectives for the Channel Catfish survey in 2019. Many fish above legal size were collected.
- **Black Basses:** Spotted Bass were more abundant than Largemouth Bass in recent surveys, largely due to the lack of submersed vegetation in the reservoir. Spotted bass up to 16 inches and Largemouth Bass up to 19 inches were collected in 2018.
- **Crappie:** Both White and Black Crappie were present in the reservoir. White Crappie were more abundant and had fish of larger sizes compared to Black Crappie in the 2019 tandem hoop netting survey.

**Management Strategies:** Conduct electrofishing in 2020 and 2022 to monitor the black bass community to assess any changes that may require further investigation. Continue to use tandem hoop nets to monitor the Channel Catfish and crappie populations. Conduct annual aquatic vegetation surveys to monitor for the presence of hydrilla and any other invasive species. Technical guidance will be given to the controlling authority regarding an integrated approach to invasive aquatic vegetation management when applicable. Vegetation surveys will also help monitor reestablishment of submersed aquatic vegetation. When aquatic vegetation is at a level that will provide adequate habitat, Florida Largemouth Bass stockings will be requested to enhance the quality and trophy potential of the fishery. All sport fish will continue to be managed under statewide harvest regulations.

## Introduction

This document is a summary of fisheries data collected from Lake Cypress Springs in 2018-2019. 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 2018-2019 data for comparison.

## Reservoir Description

Lake Cypress Springs is a 3,461-acre impoundment constructed in 1970 on Big Cypress Creek in the Cypress River Basin. It is located in Franklin County approximately 10 miles south of Mt. Vernon. The controlling authority is Franklin County Water District (FCWD). Primary water uses are municipal and industrial water supply and public recreation. It has a watershed of approximately 75 square miles and a shoreline length of 43 miles. Average annual water fluctuation is 2-2.5 feet (Figure 1). Aquatic vegetation has been sparse in recent years. The shoreline is highly developed and approximately 800 dock/boat houses were present on the reservoir. Other descriptive characteristics for Lake Cypress Springs are listed in Table 1.

## Angler Access

Lake Cypress Springs has 5 public boat ramps maintained by the FCWD and all are in excellent condition. Numerous bank fishing opportunities are available at most FCWD parks and a fishing pier is located at Mary King Park. Additional characteristics are recorded in Table 2.

## Management History

**Previous management strategies and actions:** Management strategies and actions from the previous survey report (Wright and Bister 2015) included:

1. Monitor and manage the Largemouth Bass population with electrofishing, population genetic assessment, and stocking.

**Action:** A supplemental electrofishing survey was conducted during fall 2016. Population genetic analysis in 2018 was determined to be unnecessary during development of the Objective-Based Sampling Plan for 2018-2019. Florida Largemouth Bass stocking was not requested for 2016 due to insufficient habitat.

2. Hydrilla monitoring and management.

**Action:** Annual surveys have been conducted but no hydrilla has been observed.

3. Improve fish habitat.

**Action:** Artificial fish habitat structures (Georgia DNR-type PVC cubes and Mossback Rootwad structures) were deployed in 2015.

**Harvest regulation history:** Sport fishes in Lake Cypress Springs have been managed with statewide regulations (Table 3).

**Stocking history:** Blue Catfish and Walleye have been stocked but populations were not established. Channel Catfish have been stocked numerous times from the late 1960s to the early 1990s. These stockings were done to supplement limited recruitment. Florida Largemouth Bass were stocked in 1980, 1992, and 2015. Triploid Grass Carp were stocked at a rate of 5 fish per vegetated acre (2,200 fish) in 1997 to control hydrilla. A re-stocking of 1,000 Triploid Grass Carp was conducted in 2006. A complete stocking history is available in Table 4.

**Vegetation/habitat management history:** Hydrilla has been present in the reservoir since the 1970s and was the dominant aquatic plant through the 1990s. Coverage typically approached 10% of the reservoir and reached a peak in 1996 at 13.5% (434 acres). FCWD was granted a permit to stock triploid grass carp in 1997 (2,200 fish). Hydrilla fly larvae were also introduced in 1997 as an additional control

measure. Hydrilla declined to <1% coverage after these biological control measures were implemented. This was likely the result of a combination of the biological control efforts and cold winter temperatures prior to the decline. In 2003, a native aquatic plant restoration project was initiated by FCWD to increase plant diversity and available fish habitat. Hydrilla coverage began to increase (11.9% in 2005, 14.7% in 2006) as the number of Grass Carp remaining in the reservoir declined due to natural mortality. The FCWD was permitted to stock an additional 1,000 Triploid Grass Carp (2.5 fish/hydrilla acre) in January 2006. By 2007, all submersed vegetation had declined to only trace amounts. This was likely the result of Grass Carp herbivory combined with environmental conditions. Since 2006, limited amounts of native submerged vegetation have been observed, and no hydrilla has been observed since 2006. In addition to native aquatic plant restoration, FCWD has also conducted mechanical removal of *Lyngbia* algae and American lotus. TPWD released alligatorweed flea beetles to control alligatorweed.

**Water transfer:** Lake Cypress Springs is controlled by the FCWD, who is a wholesale water supplier to four entities. These include the cities of Mount Vernon and Winnsboro as well as the Cypress Springs Special Utility District (rural water supply). All three of these have water intake structures on Lake Cypress Springs. FCWD also provides water to the City of Mount Pleasant. Water for Mount Pleasant is released from Lake Cypress Springs downstream into Lake Bob Sandlin, at which point it is removed by the City of Mount Pleasant. No interbasin transfer is known to exist.

## Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Lake Cypress Springs (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 2017).

**Electrofishing** – Largemouth Bass, Spotted Bass, sunfishes, Gizzard Shad, and Threadfin 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. Ages for Largemouth Bass were determined using otoliths from 13 randomly-selected fish (range 13.0 to 14.9 inches).

**Tandem hoop nets** – Channel Catfish and crappie were collected using 10 tandem hoop-net series at 10 stations. Nets were baited with soap and deployed for 2-night soak durations. CPUE for tandem hoop netting was recorded as the number of fish caught per tandem hoop net series (fish/series).

**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 and creel statistics.

**Habitat** – A structural habitat survey was conducted in 2010. Vegetation surveys were conducted in 2015–2018 to monitor hydrilla, alligatorweed, and any other invasive species. 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 Franklin County Water District (FCWD 2019).

## Results and Discussion

**Habitat:** A habitat survey was conducted in 2010 (Bister 2011) and changes have been negligible. Littoral zone structural habitat consisted primarily of bulkhead with boat docks and natural shoreline (Table 6). Less than 5% of the reservoir's surface area contained any aquatic vegetation (Table 7). Hydrilla has not been detected in the reservoir since 2006.

**Prey species:** Threadfin Shad were present in the 2018 survey (Appendix A). Electrofishing catch rate of Gizzard Shad was 324.0/h. Index of Vulnerability (IOV) for Gizzard Shad was moderate, indicating that 44% of Gizzard Shad were available to existing predators; this was lower than the IOV estimate in 2016, but higher than it was in 2014 (Figure 2). Total CPUE of Bluegill in 2018 (422/h) was higher than it was in the previous surveys (Figure 3). Longear Sunfish and Redear Sunfish were also present in the 2018 survey (Appendix A).

**Channel Catfish:** The tandem hoop net catch rate of Channel Catfish was 59.3/series with fish ranging in size from 8 to 26 inches (Figure 4). Relative standard error (RSE = 46) for CPUE was higher than the objective-based sampling objective (RSE < 25) due to one of the net series catching many more fish than other series. Fish body condition was good with mean  $W_r \geq 90$  for most inch groups, which indicated adequate prey availability.

**Black Basses:** The electrofishing catch rate of Spotted Bass has remained relatively consistent over the last several years from 182.0/h in 2014 to 104.0/h in 2016 and 170.0/h in 2018 (Figure 5). Size structure has also remained somewhat consistent with PSDs of 31, 33, and 28 from 2014, 2016, and 2018, respectively. Spotted Bass up to 16 inches were collected during the 2018 survey (Figure 5).

Largemouth Bass relative abundance has been lower than that of Spotted Bass during recent surveys due to the lack of submersed vegetation in the reservoir. The electrofishing total catch rate of Largemouth Bass in 2018 was 50.0/h, which was similar to that of previous years (Figure 6). The proportion of 15-inch fish in the population (PSD-P = 30) was higher in 2018 than the previous two surveys (Figure 6). In 2018, growth of Largemouth Bass was fast; mean age at 14 inches (13.0 to 14.8 inches) was 2.0 years (N = 14; range = 1 - 5 years) and was similar to that of 2014 when Largemouth Bass mean age at 14 inches 2.3 years (Wright and Bister 2015). Largemouth Bass body condition was good with mean  $W_r$  for most inch groups  $\geq 90$ ; which indicated adequate prey availability (Figure 6).

**Crappie:** Both Black and White Crappie were present in the reservoir. White Crappie were more abundant (2.8/series) and had fish of larger sizes (up to 14 inches) compared to Black Crappie (1.6/series) in the 2019 tandem hoop netting survey (Figures 7 and 8). Crappie body condition was good with mean  $W_r$  for most inch groups  $\geq 90$ ; which indicated adequate prey availability. Anecdotal information has suggested that crappie can be collected using tandem hoop nets. The effectiveness of this sampling gear was marginal at meeting sampling objectives for each crappie species independently. However, if future tandem hoop netting surveys are based on White Crappie and Black Crappie combined, sampling objectives will have a higher chance of being met.

# Fisheries Management Plan for Lake Cypress Springs, Texas

Prepared – July 2019

**ISSUE 1:** Hydrilla has not been observed in Lake Cypress Springs since 2006 but has caused access issues in the past. In 1997, 2,200 Triploid Grass Carp were stocked, and an additional 1,000 were stocked in 2006, which has eliminated the hydrilla and nearly all native submerged vegetation from the reservoir. However, the effectiveness of Grass Carp will decline as the population ages, allowing for the return of hydrilla. Additional vegetation surveys are needed to monitor for the presence of hydrilla and continued cooperation with the FCWD regarding treatment when it returns.

## MANAGEMENT STRATEGY

1. Conduct annual aquatic vegetation surveys to monitor trends and estimate coverage of hydrilla.
2. Work with FCWD and encourage an integrated approach to controlling hydrilla upon its return.

**ISSUE 2:** Fish habitat is limited in Lake Cypress Springs. When the reservoir was constructed, the lake basin was clear-cut, leaving very little submerged standing timber. Additionally, Grass Carp have eliminated nearly all submerged vegetation in the lake, further reducing habitat. Artificial fish habitat installation and native aquatic vegetation planting has been conducted in the past. Future efforts to improve fish habitat in the reservoir would be beneficial to cover-seeking fish populations.

## MANAGEMENT STRATEGIES

1. Continue to work with FCWD on issues related to improving fish habitat in the reservoir through their native aquatic vegetation restoration program.
2. Consider projects to install additional artificial fish habitat structures.

**ISSUE 3:** Lake Cypress Springs has the potential to support a quality Largemouth Bass population and quality populations have occurred in the past when submerged aquatic vegetation was present. Grass Carp have limited the abundance of submerged vegetation; however, enough floating-leaved and emergent vegetation was present to warrant stocking in 2015. The Largemouth Bass population and aquatic vegetation need to be monitored to assess changes that warrant further management actions (i.e., stocking).

## MANAGEMENT STRATEGIES

1. Monitor submerged and emergent aquatic vegetation to be able to request Florida Largemouth Bass fingerling stocking at 1,000/km of shoreline when habitat becomes conducive to supporting such a stocking.

**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 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 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.

## Objective-Based Sampling Plan and Schedule (2019–2023)

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

Sport fishes in Lake Cypress Springs include Largemouth Bass, Spotted Bass, Channel Catfish, White Crappie, and Black Crappie. Known important forage species include Bluegill, Gizzard Shad, and Threadfin Shad.

#### Low-Density/Underutilized Fisheries:

White Bass are present in this reservoir, but abundance is low due to lack of suitable spawning habitat. No directed angling effort was observed during the 2014/2015 angler creel survey.

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

**Black Bass:** The last creel survey on Lake Cypress Springs (June 2014 through May 2015) estimated 50% of directed angling effort was for black bass. Largemouth Bass are managed with a 14-inch minimum length limit. Spotted Bass are abundant in the reservoir and contribute to the overall harvest of black bass by anglers. Trend data on relative abundance and size structure have been collected biennially during fall nighttime electrofishing with 1 hour of effort at 12, 5-minute stations. Continuation of biennial trend data in this reservoir with fall nighttime electrofishing will allow for determination of any large-scale changes in the Largemouth Bass and Spotted Bass populations that may spur further investigation.

A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in 2020 and 2022, but sampling will continue at up to 3 additional random sites until 50 stock-sized fish of either Largemouth Bass or Spotted Bass are collected and the RSE of CPUE-Stock is  $\leq 25$ . Past sampling has usually achieved an RSE of CPUE-Stock  $< 25$ , so we are confident we will achieve this level of precision with the minimum sampling effort. A maximum of 15 stations will be sampled.

Sampling objectives for Largemouth Bass and Spotted Bass will include size structure (PSD and length frequency), relative abundance (CPUE-Total and CPUE-Stock), condition (mean  $W_r$  using lengths and weights from up to 10 fish per inch group). Largemouth Bass growth (mean age at 14 inches using a sample size of 13 fish between 13.0 and 14.9 inches) will also be evaluated.

**Crappie:** Trap netting for White Crappie and Black Crappie was discontinued after 2010 due to poor historical catch rates. However, a crappie fishery does exist. Crappie accounted for 8% of directed

angling effort during the 2014/2015 creel survey. Even though traditional trap netting has been unsuccessful in collecting population trend data, an alternative method would allow detection of any large-scale changes in the crappie populations that may require further investigation.

Anecdotal information has suggested that crappie can be collected using tandem hoop nets. The effectiveness of this sampling gear was marginal at meeting sampling objectives for White Crappie and Black Crappie individually but combining the species during future sampling should be more successful in meeting objectives. Therefore, we will record length and weight data for crappie collected during the Spring 2023 Channel Catfish survey (10 baited tandem hoop net series).

Objectives for crappie will include size structure (PSD and length frequency), relative abundance (CPUE-Total and CPUE-Stock), condition (mean  $W_r$  using lengths and weights from up to 10 fish per inch group). Crappie growth (mean age at 10 inches using a sample size of 13 fish between 9.0 and 10.9 inches) will also be evaluated. Sampling objectives will be to collect 50 stock-sized crappie (species combined) with an RSE of CPUE-Stock  $\leq 25$ .

**Channel Catfish:** During the 2014/2015 creel survey, catfish accounted for 33% of the total directed angling effort. During May 2019, 10 tandem hoop nets series caught almost 600 Channel Catfish. We will continue to survey the Channel Catfish population with 10 baited hoop net series with 2-night soak time in 2023. Switching to baited tandem hoop nets will reduce the by-catch and unnecessary mortality of non-target species. A target of 100 stock-size fish should provide an adequate PSD estimate per the tandem hoop net procedures (PSD within 10% with 80% confidence, 75-140 fish are recommended).

**Forage Fish:** Trend data on relative abundance and size structure of sunfish, Gizzard Shad, and Threadfin Shad have been collected biennially. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in sunfish and shad relative abundance and size structure. No additional effort will be expended beyond effort necessary to achieve Black Bass objectives. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density. Relative weight of Largemouth Bass  $\geq 8$ " TL will be determined from their length/weight data (maximum of 10 fish weighed and measured per inch class).

**Habitat:** Lake Cypress Springs has had hydrilla in the past and was managed with triploid grass carp. It is important to monitor this reservoir annually to identify growth of any invasive species. We will conduct annual invasive aquatic vegetation surveys to monitor for any regrowth of hydrilla or other invasive species.

## Literature Cited

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## Tables and Figures

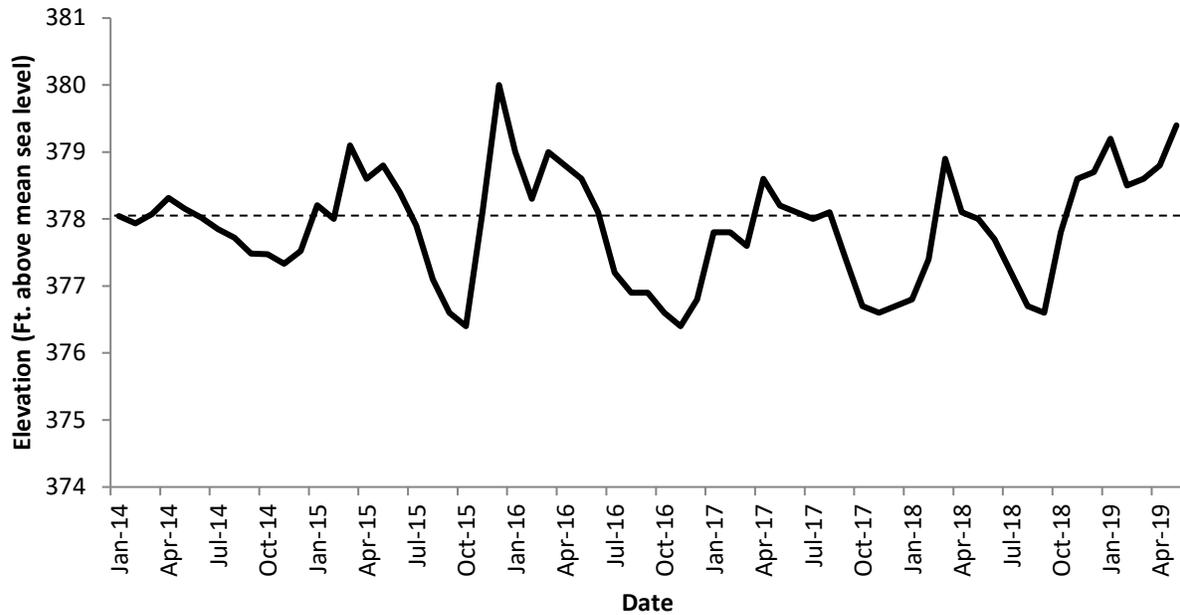


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Lake Cypress Springs, Texas. Horizontal dashed line denotes conservation pool elevation (378.0 MSL) (FCWD 2019).

Table 1. Characteristics of Lake Cypress Springs, Texas.

Characteristic	Description
Year constructed	1970
Controlling authority	Franklin County Water District
County	Franklin
Reservoir type	Mainstream
Shoreline development index (SDI)	5.2
Conductivity	168 $\mu$ S/cm

Table 2. Boat ramp characteristics for Lake Cypress Springs, Texas, August 2018. Reservoir elevation at time of survey was 378 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Guthrie Park	33.06487 -95.14173	Y	15	368	Excellent, no access issues
Dogwood Park	33.05185 -95.14268	Y	20	368	Excellent, no access issues
Mary King Park	33.05496 -95.17019	Y	15	370	Excellent, no access issues
Overlook Park	33.06348 -95.16818	Y	30	369	Excellent, no access issues
Walleye Park	33.06205 -95.15261	Y	10	368	Excellent, no access issues

Table 3. Harvest regulations for Lake Cypress Springs, Texas.

Species	Bag limit	Length limit
Catfish: Channel Catfish and Blue Catfish, 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	5 <sup>a</sup>	14-inch minimum
Bass: Spotted	5 <sup>a</sup>	None
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

<sup>a</sup> Daily bag for Largemouth Bass and Spotted Bass = 5 fish in any combination.

Table 4. Stocking history of Lake Cypress Springs, Texas. FRY = fry; FGL = fingerling; AFGL = advanced fingerling; ADL = adults; UNK = Unknown.

Species	Year(s) Stocked	Number of Years	Number Stocked	Size
Blue Catfish	1982–1987	3	13,147	AFGL
Channel Catfish	1966	1	5,500	AFGL
	1970–1983	6	242,985	FGL
	1984–1993	7	39,045	AFGL
Redear Sunfish	1967	1	2,750	UNK
Bluegill x Green Sunfish	1997	1	500	FGL
Largemouth Bass	1971	1	690,000	FRY
Florida Largemouth Bass	1980	1	9,900	FGL
	1980	1	111,000	FRY
	1992	1	172,394	FGL
	2015	1	70,570	FGL
Black Crappie	1966	1	2,750	FGL
Walleye	1970–1972	3	4,653,460	FRY
Triploid Grass Carp	1997	1	2,200	ADL
	2006	1	1,000	ADL

Table 5. Objective-based sampling plan components for Lake Cypress Springs, Texas 2018–2019.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE–Stock	RSE-Stock $\leq 25$
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Age-and-growth	Age at 14 inches	$N = 13, 13.0 - 14.9$ inches
	Condition	$W_r$	10 fish/inch group (max)
<i>Tandem hoop netting</i>			
Channel Catfish	Abundance	CPUE–Stock	RSE-Stock $\leq 25$
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	$W_r$	10 fish/inch group (max)
Crappie	Abundance	CPUE-Stock	RSE-Stock $\leq 25$
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	$W_r$	10 fish/inch group (max)

Table 6. Survey of structural habitat types, Lake Cypress Springs, Texas, 2010 (Bister 2011).

Habitat type	Estimate (miles)	% of total
Bulkhead	5.1	10.9
Bulkhead with boat docks	26.3	56.0
Natural	14.4	30.6
Rocky	1.2	0.3

Table 7. Survey of aquatic vegetation, Lake Cypress Springs, Texas, 2015–2018. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2015	2016	2017	2018
Native submersed				0 (0)
Native floating-leaved				90.0 (2.6)
Native emergent				3.0 (<0.1)
Non-native				
Alligatorweed (Tier III)*	13.0 (0.4)	8.0 (0.2)	9.0 (0.3)	<1.0 (<0.1)
Hydrilla (Tier III)*	0 (0)	0.0 (0)	0 (0)	0 (0)

\*Tier I is immediate Response, Tier II is active management, Tier III is Watch Status

## Gizzard Shad

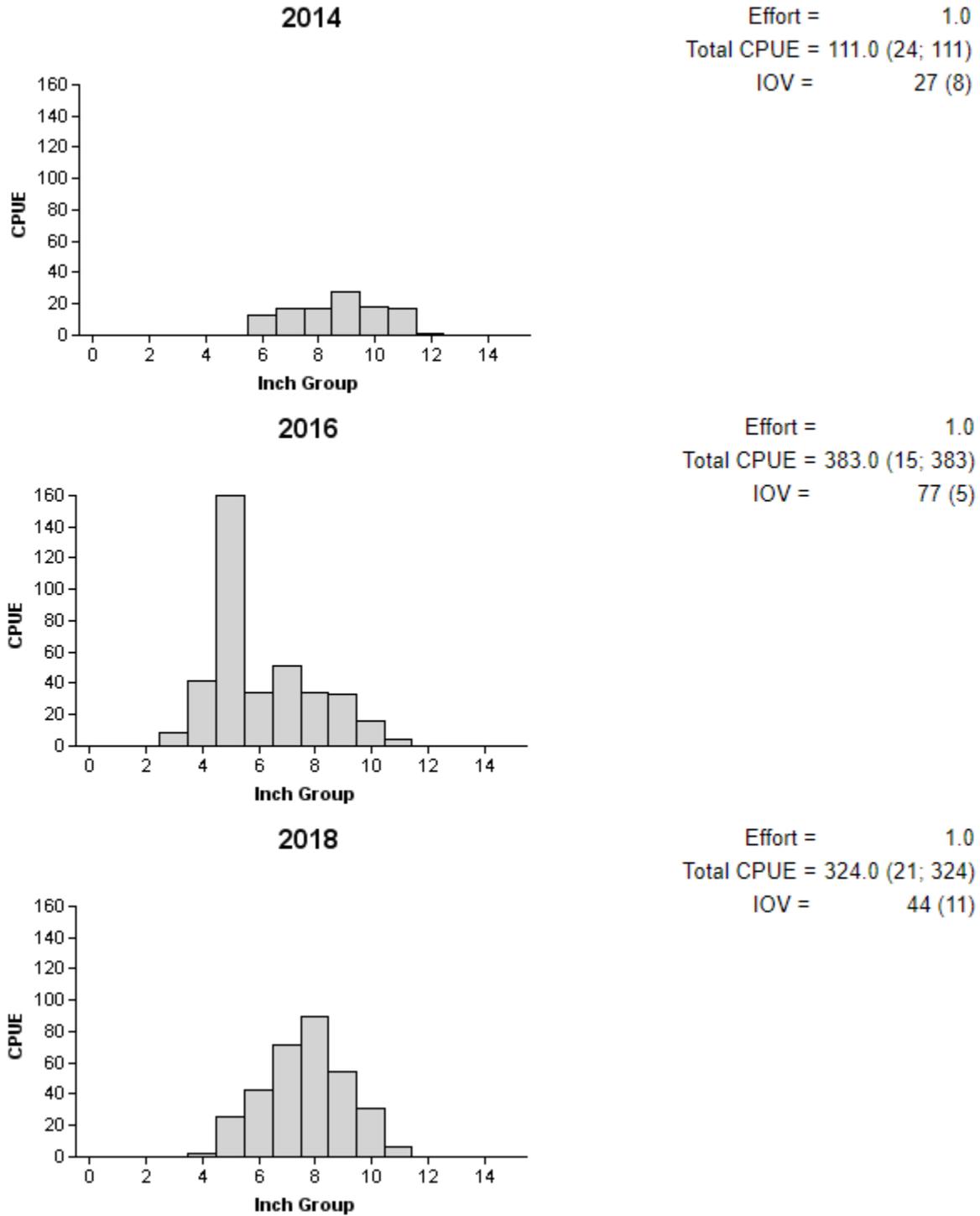


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Cypress Springs, Texas, 2014, 2016, and 2018.

## Bluegill

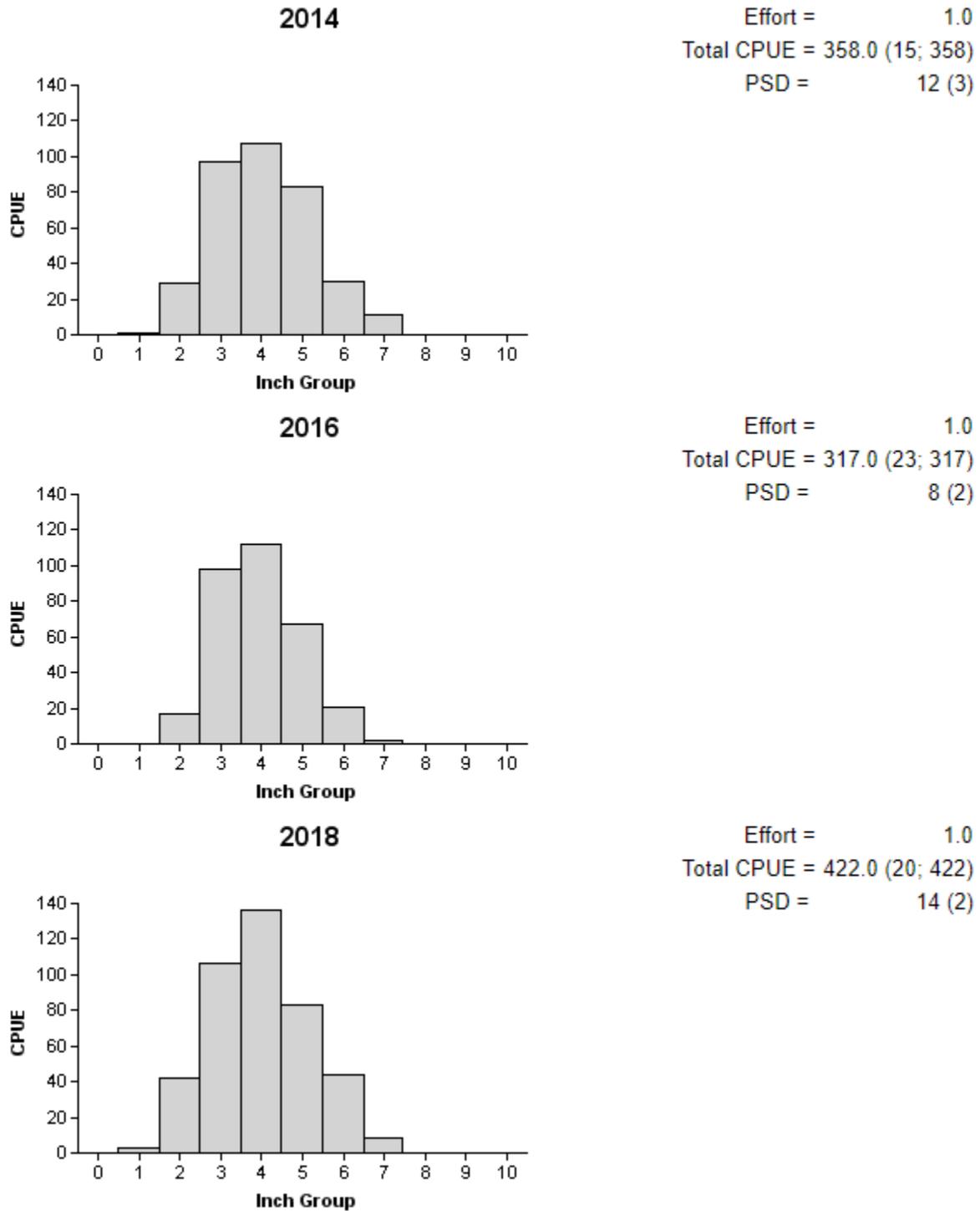


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Cypress Springs, Texas, 2014, 2016, and 2018.

## Channel Catfish

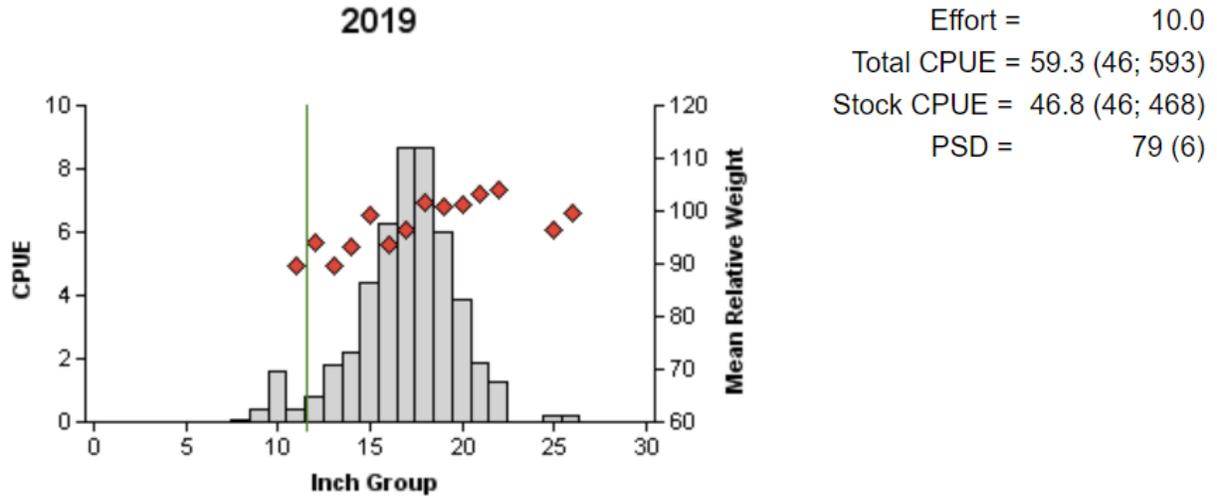


Figure 4. Number of Channel Catfish caught per net series (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring baited hoop net surveys, Lake Cypress Springs, Texas, 2019. Vertical line indicates minimum length limit.

## Spotted Bass

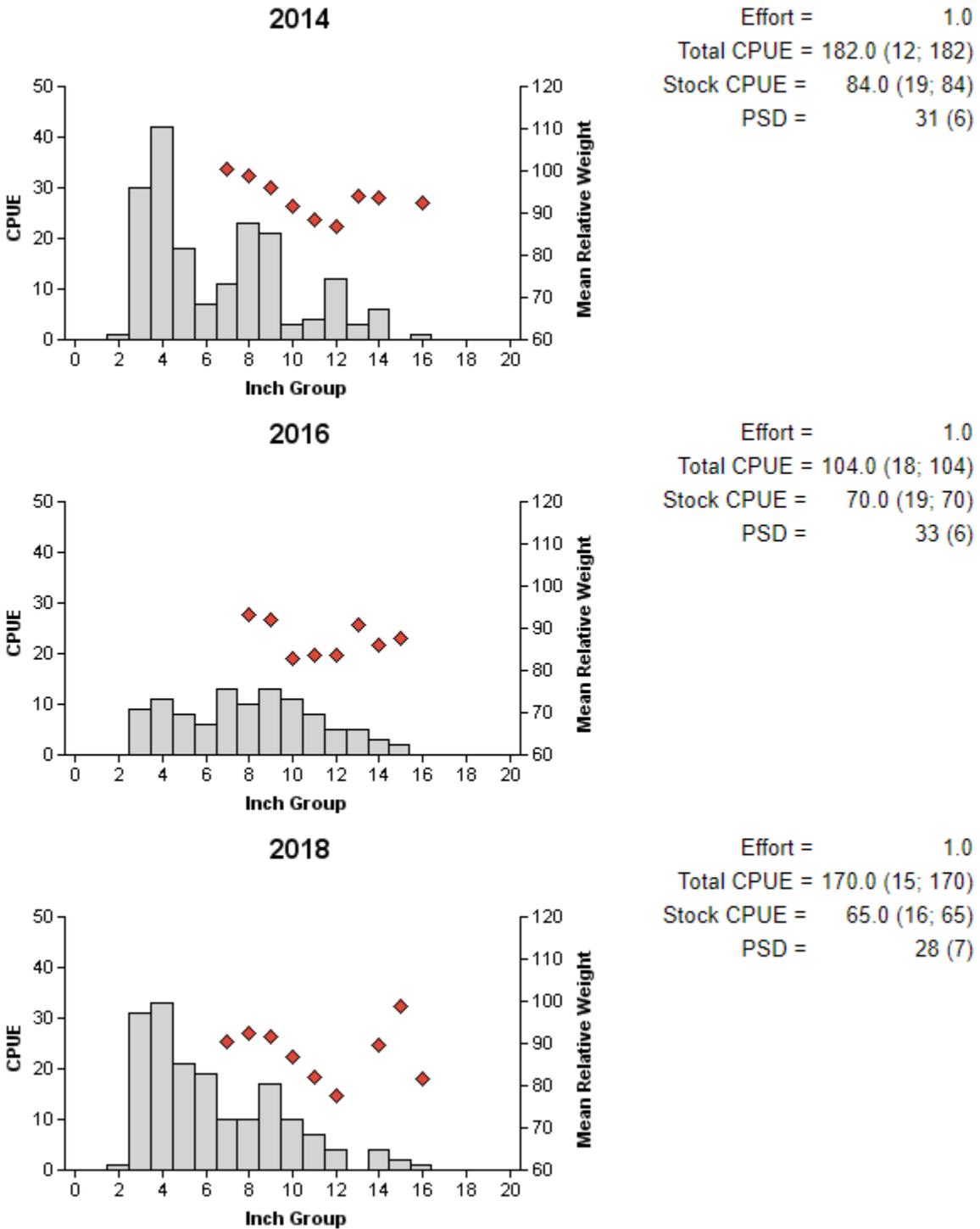


Figure 5. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Cypress Springs, Texas, 2014, 2016, and 2018.

## Largemouth Bass

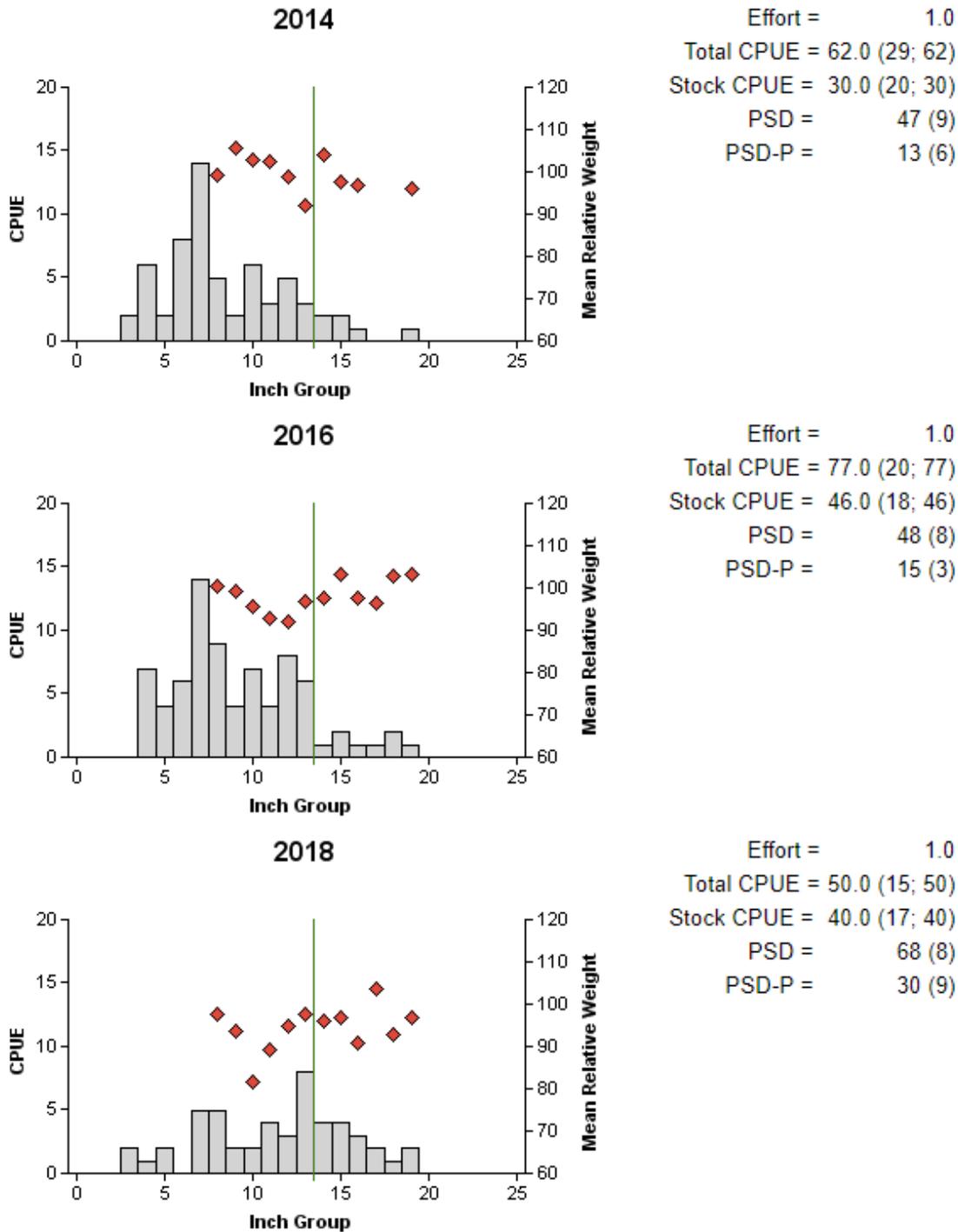


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Cypress Springs, Texas, 2014, 2016, and 2018. Vertical lines indicate minimum length limit.

### White Crappie

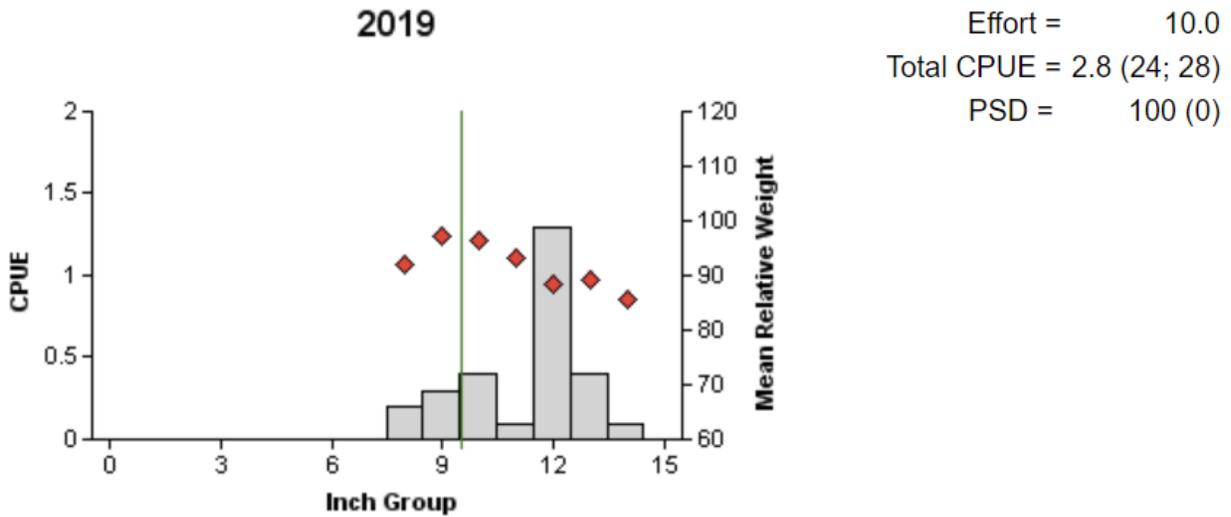


Figure 7. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring baited hoop net surveys, Lake Cypress Springs, Texas, 2019. Vertical line indicates minimum length limit.

### Black Crappie

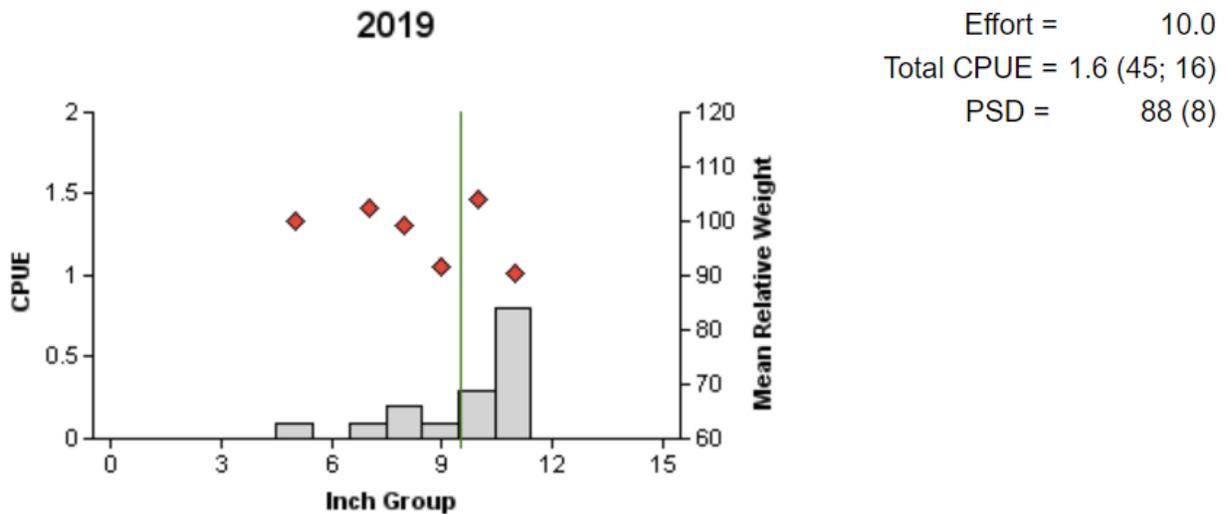


Figure 8. Number of Black Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring baited hoop net surveys, Lake Cypress Springs, Texas, 2019. Vertical line indicates minimum length limit.

## Proposed Sampling Schedule

Table 8. Proposed sampling schedule for Lake Cypress Springs, Texas. Survey period is June through May. Baited tandem hoop netting surveys are conducted in the spring, while electrofishing surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

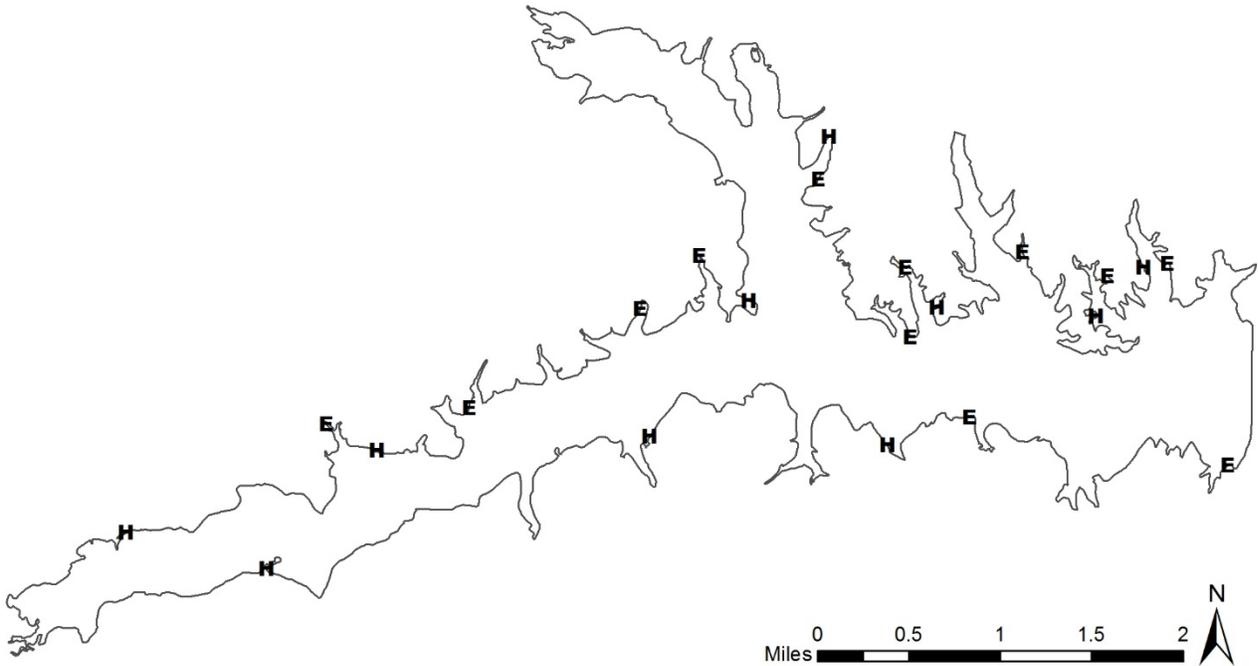
	Survey year			
	2019-2020	2020-2021	2021-2022	2022-2023
Angler Access				S
Structural Habitat				S
Vegetation	A	A	A	S
Electrofishing – Fall		A		S
Baited tandem hoop netting				A
Report				S

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

Number (N) and catch rate (CPUE, with RSE in parentheses) of all target species collected from all gear types from Lake Cypress Springs, Texas, 2018-2019. Sampling effort was 10 net series for tandem hoop netting and 1 hour for electrofishing.

Species	Tandem Hoop Netting		Electrofishing	
	N	CPUE	N	CPUE
Gizzard Shad			324	324.0 (21)
Threadfin Shad			375	375.0 (50)
Channel Catfish	593	59.3 (54)		
Flathead Catfish	1	0.10 (100)		
Bluegill			422	422.0 (20)
Longear Sunfish			120	120.0 (17)
Redear Sunfish			22	22.0 (34)
Spotted Bass			170	170.0 (15)
Largemouth Bass			50	50.0 (15)
White Crappie	28	2.8 (24)		
Black Crappie	16	16 (45)		

## APPENDIX B – Map of sampling locations



Location of sampling sites, Lake Cypress Springs, Texas, 2018-2019. Tandem hoop netting, and electrofishing stations are indicated by H and E, respectively. Water level was near full pool at time of sampling.



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