Oak Creek Reservoir

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

Prepared by:

Lynn D. Wright, District Management Supervisor

Inland Fisheries Division
San Angelo District, San Angelo, Texas

Carter Smith
Executive Director

Craig Bonds
Director, Inland Fisheries

July 31, 2019

Contents

Survey and Management Summary 1
Introduction 2
Reservoir Description 2
Angler Access 2
Management History 2
Methods 4
Results and Discussion 4
Fisheries Management Plan for Oak Creek Reservoir, Texas 7
Objective-Based Sampling Plan and Schedule (2019–2023) 8
Literature Cited 10
Tables and Figures 11
Water Level 11
Reservoir Characteristics 11
Boat Ramp Characteristics 12
Harvest Regulations 12
Stocking History 13
Objective-Based Sampling Plan for 2018-2019 13
Aquatic Vegetation Survey 15
Percent Directed Angler Effort per Species 16
Total Fishing Effort and Fishing Expenditures 16
Gizzard Shad 17
Bluegill 18
Blue Catfish 19
Channel Catfish 20
White Bass 22
Largemouth Bass 24
White Crappie 27
Proposed Sampling Schedule 29
APPENDIX A – Catch rates for all species from all gear types 30
APPENDIX B – Map of sampling locations 31
APPENDIX C – Reporting of creel ZIP code data 32

Survey and Management Summary

Fish populations in Oak Creek Reservoir were surveyed in 2018 using electrofishing and trap netting and in 2019 using gill netting and tandem hoop netting. Anglers were surveyed from June 2017 through May 2018 with a creel survey. 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: Oak Creek Reservoir is a 2,375-acre impoundment 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 and recreation. Extreme water levels fluctuations have commonly occurred on Oak Creek Reservoir and water levels have varied over 20 feet within the past 20 years. The reservoir was about one foot above conservation pool at the time of sampling. Habitat consisted of featureless bank and rocky shoreline with standing timber and abundant flooded terrestrial vegetation.

Management History: Important sport fish include White Bass, Largemouth Bass, White Crappie, and catfish. A variety of fish species have been stocked in the reservoir including Threadfin Shad, Channel Catfish, Blue Catfish, Largemouth Bass, and Smallmouth Bass.

Fish Community

- **Prey species:** Threadfin Shad were present in the reservoir in low density. Electrofishing catch of Gizzard Shad was lower than past surveys and IOV was poor, indicating most Gizzard Shad were too big for most predators to eat. Electrofishing catch of Bluegill was similar to past surveys.
- **Catfishes:** Both Blue and Channel Catfish were present in the reservoir and anglers spent 10.8% of all effort directed at catfishes. Catfish up to 28 inches were observed in the creel survey.
- **White Bass:** White Bass gill net catch rates were the highest since 1997 with fish up to 15 inches. Four percent of all angling effort was directed towards White Bass and an estimated 843 were harvested.
- **Largemouth Bass:** Largemouth Bass electrofishing catch rates were similar to past surveys. Largemouth Bass were the most sought-after species targeted by 47.6% of all anglers at Oak Creek Reservoir.
- **White Crappie:** White Crappie were the second most sought after species with 25.2% of all angling effort. An estimated 1824 crappie were harvested during the creel period.

Management Strategies: Stock Largemouth Bass at 1000 fish/km shoreline in 2020 to take advantage of increased water levels and habitat. Conduct additional fall electrofishing survey in 2020 and general monitoring surveys with electrofishing surveys in 2022. Conduct spring bass only electrofishing in 2021 and 2023. Access and vegetation surveys will be conducted in 2022.

Introduction

This document is a summary of fisheries data collected from Oak Creek Reservoir 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

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 and recreation. Extreme water levels fluctuations have commonly occurred on Oak Creek Reservoir. Fall rains filled Oak Creek in September 2007 through May 2008, but a slow steady decline began again. From 2013 to 2015 Oak Creek was at least 20 feet below conservation pool. Heavy rains again filled Oak Creek in October 2018. The reservoir was about one foot above conservation pool at the time of sampling (Figure 1). Oak Creek Reservoir was mesotrophic with a mean trophic state index (TSI) chl-a of 48.8, a 10.38-point decrease over the last decade (Texas Commission on Environmental Quality 2018). Habitat consisted of featureless bank and rocky shoreline with standing timber and flooded terrestrial vegetation. Water levels have historically fluctuated over 30 vertical feet, resulting in reservoir surface area ranging from 2,375 to 400 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. 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 (Scott 2015) included:

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

   Action: A year-long creel survey was conducted from June 1, 2017 through May 31, 2018.

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

   Action: Low-frequency electrofishing was attempted in summer 2017, but was unsuccessful. Two hours of low frequency electrofishing produced only four Blue Catfish and nine Flathead Catfish. No press releases were made about the fishery.

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

   Action: No discussions have taken place. Reservoir has filled and all ramps are usable.

4. Cooperate with the City of Sweetwater to post signage, educate the public about invasive species, and track existing and future inter-basin water transfers to facilitate potential invasive species responses.

   Action: The San Angelo District continued to work with the City of Sweetwater to post signage and to educate the public on invasive species threats through media outlets.

Harvest regulation history: Sportfish 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 have been stocked periodically since then. The complete stocking history is in Table 4.

Vegetation/habitat management history: Historically, the reservoir has not supported aquatic vegetation due to considerable water level fluctuation. Less than 3% of the reservoir had native vegetation in summer 2018, but vegetation was lost due to reservoir filling later that fall.

Water transfer: Oak Creek Reservoir is primarily used for municipal water supply and recreation. Water is pumped to the cities of Sweetwater, 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

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Oak 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, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1.2 hour at 14, 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 (10 net nights at 10 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn).

Gill netting – Blue Catfish, Channel Catfish, and White Bass were collected by gill netting (14 net nights at 14 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn).

Tandem hoop nets – Channel Catfish 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).

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2005 through 2012 and by electrophoresis for previous years.

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.

Creel survey – An access-point creel survey was conducted from 2017 through 2018. The creel period was June through May. Angler interviews were conducted on 5 weekend days and 4 weekdays per quarter to assess angler use and fish catch/harvest statistics in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Habitat – A structural habitat survey was conducted in 2010. Vegetation surveys were conducted in 2018 to monitor native 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 2019).

Results and Discussion

Habitat: A structural habitat survey was last conducted in 2010. Offshore habitat was dominated by flooded timber while natural and rocky shoreline accounted for 86.5% of the littoral zone. (Farooqi and Scott 2011). In August 2018, native submersed vegetation covered 13 acres (0.9%) of the reservoir's surface while native emergent vegetation covered 21 acres (1.5%) (Table 7). However, Oak Creek Reservoir filled in fall 2018 and all aquatic vegetation was covered by nearly 8 ft of water. Due to the increase in water level, flooded terrestrial vegetation was abundant. Historically, Oak Creek has not supported aquatic vegetation.

Creel: The majority of the directed fishing effort was for Largemouth Bass (47.6%), followed by White Crappie (25.2%), catfish species (10.8%), anglers fishing for anything (10.8%), and White Bass (4.1%) (Table 7). Total fishing effort for all species was 25,699 hours and direct expenditures at Oak Creek Reservoir was $178,970 (Table 8). Angler reported ZIP code analysis shows that 41.1% of anglers

traveled more than 100 miles to fish (Appendix C). Local anglers, defined as traveling less than 20 miles, made up 18.6% of all anglers.

Prey species: Gizzard Shad catch rates in 2018 (78.9/h) were lower than previous surveys in 2016 (171.4/h) and 2014 (116.0/h) (Figure 2). A strong Gizzard Shad year-class was produced in 2014 and as the year-class has grown to larger sizes, IOV has decreased with poor IOV's in 2016 (13) and 2018 (28). Threadfin Shad were present in the reservoir in low abundance. Catch rate of Bluegill was 204.0/h in 2018, which was similar to 198.0/h in 2016, and Bluegill provide an important component of the prey base (Figure 3). Other sunfish species present included Redbreast Sunfish, Green Sunfish, Warmouth, Longear Sunfish, and Redear Sunfish (Appendix A). Total catch rate for all sunfish species was 284.6/h.

Catfishes: The gill net catch rate of Blue Catfish was 0.9/nn in 2019, which was lower than 2017 (2.6/nn) and 2015 (5.6/nn) (Figure 4). It is likely the reduced catch rate is due to the reservoir filling in fall 2018 and fish being spread out in the reservoir. Not enough fish were collected for size structure analysis, but most fish collected ranged from 15-25 inches and size range was similar to past surveys.

The gill net catch rate of Channel Catfish was 2.4/nn in 2019 and similar to past surveys (Figure 5). Size range of collected Channel Catfish range from 9-17 inches. Gill nets have proven ineffective at collecting sufficient numbers of Channel Catfish for size structure estimation. Baited tandem hoops nets were used for the first time in spring 2019 and failed to collect meaningful numbers of Channel Catfish. Total CPUE was 0.4/series (Appendix A) with fish from 9 to 12 inches long.

In total, 2,785 h of directed effort was targeted at catfish species, which made up 10.8% of all angling effort. Combined angling catch rates were only 0.09 fish/h, indicating a low catch rate. Total harvest for Blue Catfish was 140 (Table 9). Observed harvested Blue Catfish ranged from 20 to 28 inches (Figure 6). Total harvest for Channel Catfish was 436 (Table 9) and only 28% of the legal-sized fish were released. Channel Catfish harvested ranged from 13 to 23 inches in length (Figure 6). An active jug-fishing community is present at Oak Creek Reservoir and harvest of Blue and Channel Catfish is likely significantly higher than those estimated for hook and line anglers.

White Bass: The gill net catch rate of White Bass was 7.4/nn in 2019, which was higher than previous surveys and the highest catch rate since 1997 (Figure 7). The most abundant size classes were 11 and 12 inches with fish up to 15 inches collected in nets. Directed fishing effort, catch per hour, and total harvest for White Bass was 1,047 h, 1.99 fish/h, and 843 fish, respectively (Table 10). Approximately 88% of the legal-sized White Bass were released. The high legal release rate may be due to high catch rates from anglers targeting other species, as only four percent of anglers targeted White Bass in the creel survey. Harvested fish ranged in length from 10 to 15 inches, with most being 10 to 12 inches (Figure 8).

Largemouth Bass: The electrofishing catch rate of stock-length Largemouth Bass was 32.6/h in 2018, which was similar to the 45.4/h in 2016, and 38.0/h in 2014. Size structure was adequate (Figure 9), but electrofishing has failed to collect larger bass in Oak Creek as we have only observed 1 bass over 20 inches in the past three surveys. Body condition declined with increasing fish length in 2018 with fish over 13 inches generally having relative weights below 90 (Figure 9). Directed fishing effort and catch per hour for Largemouth Bass was 12,226 h and 0.43 fish/h (Table 11). Tournament effort was 2,983 h and made up 24.4% of all largemouth bass effort. Tournament anglers retained an estimated 754 bass that were later released. Oak Creek supports a quality trophy bass fishery with an estimated 187 bass from 7.0-9.9 lbs. and 83 bass over 10 lbs. caught during the survey period. Good numbers of Sharelunker entries have been made over the past year, with 4 entries for the 8 lbs. class and 4 entries for the 10 lbs. lunker class. A new water body record 13.68 lbs. bass was caught in spring 2019, but was not entered into the Sharelunker Program. Florida Largemouth Bass influence has improved as Florida alleles have increased from 56.7 to 69.0% from 2006 to 2018 (Table 12).

White Crappie: The trap net catch rate of White Crappie have been poor over the past two surveys with catch rates of 0.2 and 0.8 in 2018 and 2016 (Figure 10). Crappie harvest data from the creel survey would indicate that the low trap net catch rate was due to ineffectiveness of the sampling gear and does not represent actual crappie abundance. Higher catch rates were observed in 2014, but this was due to low reservoir levels which enhanced trap net catch rates. Directed fishing effort for White Crappie was

6,885 h, making them the second most targeted species behind Largemouth Bass. Angler catch rates were 0.21 fish/h, and an estimated 1,824 White Crappie were harvested (Table 13). Size of harvested White Crappie ranged from 10 to 16 inches in total length with most at 11 inches (Figure 11). Due to ineffectiveness of trap nets to catch sufficient numbers of White Crappie during normal water level, we will discontinue use of trap nets on Oak Creek Reservoir.

Fisheries Management Plan for Oak Creek Reservoir, Texas

Prepared – July 2019

ISSUE 1: A trophy Largemouth Bass population is present in Oak Creek Reservoir. In 2018, 8 Sharelunker entries were made from Oak Creek Reservoir, with the largest being over 12 pounds. A new water body record 13.68 lbs. bass was caught in spring 2019. Continued stocking of Florida Largemouth Bass is warranted to take advantage of the increased water level and available habitat.

MANAGEMENT STRATEGY

1. Request Florida Largemouth Bass stockings, pending adequate water levels and habitat, to enhance year-class strength in 2020.
2. Monitor Largemouth Bass populations with fall electrofishing in 2020 and 2022 and spring electrofishing in 2021 and 2023.
3. Collect Largemouth Bass genetics in fall 2022.
4. Promote the ShareLunker Program and encourage anglers to submit entries, especially 13 lbs. and bigger fish. Provide local marinas with signs and materials in support of the ShareLunker Program.

ISSUE 2: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

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

Sport fish, forage fish, and other important fishes

Primary sport fishes in Oak Creek Creek Reservoir include Largemouth Bass, Channel Catfish, Blue Catfish, White Crappie, and White Bass. Known important forage species include Bluegill and Gizzard and Threadfin Shad.

Low-density fisheries

Flathead Catfish: Flathead Catfish are present in Oak Creek Reservoir, but gill net catch rates have been low and low-frequency electrofishing has been ineffective at collecting sufficient numbers. No directed effort was documented during the creel in 2017-2018. Sampling this population is unnecessary in FY 2019-2023.

White Bass: White Bass are present in Oak Creek, however, fishing pressure is low (< 0.5 h/acre) and historically gill nets have been ineffective at sampling adequate numbers of White Bass. Gill net data from 2011 to 2017 indicate most years would require 30 to 50 gill net sets to collected 50 stock size fish and achieve an RSE ≤ 25. White Bass catch rates were high in 2019, however, it is likely the catch rates will return to more typical levels moving forward. Angler effort, catch, and harvest will be assessed during the next creel survey. Sampling this population is unnecessary in FY 2019-2023.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are a primary sport fish in Oak Creek Reservoir with over 47.6% of the directed angling effort during the 2017-2018 creel survey. Largemouth bass are managed with the statewide 14-in MLL regulation and the reservoir has produced eight Sharelunker entry's in 2018. Continued collection of trend data with night-time electrofishing in the fall every 2 years will allow for determination of any large-scale changes in the largemouth bass population that may spur further investigation. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in fall 2020 and 2022 (Table 14), but sampling will continue at random sites until we achieve a CPUE-Stock RSE ≤25 and 50 stock-size fish are collected. Past sampling data from 2008-2018 indicates that 50 stock size fish and RSE ≤25 could be collected with 12-18 stations with 80% confidence. Twelve random stations will be determined for electrofishing. Exclusive of the original 12 random stations, another 6 random stations will be determined in the event some extra sampling is necessary. A maximum of 18 stations will be sampled. Otoliths from 13 fish between 13.0 and 14.9 inches will be collected in 2020 and 2022 to determine mean age at 14 inches to monitor large-scale changes in growth. Relative weight of Largemouth Bass ≥ 8 inches (total length) will be determined from their length/weight data. A genetic sample of 30 fish will be collected during fall electrofishing in 2022.

Additionally, we will conduct spring electrofishing to get a better representation of Largemouth Bass over 20 inches. Twelve randomly selected 5-min electrofishing sites will be sampled in spring 2021 and 2023 (Table 14). Objectives for spring bass only electrofishing will be to collect at minimum 50 stock size fish for size structure estimation.

White Crappie: White Crappie are the second most sought after species in Oak Creek Reservoir with 25.2% of all directed effort during the 2017-2018 creel survey. Past trap net catch rates have been variable ranging from 0.2 to 4.4 fish/nn from 2007 to 2018. However, trap nets have only been effective during periods of low water. We will discontinue trap netting for sampling crappie in Oak Creek Reservoir and monitor the population through creel surveys. Information on angler effort, catch rate, and harvest may be collected during the next creel survey. The next creel survey will likely be conducted after 2022.

Catfishes: Overall, catfish species received just over 10% of all directed effort at Oak Creek Reservoir during the 2017/2018 creel survey. Gill nets, baited tandem hoop nets, and low frequency electrofishing have all been insufficient at collecting adequate samples for either Blue or Channel Catfish. We will discontinue sampling with these gears at Oak Creek and monitor the catfish populations through creel surveys. The next creel survey will likely be conducted after 2022.

Sunfish and Shad: Sunfish and Gizzard Shad are important forage fish in Oak Creek Creek Reservoir. From 2007 to 2018 total catch rates of Bluegill has ranged from 15.0 fish/h to 370.0 fish/h while Gizzard Shad have ranged from 78.9 fish/h to 385.0 fish/h. Threadfin Shad have been present in lower abundance with a CPUE-total of 10.3 fish/h in 2016. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in Bluegill and Gizzard Shad relative abundance and size structure. Sampling effort based on achieving sampling objectives for Largemouth Bass should result in sufficient numbers of Gizzard Shad and Bluegill for size structure estimation (PSD and IOV; 50 fish minimum with 80% confidence) and relative abundance estimates (RSE ≤ 25 of CPUE-Total). No additional effort will be expended if objectives are not meet beyond the effort for Largemouth Bass.

Literature Cited

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and Gizzard Shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.

Farooqi, M., and M. K. Scott. 2011. Statewide freshwater fisheries monitoring and management program survey report for Oak Creek Reservoir, 2010. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.

Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. Fisheries 32(7): 348.

Scott, M.K. 2015. Statewide freshwater fisheries monitoring and management program survey report for Oak Creek Reservoir, 2014. Texas Parks and Wildlife Department, Federal Aid Report F-221-M-5, Austin.

Texas Commission on Environmental Quality. 2018. Trophic classification of Texas reservoirs. Draft 2016. Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d), Austin. 15 pp.

United States Geological Society (USGS). 2019. National water information system: Web interface. Available: http://waterdata.usgs.gov/tx/nwis (July 2019).

Tables and Figures

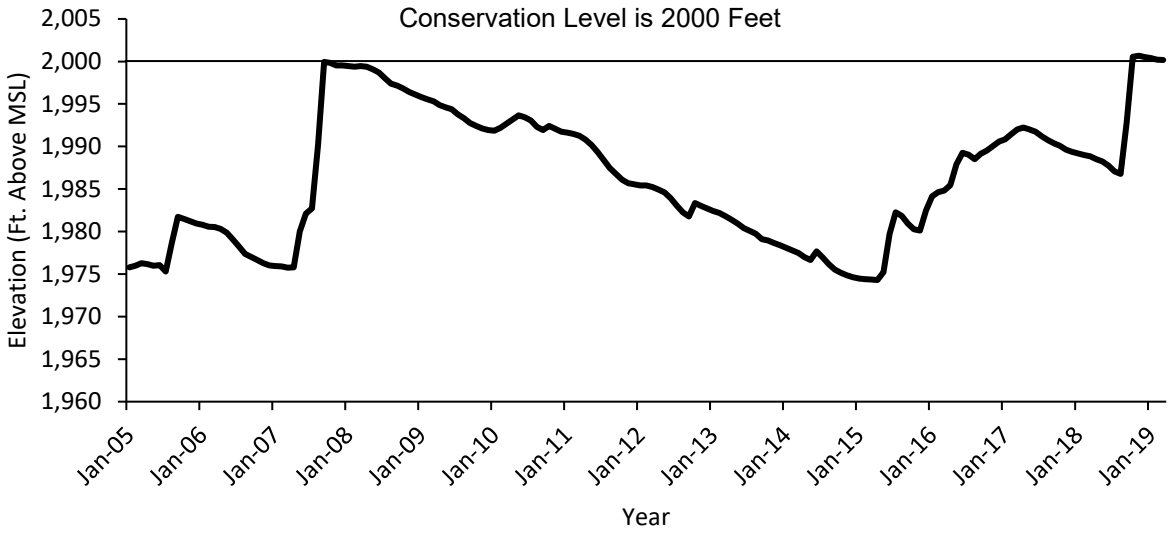


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Oak Creek Reservoir, Texas.

Table 1. Characteristics of Oak Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1952
Controlling authority	City of Sweetwater
County	Coke
Drainage basin	Colorado River Basin
Reservoir type	Tributary
Shoreline Development Index	4.72
Conductivity	932 µS/cm

Table 2. Boat ramp characteristics for Oak Creek Reservoir, Texas, March, 2019. Reservoir elevation at time of survey was 2,000 feet above mean sea level.

Boat ramp	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	Good, no access issues
Hwy 70 Bridge	32.05437 -100.29823	Y	15	1984	Good, no access issues
Live Oak Lodge	32.05533 -100.29772	N	10	1982	Good, no access issues

Table 3. Harvest regulations for Oak 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, White	25	10-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 of Oak Creek Reservoir, Texas. Size categories are FRY =<1 inch, FGL = 1-3 inches, and UNK = unknown.

Species	Year(s) Stocked	Number of Years	Number Stocked	Size
Threadfin Shad	1980	1	2,000	UNK
Golden Shiner	1980	1	59	UNK
Blue Catfish	1976–1979	4	125,046	UNK
	2003	1	77,124	FGL
Channel Catfish	1971–1975	3	51,750	UNK
	2004	1	42,399	FGL
Smallmouth Bass	1984–1985	2	95,798	FGL
Largemouth Bass	1973	1	30,000	UNK
Lake Fork Largemouth Bass	1994	1	180	ADL
Florida Largemouth Bass	1980	1	40	ADL
	1986	1	199,500	FRY
	1987-2008	4	345,115	FGL
	2016	1	50,809	FGL
	2017	1	178,702	FGL
	2017	1	42	ADL
	2018	1	57,573	FGL
	2019	1	81,907	FGL

Table 5. Objective-based sampling plan components for Oak Creek Reservoir, Texas 2018–2019.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Abundance	CPUE–Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Age-and-growth	Age at 14 inches	N = 13, 13.0 – 14.9 inches
	Condition	W_r	10 fish/inch group (max)
	Genetics	% FLMB	N = 30, any age
Bluegill [a]	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
Gizzard Shad [a]	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
	Prey availability	IOV	N ≥ 50
Gill Netting			
Blue Catfish	Size structure	PSD, Length frequency	N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)
Trap netting			
Crappie	Size structure	PSD, length frequency	N = 50
	Condition	W_r	10 fish/inch group (max)
Tandem hoop netting			
Channel Catfish	Abundance	CPUE–stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)

[a] No additional effort will be expended to achieve an RSE ≤ 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 aquatic vegetation, Oak Creek Reservoir, Texas, 2006, 2010, 2014, and 2018. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2006	2010	2014	2018
Native submersed	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	13.0 (0.9)
Native floating-leaved	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Native emergent	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	21.0 (1.5)

Table 7. Percent directed angler effort by species for Oak Creek Reservoir, Texas, 2017–2018. Survey periods were from 1 June through 31 May.

Species	2017/2018
Common Carp	1.5
Catfishes	10.8
White Bass	4.1
Largemouth Bass	47.6
Crappie	25.2
Anything	10.8

Table 8. Total fishing effort (h) for all species and total directed expenditures at Oak Creek Reservoir, Texas, 2017-2018. Survey periods were from 1 June through 31 May. Relative standard error is in parentheses.

Creel statistic	2017/2018
Total fishing effort	25,699 (10)
Total directed expenditures	$178,970 (31)

Gizzard Shad

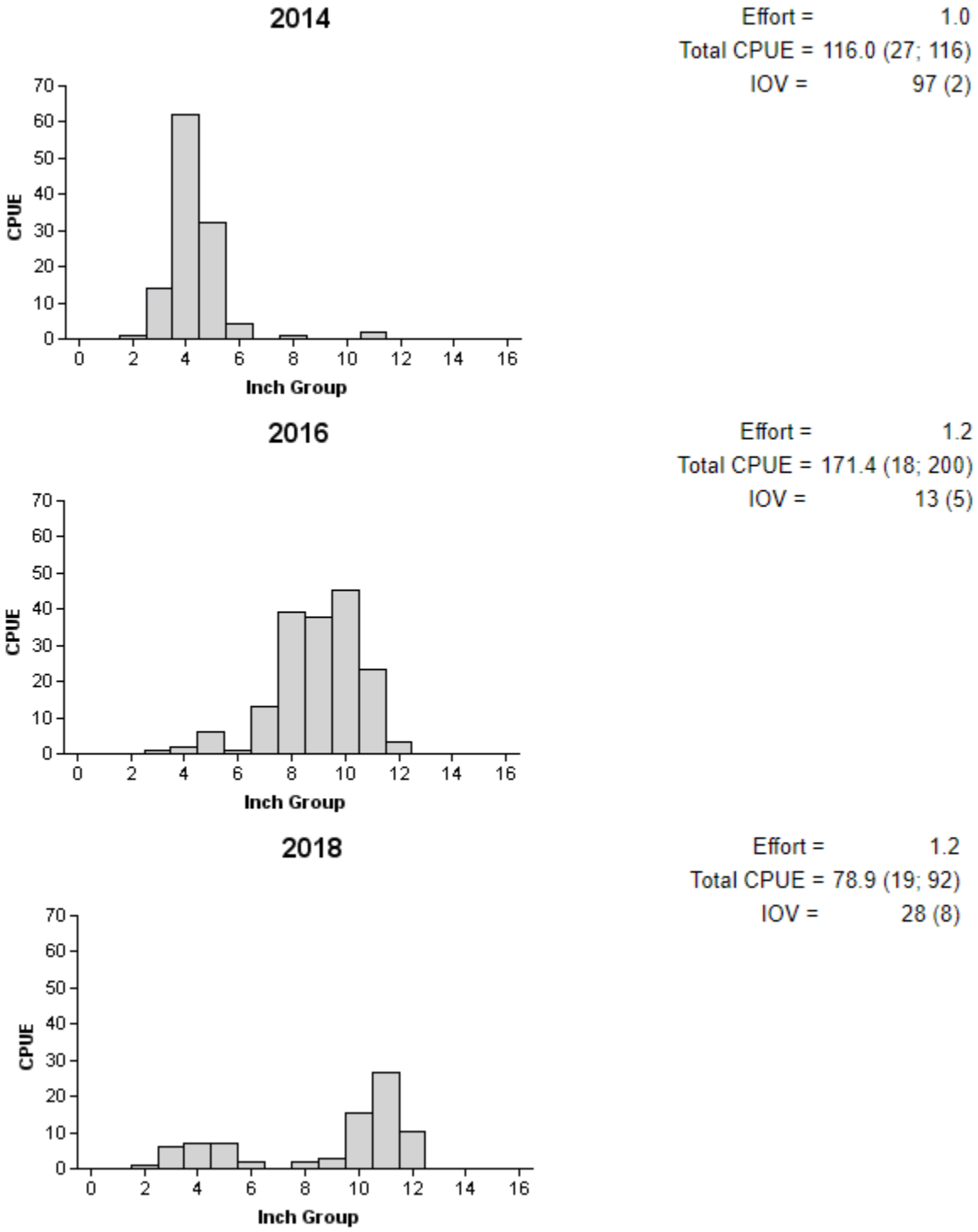


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Oak Creek Reservoir, Texas, 2014, 2016, and 2018.

Bluegill

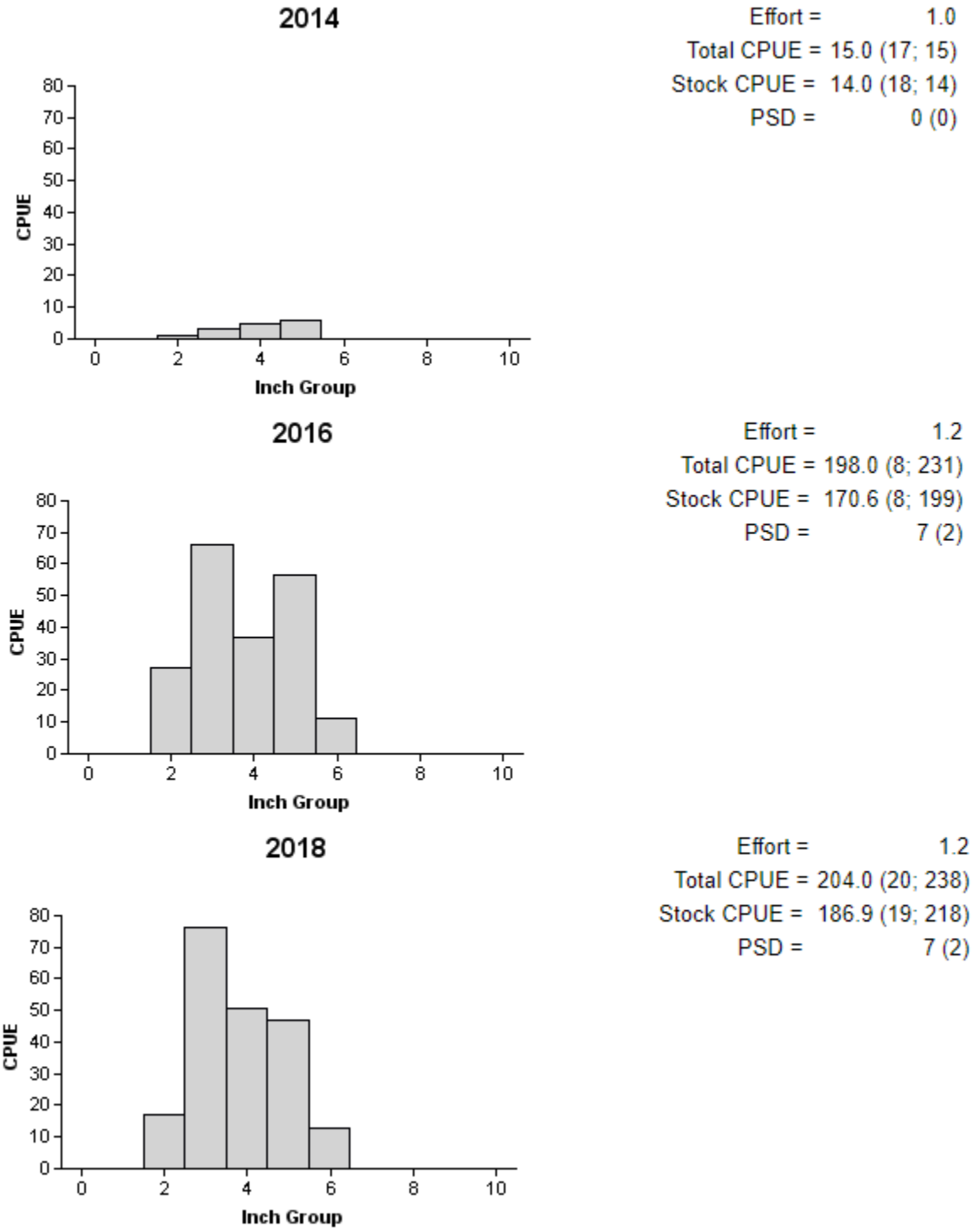


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Oak Creek Reservoir, Texas, 2014, 2016, and 2018.

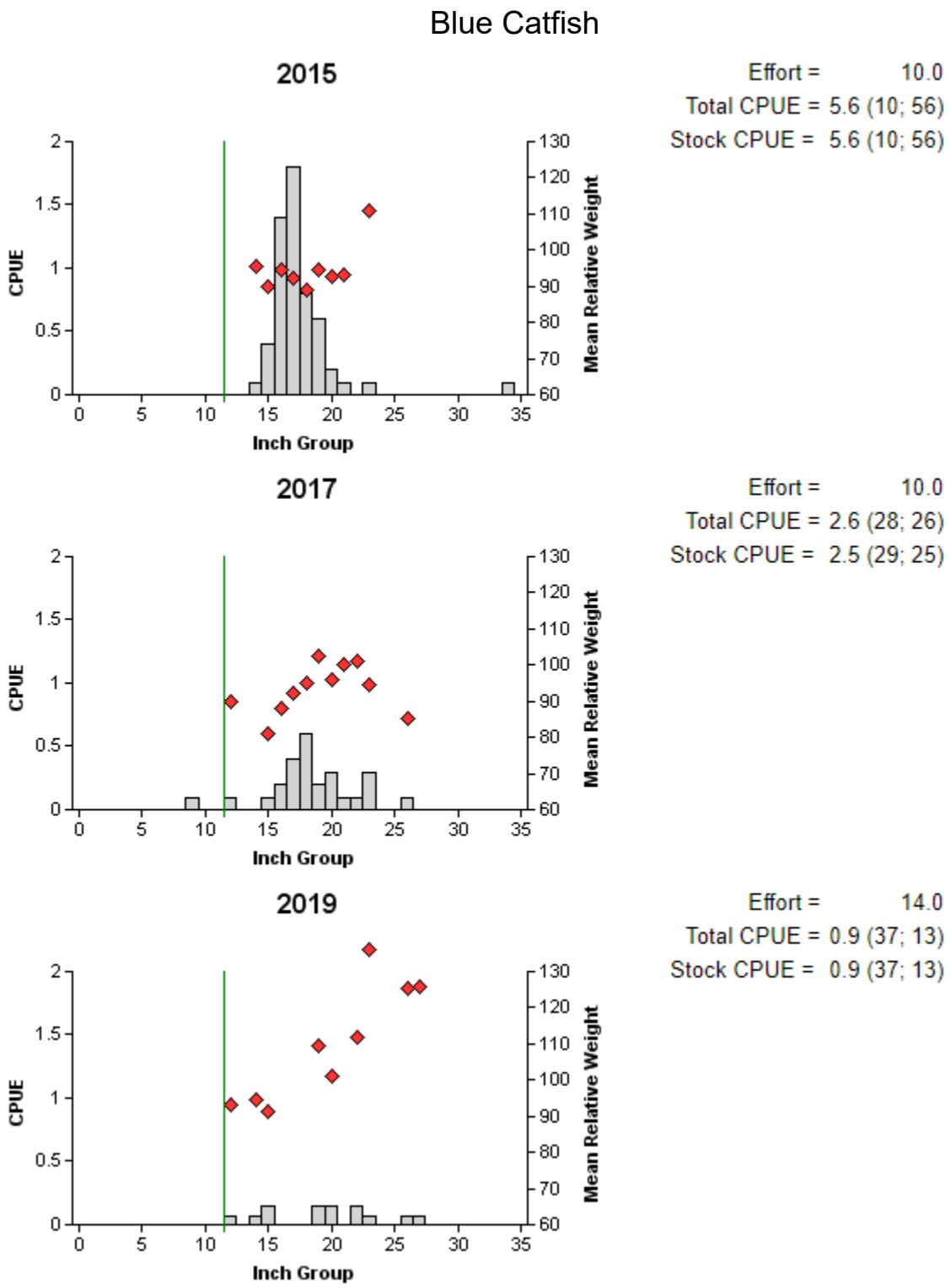


Figure 4. Number of Blue Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE) for spring gill net surveys, Oak Creek Reservoir, Texas, 2015, 2017, and 2019. Vertical line indicates minimum length limit.

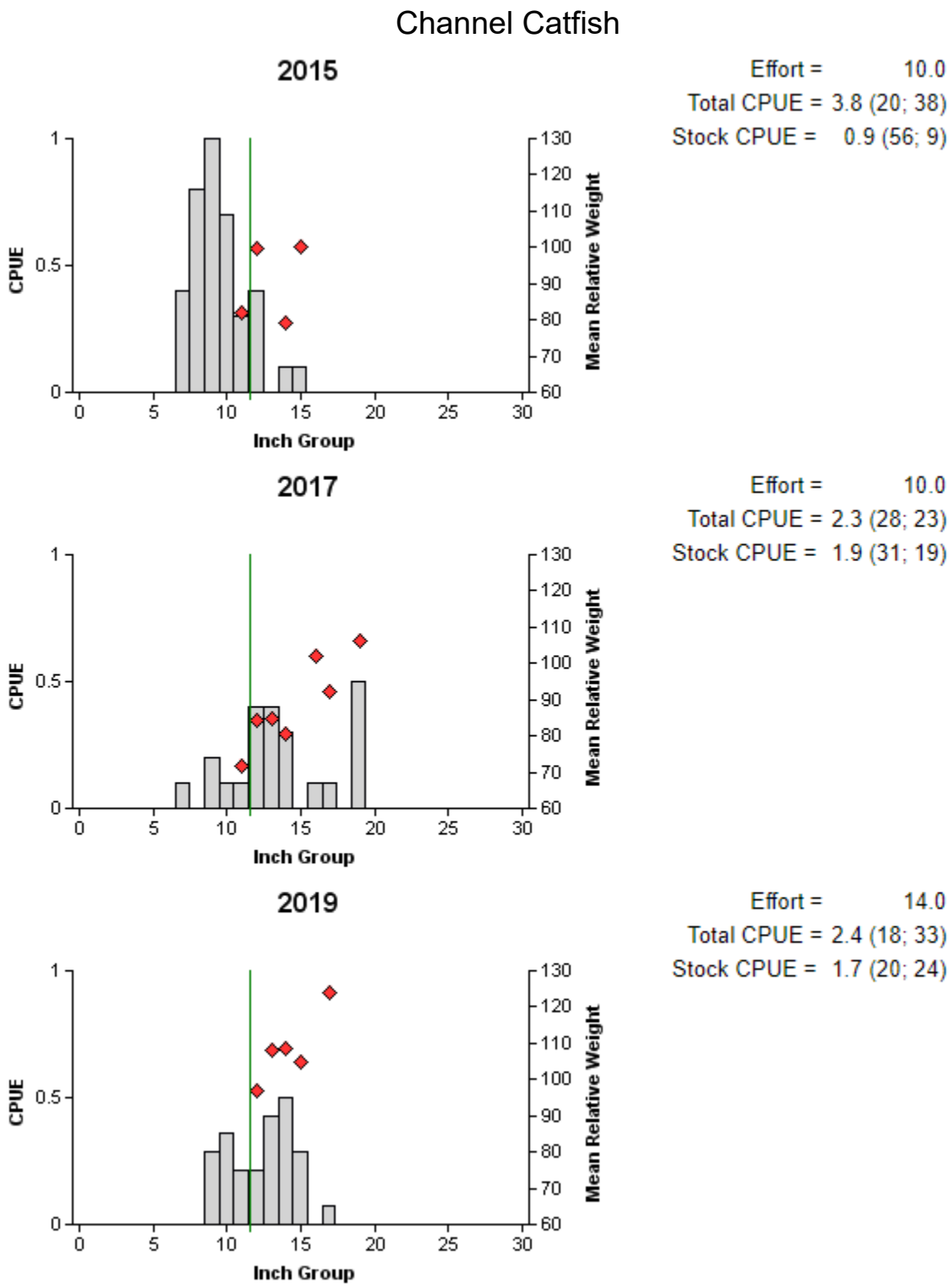


Figure 5. Number of Channel Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE) for spring gill net surveys, Oak Creek Reservoir, Texas, 2015, 2017, and 2019. Vertical line indicates minimum length limit.

Table 9. Creel survey statistics for Catfish at Oak Creek Reservoir, Texas, from June 2017 through May 2018. Total catch per hour is for anglers targeting Catfish and total harvest is the estimated number of Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2017/2018
Surface area (acres)	1,381
Directed effort (h)	2,785.03 (30)
Directed effort/acre	2.02 (30)
Total catch per hour	0.09 (111)
Total harvest	576.52 (107)
Blue Catfish	140.03 (121)
Channel Catfish	436.49 (107)
Harvest/acre	0.42 (107)
Percent legal released	23
Blue Catfish	0
Channel Catfish	28

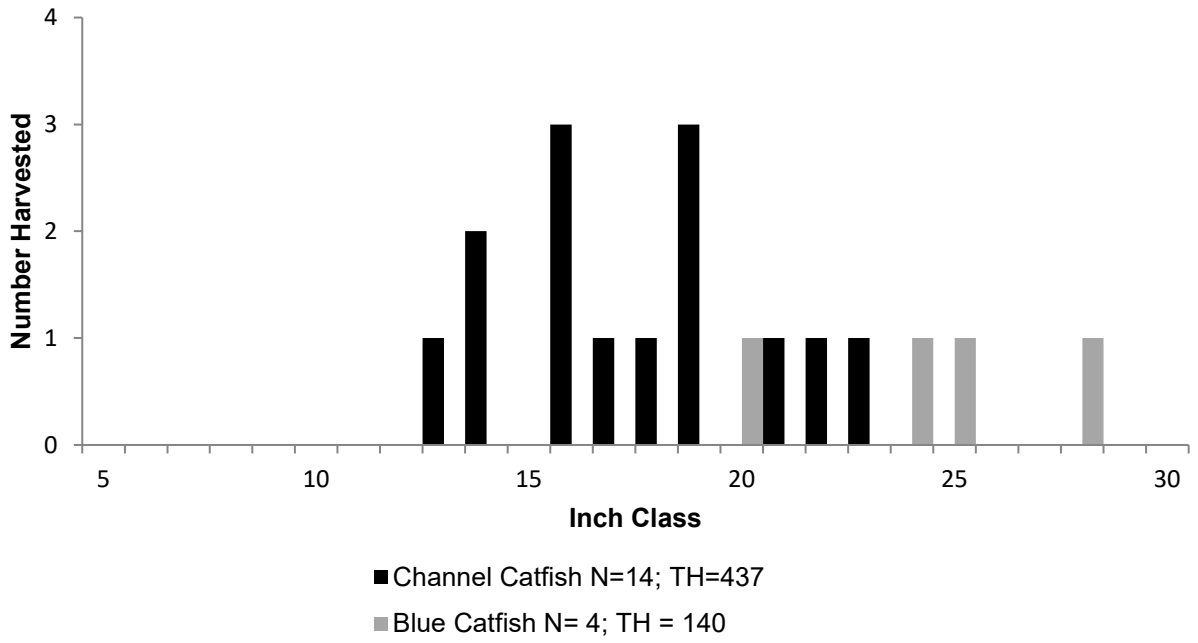


Figure 6. Length frequency of harvested Blue and Channel Catfish observed during creel surveys at Oak Creek Reservoir, Texas, June 2017 through May 2018, all anglers combined. N is the number of harvested Blue and Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

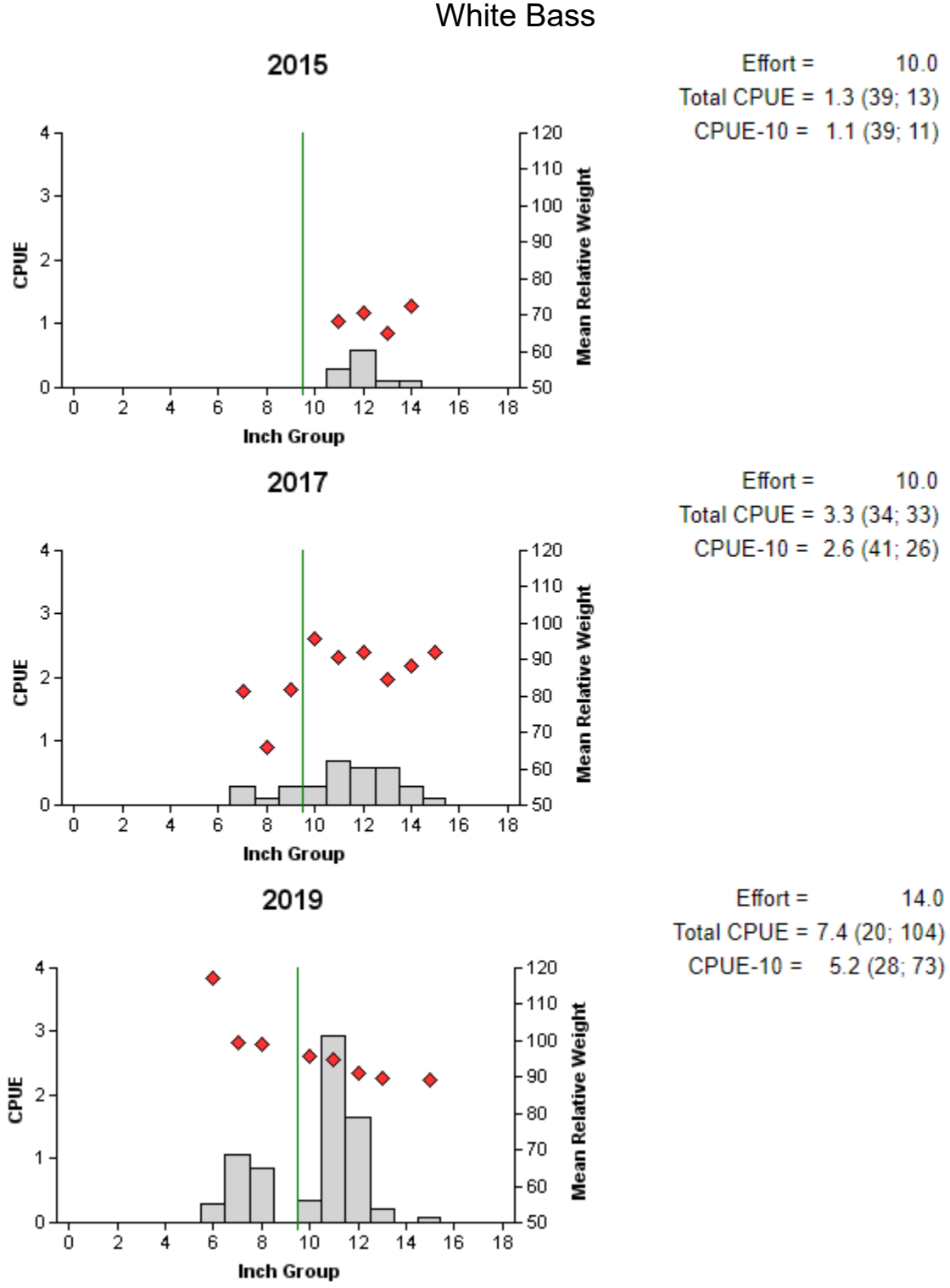


Figure 7. Number of White Bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE) for spring gill net surveys, Oak Creek Reservoir, Texas, 2015, 2017, and 2019. Vertical line indicates minimum length limit.

Table 10. Creel survey statistics for White Bass at Oak Creek Reservoir, Texas, from June 2017 through May 2018. Total catch per hour is for anglers targeting White Bass and total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2017/2018
Surface area (acres)	1,381
Directed effort (h)	1,046.72 (45)
Directed effort/acre	0.76 (45)
Total catch per hour	1.99 (72)
Total harvest	843.16 (70)
Harvest/acre	0.61 (70)
Percent legal released	88

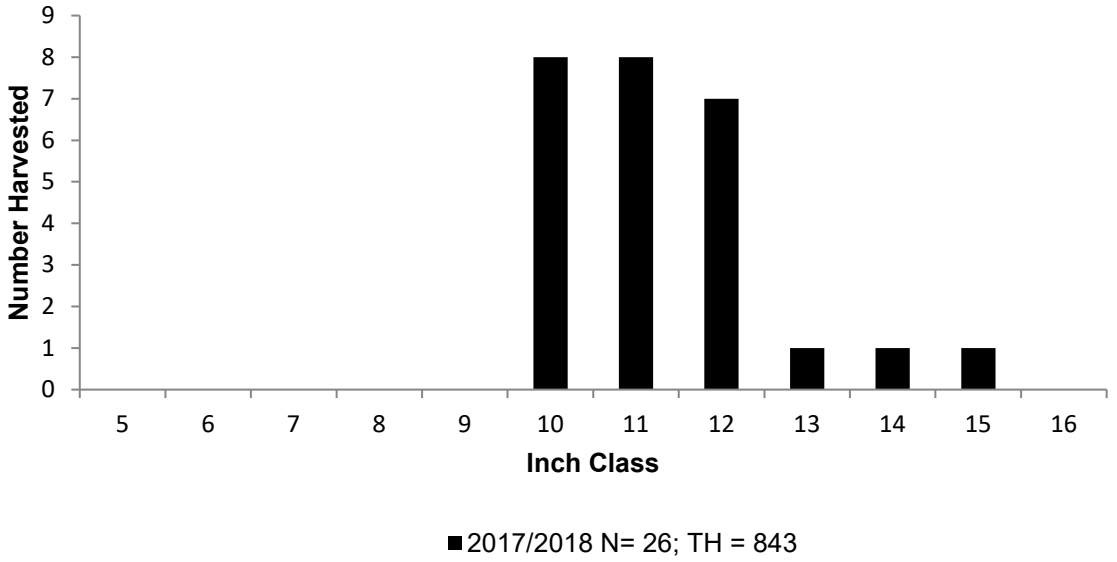


Figure 8. Length frequency of harvested White Bass observed during creel surveys at Oak Creek Reservoir, Texas, June 2017 through May 2018, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

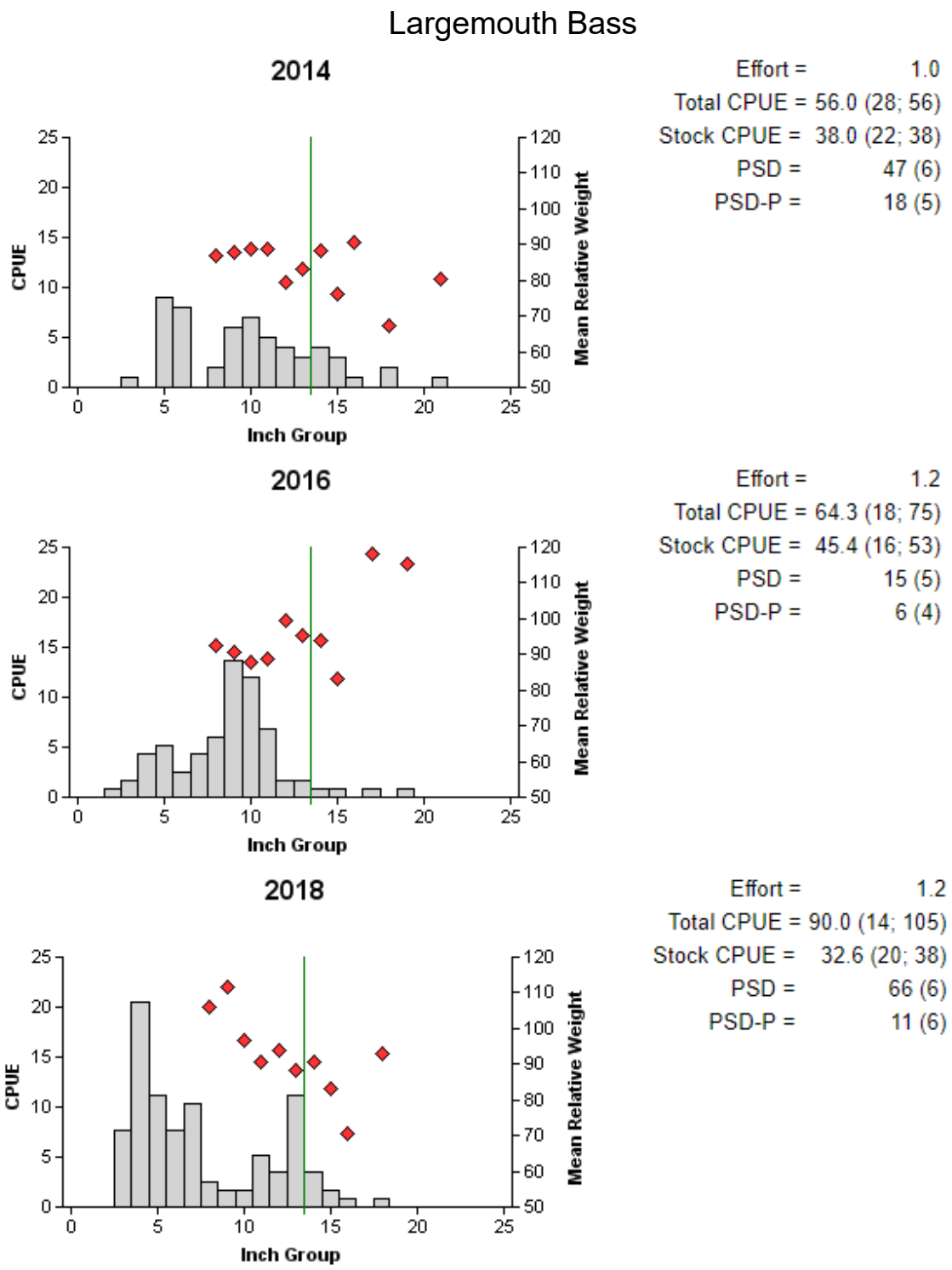


Figure 9. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Oak Creek Reservoir, Texas, 2014, 2016, and 2018. Vertical line indicates minimum length limit.

Table 11. Creel survey statistics for Largemouth Bass at Oak Creek Reservoir, Texas, from June 2017 through May 2018. Catch rate is for all anglers targeting Largemouth Bass. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

Statistic	2017/2018
Surface area (acres)	1,381
Directed angling effort (h)	
Tournament	2,983 (28)
Non-tournament	9,243 (18)
All black bass anglers combined	12,226 (16)
Angling effort/acre	8.9 (16)
Catch rate (number/h)	0.43 (63)
Tournament	0.42 (85)
Non-Tournament	0.42 (37)
Harvest	
Non-tournament harvest	0 (NA)
Harvest/acre	0.0 (NA)
Tournament weigh-in and release	754 (30)
Release by weight	
<4.0 lbs	10,447 (91)
4.0-6.9 lbs	0 (NA)
7.0-9.9 lbs	187 (103)
≥10.0 lbs	83 (88)
Percent legal released (non-tournament)	100

Table 12. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Oak Creek Reservoir, Texas, 1997, 2006, and 2018. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

		Number of fish				
Year	Sample size	FLMB	Intergrade	NLMB	% FLMB alleles	% FLMB
1997	30	7	22	1	65.8	23.3
2006	61	0	61	0	56.7	0.0
2018	30	1	29	0	69.0	3.3

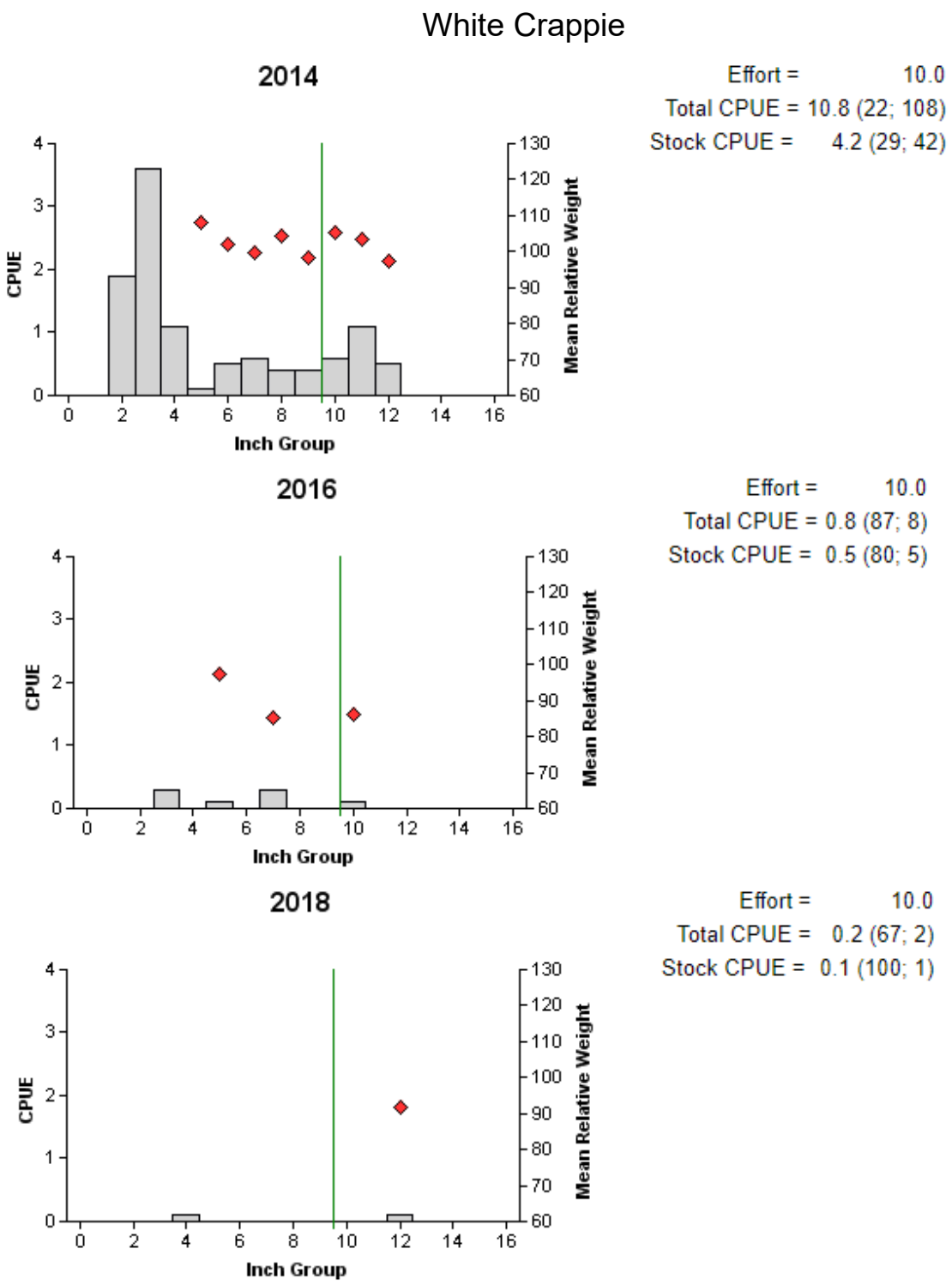


Figure 10. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE) for fall trap netting surveys, Oak Creek Reservoir, Texas, 2014, 2016, and 2018. Vertical line indicates minimum length limit.

Table 13. Creel survey statistics for White Crappie at Oak Creek Reservoir, Texas, from June 2017 through May 2018. Total catch per hour is for anglers targeting White Crappie and total harvest is the estimated number of White Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year
	2017/2018
Surface area (acres)	1,381
Directed effort (h)	6484.59 (20)
Directed effort/acre	4.70 (20)
Total catch per hour	0.21 (71)
Total harvest	1824.04 (42)
Harvest/acre	1.32 (42)
Percent legal released	0

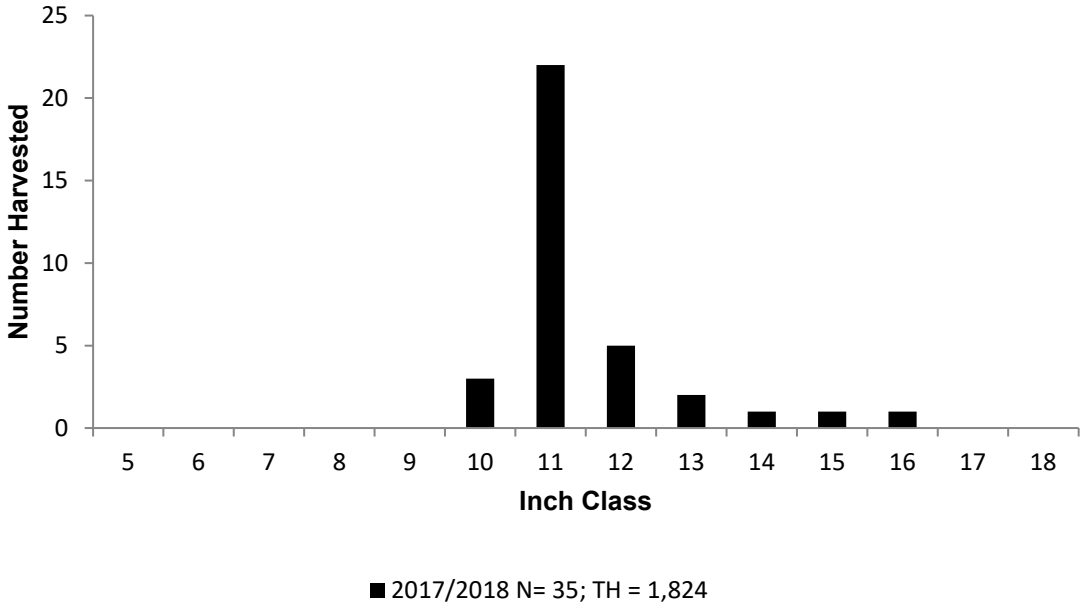


Figure 11. Length frequency of harvested White Crappie observed during creel surveys at Oak Creek Reservoir, Texas, June 2017 through May 2018, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 14. Proposed sampling schedule for Oak Creek Reservoir, Texas. Survey period is June through May. Standard survey denoted by S and additional survey denoted by A.

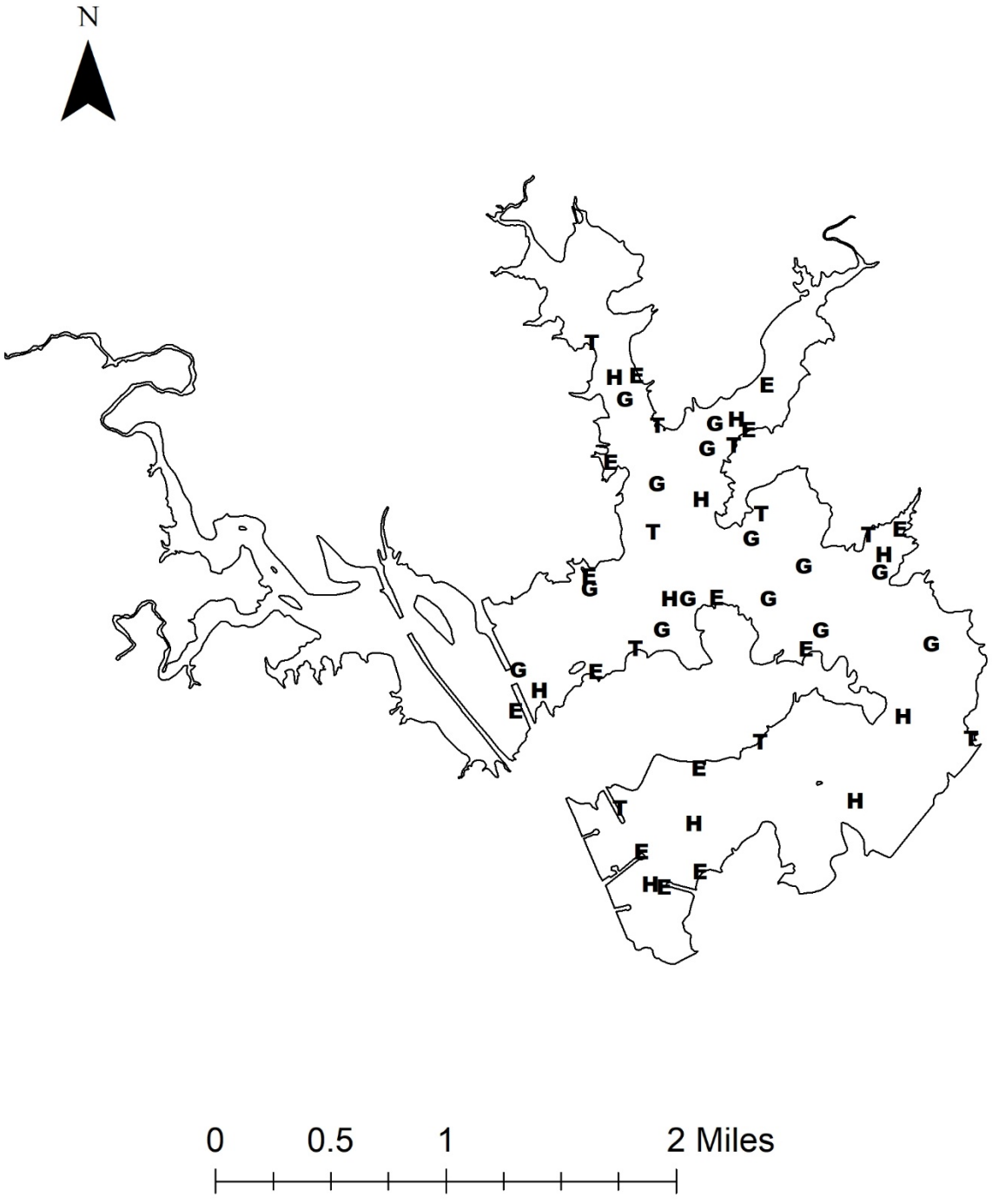
	Survey year			
	2019-2020	2020-2021	2021-2022	2022-2023
Angler Access				S
Structural Habitat				
Vegetation				S
Electrofishing – Fall		A		S
Electrofishing – Spring		A		A
Gill netting				
Creel survey				
Report				S

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

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from Oak Creek Reservoir, Texas, 2018-2019. Sampling effort was 14 net nights for gill netting, 10 net nights for trap netting, 1.2 hour for electrofishing, and 10 net sets for hoop netting.

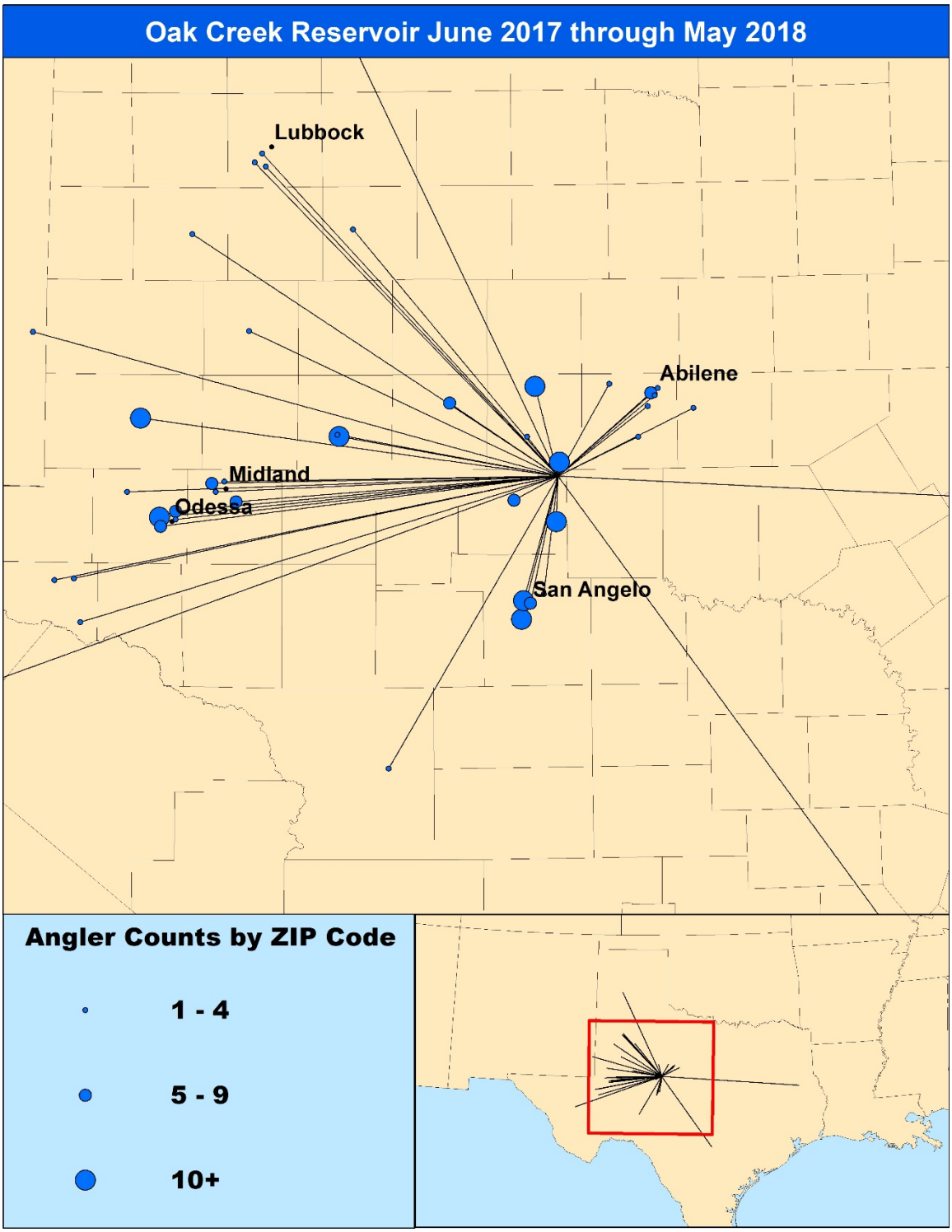
Species	Gill Netting		Trap Netting		Electrofishing		Hoop Netting	
	N	CPUE	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					92	78.9 (19)		
Threadfin Shad					12	10.3 (42)		
Blue Catfish	13	0.9 (37)						
Channel Catfish	33	2.4 (18)					4	0.4 (55)
Flathead Catfish	5	0.4 (47)						
White Bass	104	7.4 (20)						
Redbreast Sunfish					27	23.1 (22)		
Green Sunfish					1	0.9 (100)		
Warmouth					17	14.6 (38)		
Bluegill					238	204.0 (20)		
Longear Sunfish					47	40.3 (27)		
Redear Sunfish					1	0.9 (100)		
Largemouth Bass					105	90.0 (14)		
White Crappie			2	0.2 (67)				

APPENDIX B – Map of sampling locations



Location of sampling sites, Oak Creek Reservoir, Texas, 2018-2019. Trap net, gill net, hoop net, and electrofishing stations are indicated by T, G, H, and E, respectively. Water level was near full pool at time of sampling.

APPENDIX C – Reporting of creel ZIP code data



Location, by ZIP code, and frequency of anglers that were interviewed at Oak Creek Reservoir, Texas, during the June 2017 through May 2018 creel survey.

Life's better outside.®

In accordance with Texas State Depository Law, this publication is available at the
Texas State Publications Clearinghouse and/or Texas Depository Libraries.