

Cooper Reservoir

2019 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 Cooper Reservoir were surveyed in 2019 using electrofishing, low-frequency electrofishing and trap netting. Anglers were surveyed from June 2019 through August 2019 with a creel survey. Historical data are presented with the 2019-2020 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: Cooper Reservoir is located in Delta and Hopkins Counties, Texas, on the Middle and South Forks of the Sulphur River. It was constructed by the U. S. Army Corps of Engineers for water supply and flood control. In 2015, water level in Cooper Reservoir rose six feet above conservation pool elevation, flooding Doctor's Creek and South Sulphur Units of Cooper Lake State Park. Water levels have fluctuated from four feet low to six feet above conservation pool, since 2015.

Management History: Important sport fishes at Cooper Reservoir include Hybrid Striped Bass, White Bass, Blue Catfish, Channel Catfish, Largemouth Bass, and White Crappie. Annual requests are made to stock Hybrid Striped Bass (Palmetto Bass and/or Sunshine Bass) at a rate of 10/acre.

Fish Community

- **Prey species:** Bluegill and Gizzard Shad were present in 2019 fall electrofishing surveys but continue to have low abundances, however, limited data from body condition of game fish in Cooper Reservoir indicates an adequate availability of prey species.
- **Catfishes:** Channel Catfish and Blue Catfish were not sampled with gill nets in 2020 due to staffing concerns and COVID-19. In the past, Blue Catfish have been dominant and are thought to out-compete Channel Catfish. Low-frequency electrofishing was used in 2019 to conduct an age and growth assessment on Blue Catfish though few individuals of target size were obtained.
- **Temperate basses:** White Bass and Hybrid Striped Bass have been present in the reservoir but were not sampled this year due to staffing shortages and COVID-19. Fifty-three percent of the total fishing effort in Cooper Reservoir was directed towards Temperate bass populations (22% specifically towards White Bass). Hybrid Striped Bass stocking requests are made annually at 10/acre.
- **Largemouth Bass:** Largemouth Bass abundance continues to be limited, indicating low population density. In 2019, the majority of Largemouth Bass were smaller individuals. A slight increase in the CPUE of stock sized fish (≥ 8 inches) was observed in 2019 however only one legal-length fish was collected with our electrofishing survey.
- **White Crappie:** White Crappie continue to be present in Cooper Reservoir; the population is dominated by fish less than 5 inches. Very few individuals of legal length were captured with trap nets.

Management Strategies: Annual stockings of Hybrid Striped Bass (Palmetto and/or Sunshine Bass) at a rate of 10/acre should resume to maintain the fishery. Inform the public about the negative impacts of aquatic invasive species and work with controlling authority as needed to provide technical guidance with aquatic nuisance species. Continue managing all sport fish under statewide harvest regulations.

Introduction

This document is a summary of fisheries data collected from Cooper Reservoir in 2019-2020. 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 fish was collected, this report deals primarily with major sport fish and important prey species. Historical data are presented with the 2019-2020 data for comparison.

Reservoir Description

Cooper reservoir is an impoundment of the Sulphur River in Delta and Hopkins counties, Texas. The reservoir was constructed by the U.S. Army Corps of Engineers in 1991 for water supply, recreation, and flood control. The reservoir is eutrophic with a mean TSI cl-a of 57.5 (Texas Commission on Environment Quality 2020). At conservation pool (440.0 feet msl), Cooper Reservoir is 19,280 surface acres, has a shoreline length of 125 miles, and a mean depth of 15 feet. After the flood in early 2015, the water level has fluctuated roughly 5 ft throughout the year (Figure 1.). Other descriptive characteristics of Cooper Reservoir are presented in Table 1.

Angler Access

Cooper Reservoir has five public boat ramps and no private boat ramps. There are two units to Cooper Lake State Park, the South Sulphur Unit and Doctor's Creek Unit, each with public ramps and shoreline access areas and fishing piers available to customers paying the entry fee. Although public ramps at Tira and John's Creek are not located physically within the state park boundaries, they are administered by Cooper Lake State Park and subject to launch fees. There is limited shoreline access available at these boat ramps. During periods of extreme drought boat ramps have been inaccessible because of low lake elevation. Additional boat ramp characteristics are in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Storey 2016) included:

1. Maintain the Hybrid Striped Bass fisheries in Cooper Reservoir.

Action: Annual requests for stocking of Hybrid Striped Bass fingerlings at a rate of 10/acre were submitted; stockings occurred in 2016 (92,536), 2017 (fry; 1,890,261), and 2018 (91,465). Gill netting was not conducted in 2020 due to staffing shortages and COVID-19 social distancing suggestions.
2. Conduct annual aquatic vegetation surveys to monitor Hydrilla and other invasive species.

Action: Aquatic vegetation surveys were conducted annually in August 2016 through 2019 to monitor hydrilla coverage and other invasive species.
3. Increase angler awareness of the fisheries resources at Cooper Reservoir.

Action: District Facebook page was utilized when appropriate to promote fishing opportunities on Cooper Reservoir.

Harvest regulation history: Sport fishes in Cooper Reservoir are currently managed with TPWD statewide regulations. Prior to 2018, Largemouth Bass were managed with an 18-inch, five fish daily bag limit. Current regulations are found in Table 3.

Stocking history: Cooper Reservoir has received annual stockings of Palmetto Bass since 1996 with the exception of 2000, 2001, 2010, 2012, 2015 and 2019. In 2015, Sunshine Bass were substituted for Palmetto Bass (Table 4). Florida Largemouth Bass were stocked in 2009, 2010 and most recently in 2019. Blue Catfish were stocked in 1991 and 1992. The complete stocking history is listed in Table 4.

Vegetation/habitat management history: Native vegetation has fluctuated in the past due to fluctuations in water levels. In 2019, American lotus made up a majority of the vegetation present within the reservoir. Hydrilla and Alligatorweed have been present in Cooper Reservoir for many years but has never created an access problem.

Water transfer: Cooper Reservoir provides water supply storage for the North Texas Municipal Water District, the Sulphur River Municipal Water District, and the city of Irving. This water supply storage exists in the conservation pool between elevations 415.5 ft msl and 440.0 ft msl. The water intake structure is located on the south shore of the lake, which provides anywhere from 2.0 million gallons per day of water in the winter months to 5.0 million gallons per day in the summer months. No inter-basin transfers exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Cooper Reservoir (Storey, 2016). 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, 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.

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).

Low-frequency electrofishing – Blue Catfish were collected by low-frequency electrofishing at 20 stations. The minimum duration of electrofishing at each station was 3 minutes. CPUE for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

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). Palmetto Bass PSD was calculated according to Dumont and Neely (2011). Standard error (SE) was calculated for structural indices. Relative standard error ($RSE = 100 \times SE$ of the estimate/estimate) was calculated for all CPUE and creel statistics.

Creel survey – An annual roving creel survey was conducted from June 2019 through August 2019. 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 2017).

Habitat – A complete vegetation survey was conducted in the summer of 2019 to monitor native and non-native 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 obtained from the Texas Water Development Board (TWDB 2020).

Results and Discussion

Habitat: The water level in Cooper Reservoir has remained within 4 feet (above or below) of conservation pool since 2016 allowing buttonbush and black willow to thrive, occupying 87% of the shoreline in 2019 (Table 6). American Lotus (1,470 acres) and pondweed (54 acres) were the two most

abundant native macrophytes present. Hydrilla and Alligatorweed are still present in the reservoir but at very low acreages (2.9 acres and 0.3 acres, respectively).

Creel: Directed fishing effort by anglers was highest for Temperate Bass (52%: 22% White Bass specifically), followed by anglers fishing for catfish (26%) during the 2019 summer creel period (Table 7). Total fishing effort for all species and direct expenditures at Cooper Reservoir was estimated at 10,356 hours and \$74,368, respectively (Table 8).

Prey species: Threadfin shad were present in the reservoir. Electrofishing catch rates of Gizzard Shad and Bluegill were 91.0/h and 41.0/h, respectively. Index of Vulnerability (IOV) for Gizzard Shad was similar previous surveys, indicating that 93% of Gizzard Shad were available to existing predators (Figure 2). Total sunfish densities remained low, likely due to a combination of turbid water and limited littoral habitat.

Catfishes: Due to limited staffing and social distancing protocols due to COVID-19 during the spring of 2020, gill nets survey was canceled. Previous gill net survey data for Blue and Channel Catfish can be found in the 2016 management report (Storey 2016). The 2019 low-frequency electrofishing survey suggested Blue Catfish recruitment is consistent in the reservoir; most of the fish collected were under 10 inches (Figure 3). Body condition of stock size Blue Catfish was good (Wr range = 85 – 110). The 2016 OBS plan called for a category 3, mean length at age analysis, however the size range of fish collected in adequate abundance during the low-frequency survey was too narrow (6-11 inches) to characterize length at age for the population. All but one fish aged from 6-11 inches were two years old, or less.

Directed angling effort for catfishes during the 2019 summer creel survey was 2,723h (Table 9). Anglers caught an average of 0.44 fish/h and harvested an estimated 268 Blue Catfish and 697 Channel Catfish. Length frequency graphs of Blue Catfish and Channel Catfish harvested during the 2019 summer creel can be found in figures 4 and 5.

Temperate Bass: Due to limited staffing and social distancing protocols due to COVID-19 during the spring of 2020, the gill net survey was canceled. Previous gill net survey data for Temperate Bass can be found in the 2016 management report (Storey 2016).

Directed fishing effort, catch per hour, and total harvest for temperate bass was 5,414 h, 6.1 fish/h, and 10,942 fish, respectively, over the last creel period (Table 10). Only 12% of legal-sized White Bass caught during the 2019 creel survey were released; harvested White Bass were 11 – 16 inches (Figure 6). While no hybrids were harvested, an estimated 552 fish were released by anglers during the 2019 creel survey; 64% were legal length. Several anglers noted they were adamant about releasing all Hybrid Striped Bass caught in hopes of allowing the population to rebound.

Largemouth Bass: Largemouth Bass electrofishing catch rates have been low over the last three night-time surveys from 2007 – 2019 (CPUE range: 8.5/h – 15.0/h; Figure 7). Only one legal-sized fish was caught in 2019. Fluctuating water levels and limited littoral habitat have historically limited Largemouth Bass production in Cooper Reservoir. Florida Largemouth Bass were stocked in 2019 for the first time in 10 years; flooded terrestrial vegetation and abundant Threadfin Shad should improve recruitment.

Anglers spent minimal effort targeting Largemouth Bass during the 2019 creel (209 hours) and no fish were caught during creel surveys.

Crappie: Black Crappie were present in the reservoir, however White Crappie continued to make up the bulk of the population. The 2019 crappie trap net catch rate (12.5/nn) was higher than the previous two surveys (2007 and 2015; Figure 8). Size structure (PSD = 14) was down from previous surveys and most fish were below 10 inches.

Anglers spent minimal effort targeting crappie during the 2019 creel (117 hours) and no fish were caught during creel surveys.

Fisheries Management Plan for Cooper Reservoir, Texas

Prepared – July 2020

ISSUE 1: Hybrid Striped Bass have supported a high-quality fishery in Cooper Reservoir since the late 1990s. Sunshine Bass were introduced in 2015 and future stockings could potentially include either or both of these hybrids. Over 50% of all directed effort was spent targeting temperate bass in 2019 and made up the bulk of all fish caught. These stockings are necessary to maintain the best potential fishery on the reservoir.

MANAGEMENT STRATEGIES

1. Stock Hybrid Striped Bass (Palmetto Bass, Sunshine Bass, or combination of both to meet stocking request) annually at 15 fish/acre. If annual stocking requests are met consistently for two consecutive years, drop the request to 10 fish/acre. Fry can be substituted at the appropriate rate if fingerlings are not produced or available.
2. Conduct spring gill net surveys every four years to monitor the Hybrid Striped Bass population.

ISSUE 2: Several years of drought resulted in very poor littoral habitat, and likely very poor year classes of Largemouth Bass. The rebounding lake levels over the last two years resulted in expansive flats of inundated terrestrial vegetation and submersed species that provided excellent habitat for juvenile fish. If water levels remain stable, Cooper Reservoir will likely experience a new lake effect over the next several years, offering improved survival and recruitment of Largemouth Bass.

MANAGEMENT STRATEGIES

1. Monitor aquatic vegetation in Cooper Reservoir for suitable Largemouth Bass populations.
2. Stock fingerling Largemouth Bass when they are available and when aquatic vegetation is suitable.

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 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 state park staff 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 (2020–2024)

Sport fish, forage fish, and other important fishes

Sport fishes in Cooper Reservoir include Hybrid Striped Bass, White Bass, Blue Catfish, Channel Catfish, Crappie, and Largemouth Bass. Important forage species include Threadfin and Gizzard Shad. Sunfish are present, but catch rates are low.

Survey objectives, fisheries metrics, and sampling objectives

Blue Catfish: Catfishes accounted for 26% of directed angler effort during the last creel survey. Historical gill net data suggest population indices (CPUE, PSD, W_r) can be estimated with acceptable precision ($RSE < 25$) and sample size ($N \geq 50$ stock-size fish) with only 10 nights of gill net effort at least 80% of the time. Population trend data (CPUE and PSD) will be monitored every four years in order to detect any large-scale changes. In the spring of 2024, 10 gill nets will be set, with up to 10 additional nets set, in order to achieve a precise estimate ($RSE < 25$) of abundance and an acceptable size-structure estimate ($N \geq 50$ stock-size fish).

Channel Catfish: Channel Catfish gill net catch rate from the last three surveys has ranged from 1.1 – 2.1 fish/nn. Historical gill net catch rates suggest estimating size structure would require a substantial amount of gill net effort. However, gill net catch rates have been consistent enough ($RSE < 25$) to continue monitoring relative abundance with CPUE estimates. The effort required for Blue Catfish sample objectives will be sufficient to collect CPUE data on Channel Catfish.

Hybrid Striped Bass: Hybrid Striped Bass provide a popular fishery at Cooper Reservoir. While no fish were harvested, 552 fish were caught and released by anglers. Palmetto Bass have been stocked regularly since 1996 although some years have been skipped along with decreases in the amount stocked. Catch per unit effort (CPUE) of Hybrid Striped Bass has decreased over the past few surveys from 5.1/nn in 2008 to 0.9/nn in 2016. Though a flooding event before 2016 could have been a factor in Hybrid Striped Bass CPUEs, annual stockings are preferable to maintain the fishery. Stocking requests are submitted every year by District staff. In 2015, Sunshine Bass were stocked in lieu of Palmetto Bass. Based on analysis of the 2016 gill net data, the anticipated effort required to collect 50 stock-sized fish with 80% confidence would be in excess of 50 net nights. While trend data will be extremely difficult to estimate, it will still be necessary to document the survival of stocked HSB within the reservoir and the overall body condition. In accordance with the catfish sampling objectives, 10 gill nets will be set in the spring of 2024, with up to 10 more, if necessary, in order to document the presence of HSB year classes and estimate W_r ; catch data will still be reported. No additional effort will be expended if HSB have not been collected after 20 gill nets.

White Bass: White Bass are abundant in Cooper Reservoir and are a popular fishery (22 % total angling effort). White Bass also had the highest CPUE and harvest during the 2019 summer creel survey (4.2 fish/hr and 10,942 fish, respectively). Catch per unit effort (CPUE) for White Bass has been consistent in the last surveys with 5.1/nn in 2012 and 4.4/nn in 2016. Continuation of trend data in this reservoir with

spring gill netting will allow for determination of any large-scale changes in the White Bass population that may spur further investigation. A minimum of 10 gill nets will be set at randomly selected sites in spring 2024 but sampling will continue at random sites until 50 stock-sized fish are collected and the RSE of CPUE-S \leq 30. Based on analysis of the 2016 data, the anticipated effort required to collect the sampling objective of stock-sized fish is 15 stations with 80% confidence. In order to attain an RSE of CPUE-S \leq 30 with 80% confidence would take approximately 20 net nights. A sample of 13 fish in the length range between 9 and 10.9 inches will be collected to calculate growth rate to minimum length limit.

Crappie: Both White and Black Crappie are present in Cooper Reservoir; however, Black Crappie are low in abundance. Crappie also have the lowest directed angling effort of all fish populations in Cooper Reservoir at 1%. However, White Crappie trap net catch rates have been stable enough to continue monitoring population. Crappie size structure, body condition, and growth (PSD, W_r , mean age at 10 inches) will continue to be monitored every four years in order to detect any larger scale population fluctuations. In the fall of 2023 a minimum of 10, randomly selected single-cod shoreline trap net sites will be sampled, and up to 10 additional nets will be set, if needed, to collect at least 50 stock-size individuals. Thirteen fish (9.0 – 10.9 inches) will be subsampled to determine average age at legal length if specimens are available.

Largemouth Bass: Cooper Reservoir produced four ShareLunker entries between 1998 and 2000; the likely remnants of adult Florida Largemouth Bass stocked immediately following impoundment. Despite these early successes, the Largemouth Bass population has historically been very difficult to sample and electrofishing CPUEs have generally been low. Largemouth Bass also have the second lowest directed fishing pressure within Cooper Reservoir with only 2% of total angling effort. Additionally, no Largemouth Bass were caught or harvested during the 2019 summer creel survey. However, newly flooded terrestrial vegetation and recent stocking efforts will require future monitoring efforts to determine the effects from both improved littoral habitat and stocking. However, standard night-time surveys have produced poor catch rates, suggesting alternative sampling approaches may be needed to adequately monitor the population. Twelve biologist-selected daytime electrofishing sites will be sampled in the fall of 2023 to detect potential improvements in Largemouth Bass relative abundance (CPUE). No additional effort will be expended and the results of the 2023 survey will be used to determine future sampling efforts. If catch rates remain low and water quality conditions remain poor, electrofishing will be discontinued after the 2023 survey.

Shad Species: Gizzard Shad, Threadfin Shad and sunfish are important prey species in Cooper Reservoir. However, traditional electrofishing surveys produced variable catch rates. Relative weights of Largemouth Bass, catfish and temperate bass will be used to gauge prey availability for sport fish in the reservoir. No sampling objectives will be set for prey species.

Literature Cited

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Tables and Figures

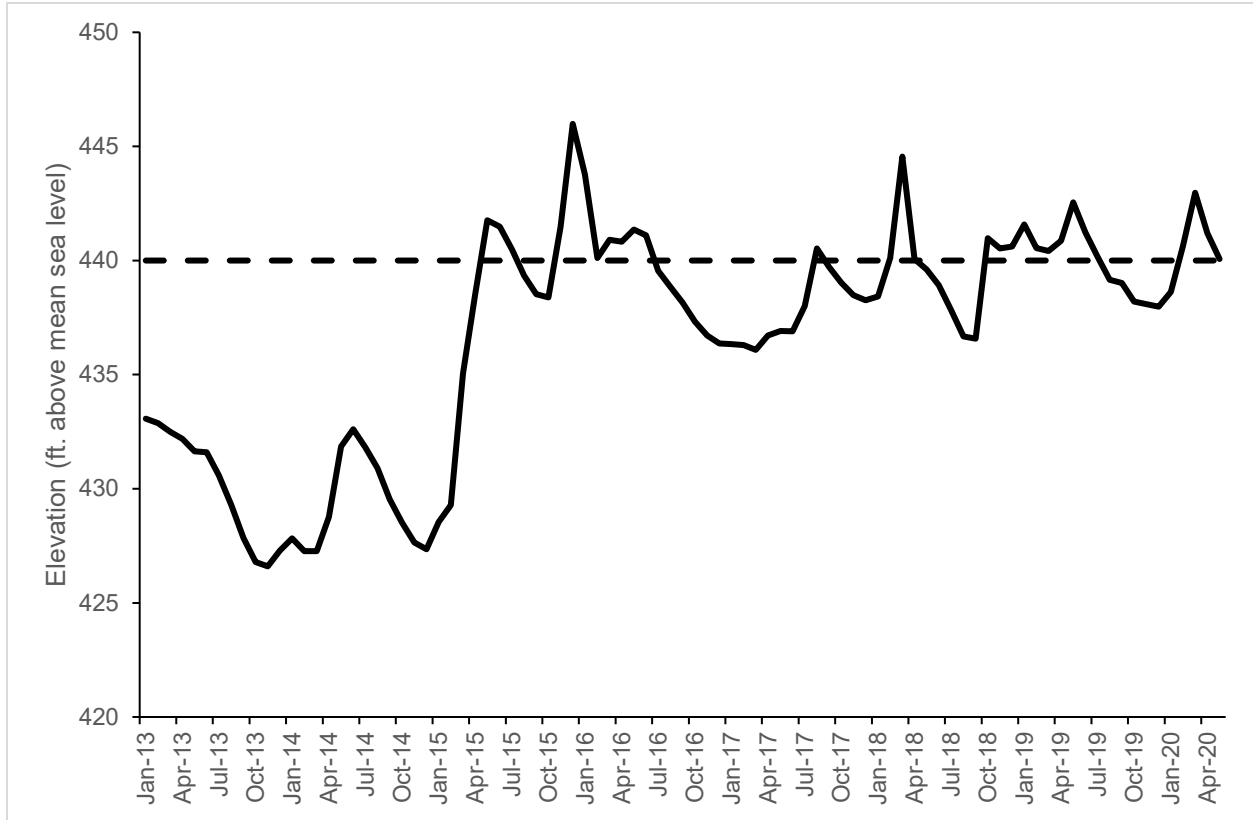


Figure 1. Monthly average water level elevations in feet above mean sea level (MSL) recorded for Cooper Reservoir, Texas, from the Texas Water Development Board. The dashed line represents the conservation pool elevation at 440.0 ft msl.

Table 1. Characteristics of Cooper Reservoir, Texas.

Characteristic	Description
Year constructed	1991
Controlling authority	U.S. Army Corps of Engineers
County	Delta and Hopkins
Reservoir type	Mainstem
Shoreline Development Index	6.42
Conductivity	150 μ S/cm

Table 2. Boat ramp characteristics for Cooper Reservoir, Texas, August, 2015. Reservoir elevation at time of survey was 440.46 feet above conservation elevation.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Tira	33.31181 -95.61077	Y	93	431	Excellent, no access issues
Doctor's Creek	33.34318 -95.66298	Y	87	428	Excellent, no access issues
John's Creek	33.32413 -95.73598	Y	32	432	Excellent, no access issues
Honey Creek	33.29000 -95.67619	Y	43	430	Excellent, no access issues
Gull's Creek	33.29421 -95.65205	Y	111	430	Excellent, no access issues

Table 3. Harvest regulations for Cooper 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, Hybrid Striped	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 of Cooper Reservoir, Texas. FGL = fingerling; ADL = adults, UNK = unknown.

Species	Year	Number Stocked	Life Stage
Blue Catfish	1991	3,500	FGL
	1992	482,075	FGL
	Total	485,575	
Channel Catfish	1991	12,500	FGL
	Total	12,500	
Bluegill	1991	41,600	FRY
	Total	41,600	
Florida Largemouth Bass	1991	151	ADL
	1991	5,142	FGL
	1992	192	ADL
	1992	1,929,012	FGL
	1993	30	ADL
	1993	481,745	FGL
	1993	200,084	FRY
	1997	482,879	FGL
	1998	482,084	FGL
	1999	484,695	FGL
	2000	9,132	FGL
	2002	489,878	FGL
	2002	477,289	FGL
	2009	475,672	FGL
	2010	365,041	FGL
	2019	208,899	FGL
Total	6,091,925		
Palmetto Bass	1996	146,573	FGL
	1998	193,665	FGL
	1999	97,749	FGL
	2002	94,410	FGL
	2003	95,100	FGL
	2004	167,707	FGL
	2005	190,388	FGL
	2006	142,178	FGL
	2007	188,931	FGL
	2008	192,522	FGL
	2009	90,775	FGL
	2011	104,070	FGL
	2013	172,684	FGL
	2014	76,204	FGL
	2016	92,536	FGL
	2017	1,890,261	FRY
2018	91,465	FGL	
Total	4,027,218		
Sunshine Bass (white bass x striped bass hybrid)	2015	147,174	UNK
	Total	147,174	

Table 5. Objective-based sampling plan components for Cooper Reservoir, Texas 2019–2020.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Gill Netting</i>			
Blue Catfish	Abundance	CPUE–Stock	RSE-Stock \leq 25
	Size structure	PSD, length frequency	N \geq 50 stock
Channel Catfish	Abundance	CPUE–Total	RSE \leq 25
	Size structure	PSD, length frequency	N \geq 50
White Bass	Abundance	CPUE–Total	RSE \leq 30
	Size structure	PSD, length frequency	N \geq 50 stock
	Age-and-growth	Age at 10 inches	N = 13, 9.0 – 10.9 in
Hybrid Striped Bass	Abundance	CPUE–Total	
	Size Structure	PSD, length frequency	
<i>Low-frequency electrofishing</i>			
Blue Catfish	Age-and-growth	Category 3: mean length at age	*N = 200, subsample at 5 fish per 10 mm strata
<i>Trap netting</i>			
Crappie ^a	Abundance	CPUE–Stock	RSE-Stock \leq 25
	Size Structure	PSD, length frequency	N = 50

^a No additional effort will be expended to achieve an RSE \leq 25 for CPUE of Crappie species if not reached from designated sampling effort.

*Size range of fish collected was too narrow to adequately assess length-at-age for the population.

Table 6. Survey of aquatic vegetation, Cooper Reservoir, Texas, 2007, 2015, and 2019. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2007	2015	2019
Native submersed			54.0 (0.3)
Native emergent	3,457.2 (18.2)	<0.1 (<0.1)	1,469.96 (7.7)
Native terrestrial		244.1 (<0.1)	70.4 (87.0) ^a
Non-native			
Hydrilla (Tier III)*	16.0 (<0.1)	1.1 (<0.1)	2.9 (<0.1)
Alligatorweed (Tier III)*		0.2 (<0.1)	0.3 (<0.1)

*Tier III is Watch Status

^aVegetation is measured as shoreline miles

Table 7. Percent directed angler effort by species for Cooper Reservoir, Texas, 2019. Survey period was from 1 June through 31 August.

Species	2019/2020
Catfish	26.3
Temperate Bass	30.7
White Bass	21.5
Largemouth Bass	2.0
Crappie	1.1
Anything	18.3

Table 8. Total fishing effort (h) for all species and total directed expenditures at Cooper Reservoir, Texas, 2019. Survey period was from 1 June through 31 August. Relative standard error is in parentheses.

Creel statistic	2019/2020
Total fishing effort	10,356 (39)
Total directed expenditures	\$74,368 (54)

Gizzard Shad

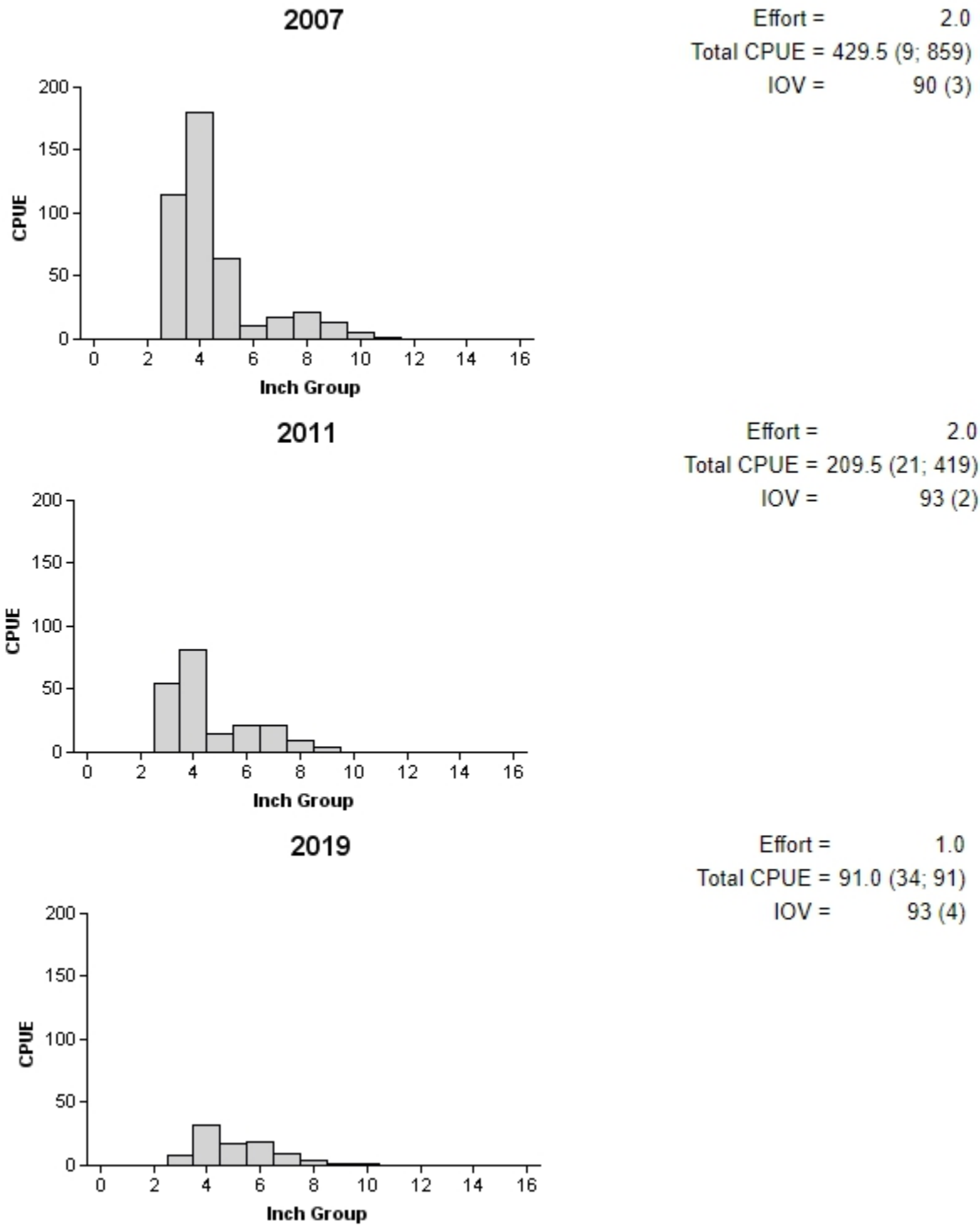


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for daytime fall electrofishing surveys, Cooper Reservoir, Texas, 2007, 2011 and 2019.

Blue Catfish

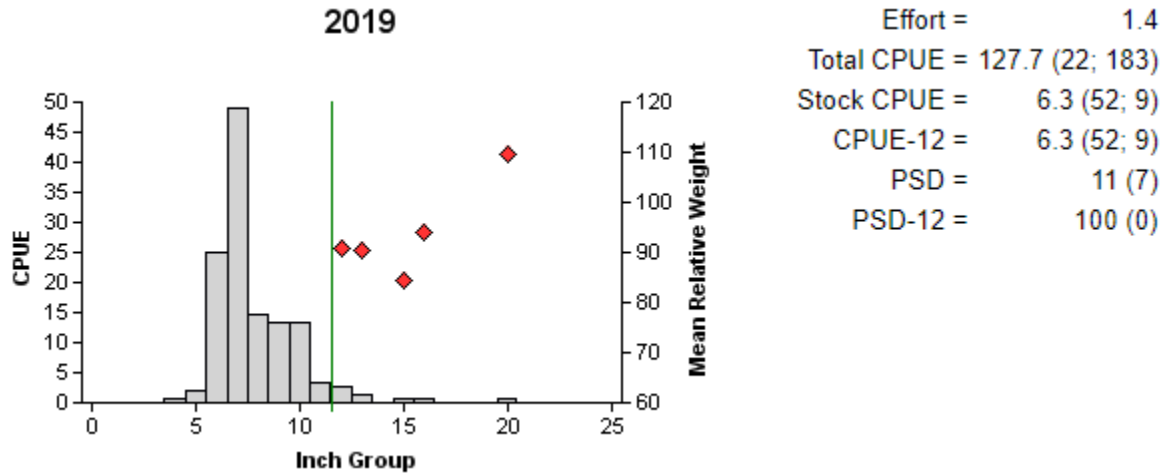


Figure 3. Number of Blue Catfish caught per hour (CPUE) and population indices (RSE and N for CPUE) for low-frequency electrofishing surveys, Cooper Reservoir, Texas, 2019. Vertical line represents minimum length limit.

Catfish

Table 9. Creel survey statistics for catfishes at Cooper Reservoir, Texas, from June 2019 through August 2019. Total catch per hour is for anglers targeting Channel Catfish and total harvest is the estimated number of catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	
Surface area (acres)	19,018
Directed effort (h)	2,723 (45)
Directed effort/acre	0.14 (45)
Total catch per hour	0.44 (89)
Total harvest	965 (142)
Blue Catfish	268 (203)
Channel Catfish	697 (119)
Harvest/acre	0.05 (142)
Percent legal released	11.9

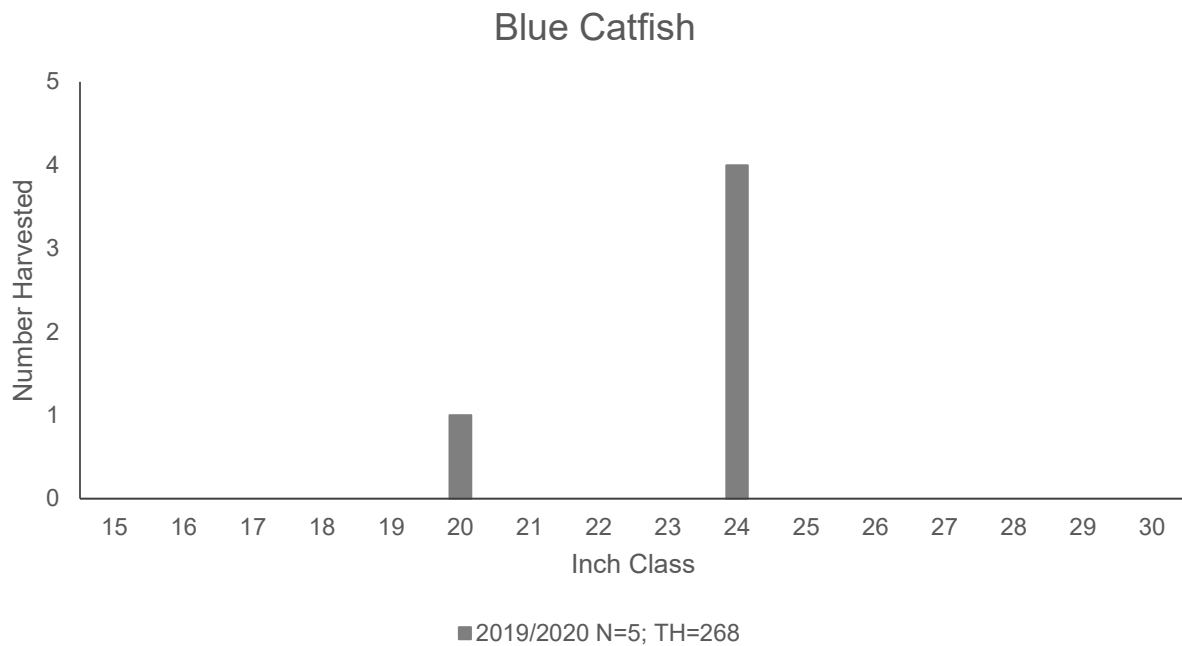


Figure 4. Length frequency of harvested Blue Catfish observed during creel surveys at Cooper Reservoir, Texas, June 2019 through August 2019, all anglers combined. N is the number of harvested Blue Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

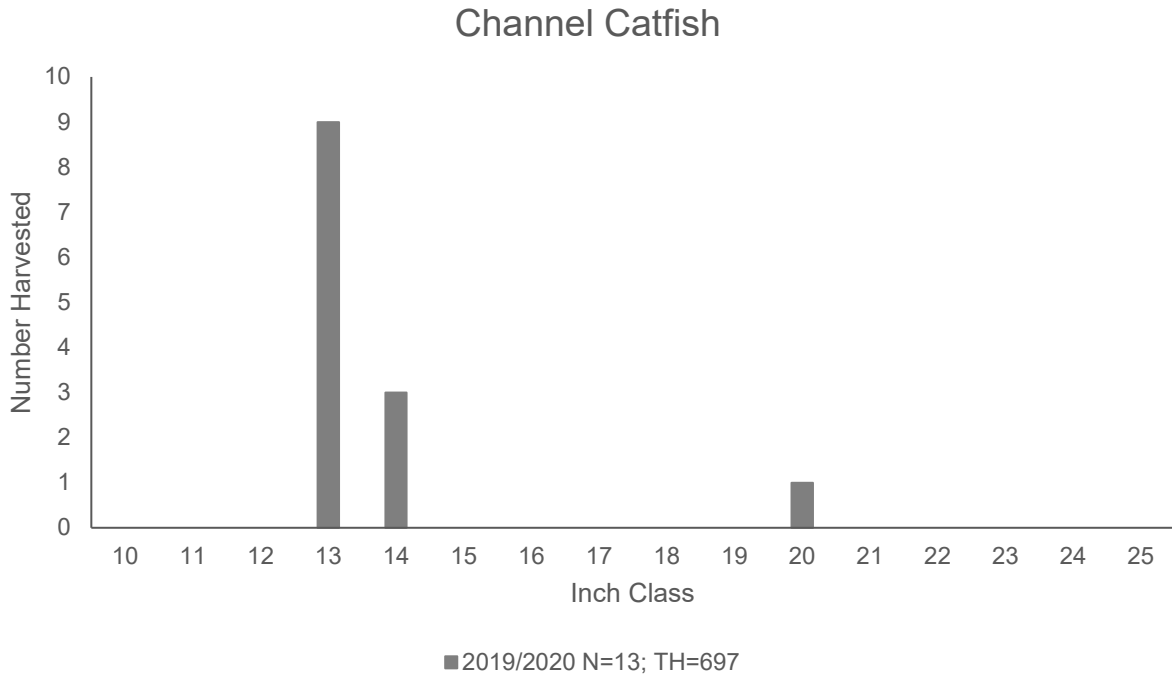


Figure 5. Length frequency of harvested Channel Catfish observed during creel surveys at Cooper Reservoir, Texas, June 2019 through August 2019, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Temperate Bass

Table 10. Creel survey statistics for temperate bass at Cooper Reservoir, Texas, from June 2019 through August 2019. Total catch per hour is for anglers targeting temperate and total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	2019
Surface area (acres)	19,018
Directed effort – any temperate bass (h)	5,414 (39)
White Bass specifically	2,231 (48)
Directed effort/acre	0.28 (39)
Total catch per hour	6.10 (36)
Total harvest*	10942 (83)
Harvest/acre*	0.57 (83)
Percent legal released	
White Bass	12
Hybrid Striped Bass	100

* White Bass only, no Hybrids were harvested.

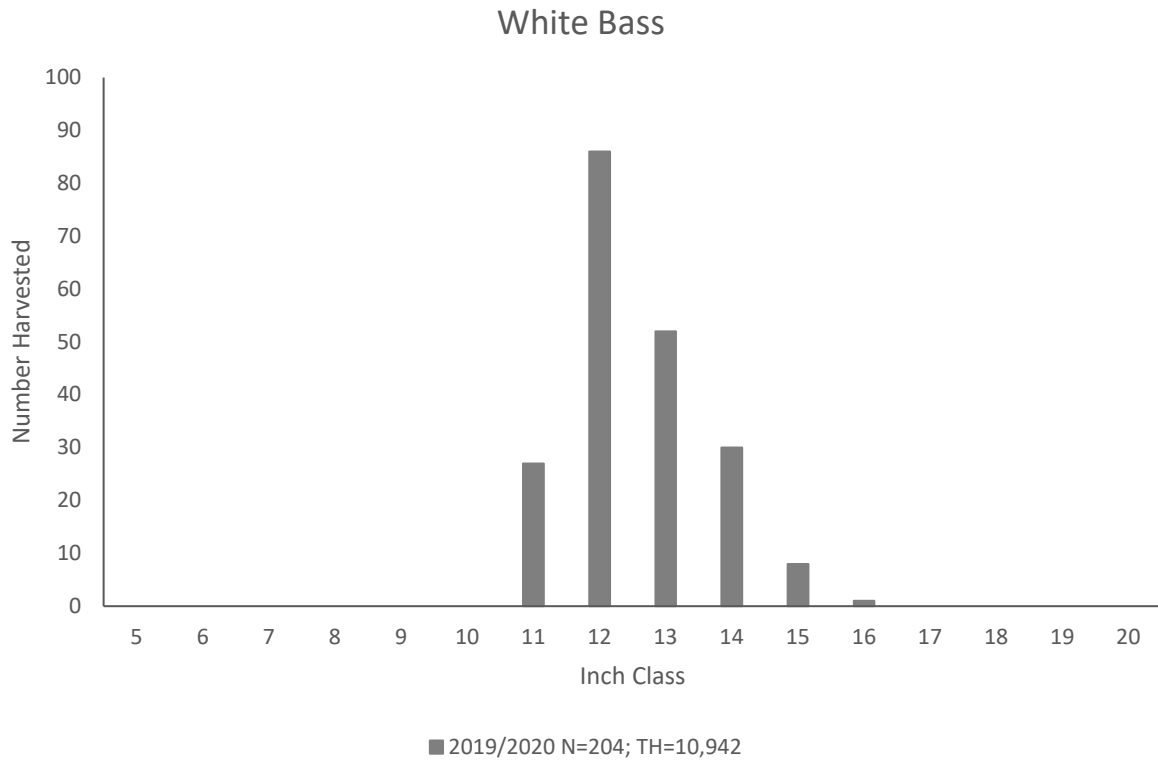


Figure 6. Length frequency of harvested White Bass observed during creel surveys at Cooper Reservoir, Texas, June 2019 through August 2019, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass

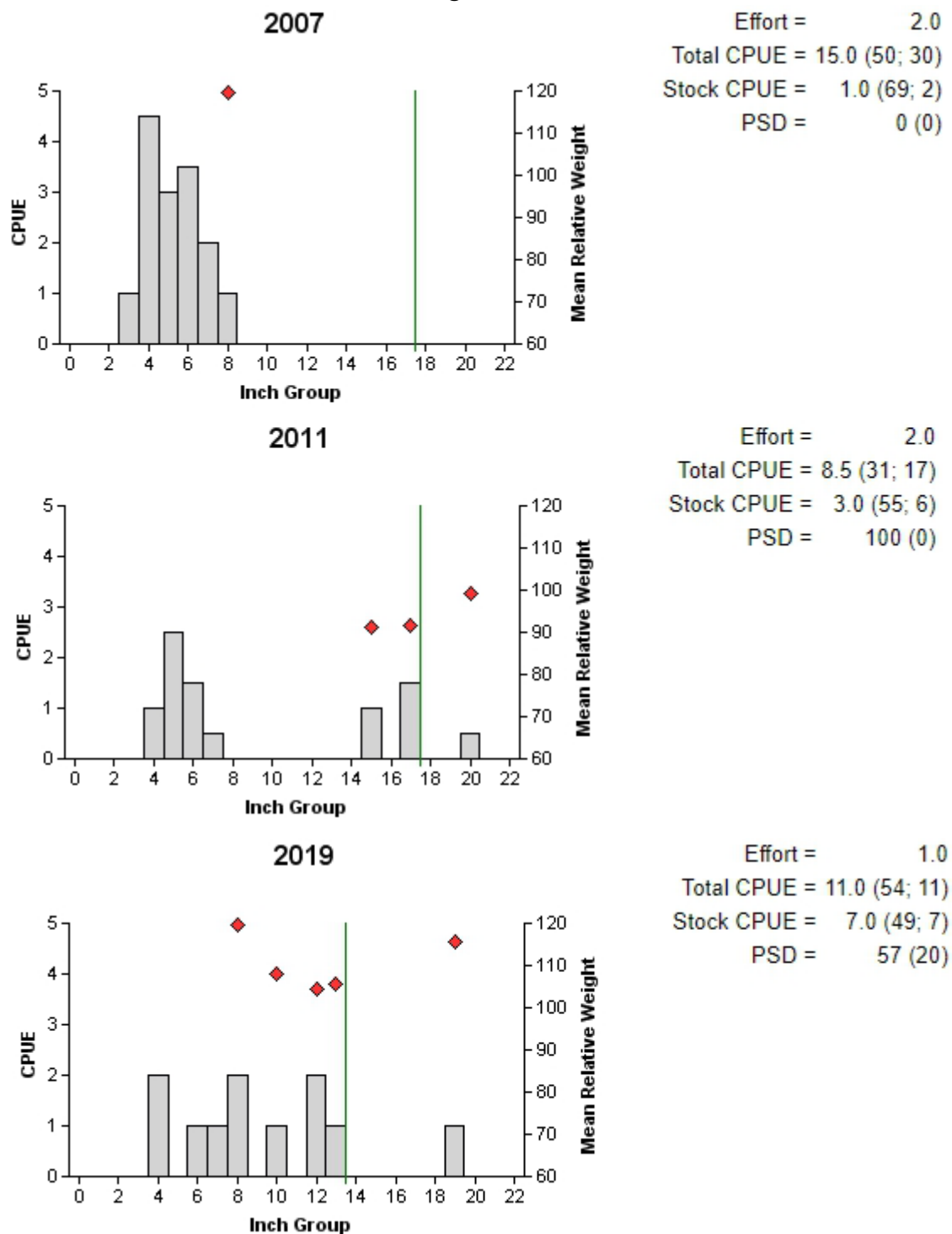


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Cooper Reservoir, Texas, 2007, 2011, and 2019. Vertical line represents minimum length limit at time of survey.

White Crappie

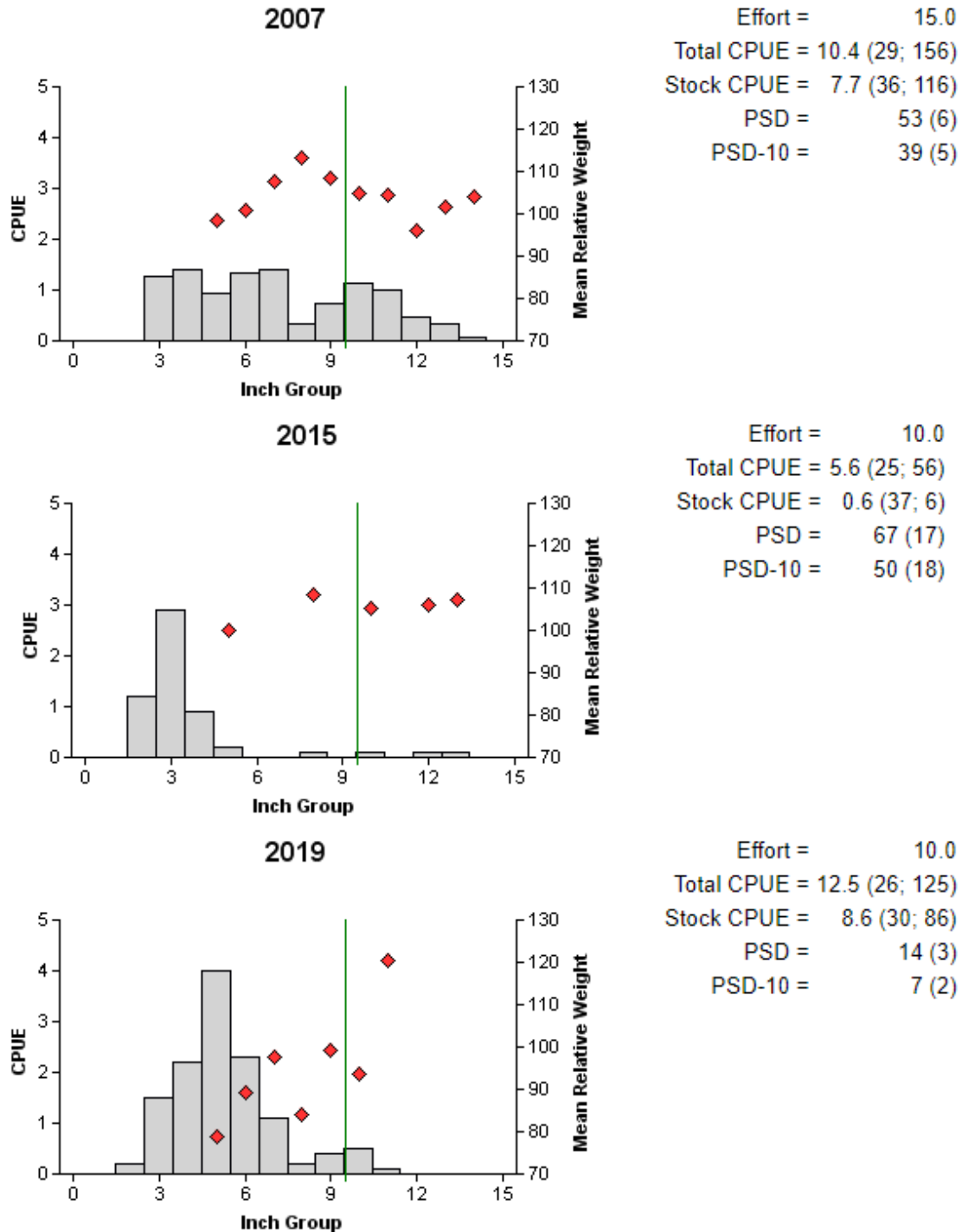


Figure 8. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Cooper Reservoir, Texas, 2007, 2015, and 2019. Vertical line indicates minimum length limit.

Proposed Sampling Schedule

Table 11. Proposed sampling schedule for Cooper Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A

	Survey year			
	2020-2021	2021-2022	2022-2023	2023-2024
Angler Access				S
Vegetation				S
Electrofishing*				A
Trap netting				S
Gill netting				S
Report				S

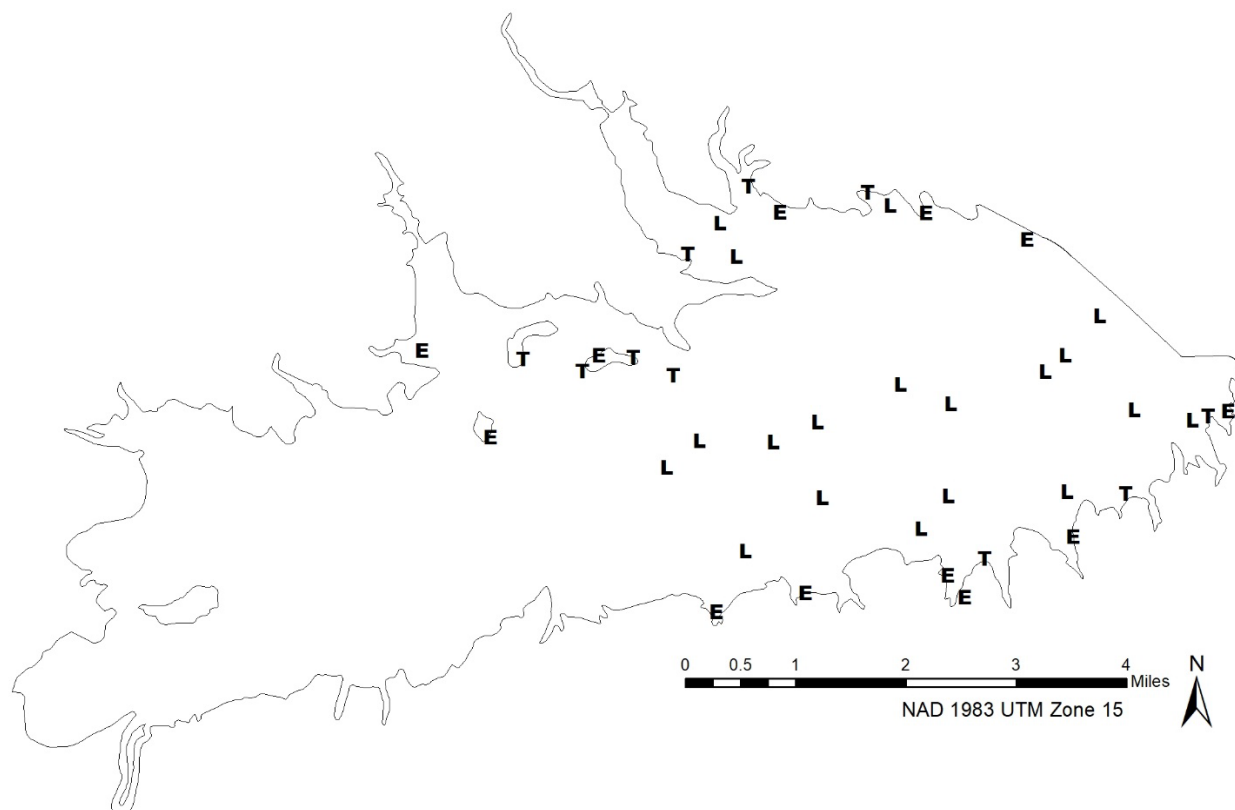
*Daytime survey, biologist selected sample locations.

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 Cooper Reservoir, Texas, 2019-2020. Sampling effort was 10 net nights for trap netting, 1 hour for electrofishing, and 1.43 hours for low-frequency electrofishing .

Species	Trap Netting		Electrofishing		Low-Frequency Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad			91	91.0 (34)		
Threadfin Shad			1124	1124.0 (41)		
Blue Catfish					183	127.7 (22)
Green Sunfish			4	4.0 (100)		
Warmouth			2	2.0 (100)		
Bluegill			41	41.0 (95)		
Longear Sunfish			28	28.0 (92)		
Largemouth Bass			11	11.0 (54)		
White Crappie	125	12.5 (26)				
Black Crappie	11	1.10 (21)				

APPENDIX B – Map of sampling locations



Location of sampling sites, Cooper Reservoir, Texas, 2019-2020. Trap net, electrofishing, and low-frequency electrofishing stations are indicated by T, E, and L, respectively. Water level was near full pool at time of sampling.



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