Weatherford 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 Weatherford Reservoir were surveyed in 2019 using electrofishing and trap netting. Shoreline habitat was surveyed in 2015 and vegetation was surveyed in 2019. Historical data are presented with the 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: Weatherford Reservoir is a 1,158-acre impoundment on the Clear Fork Trinity River in Parker County. The reservoir refilled in 2015 after several years of drought. Since 2015, the water level has remained near the conservation elevation of 896.0 feet above mean sea level (ft-msl). The reservoir is increasingly eutrophic resulting from agricultural and domestic runoff in the watershed, and raw water transfer from Benbrook Reservoir. Habitat features consisted mainly of bulkhead and rocky and natural shoreline with numerous boat docks and piers.

Management History: Important sport fishes included Channel Catfish, Largemouth Bass, and White Crappie. In 1999, a 14- to 18-inch slot limit was removed for Largemouth Bass and replaced with the statewide regulation. All sport fishes are now managed with statewide regulations. Channel Catfish, Threadfin Shad, and Florida Largemouth Bass have been stocked periodically. Eurasian watermilfoil used to be problematic on the reservoir, but since flooding and Grass Carp stockings in the early 1990s, aquatic vegetation has been minimal. The management plan for the 2016 survey report included recommendations to promote the Largemouth Bass and White Crappie fisheries and educate the public about invasive species.

Fish Community

- **Prey species:** Threadfin Shad were present in the reservoir. Electrofishing catch of Gizzard Shad was a new record and almost all were available to predators. Electrofishing catch of Bluegill was similar to the previous survey, and few Bluegill were over 6-inches long.
- **Catfishes:** Due to coronavirus travel restrictions, gill netting for Channel and Flathead Catfish did not occur for this report. Historically, they have been present and available to anglers.
- **White Bass:** Due to coronavirus travel restrictions, gill netting for White Bass did not occur for this report. Historically, they have been present in low abundance.
- **Largemouth Bass:** Electrofishing catch rate of stock-length Largemouth Bass increased since 2015. The amount of legal-length bass available to anglers has doubled.
- **White Crappie:** Trap net catch rate of White Crappie was a new record. The catch rate of legal-length crappie was also a new record, with 58% of the sample population 10 inches and larger. White Crappie body condition and growth were excellent.

Management Strategies: Request a Florida Largemouth Bass (FLMB) stocking in 2024. Promote the improving Largemouth Bass and White Crappie fisheries on Weatherford Reservoir. Conduct general monitoring surveys with trap nets and electrofishing surveys in 2023 and gill net surveys in 2024. Access and vegetation surveys will be conducted in 2023. Continue public education about invasive species.

Introduction

This document is a summary of fisheries data collected from Weatherford Reservoir in 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 2019 data for comparison.

Reservoir Description

Weatherford Reservoir, a 1,158-acre impoundment on the Clear Fork Trinity River, is located northeast of Weatherford in Parker County. It was constructed in 1957 by the City of Weatherford for municipal and industrial uses. The reservoir also provides recreation for boaters and anglers. The reservoir drains approximately 109 square miles and has six miles of shoreline. In May 2015, the reservoir refilled after several years of drought conditions (Figure 1). The reservoir has remained near conservation elevation (896.0 ft-msl) since 2015. The TSI chl–*a* index of Weatherford Reservoir increased from 55.2 in 2010 to 64.2 in 2020, indicating eutrophic and almost hypereutrophic conditions (Texas Commission on Environmental Quality 2020). Beginning in 2006, the City of Weatherford experienced periodic algae blooms that created taste and odor issues for drinking water. In 2008, a study was initiated that lead to the installation of 12 aerators in the lower lake to improve water quality (City of Weatherford 2009). Habitat features consisted mainly of bulkhead and rocky and natural shoreline with numerous boat docks and piers. Other descriptive characteristics for Weatherford Reservoir are in Table 1.

Angler Access

Weatherford Reservoir has one public boat ramp with parking, boarding piers, and ample illumination. Much of the perimeter of Weatherford Reservoir is privately owned with occupied homes and boat docks; however, there is an interspersion of bank access. Shoreline access is available at the public park adjacent to the boat ramp area and a 0.3 mi stretch of shoreline (the Wall) on the east side of the reservoir. Further information about Weatherford Reservoir and its facilities can be obtained by visiting the Texas Parks & Wildlife Department (TPWD) website at www.tpwd.texas.gov and navigating within the fishing link. Additional boat ramp characteristics are in Table 2.

Management History

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

1. Promote improvements in the Largemouth Bass and White Crappie populations.

   Action: Denison District Facebook posts reported sampling an 8.4 pound Largemouth Bass during electrofishing in October 2015 and the capture of a White Crappie in March 2016 that would have been a lake record. Lonestar Outdoor News also reported on the White Crappie.

2. Continue public education campaign on the threats of invasive species.

   Action: Updated signage was posted at the boat ramp in 2019.

Harvest regulation history: From September 1, 1993 to August 31, 1999, Weatherford Reservoir had a 14- to 18-inch slot limit on Largemouth Bass. On September 1, 1999 the statewide minimum length limit (MLL) of 14-inches was enacted for Largemouth Bass. All sport fishes are currently managed with statewide regulations (Table 3).

Stocking history: Channel Catfish and Largemouth Bass were stocked in the 1960s and early 1970s. Threadfin Shad were stocked in the early 1980s for forage. Florida Largemouth Bass were stocked in 1988, 1991, 1997, and 2019. Stocking history is detailed in Table 4.

Vegetation/habitat management history: In July 1990, 1,101 adult triploid Grass Carp were stocked into Weatherford Reservoir to control aquatic vegetation. Prior to the stocking, nuisance levels of Eurasian watermilfoil were estimated to cover over 50% of the reservoir (Poarch and Chilton 1992). In

the spring of 1990, flooding and high turbidity removed most of the vegetation with the exception of bulrush. In July 1991, pondweed, coontail, and American lotus were found in exclosure cages (Poarch and Chilton 1992). Since 1991, native floating and emergent aquatic vegetation were present in the reservoir, but not problematic (Moczygemba and Hysmith 2008). In recent years the shallow, upper portion of the lake has been colonized by American lotus.

In 2018, we partnered with the Fort Worth Fly Fishers and proposed an experimental native aquatic plant establishment project to the City of Weatherford; however, that initiative was sidelined citing plans to dredge the upper end of the reservoir.

Water transfer: Water is pumped into Weatherford Reservoir from Benbrook Reservoir within the Trinity River Basin. No interbasin transfers are known to exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Weatherford Reservoir (Moczygemba and Bennett 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 (1.1 hours at 13, 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 5 fish (range 13.0 to 14.9 inches).

Trap netting – Crappie were collected using trap nets (5 net nights at 5 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn). Ages for crappie were determined using otoliths from 13 randomly-selected fish (range 9.0 to 10.9 inches).

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017). Micro-satellite DNA analysis was used to determine genetic composition of individual fish.

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 vegetation survey was conducted in 2019. A structural habitat survey was last conducted in 2015. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Water level – Source for water level data was the United States Geological Survey (USGS 2020).

Results and Discussion

Habitat: A vegetation survey was conducted in 2019. American lotus covered 4.6% of the reservoir, predominantly in the upper end (Table 6). A habitat survey was last conducted on Weatherford Reservoir in 2015 (Moczygemba and Bennett 2016).

Prey species: Electrofishing catch rate of Gizzard Shad was 2,277.2/h in 2019, a new record. The increase in abundance may have been influenced by rising productivity in the reservoir. Gizzard Shad IOV was excellent, indicating that 99% of Gizzard Shad were available to existing predators (Figure 2). Gizzard Shad from 3 to 4 inches in length dominated the sample. Total CPUE of Bluegill in 2019 was similar to the previous survey, and size structure continued to be dominated by small individuals (Figure 3). Sampling objectives were met for Gizzard Shad and Bluegill (Table 5). Longear Sunfish have been prevalent in Weatherford, but catch rate was below the historical average (Appendix C). Threadfin Shad CPUE was lower than in 2015 (Appendix C).

Catfishes: Historical gill net catch rates for Channel Catfish have been moderate and catch rates for Flathead Catfish have been low (Appendix C). Due to cancellation of non-essential fieldwork during the coronavirus outbreak, gill netting was not attempted. The Weatherford Marina occasionally posts catches of quality Channel and Flathead Catfish, which has been consistent in recent years.

White Bass: Historical gill net catch rates for White Bass have been low (Appendix C). White Bass were first collected in 1993 and only three were collected in 2016 (Moczygemba and Bennett 2016). Due to cancellation of non-essential fieldwork during the coronavirus outbreak, gill netting was not attempted.

Largemouth Bass: The electrofishing catch rate of stock-length Largemouth Bass was 48.9/h in 2019, higher than the 36.0/h in 2015. Size structure improved as PSD was 64 in 2019 compared to 49 in 2015. (Figure 4). The 2015 sample was dominated by young-of-year bass due to successful spawning with the rising water level (Moczygemba and Bennett 2016). The catch rate of legal-length Largemouth Bass doubled since 2015. Average age at 14 inches (13.0 to 14.9 inches) for Largemouth Bass was 2.0 years (N = 5; range = 1 – 4 years). Sampling to collect additional bass near the MLL for age analysis was not conducted since the other sampling objectives were achieved (Table 5). Body condition in 2019 was good (relative weight over 90) for most length classes of fish. Florida Largemouth Bass allele frequencies have been stable for the last several surveys, with 48% in 2019 (Table 7). Four pure Florida Largemouth Bass and one F1 hybrid were identified, and 47% of bass in the sample (14, FB + Fx - Fx + F1) had over 50% Florida alleles. Two Elite Class (≥ 10 pounds) ShareLunkers and one Lunker Class (≥ 8 pounds) ShareLunker were submitted in 2019. An Elite Class ShareLunker was also caught in March of 2020.

White Crappie: The trap net catch rate of White Crappie was 53.0/nn in 2019, higher than in 2015 (38.2/nn) and a new record for trap net CPUE. The catch rate of legal-length (10 inches) White Crappie (31.0/nn) was also a record and made up 58% of the sample. The PSD increased to 97 in 2019, higher than the two previous surveys (Figure 5). A high PSD usually indicates an unbalanced population, which risks collapse if the larger fish are removed by anglers or natural mortality. Elevated water levels could provide sufficient recruitment to replace older fish. Crappie populations tend to be cyclical and management options to counteract that are limited (Maceina 2003). Body condition was excellent as mean relative weight was ≥ 100 for all measured size classes in 2019. White Crappie reached 10 inches in total length in one year (N = 13, range = 1 year), signifying excellent growth. Extra sampling was not conducted to improve precision estimates because the catch rate was high and the other sampling objectives were achieved (Table 5).

Fisheries Management Plan for Weatherford Reservoir, Texas

Prepared – July 2020

ISSUE 1: Florida Largemouth Bass were stocked in 2019, which was the first time since 1997. The FLMB allele frequencies have been stable at around 48%; however, the proportion of pure FLMB, F1 hybrids, and hybrids with over 50% Florida alleles are key to improving bass trophy potential. Hybrids make up most of the Largemouth Bass populations in Texas reservoirs, but are unlikely to attain large size unless they are F1 hybrids or their genome is composed of over 50% Florida alleles (Lutz-Carillo et al. in press). Weatherford Reservoir has a history of producing trophy bass (≥ 8 pounds), including the lake record of 12.37 pounds in 1999.

MANAGEMENT STRATEGIES

1. Request a stocking of FLMB at a rate of 1,000/km of shoreline in 2021 to increase the proportion of FLMB genetics in the population.

ISSUE 2: The White Crappie and Largemouth Bass populations in Weatherford Reservoir have improved over the last several years with abundant and large fish available for anglers. Some anglers in the area may not be aware of the improvements.

MANAGEMENT STRATEGY

1. Promote the White Crappie and Largemouth Bass fisheries through social media, news releases, or articles in the TPWD magazine.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. 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. Water samples from Weatherford Reservoir tested positive for zebra mussel eDNA each year from 2017 to 2019; however, neither adult mussels or veligers have been observed.

MANAGEMENT STRATEGIES

1. Cooperate with the City of Weatherford to maintain signage at access points around the reservoir.
2. Educate the public about invasive species through the use of media and the internet.
3. Make a speaking point about invasive species when presenting to constituent and user groups.
4. Continue to check rip-rap periodically for presence of adult zebra mussels.
5. Keep track of (i.e., map) 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 Weatherford Reservoir include Channel Catfish, Largemouth Bass, and White Crappie. Known important forage species include Gizzard and Threadfin Shad and Bluegill.

Low-density fisheries:

White Bass: White Bass are considered a low-density fishery because of low abundance. They are vulnerable to gill netting and may be sampled along with other open water species.

Survey objectives, fisheries metrics, and sampling objectives:

Channel Catfish: Continuation of trend data monitoring with gill netting every four years in the spring should allow for determination of any large-scale changes in the Channel Catfish population that may invite further investigation. A minimum of five randomly-selected gill net stations will be sampled in spring 2024. Channel Catfish will be sampled until precision (RSE) of the CPUE-Stock estimate is ≤ 25. Body condition will be determined by weighing up to 10 catfish/inch group. Although the gill net survey was not done in 2020, a replacement survey will not be done. Since the Channel Catfish population appeared to be stable with evidence of recruitment, and no regulation changes are being considered, missing a survey shouldn't be detrimental to the fishery or management.

Largemouth Bass: Continuation of trend data monitoring with fall nighttime electrofishing every four years should allow for determination of any large-scale changes in the Largemouth Bass population that may invite further investigation. A minimum of 12 randomly-selected 5-min electrofishing stations will be sampled in the fall of 2023. Largemouth Bass will be sampled until precision (RSE) of CPUE-Stock estimate is ≤ 25. To get a reliable size structure, 50 stock-size Largemouth Bass should be collected. A category-2 age analysis of 13 Largemouth Bass between 13.0 and 14.9 inches total length, randomly collected during electrofishing, will be conducted to estimate the average age at the minimum-length-limit. Body condition will be determined by weighing up to 10 bass/inch group. Additional sampling stations may be necessary to achieve sampling goals.

White Crappie: Continuation of trend data monitoring with fall trap netting every four years should allow for determination of any large-scale changes in the White Crappie population that may invite further investigation. A minimum of five trap nets will be used to sample White Crappie in the fall of 2023. An additional five nets will be set if collecting 50 stock-size White Crappie with a sampling precision (RSE) ≤ 25 is deemed feasible. A category-2 age analysis of 13 White Crappie between 9.0 and 10.9 inches total length, randomly collected during trap netting, will be conducted to estimate the average age at the minimum-length-limit. Body condition will be determined by weighing up to 10 crappie/inch group. Additional sampling stations may be necessary to achieve sampling goals.

Prey species: Bluegill along with Gizzard and Threadfin Shad are the primary forage at Weatherford Reservoir. Trend data on CPUE-total and size structure of Bluegill and Gizzard Shad have been collected at multi-year intervals along with Largemouth Bass since 1986 with fall electrofishing. CPUE-total was also calculated for Threadfin Shad. Continuation of multi-year trend data with nighttime electrofishing every four years in the fall will allow for determination of any large-scale changes in the shad and Bluegill populations that may invite further investigation. A minimum of 12 randomly-selected 5-min electrofishing sites will be sampled in 2023, but sampling will continue in conjunction with Largemouth Bass sampling and/or until sufficient numbers for Bluegill PSD and IOV (50 fish) have been collected. No additional effort will be expended to achieve an RSE ≤ 25 for CPUE-stock of Bluegill and Gizzard Shad. Instead, Largemouth Bass body condition (relative weight of Largemouth Bass > 8") can provide information on forage abundance, vulnerability, or both, relative to predator density.

Creel Survey: No creel survey has been conducted on Weatherford Reservoir. The reservoir is one of the smaller ones in the district, located over two hours away, and hasn't had any serious management issues. These factors have likely contributed to a creel survey not being conducted. While there is a need to assess directed effort, catch rates, and harvest, other creels and priorities in the district prevent a survey to be scheduled before the next report. When time and resources allow, a creel survey or a similar method to collect angler information will be performed for the reservoir.

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Tables and Figures

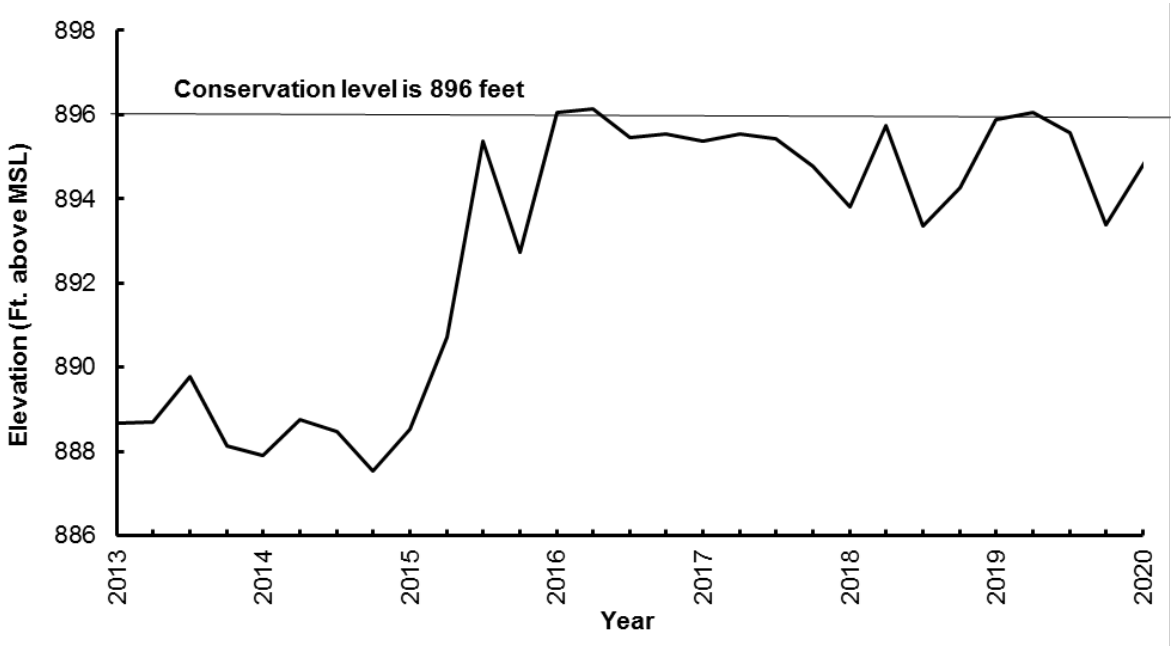


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Weatherford Reservoir, January 2013 to April 2020.

Table 1. Characteristics of Weatherford Reservoir, Texas.

Characteristic	Description
Year constructed	1957
Controlling authority	City of Weatherford
County	Parker
Reservoir type	Mainstream
Shoreline Development Index	1.3
Conductivity	572 µS/cm

Table 2. Boat ramp characteristics for Weatherford Reservoir, Texas, August, 2019. Reservoir was near conservation elevation (896 ft above msl) at time of survey.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Lake Weatherford Marina	32.77242 -97.68554	Y	10	884	Excellent, no issues.

Table 3. Harvest regulations for Weatherford Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	5 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5[a]	14-inch minimum
Bass: Spotted	5[a]	None
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

[a] Daily bag for Largemouth Bass and Spotted Bass = 5 fish in any combination.

Table 4. Stocking history of Weatherford Reservoir, Texas. FGL = fingerling; FRY = fry; AFGL = advanced fingerling; UNK = unknown.

Species	Year	Number	Life Stage
Channel Catfish	1961	18,850	AFGL
	1962	22,540	AFGL
	1964	31,025	AFGL
	1970	28,000	AFGL
	Total	100,415	
Florida Largemouth Bass	1988	114,400	FRY
	1991	36,392	FGL
	1991	81,087	FRY
	1997	114,450	FGL
	2019	55,485	FGL
	Total	401,814	
Largemouth Bass	1962	233,000	UNK
	1967	14,000	UNK
	1971	20,000	UNK
	Total	267,000	
Paradise Bass (Yellow Bass X Striped Bass)	1977	14,997	UNK
Threadfin Shad	1981	1,790	AFGL
	1984	1,000	AFGL
	Total	2,790	
Triploid Grass Carp	1990	1,101	AFGL
Walleye	1982	755,550	FRY
	1983	1,730,000	FRY
	1984	2,500,000	FRY
	Total	4,985,550	

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

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
	Genetics	% FLMB	N = 30, any age
	Condition	W_r	10 fish/inch group (max)
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
Trap netting			
White Crappie	Abundance	CPUE-Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N = 50
	Age-and-growth	Age at 10 inches	N = 13, 9.0 – 10.9 inches
	Condition	W_r	10 fish/inch group (max)
Gill netting			
Channel Catfish	Abundance	CPUE-Stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N = 50 stock
	Age-and-growth	Age at 12 inches	N = 13, 11.0 – 12.9 inches
	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, Weatherford Reservoir, Texas, 2007 – 2019. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2007	2011	2015	2019
Native floating-leaved[a]	0.1 (<0.1)	0.0	0.3 (<0.1)	53.0 (4.6)
Native emergent[b]	0.0	0.0	0.3 (<0.1)	0.3 (<0.1)
Native terrestrial[c]	NA	NA	76.0 (6.6)	0.0

[a] American lotus
[b] Bulrush
[c] Black willow (inundated)

Gizzard Shad

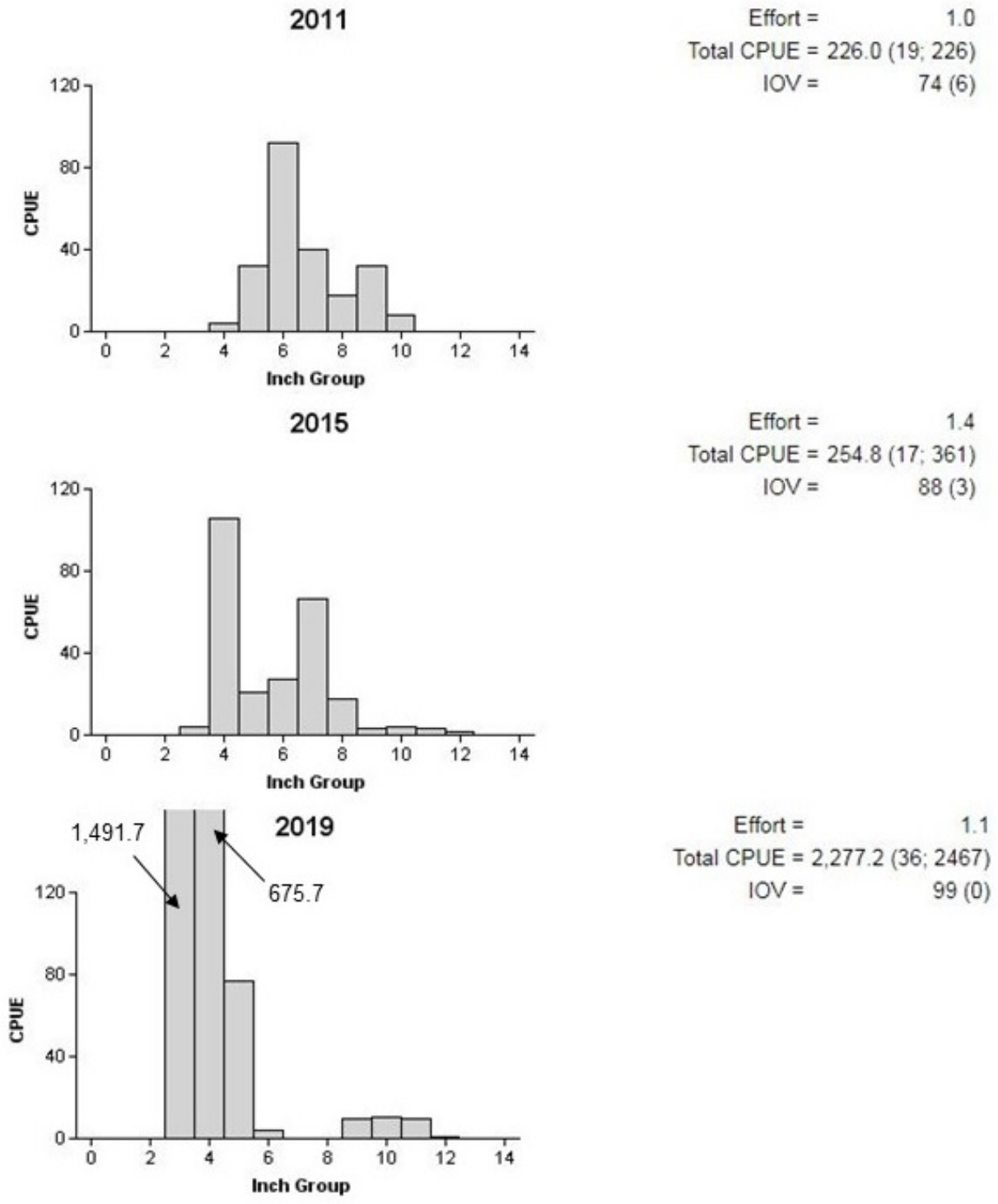


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Weatherford Reservoir, Texas, 2011, 2015, and 2019.

Bluegill

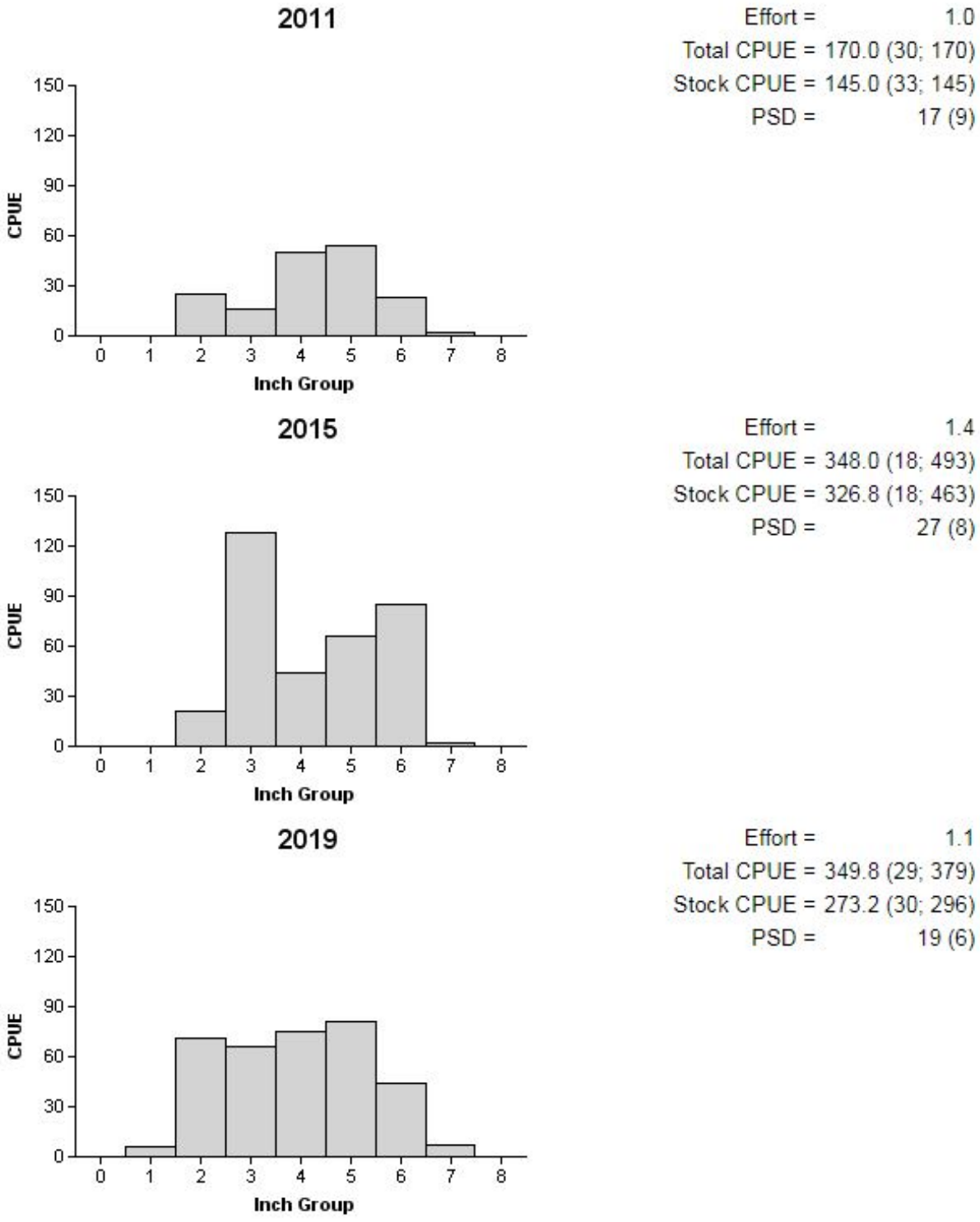


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Weatherford Reservoir, Texas, 2011, 2015, and 2019.

Largemouth Bass

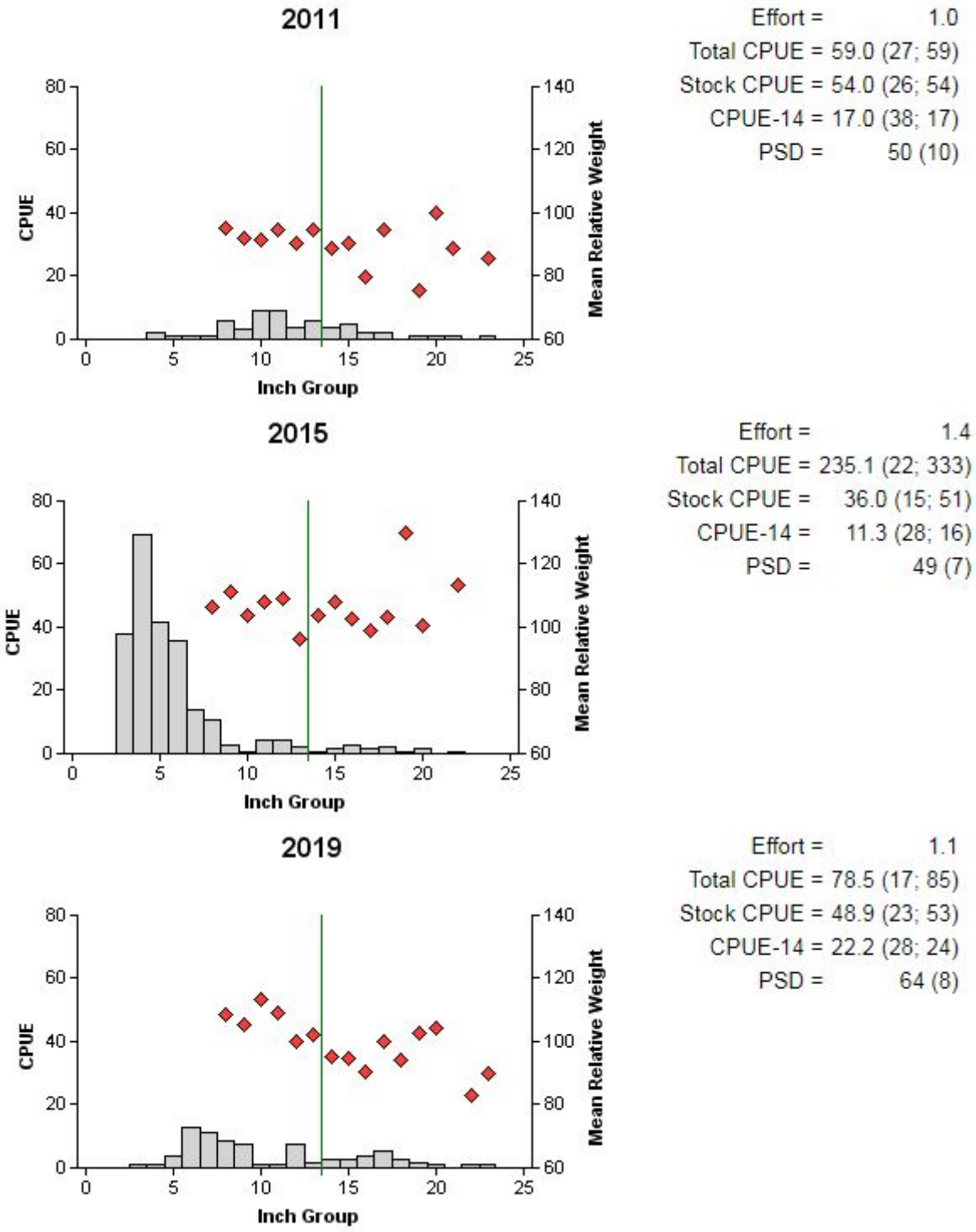


Figure 4. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Weatherford Reservoir, Texas, 2011, 2015, and 2019. Vertical line indicates minimum length limit.

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Weatherford Reservoir, Texas, 2007, 2015, and 2019. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, F1 = first generation hybrid between a FLMB and NLMB, Fx = second or higher generation hybrid between a FLMB and NLMB. Genetic composition was determined by micro-satellite DNA analysis.

		Number of fish					
Year	Sample size	FLMB	F1	Fx	NLMB	% FLMB alleles	% pure FLMB
2007	30	0	NA	29[a]	1	45.5	0.0
2015	30	0	0	28	2	47.0	0.0
2019	30	4	1	20	5	48.0	3.9

[a] Determination of hybrid status not conducted.

White Crappie

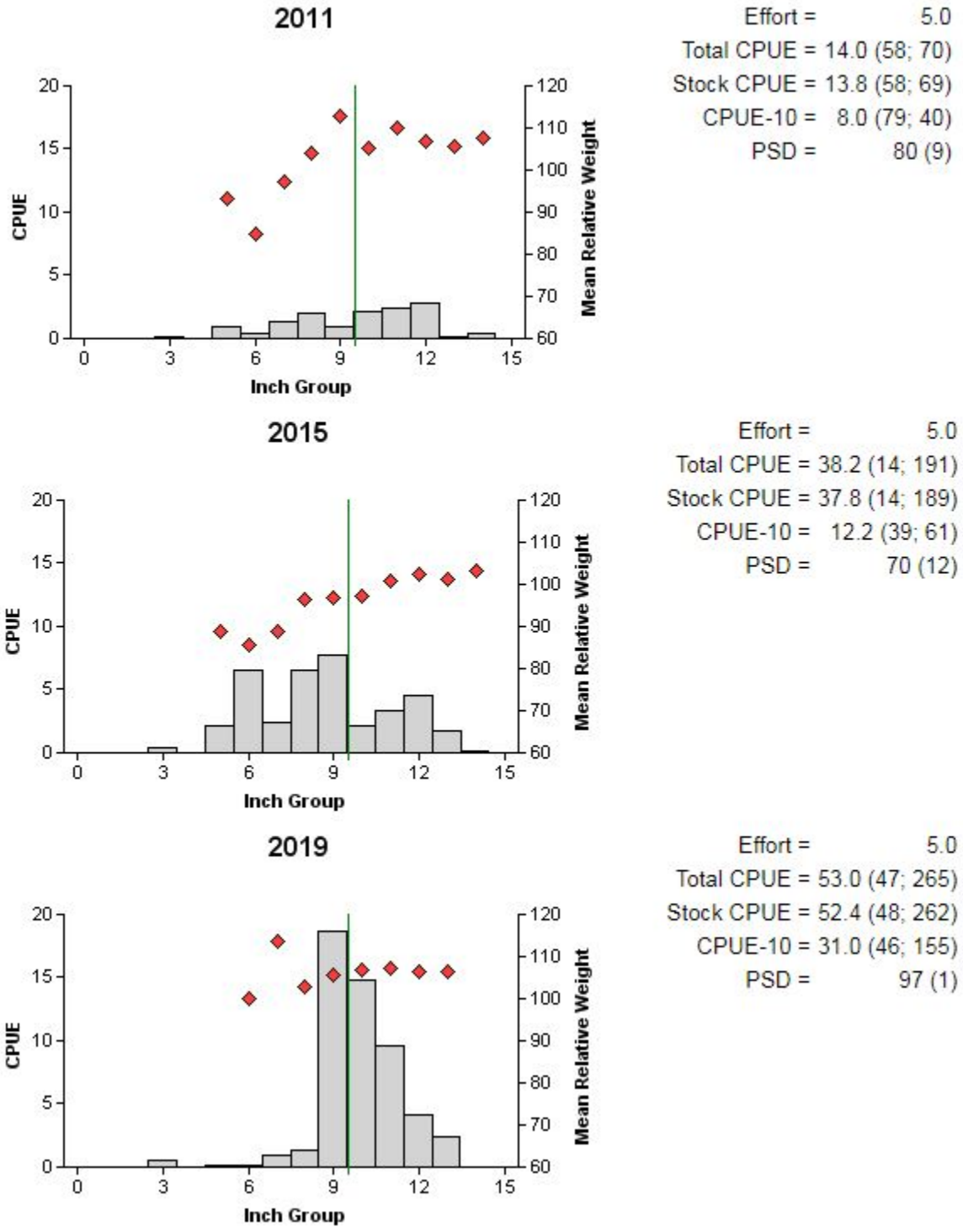


Figure 5. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Weatherford Reservoir, Texas, 2011, 2015, and 2019. Vertical line indicates minimum length limit.

Proposed Sampling Schedule

Table 8. Proposed sampling schedule for Weatherford Reservoir, Texas. Survey period is June through May. Electrofishing and trap netting surveys are conducted in the fall. Gill netting surveys are conducted in the spring. Standard survey denoted by S and additional survey denoted by A.

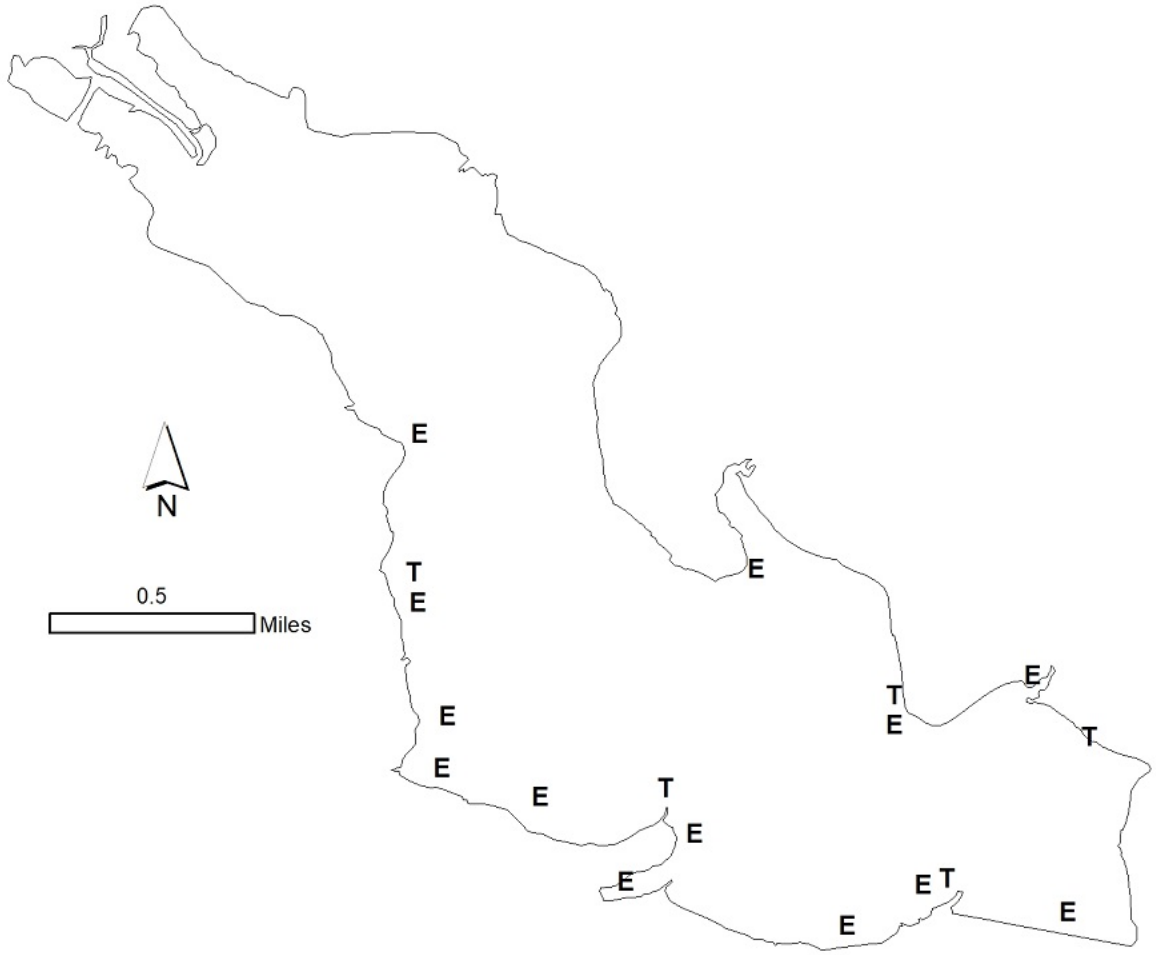
	Survey year			
	2020-2021	2021-2022	2022-2023	2023-2024
Angler Access				S
Structural Habitat				
Vegetation				S
Electrofishing – Fall				S
Trap netting				S
Gill netting				S
Creel survey				
Report				S

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 Weatherford Reservoir, Texas, 2019. Sampling effort was 5 net nights for trap netting, and 1.1 hour for electrofishing.

	Trap Netting		Electrofishing	
Species	N	CPUE	N	CPUE
Gizzard Shad			2,467	2,277.2 (36)
Threadfin Shad			138	127.4 (21)
Green Sunfish			7	6.5 (100)
Warmouth			6	5.5 (68)
Bluegill			379	349.9 (29)
Longear Sunfish			75	69.2 (49)
Spotted Bass			1	1.0 (100)
Largemouth Bass			85	78.5 (17)
White Crappie	265	53.0 (47)		
Black Crappie	1	0.2 (100)		

APPENDIX B – Map of sampling locations



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

APPENDIX C – Historical catch rates

Catch rates of targeted species by gear type for standard surveys on Weatherford Reservoir, Texas, 1986 - 2019.

Gear	Species	Year										
		1986	1989	1993	1996	1999	2003	2007	2011	2015	2019	**Avg**
Gill Net (fish/net night)	Channel Catfish		13.4	5.0	10.8	7.4	5.8	12.0	6.0	6.8		**8.4**
	Flathead Catfish		0.8	0.2	0.0	0.6	0.0	0.2	0.1	0.0		**0.2**
	White Bass		0.0	9.2	34.0	2.6	0.4	1.2	0.0	0.6		**6.0**
Electrofishing (fish/hour)	Gizzard Shad	20.5	84.7	99.3	103.3	1,024.0	217.0	289.0	226.0	254.8	2,277.2	**459.6**
	Threadfin Shad	8,045.5	97.3	27.3	0.0	235.0	151.0	53.0	3,993.0	230.8	127.4	**1,296.0**
	Green Sunfish	22.0	19.3	11.3	24.7	11.0	12.0	5.0	1.0	12.0	6.5	**12.5**
	Warmouth	2.5	16.0	4.0	2.7	3.0	7.0	5.0	2.0	8.5	5.5	**5.6**
	Orangespotted Sunfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0	**1.2**
	Bluegill	177.5	640.0	132.0	430.0	255.0	314.0	303.0	170.0	348.0	349.9	**311.9**
	Longear Sunfish	104.0	63.3	84.0	193.3	65.0	310.0	112.0	43.0	146.1	69.2	**119.0**
	Redear Sunfish	22.0	72.7	24.7	17.3	12.0	4.0	4.0	6.0	30.4	0.0	**19.3**
	Spotted Bass	0.0	0.0	0.0	0.7	0.0	0.0	0.0	5.0	0.0	0.9	**0.7**
	Largemouth Bass	36.5	112.7	107.3	159.3	158.0	91.0	78.0	59.0	235.1	78.5	**111.5**
Trap Net (fish/net night)	White Crappie	24.4	2.2	22.8	1.5	6.4	11.0	15.0	14.0	38.2	53.0	**18.9**
	Black Crappie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.2	**0.1**

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