

# Hords Creek Reservoir

## 2017 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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## Survey and Management Summary

Fish populations in Hords Creek Reservoir were surveyed in 2014-2018 by using tandem hoop nets, electrofishing, and trap nets. Historical data are presented with the 2014-2018 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:** Hords Creek Reservoir is a 510-acre impoundment constructed in 1948 on Hords Creek. Hords Creek Reservoir is in Coleman County approximately 55 miles south of Abilene and is controlled by the United States Army Corps of Engineers (USACE). Primary water uses included flood control and recreation. The reservoir has a history of substantial water level fluctuation. Water level reached conservation pool (CP) elevation in 2007 but dropped to 19 feet below CP by May 2014. In 2016, the water level nearly reached CP but declined steadily since. Habitat consisted of riprap, flooded terrestrial vegetation, and aquatic and semi-aquatic vegetation. Boater access consisted of three useable ramps. Bank fishing access was ample throughout the USACE park areas, and there were three handicap-accessible fishing piers.

**Management History:** Sport fish include Largemouth Bass, Channel Catfish, Flathead Catfish, and crappie. Electrofishing was conducted biennially to monitor trends in relative abundance and size structure for Largemouth Bass and forage fish. Florida Largemouth Bass fingerlings were stocked in 2016 and 2017 and Channel Catfish fingerlings were stocked in 2017. Sport fishes have been managed with statewide size and bag limits.

### Fish Community

- **Prey species:** Forage was abundant and consisted primarily of Gizzard Shad with some sunfish available. Approximately half of the Gizzard Shad were available to most sport fish. Some Bluegill were present and of vulnerable size to most sport fish.
- **Catfishes:** Channel Catfish and Flathead Catfish were present. Channel Catfish were not abundant; however, most were of a harvestable size. Few anglers targeted Channel Catfish when fishing, and tend to harvest legal-sized fish.
- **Largemouth Bass:** Largemouth Bass were relatively abundant in electrofishing surveys, and the quantity of legal-size fish sampled was fair. Body condition for legal-size fish was optimal to excellent, which suggested that prey availability was not an issue. Most anglers (71%) released legal-size Largemouth Bass during the creel survey period.
- **White Crappie:** In 2017, White Crappie numbers in trap netting surveys dramatically declined from the previous survey. Some legal-size White Crappie were available to anglers. Body condition for most inch classes were poor to excellent depending on length.

**Management Strategies:** Electrofishing will be conducted in fall 2021 to monitor prey species and Largemouth Bass. Trap netting will be conducted in fall 2021 to monitor White Crappie. Access and vegetation surveys will be conducted in summer 2021. Develop collaborative efforts for habitat enhancement projects. Media outlets, social media, and popular press will be used to inform the public of the threat and detriments of invasive species.

## Introduction

This document is a summary of fisheries data collected from Hords Creek Reservoir in 2014-2018. 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 2014-2018 data for comparison.

## Reservoir Description

Hords Creek Reservoir is a 510-acre impoundment constructed in 1948 on Hords Creek. It is in Coleman County approximately 55 miles south of Abilene and is owned and operated by the United States Army Corps of Engineers (USACE). Primary water uses included flood control and recreation. Hords Creek Reservoir has experienced long periods of reduced water level broken by occasional heavy precipitation events that filled the reservoir. The reservoir refilled from substantial rainfall in 2007. From 2007 until 2011, water level rapidly dropped and was nearly 19 feet below conservation pool elevation by May 2014. In 2016, the reservoir refilled, but water level has steadily declined since (Figure 1). Other descriptive characteristics for Hords Creek Reservoir are in Table 1.

## Angler Access

Public access to Hords Creek Reservoir requires an entry fee, collected by USACE. During the 2014-2018 monitoring period, water level fluctuated and impacted the number of ramps available. In 2016, only the day use ramp near the dam was useable because of low water level. After the water level rise, two boat ramps were opened. At the time of the survey, the reservoir had three boat ramps open. Bank anglers had plenty of access within walking distance of road pull-offs and camp grounds within the USACE grounds. Three handicap-accessible piers were also available. Additional boat ramp characteristics are presented in Table 2.

## Management History

**Previous management strategies and actions:** Management strategies and actions from the previous survey report (Amoroso and Homer 2014) included:

1. Continue to monitor sport fishes and forage populations to determine trends in relative abundance, size structure, and body condition.
 

**Action:** Electrofishing was conducted in 2015 and 2017 to monitor Largemouth Bass and sunfishes; trap netting was conducted in 2017 to monitor White Crappie; and tandem hoop netting was conducted in 2017 to monitor Channel Catfish.
2. Collaborate with USACE and others on a habitat improvement project by installing artificial habitat.
 

**Action:** Two habitat enhancement projects were conducted at Hords Creek Reservoir. In 2014, TPWD partnered with Still Waters Bass Club, also a Friends of the Reservoirs chapter, to construct and deploy artificial structures at four locations. In 2017, TPWD partnered with USACE Lewisville Aquatic Ecosystem Research Facility to deploy artificial structures among eight sites and plant native vegetation in two coves (Dodd et al. 2017).
3. Conduct an on-site volunteer creel survey to determine angler directed effort, catch, release, and harvest of sport fishes.
 

**Action:** A self-reporting creel survey began September 1, 2014 and ended August 31, 2015. USACE assisted TPWD with issuing the survey cards to visitors upon entry into the grounds. Completed questionnaires were returned to drop-off stations then collected by TPWD for data entry and analysis.

4. Provide USACE with information about the Boating Access Grant and partnership program to extend the boat ramps.

**Action:** A meeting to discuss ramp extensions was not held because water level increased substantially during the survey period, and multiple ramps were readily accessible.

5. Educate the public about the threats of invasive species.

**Action:** Press releases were distributed to local and statewide media. Signage was posted at Hords Creek Reservoir boat ramps to notify users of the potential threats of invasive species. Other information about invasive species is available at the USACE gatehouse.

**Harvest regulation history:** Sport fishes have been managed with statewide harvest regulations (Table 3).

**Stocking history:** Unsuccessful stocking of Smallmouth Bass and Lake Chubsuckers occurred in the 1980s. Threadfin Shad were introduced in 1984. Florida Largemouth Bass were introduced in 1986 and were last stocked in 2016 and 2017. Channel Catfish were stocked in 2017. The complete stocking history is displayed in Table 4.

**Vegetation/habitat management history:** Artificial habitat structures were deployed among four locations in the reservoir during 2014. In 2017, founder colonies of 9 aquatic plant species were planted in two coves at Hords Creek Reservoir as part of a collaborative habitat enhancement project with USACE Lewisville Aquatic Ecosystem Research Facility (Dodd et al. 2017). Artificial habitat structures were also deployed near of these areas as part of project.

**Water transfer:** 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 Hords 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, and Gizzard Shad were collected by electrofishing (1 h 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** – White Crappie were collected by using trap nets (10 net nights at 10 stations). Catch per unit effort for trap netting was recorded as the number of fish caught per net night (fish/nn).

**Tandem hoop nets** – Channel Catfish were collected by deploying 8 tandem hoop net series at 8 stations. Nets were baited with soap and deployed for two-night soak durations. Catch per unit effort 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.

**Statistics** – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight ( $W_r$ )] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error ( $RSE = 100 \times SE$  of the estimate/estimate) was calculated for all CPUE.

**Creel survey** – An on-site volunteer creel survey was conducted from September 1, 2014 to August 31, 2015 to determine directed fishing effort towards species, to obtain information regarding anglers' harvests tendencies, and to collect demographic information. Five hundred survey cards were developed and provided to USACE Hords Creek staff to distribute to anglers. Anglers accessed the reservoir through a gated single lane entrance with a gatehouse that was monitored by USACE. Survey cards were issued to anglers upon gate entry by USACE staff. Anglers completed their survey cards at the conclusion of their fishing trip and return them to one of two drop-off stations. A lockable mailbox was installed along the exit lane at the gatehouse to serve as a survey drop-off station, and another was installed near the boat ramp near the dam. Creel survey cards were regularly collected from the drop boxes and used for data analysis. At the end of the survey period, all unissued survey cards were collected from USACE. The reporting rate  $R$  was determined by calculating the percentage of completed surveys  $C$  from the total number of surveys that were issued  $N$  to anglers.

$$R = (C/N) \times 100$$

**Habitat** – A structural habitat survey and vegetation habitat survey were conducted in summer 2017 using the random point method (TPWD Inland Fisheries Division, unpublished manual revised 2015). For the structural habitat survey, a total of 50 points were randomly selected along the shoreline and four points were discarded because they could not be sampled. During the vegetation habitat survey, a total of 200 points were randomly selected throughout the reservoir, and six points were discarded because they could not be sampled. During both habitat surveys, presence/absence was determined for habitat types identified at or below the waterline. Percent occurrence ( $\% = [\# \text{ stations present} / \text{total stations sampled}] \times 100$ ) and associated Wilson 95% confidence intervals (Ausvet 2018) were calculated for each habitat feature type.

**Water level** – Source for water level data was the United States Geological Survey (USGS 2018).

## Results and Discussion

**Habitat:** In 2017, nearly two-thirds of the shoreline was rocky shoreline, and about a third was natural/featureless shoreline (Table 6). Gravel shoreline was also present. In 2017 Chara sp., coontail, stargrass, and pondweed were the predominant aquatic vegetation present (Table 7). Water level at the time of sampling was 5.0 feet below mean sea level. During summer 2017, 65 artificial habitat structures were deployed among two coves to enhance structural habitat in the reservoir. This habitat enhancement effort was part of a collaborative project with USACE (Dodd et al., 2017).

**Creel:** A total of 306 questionnaires were handed out to park visitors that indicated they were going to fish. Anglers returned 36 questionnaires for a 11.8% response rate. However, one questionnaire was returned incomplete and was omitted from the total creel survey response rate. Of the completed surveys, there were 48 boat anglers and 28 bank anglers. The average group size was 2.2 anglers and they fished an average of 4.2 h. Angler groups spent an average of \$34.00 per fishing trip. Anglers spent most effort targeting Largemouth Bass (46.1%) followed by targeting anything (36.8%), crappie (11.8%), catfish (3.9%), and sunfish (1.3%; Table 8). Anglers reported catching more White Crappie than other species (Table 9).

**Prey species:** The prey base primarily consisted of Gizzard Shad and Bluegill. Catch rate of Gizzard Shad in 2017 had increased to 322.0/h from 287.0/h in 2015. In 2017, IOV was somewhat similar (53) to that which was reported in 2015 (60; Figure 2), indicating that over half of the Gizzard Shad were of suitable prey size for sport fishes. Bluegill catch rate dramatically decreased from 558.0/h in 2015 to 54.0/h in 2017. In 2017, most Bluegill caught were < 7 inches, optimal prey size for sport fishes (Figure 3).

**Channel Catfish:** Since 1985, gill net catch rates of Channel Catfish have been less than 6.0/nn. Catch rates in recent gill net surveys increased slightly from 1.0/nn in 2006, to 3.4/nn in 2010, and to 5.4/nn in 2014. In 2017, catch rate of Channel Catfish in tandem hoop netting surveys was 0.4/series; only 3 fish were caught. Anglers reported harvesting legal-size Channel Catfish in the creel survey.

**Largemouth Bass:** Electrofishing catch rate for Largemouth Bass decreased slightly from 137.0/h in 2013 to 123.0/h in 2015 to 116.0/h in 2017 (Figure 4). Catch rates of stock-size Largemouth Bass ( $\geq 8$  inches) fluctuated from 61.0/h in 2013 to 28.0/h in 2015 and to 98.0/h in 2017. Catch rates of legal-sized ( $\geq 14$  inches) Largemouth Bass fluctuated from 15.0/h in 2013 to 6.0/h in 2015 to 15.0/h in 2017. Values for PSD declined from 59 in 2013 and 57 in 2015 to 29 in 2017, which indicated that the population size structure shifted from larger to smaller individuals, likely the result of increased recruitment following the rise in water levels in 2015 and 2016. Mean relative weight for legal-size fish were optimal to excellent and ranged from 91 to 115. Florida Largemouth Bass allele frequencies ranged from 39.7-54.3% from 1995 to 2017 (Table 10). In 2017, one pure Florida Largemouth Bass and no pure Northern Largemouth Bass were represented in the sample, and all other fish collected were intergrades (Table 10). Largemouth Bass are the most sought-after fish species by anglers with 46.1% of all directed effort. Additionally, 23.6% of the total fish reported caught during the creel survey period were Largemouth Bass. Anglers reported that 25.7% of all Largemouth Bass caught were harvested and ranged from 14-19 inches (Table 9). However, anglers reported releasing 71.0% of the legal-size Largemouth Bass caught.

**White Crappie:** Trap netting catch rates for White Crappie declined from 124.5/nn in 2013 to 4.2/nn in 2017. Catch of stock-size White Crappie ( $\geq 6$  inches) also declined from 14.8/nn in 2013 to 4.2/nn in 2017. Catch rate for legal-size fish (i.e.,  $\geq 10$  inches) was similar from 2009-2017 and ranged from 1.0-1.1/nn (Figure 5). Size structure of White Crappie shifted from high representation of sub-stock individuals to low representation of smaller fish; PSD increased from 14 in 2013 to 81 in 2017. Mean relative weights were variable and ranged from 81-114. Although directed effort for crappie was only 11.8%, crappie anglers reported catching and harvesting more crappie than any other species (Table 9). Most anglers (87.3%) who reported catching legal-size crappie, harvested them. Harvested crappie ranged from 10-16 inches, of which 12-inch fish were most common.

# Fisheries Management Plan for Hords Creek Reservoir, Texas

Prepared – July 2018

**ISSUE 1:** Salt cedar (*Tamarix* sp.) has become established at Hords Creek Reservoir. This exotic species has great demand for water, which can exacerbate water level issues at the reservoir. However, coverage of salt cedar is not known.

## MANAGEMENT STRATEGIES

1. Map coverage of salt cedar in Hords Creek Reservoir.
2. Discuss salt cedar establishment and potential control strategies with the USACE and Texas Parks and Wildlife Department invasive species experts.

**ISSUE 2:** Hords Creek Reservoir is subject to extreme water level fluctuations, and habitat availability during prolonged drought and low water level is poor. Habitat enhancements at the reservoir may enhance the quality of Largemouth Bass, White Crappie, and sunfish fisheries.

## MANAGEMENT STRATEGY

1. Collaborate with stakeholders on potential habitat enhancement efforts such as artificial habitat structure deployments and native vegetation plantings.

**ISSUE 3:** Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

## MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate USACE about invasive species threats, 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 (2018–2022)

Sport fishes, forage fishes, and other important fishes: Sport fishes present in Hords Creek Reservoir are Channel Catfish, Flathead Catfish, Largemouth Bass, and crappie. Important prey species include Gizzard Shad and Bluegill. See Table 11 for proposed sampling plan.

Low-density fisheries:

Channel Catfish: Channel Catfish are present in the reservoir and have been managed with the 12-inch minimum length limit (MLL) and 25-fish (in combination with Blue Catfish) daily bag limit. Anecdotal evidence and a self-reported creel survey conducted from September 2014- August 2015 suggested that anglers seldom target catfishes.

Gill netting and baited tandem hoop nets have yielded poor catches of Channel Catfish, and abundance is suspected to be low at the reservoir. Monitoring for Channel Catfish relative abundance (CPUE-Total, CPUE-Stock), size structure, and body condition will not be conducted during the 2018-2022 monitoring period. Presence/absence for Channel Catfish will be conducted during sampling efforts for other species.

Flathead Catfish: Flathead Catfish are present in the reservoir and have been managed with the statewide 18-inch MML and 5-fish daily bag limit. Based on a self-reporting creel survey, approximately 4% of anglers at Hords Creek Reservoir specifically target catfish. Since historic catch rates during gill nets have been low (catch rates in 2006-2014 ranged from 1.4/nn-1.6/nn), monitoring for Flathead Catfish will not be sampled by gill nets. Presence/absence for Flathead Catfish will be conducted during sampling efforts for other species.

Survey objectives, fisheries metrics, and sampling objectives:

Prey Species: Gizzard Shad and Bluegill are the primary prey species in Hords Creek Reservoir. The next electrofishing survey will be conducted in fall 2021 for 1.0 h at 12, 5-minute random stations. Target precision for CPUE-Total will be  $RSE \leq 25\%$  for both species. A sample of 50 Gizzard Shad will be collected for monitoring trends of size structure (length frequency) and to calculate Index of Vulnerability for assessing prey availability/size suitability for sport fishes. Size structure (i.e., PSD) will be determined for Bluegill by collecting 50 stock-size ( $\geq 3$  inch) fish. If desired precision for relative abundance estimates and/or sample sizes are not achieved, no additional sampling will be conducted unless additional electrofishing is needed to fulfill objectives set for Largemouth Bass. Largemouth Bass body condition will be used to infer prey availability and vulnerability to predation.

Largemouth Bass: Largemouth Bass have been managed with the statewide 14-inch MLL and 5-fish daily bag limit. Largemouth Bass are abundant in Hords Creek Reservoir and are an important fishery for anglers according to a self-reporting creel survey conducted in 2014-2015. Largemouth Bass were the most targeted species by anglers accounting for 46.1% of all directed fishing effort. Additionally, electrofishing catch rates have been excellent with a CPUE-Total of at least 116.0/h over the past 3 surveys.

To monitor Largemouth Bass, an electrofishing survey will be conducted during fall 2021 for 1.0 h at 12, 5-minute random stations to monitor trends in relative abundance, size structure, and body condition. A target precision of  $RSE \leq 25\%$  will be attempted for estimates of CPUE-Total, CPUE-Stock, and CPUE-14 during sampling. A target of 50 fish  $\geq$ stock-size will be collected to assess size structure, and 5 fish per inch group  $\geq$ stock-size will be measured for length and weight to assess body condition. A sample of 13 Largemouth Bass, 13.0-14.9 inches will be collected to evaluate age at legal length. If precision, size structure, or body condition objectives are not achieved, up to half h of additional sampling (6, 5-minute stations) may be added if deemed feasible. If additional fish for age and growth are needed, biologist selected stations will be used.

White Crappie: White Crappie are present and have been managed under the statewide 10-inch MLL and 25-fish daily bag limit. Historically, White Crappie have been relatively abundant in Hords Creek

Reservoir and are an important fishery for anglers according to a self-reporting creel survey conducted in 2014-2015. Approximately 12% of anglers targeted crappie, making them the third most sought after group behind Largemouth Bass and anything. Anglers also reported catching more crappie than any other species and harvesting them if they were legal-sized.

Trap netting every four years with 10 trap nets has been adequate to detect large-scale changes in the fishery, to inform the fisheries biologist on the status of the fishery, and for distributing the information to constituents. Trap nets will be deployed at 10 random stations in fall 2021 to obtain general monitoring trends and should be effective at obtaining optimal precision and sampling sizes for size structure and body condition based on past sampling. A target precision of  $RSE \leq 25\%$  will be attempted for estimates of CPUE-Total and CPUE-Stock. A target of 50 fish  $\geq$ stock-size will be collected to assess size structure, and  $\geq 5$  fish per inch group  $\geq$ stock-size will be measured for length and weight to assess body condition. A sample of 13 White Crappie, 9.0-10.9 inches will be collected to evaluate age at legal length. No additional effort will be conducted if objectives for White Crappie are not met.

## Literature Cited

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## Tables and Figures

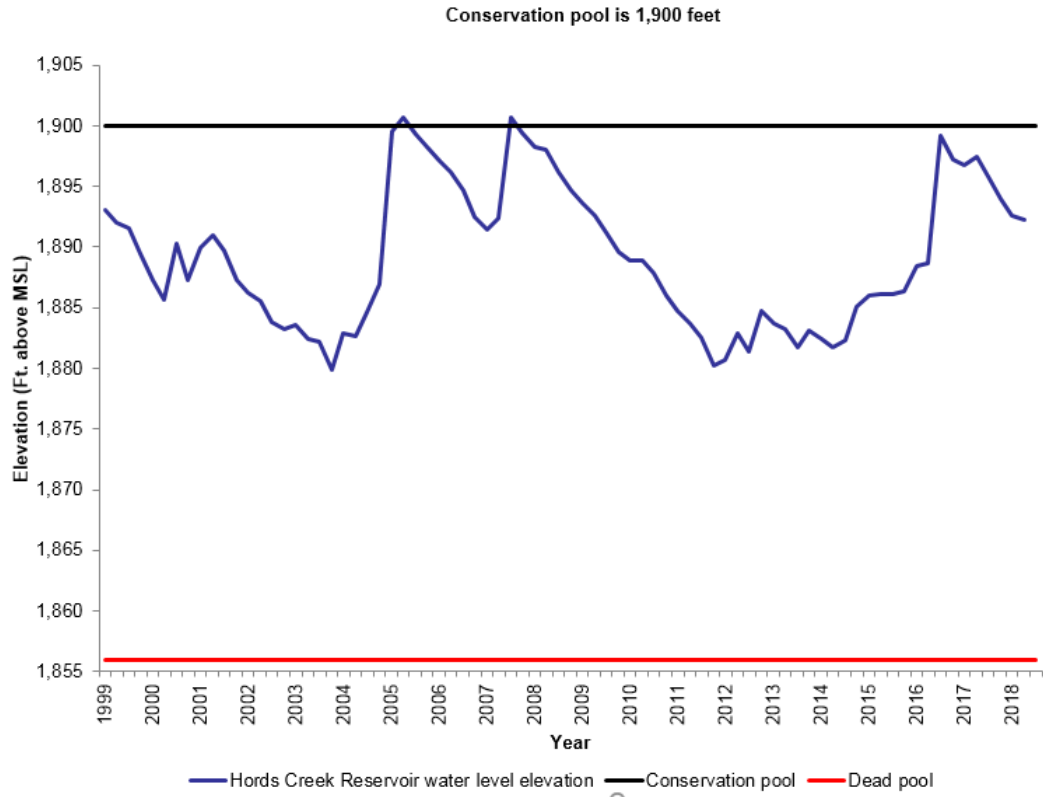


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Hords Creek Reservoir, Texas, (USGS 2018). Conservation pool is 1,900 feet above mean sea level. Dead pool is approximately 1,856 feet above mean sea level.

Table 1. Characteristics of Hords Creek Reservoir, Texas.

Characteristic	Description
Year Constructed	1948
Controlling Authority	U.S. Army Corps of Engineers
County	Coleman
Conservation Pool	1,900 feet above mean sea level
Dead Pool	1,856 feet above mean sea level
Reservoir Type	Tributary
River Basin	Colorado (120901)
Sub-basin <sup>1</sup>	Jim Ned (12090108)
Watershed <sup>1</sup>	Lower Jim Ned Creek (1209010802)
Sub-watershed <sup>1</sup>	Upper Hords Creek (120901080201)
Shoreline Development Index	3.2
Conductivity	650 $\mu$ S/cm

<sup>1</sup>U.S. Geological Survey Hydrologic Unit Code

Table 2. Boat ramp characteristics for Hords Creek Reservoir, Texas, August, 2017. Reservoir elevation at time of survey was 1,895 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Dam	31.83105 -99.56121	Y	20	1,880	Good; Accessible
Flatrock Park	31.83337 -99.57103	Y	6	1,882	Good; Accessible
Lakeside Park	31.83815 -99.57719	Y	6	1,884	Good; Accessible

Table 3. Harvest regulations for Hords Creek Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Hords Creek Reservoir, Texas. FRY = fry; FGL = fingerling; AFGL = advanced fingerling; ADL = adults.

Species	Year	Number	Size	Mean TL (in)
Threadfin Shad	1984	1,070	ADL	3.0
Channel Catfish	1998	15,411	AFGL	9.0
	2017	91,784	FGL	3.0
	Total	107,195		
Smallmouth Bass	1984	20,000	FGL	2.0
	1985	19,800	FGL	2.0
	Total	39,800	FGL	2.0
Largemouth Bass	1970	115,000	UNK	UNK
Florida Largemouth Bass	1986	18,108	FRY	1.0
	1987	9,993	FGL	2.0
	1994	25,500	FGL	1.1
	1997	150,506	FGL	1.3
	2001	42,352	FGL	2.0
	2006	52,712	FGL	1.6
	2015	53,937	FGL	1.5
	2016	63,600	FGL	1.3
	2017	56,620	FGL	1.7
	Total	455,220		
Lake Chubsucker	1981	19,200	ADL	UNK

Table 5. Objective-based sampling plan components for Hords Creek Reservoir, Texas 2017–2018.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE–Total, CPUE–Stock, CPUE–14	RSE-Stock $\leq$ 25
	Size structure	PSD, length frequency	N $\geq$ 50 stock
	Condition	$W_r$	5 fish/inch group (max)
	Genetics	% FLMB	N = 30, any age
Bluegill <sup>a</sup>	Abundance	CPUE–Total	RSE $\leq$ 25
	Size structure	PSD, length frequency	N $\geq$ 50 stock
Gizzard Shad <sup>a</sup>	Abundance	CPUE–Total	RSE $\leq$ 25
	Size structure	Length frequency	N $\geq$ 50
	Prey availability	IOV	N $\geq$ 50
<i>Tandem hoop netting</i>			
Channel Catfish	Abundance	CPUE–Total and CPUE–Stock	Practical effort
	Size structure	PSD, Length frequency	Practical effort
	Body Condition	$W_r$	Practical effort
<i>Trap netting</i>			
Crappie	Abundance	CPUE–Total, CPUE–Stock, CPUE-10	Practical effort
	Size structure	PSD, length frequency	N $\geq$ 50 stock
	Condition	$W_r$	5 fish/inch group (max)

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



Table 6. Percent occurrence with lower and upper 95% confidence limits (CL) of vegetative habitat structural habitat at 46 random sites in Hords Creek Reservoir, Texas, August, 2017. Water level at time of survey approximately 5 feet below mean conservation pool.

Structural habitat type	Percent occurrence	Lower CL	Upper CL
Rocky Shoreline	63.0	48.6	75.5
Natural/Featureless Shoreline	32.6	20.9	47.0
Gravel	4.3	1.2	14.5

Table 7. Percent occurrence with lower and upper 95% confidence limits (CL) of vegetative habitat structural habitat at 194 random sites in Hords Creek Reservoir, Texas, August, 2017. Water level at time of survey approximately 5 feet below conservation pool.

Structural habitat type	Percent occurrence	Lower CL	Upper CL
Open water/featureless	53.6	46.6	60.5
Flooded terrestrial	43.3	36.5	50.3
<i>Chara</i> sp.	15.5	11.1	21.2
Coontail	10.3	6.8	15.4
Water stargrass	8.8	5.5	13.6
Pondweed	4.1	2.1	7.9
Common buttonbush	1.5	0.5	4.4
Dwarf spikerush	1.5	0.5	4.4
Water primrose	0.5	0.1	2.9
Frog's bit	0.5	0.1	2.9
<i>Sagittaria</i> sp.	0.5	0.1	2.9

Table 8. Percent directed angler effort by species for Hords Creek Reservoir, Texas, 2014–2015. Survey periods were from 1 September through 31 August.

Species	2014/2015
Largemouth Bass	46.1%
Anything	36.8%
Crappie	11.8%
Catfish	3.9%
Sunfish	1.3%

Table 9. Number (N=148) and percent of fish caught, fish harvested, and fish released by species for Hords Creek Reservoir, Texas, 2014–2015. Survey period were from 1 September through 31 August.

Species	Number caught (Percent of all fish caught)	Number harvested (Percent harvested for each species)	Percent legal release for each species
Crappie	97 (65.5%)	48 (49.5%)	12.7%
Largemouth Bass	35 (23.6%)	9 (25.7%)	71.0%
Catfish	8 (5.4%)	7 (87.5%)	12.5%
Sunfishes	5 (3.4%)	1 (20.0%)	80.0%
Common Carp	3 (2.0%)	2 (66.7%)	33.3%

## Gizzard Shad

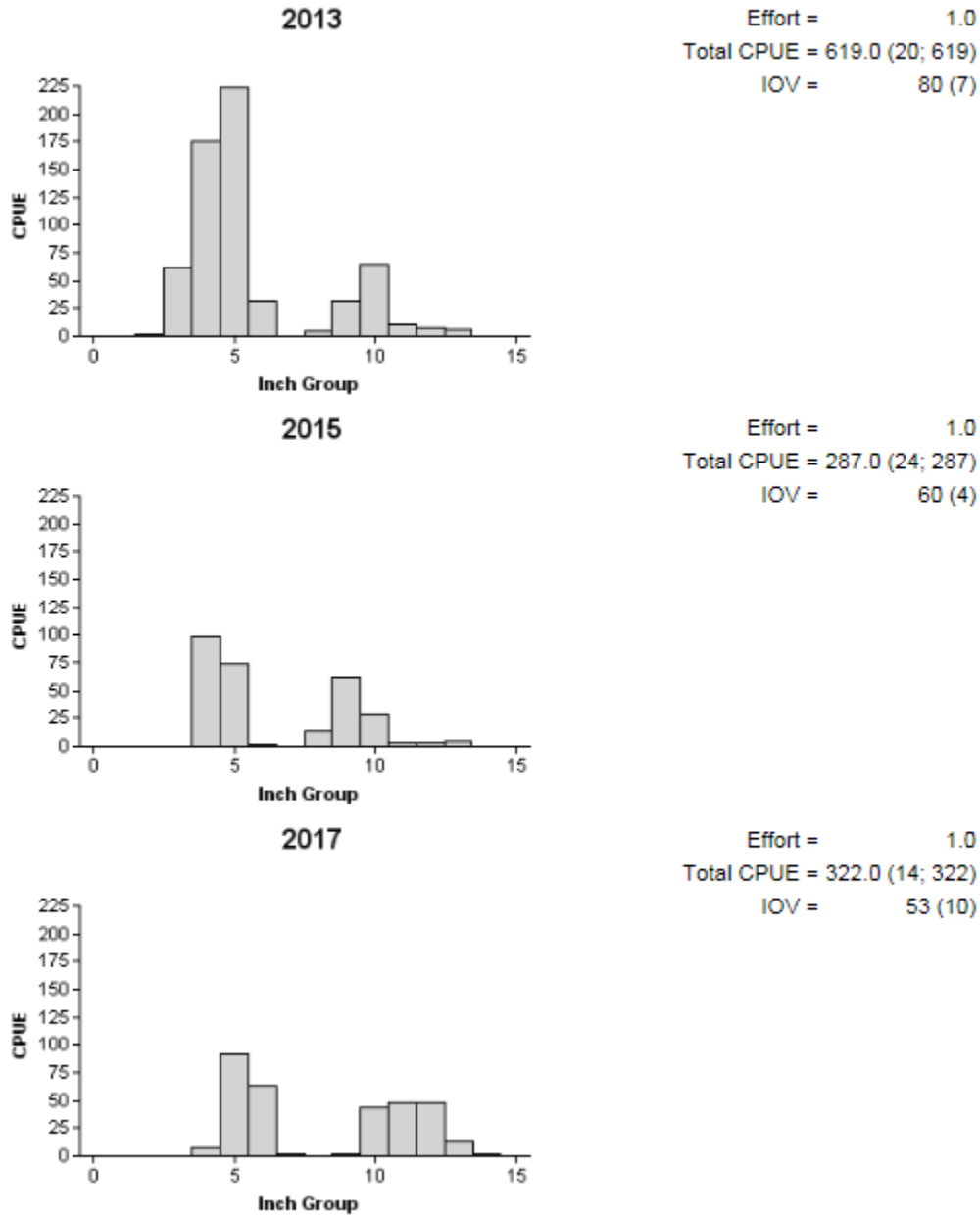


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Hords Creek Reservoir, Texas, 2013, 2015, and 2017.

# Bluegill

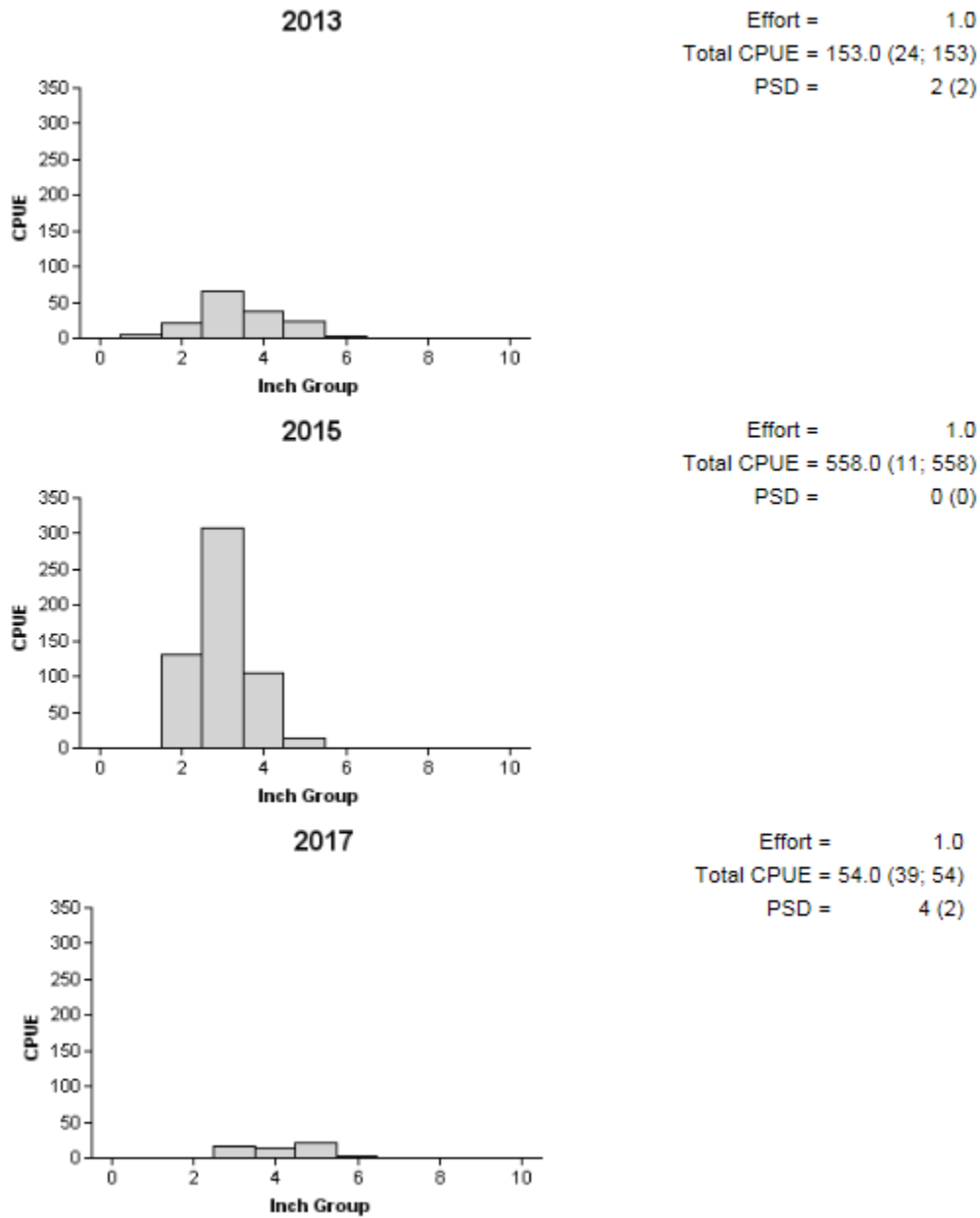


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Hords Creek Reservoir, Texas, 2013, 2015, and 2017.

## Largemouth Bass

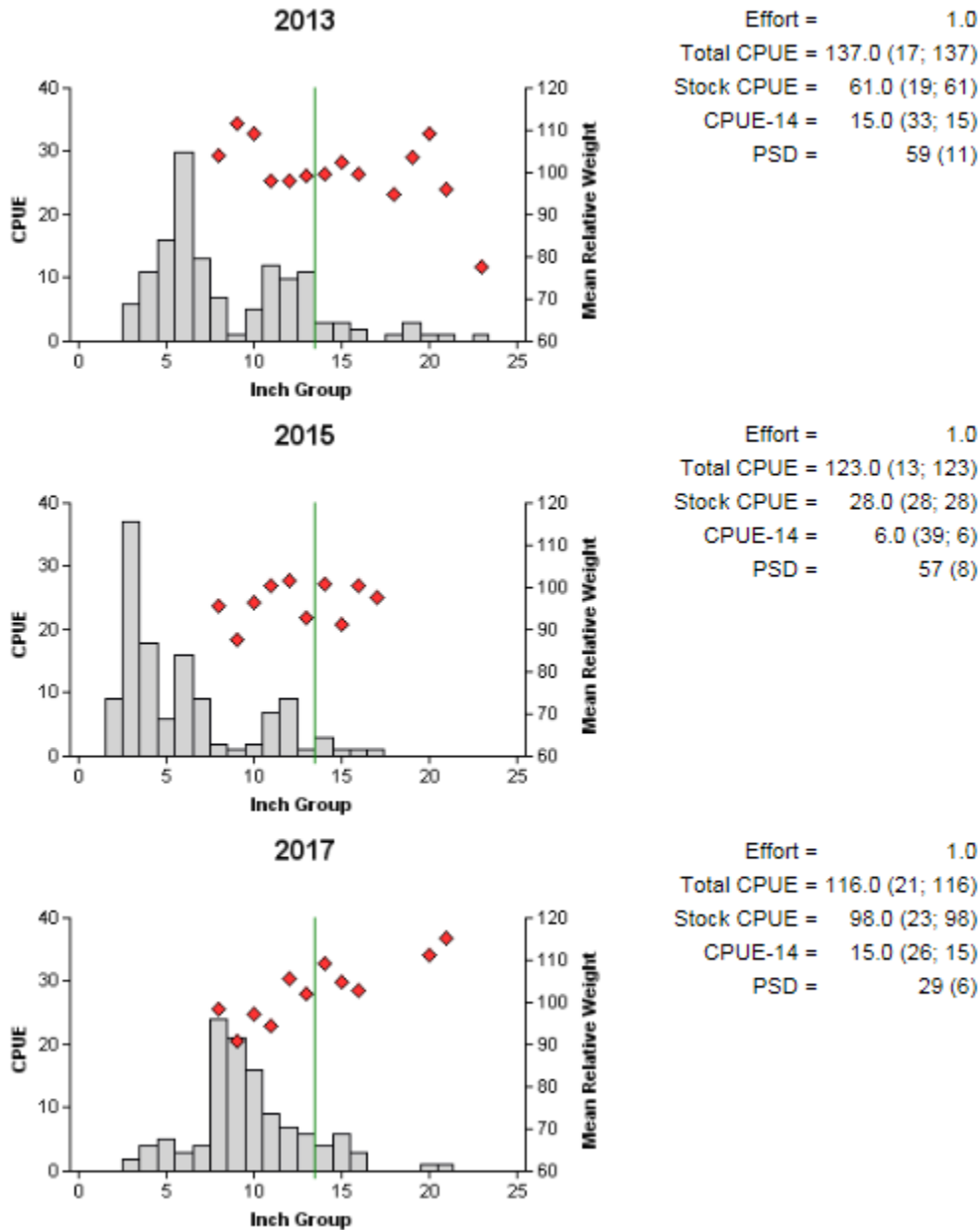


Figure 4. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Hords Creek Reservoir, Texas, 2013, 2015, and 2017. Vertical line indicates minimum length limit.

Table 10. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Hords Creek Reservoir, Texas, 1991 to present. 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.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
1991	38	0	13	25	14.0	0.0
1995	28	4	19	5	46.4	14.3
1998	30	3	22	5	54.3	10.0
2003	33	3	26	4	48.4	9.1
2005	24	0	24	0	54.3	0.0
2015	30	0	28	2	39.7	0.0
2017	30	1	29	0	57.5	3.3

## White Crappie

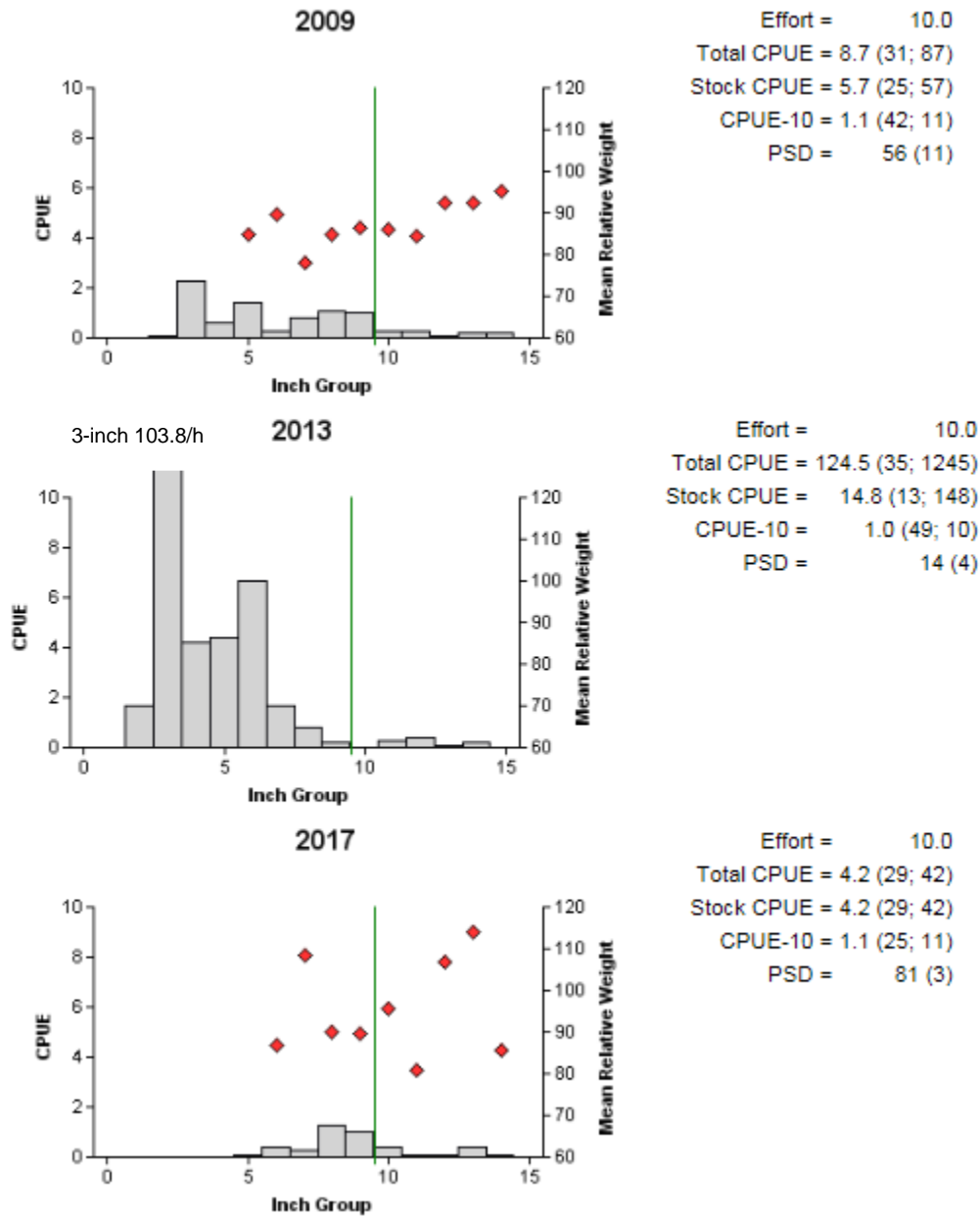


Figure 5. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Hords Creek Reservoir, Texas, 2009, 2013, and 2017. Vertical line indicates minimum length limit.

## Proposed Sampling Schedule

Table 11. Proposed sampling schedule for Hords Creek 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.

	Survey year			
	2018-2019	2019-2020	2020-2021	2021-2022
Angler Access				S
Structural Habitat				
Vegetation				S
Electrofishing – Fall				S
Electrofishing – Spring				
Electrofishing – Low Frequency				
Trap Netting				S
Gill Netting				
Baited Tandem Hoop Netting				
Creel Survey				
Report				S

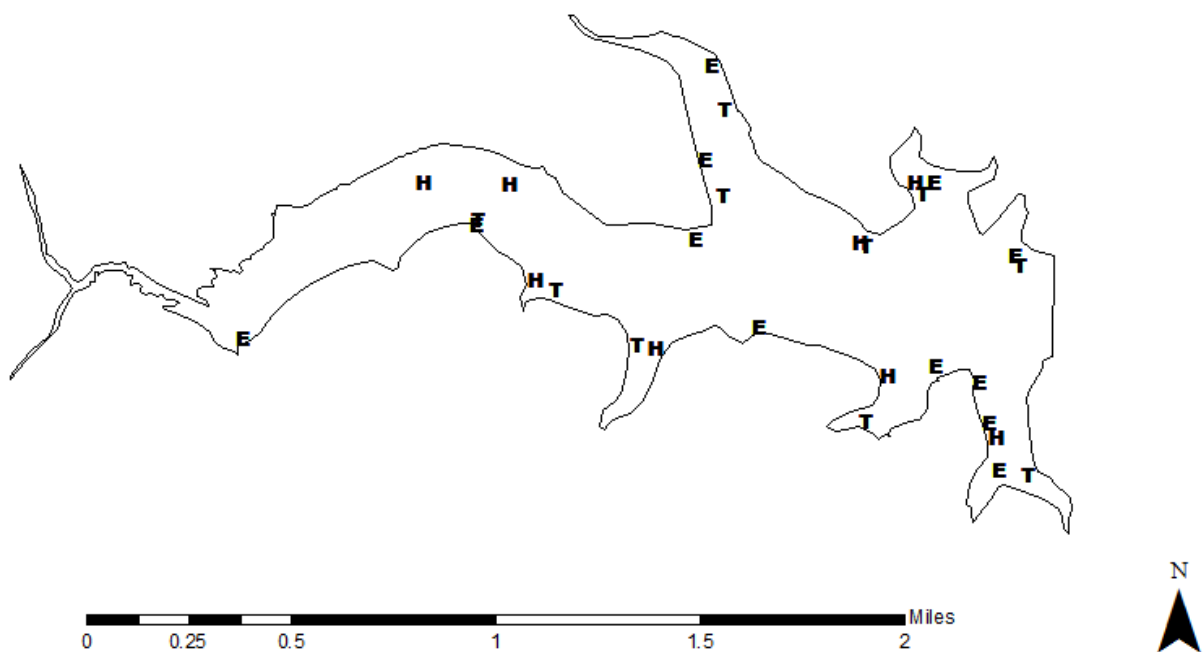


## APPENDIX A – Catch rates for all species from all gear types

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from Hords Creek Reservoir, Texas, 2017. Sampling effort was 8 net nights for tandem hoop netting, 10 net nights for trap netting, and 1.0 hour for electrofishing.

Species	Hoop Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					322	322.0 (14)
Golden Shiner					2	2.0 (100)
Channel Catfish	3	0.4 (49)				
Green Sunfish					1	1.0 (100)
Bluegill					54	54.0 (39)
Longear Sunfish					1	1.0 (100)
Largemouth Bass					116	116.0 (21)
White Crappie			42	4.2 (29)		
Black Crappie			7	0.7 (48)		

## APPENDIX B – Map of sampling locations



Location of sampling sites, Hords Creek Reservoir, Texas, 2017. Tandem hoop net, electrofishing, and trap net stations are indicated by H, E, and T, respectively. Water level was 3.5 feet below mean sea level during tandem hoop netting, 5.5 feet below mean sea level during electrofishing, and 6.8 feet below mean sea level during trap netting.

## APPENDIX C – Hords Creek Reservoir creel survey card

### Texas Parks and Wildlife Fishing Survey for Hords Creek Reservoir

Please answer the following questions by writing your answer in the blanks and by following directions in parentheses.

1. Date \_\_\_/\_\_\_/\_\_\_\_\_
2. What is your home 5-digit Zip Code? \_\_\_\_\_
3. How many people were fishing in your group today? \_\_\_\_\_
4. Were you fishing from a **BOAT** or the **SHORELINE** (*circle one*)
5. How long did you fish today \_\_\_\_\_ hours \_\_\_\_\_ minutes
6. **Today only**, how much money did you spend on fishing? \_\_\_\_\_
7. What were you fishing for (*circle one*)

Largemouth Bass,    Catfish,    Common Carp,    Sunfish,  
 Crappie,    Anything

8. What kind of fishing gear were you using (*circle one*)

Fishing Rod,    Jug Line,    Trot Line

9. If you caught fish today, can you tell us about what fish you **KEPT** and what you **LET GO** in the table below? (If you did not catch fish, please leave blank.)

KEPT			LET GO		
Species Name	# of Fish	Length (inches)	Species Name	# of Fish	Length (inches)



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