

# Palo Duro Reservoir

## 2018 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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July 31, 2019



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## Survey and Management Summary

Fish populations in Palo Duro Reservoir were not surveyed in 2018-2019 due to extreme low water conditions that prevented boat access and effective fish sampling. Limited historical data are presented from additional survey efforts conducted since the last report. This report summarizes the results of the previous surveys and contains a management plan for the reservoir based on those findings.

**Reservoir Description:** At conservation pool, Palo Duro Reservoir is a 2,413-acre impoundment located on Palo Duro Creek approximately 13 miles north of Spearman in Hansford County, Texas. At current elevation the reservoir surface area is estimated to be less than 150 acres. The reservoir is owned and operated by the Palo Duro Water District for municipal water supply. The dam was completed, and the reservoir began filling in 1991. The reservoir drainage area has experienced a drought of record since 2000 and the lakebed is prone to seepage resulting in extremely low water levels. At the time of this report there were no usable boat ramps nor ADA accessible areas. The entire shoreline is accessible to bank anglers.

**Management History:** Important sport fish include Largemouth Bass, White Crappie, and catfish. There were no stockings due to low water levels. All fish populations have been managed with statewide regulations since it was impounded.

### Fish Community

- **Prey species:** Gizzard Shad and Bluegill were not sampled in 2018 due to extremely low water levels that restricted boat access.
- **Catfishes:** Catfishes were not sampled in 2019 due to extremely low water levels that restricted boat access.
- **Largemouth Bass:** Were not sampled in 2018 due to extremely low water levels that restricted boat access
- **White Crappie:** White Crappie were not sampled in 2018 due to extremely low water levels that restricted boat access.

**Management Strategies:** Monitor lake levels at Palo Duro Reservoir and keep public informed of current conditions. If lake levels improve, stock fish and perform sport fish populations surveys as appropriate for the available habitat. Inform the public about the negative impacts of aquatic invasive species. Conduct general monitoring surveys with trap nets, gill nets, and electrofishing in 2022-2023. Access and vegetation surveys will be conducted in 2022.

## Introduction

This document is a summary of fisheries data collected from Palo Duro Reservoir in 2018-2019. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Due to the lack of boat access in 201-19, historical data are presented and used as the most current data available for Palo Duro Reservoir.

## Reservoir Description

At Conservation Pool, Palo Duro Reservoir is a 2,413-acre impoundment located on Palo Duro Creek approximately 13 miles north of Spearman in Hansford County, Texas. At current elevation the reservoir is estimated to be less than 150 acres. The reservoir is owned and operated by the Palo Duro Water District for municipal water supply. The dam was completed and the reservoir began filling in 1991. The reservoir drainage area has experienced a drought of record since 2000 and the lakebed is prone to seepage resulting in extremely low water levels (Figure 1) punctuated by three short-term increases. Other descriptive characteristics for Palo Duro Reservoir are in Table 1.

## Angler Access

Angler access at Palo Duro Reservoir was impacted by water levels. The entire shoreline was accessible by bank anglers at all water levels, but low water levels have greatly restricted boat access. The reservoir is accessible by boat via the low water ramps during most years but there is no improved parking or facilities at these ramps. At the time of this report the low water ramps were not usable. Extension of ramps was not feasible. Boat ramp characteristics are presented in Table 2.

## Management History

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

1. The reservoir has a history of White Crappie becoming overabundant with poor growth and size structure. Walleye may be an effective predator control for the White Crappie population.

**Action:** Due to low water conditions Walleye were not stocked during the last report cycle. A trap net survey was performed in 2015 to monitor White Crappie Populations.

2. Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally and economically.

**Action:** Cooperated with the Palo Duro Water District and educated the public about the risks of invasive species.

**Harvest regulation history:** Sport fish in Palo Duro Reservoir have been managed with statewide regulations since the reservoir was impounded in 1991. Current regulations are found in Table 3.

**Stocking history:** Palo Duro Reservoir was stocked with multiple species to establish a fish community after it was impounded in 1991. Genetic analysis of Largemouth Bass in 1997 indicated that Northern Largemouth Bass in the reservoir had a unique genetic mark. Largemouth Bass stocking was halted from 1997-2011 to preserve the genetic mark. Later genetic testing indicated that other Largemouth Bass strains had been released into the reservoir and the previous genetic mark was no longer dominant and Largemouth Bass stockings were resumed. Largemouth Bass fingerlings were stocked in 2016 and 2017. Walleye were stocked to supplement natural reproduction and increase predation on the historically abundant White Crappie population. The lack of recent fish stockings has been directly related to low water levels and poor access. If lake levels improve, fish will be stocked as needed to rebuild the fishery. The complete stocking history can be viewed in Table 4.

**Vegetation/habitat management history:** Habitat in Palo Duro Reservoir was surveyed in 2014. Habitat was typified by nondescript eroded bank shoreline with flooded terrestrial vegetation and very little aquatic vegetation (Munger and Clayton 2015). No habitat enhancement has occurred.

**Water transfer:** Palo Duro Reservoir is scheduled to be used for municipal water supply for six member cities. Construction of transmission systems for delivering water to member cities is anticipated to be completed by 2030. There are currently no interbasin transfers.

## Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Palo Duro Reservoir, Texas (Munger and Clayton 2015). 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 using fall electrofishing (50 minutes at 10, 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 (5 net nights at 5 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn).

**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.

**Water level** – Source for water level data was the United States Geological Survey (USGS 2019).

## Results and Discussion

**Habitat:** A habitat survey was not completed in 2018 due to extreme low water conditions and the lack of boat access. The last habitat survey was conducted in 2014 (Munger and Clayton 2015). Total surface area has declined to the point that there are less than 150 acres of water standing in the reservoir basin. Based on visual assessment, most of the shoreline habitat is silt with limited areas of flooded timber.

**Prey species:** No sampling was conducted in 2018 by electrofishing due to extreme low water levels that prevented boat access. Electrofishing data was collected in 2016 and is discussed in the following text. Electrofishing catch rates of Gizzard Shad and Bluegill were 758.4.0/h and 4.8/h, respectively. Index of Vulnerability (IOV) for Gizzard Shad was excellent, indicating that 98% of Gizzard Shad were available to existing predators; this was comparable to data collected in 2014 and 2012 (Figure 2). Total CPUE of Gizzard Shad was slightly higher than data collected in 2014 (Figure 2). Total CPUE of Bluegill in 2016 was lower than the total CPUE from the 2012 survey but higher than data collected in 2008 (Figure 3).

**Catfishes:** No fish were collected by gill netting due to extreme low water levels which prevented sampling.

**Largemouth Bass:** No sampling was conducted in 2018 by electrofishing due to extreme low water levels that prevented boat access. Electrofishing data was collected in 2016 and is discussed in the following text. The electrofishing total catch rate and stock-length catch rate for Largemouth Bass was 15.6/h and 0.0/h, respectively in 2016 (Figure 4). This is an increase compared to 2014 total catch rate of 1.7/h. Size structure was poor as PSD calculations were not possible because all fish captured were less than the specified stock length for Largemouth Bass. Relative weight was not calculated because fish weight data for sub-stock fish was not recorded in 2016.

**White Crappie:** No sampling was conducted in 2018 by trap netting due to extreme low water levels that prevented boat access. Trap net data was collected in 2015 and is discussed in the following text. The trap net catch rate of White Crappie was 0.6/nn in 2015, lower than in 2013 (5.0/nn) and 2010 (39.0/nn; Figure 5). The population remains dominated by fish less than 5 inches long even though catch rates have declined. Relative weight was not calculated because fish weight data was not recorded for sub-stock fish in 2015. Sampling objectives described by Munger and Clayton (2015) were not met due to

extremely low catch rates and poor lake level elevation that limited the number of suitable net sites in 2015.

# Fisheries Management Plan for Palo Duro Reservoir, Texas

Prepared – July 2019

**ISSUE 1:** Lake levels at Palo Duro Reservoir continue to provide major challenges to the management of sportfish populations. Based on historic data, improvements in water level are often short lived due to evaporation and ground infiltration rates. It is unlikely that the reservoir will experience an extended period of improved water elevation in the near future.

## MANAGEMENT STRATEGIES

1. Monitor reservoir water level to keep the public informed of current conditions
2. If the water level improves, request fish as necessary to take advantage of the increased lake level. It is important to note that based on historic data, any substantial water level increases will most likely be temporary and fish should be stocked with this history in mind.

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

## MANAGEMENT STRATEGIES

1. Cooperate with Palo Duro Water District to post appropriate 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. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

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

Reservoir Status Disclaimer: Water levels have directly impacted the fishery and efforts by Texas Parks and Wildlife Personnel to conduct necessary fish population sampling. At conservation pool the reservoir is 2,413 acres, but at the current elevation the reservoir is approximately 150 acres. This decline in elevation has resulted in a lack of boat access and prevented any fish sampling efforts in 2018-2019. It is unlikely that reservoir conditions and access will improve without major rain events that result in lake elevation improvements.

Sport fish, forage fish, and other important fishes

Sport fishes in Palo Duro Reservoir have historically included Blue Catfish, Channel Catfish, White Bass, Largemouth Bass, White Crappie and Walleye. The primary forage species are Gizzard Shad and Bluegill.

Low-density fisheries

Due to extreme water level fluctuations and an oxygen related fish kill that occurred in the spring of 2019, it would be difficult to determine which fisheries currently exist and which fisheries may be considered negligible. Personnel have been unable to conduct gill net sampling due to low water conditions. Trap net and electrofishing catch rates were low for Largemouth Bass (15.6/hr) and White Crappie (0.6/nn) in 2015-16.

Survey objectives, fisheries metrics, and sampling objectives

Due to the extreme low water conditions at Palo Duro Reservoir, statuses of all fish populations are unknown. Future sampling will be exploratory to determine presence/absence of all fish species. Sampling will take place following a weather event that allows the minimum boat access necessary to conduct specific populations surveys. Minimal effort will initially be used to determine presence/absence and will begin with 12 random electrofishing stations and 5 trap net and gill nets stations. Once fish populations are detected using above sampling techniques and become established, survey objectives, fisheries metrics, and sampling effort will be reevaluated.

## Literature Cited

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## Tables and Figures

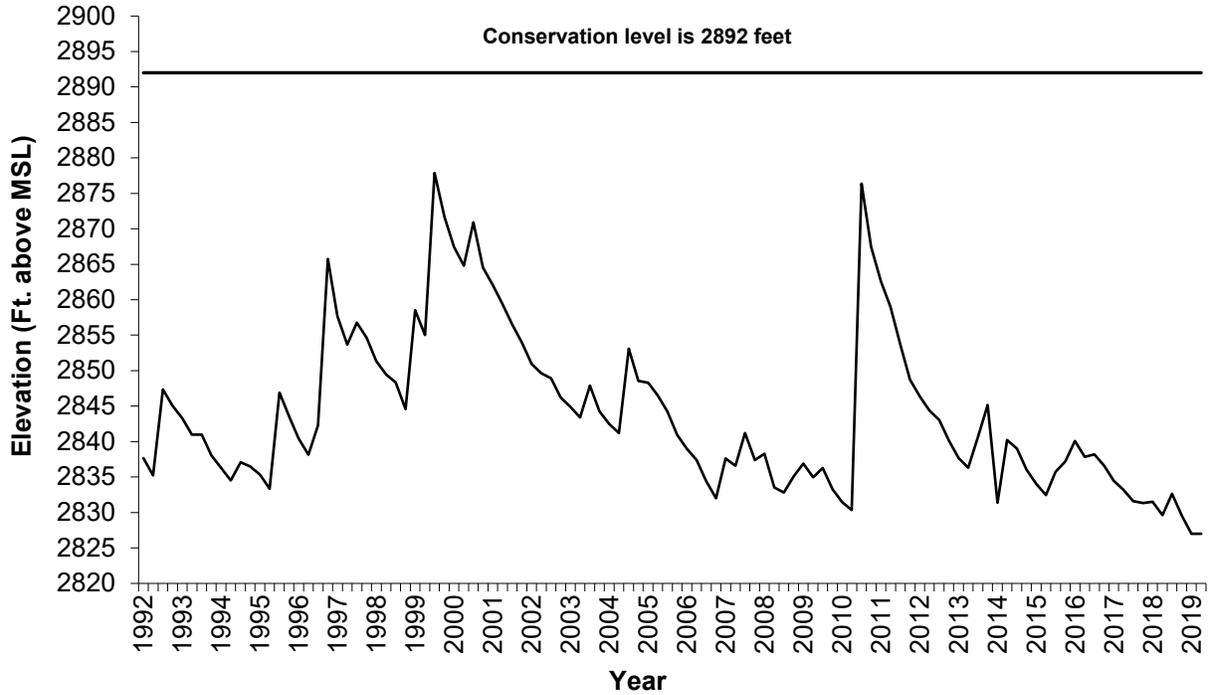


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Palo Duro Reservoir, Texas.

Table 1. Characteristics of Palo Duro Reservoir, Texas.

Characteristic	Description
Year constructed	1991
Controlling authority	Palo Duro Water District
County	Hansford
Reservoir type	Mainstem
Shoreline Development Index	6.3
Conductivity	301 $\mu$ S/cm

Table 2. Boat ramp characteristics for Palo Duro Reservoir, Texas, August 2018. Reservoir elevation at time of survey was 2,827 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
	36.3549				
North Ramp	-101.17997	Y	100	2,860	Unusable. Extension is not feasible.
	36.34682				
South Ramp	-101.1696	Y	100	2,871	Unusable. Extension is not feasible.
	36.358736				
North Low Water Ramp	-101.169893	Y	10	2,828	Unusable. Extension is not feasible.
	36.35034				
South Low Water Ramp	-101.16401	Y	10	2,829	Unusable. Extension is not feasible.

Table 3. Harvest regulations for Palo Duro Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue, their hybrids and subspecies	25 (in any combination)	12 – inch minimum
Catfish, Flathead	5	18 – inch minimum
Bass, White	25	10 – inch minimum
Bass, Largemouth	5	14 – inch minimum
Crappie: White and Black, their hybrids and subspecies	25 (in any combination)	10 – inch minimum
Walleye	5	Only 2 fish allowed under 16 inches

Table 4. Stocking history of Palo Duro Reservoir, Texas. FGL = fingerling; FRY = fry; ADL = adults.

Species	Year	Number	Size
Bass, Florida Largemouth	1991	40,030	FGL
	1993	177	ADL
	Total	40,207	
Bass, Largemouth	1992	124,562	FGL
	2011	140,765	FGL
	2016	30,000	FGL
	2017	9,001	FGL
	Total	304,328	
Smallmouth Bass	1993	12,581	FGL
Bluegill	1991	88,221	FGL
	1991	77,123	FRY
	1992	74,084	FGL
	Total	239,428	
Bluegill, Coppernose	1991	82,293	
Catfish, Blue	1991	25,607	FGL
	1998	64,838	FGL
	1999	81,500	FGL
	2002	102,951	FGL
	Total	68,724	
Catfish, Channel	1991	24,414	FGL
	1991	10,000	FRY
	1996	53,026	FGL
	2010	204,014	FGL
	Total	291,454	
Crappie, White	1992	250	FGL
Perch, Yellow	1991	4,094	FGL
	1992	20,000	FGL
	Total	24,094	
Shad, Gizzard	1992	67	ADL

Table 4. Stocking history continued.

Species	Year	Number	Size
Walleye	1992	134,640	FRY
	1993	1,000,000	FRY
	1999	20,049	FGL
	2000	69,000	FGL
	2001	1,985,505	FRY
	2002	3,442,699	FRY
	2004	15,693	FGL
	2005	6,080	FGL
	2011	3,405,200	FRY
	2014	491,200	FRY
	2015	207,200	FRY
	Total	10,777,266	

Table 5. Objective-based sampling plan components for Palo Duro Reservoir, Texas 2018-2019.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Exploratory	Presence/Absence	Trend Data
Walleye	Exploratory	Presence/Absence	Trend Data
Gizzard Shad <sup>a</sup>	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	N ≥ 50
	Prey availability	IOV	N ≥ 50
Bluegill	Exploratory	Presence/Absence	Trend Data
<i>Gill Netting</i>			
Walleye	Size structure	PSD, length frequency	N = 50
Blue Catfish	Abundance	CPUE	RSE≤25
	Size structure	PSD, length frequency	N = 50
<i>White Bass</i>	Abundance	CPUE	RSE≤40
	Size structure	PSD, length frequency	N = 50
Channel Catfish	Exploratory	Presence/Absence	Trend Data
<i>Trap Netting</i>			
White Crappie	Abundance	CPUE	RSE≤25
	Size structure	PSD, length frequency	N = 50

<sup>a</sup> 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.

## Gizzard Shad

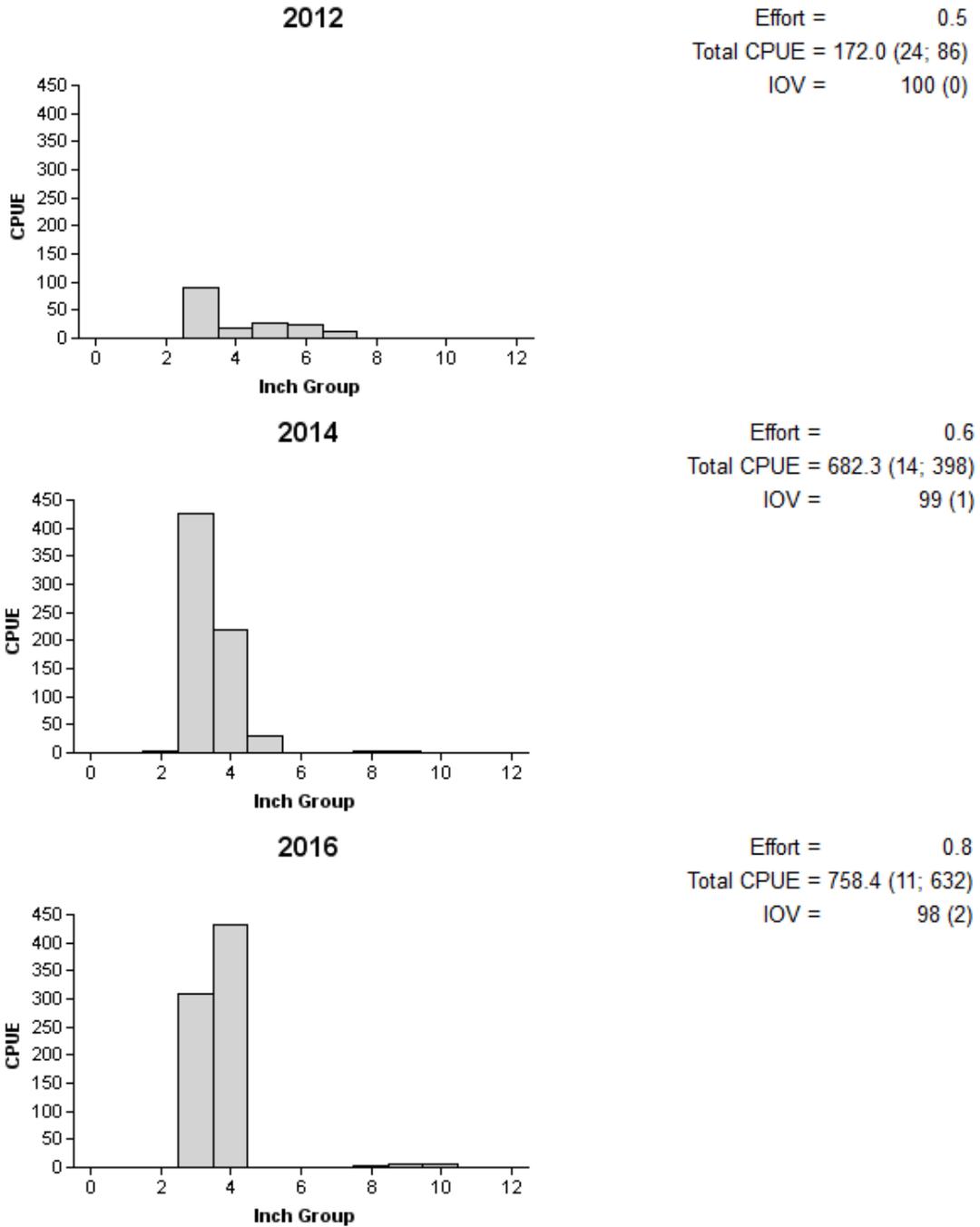


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Palo Duro Reservoir, Texas, 2012, 2014, and 2016.

# Bluegill

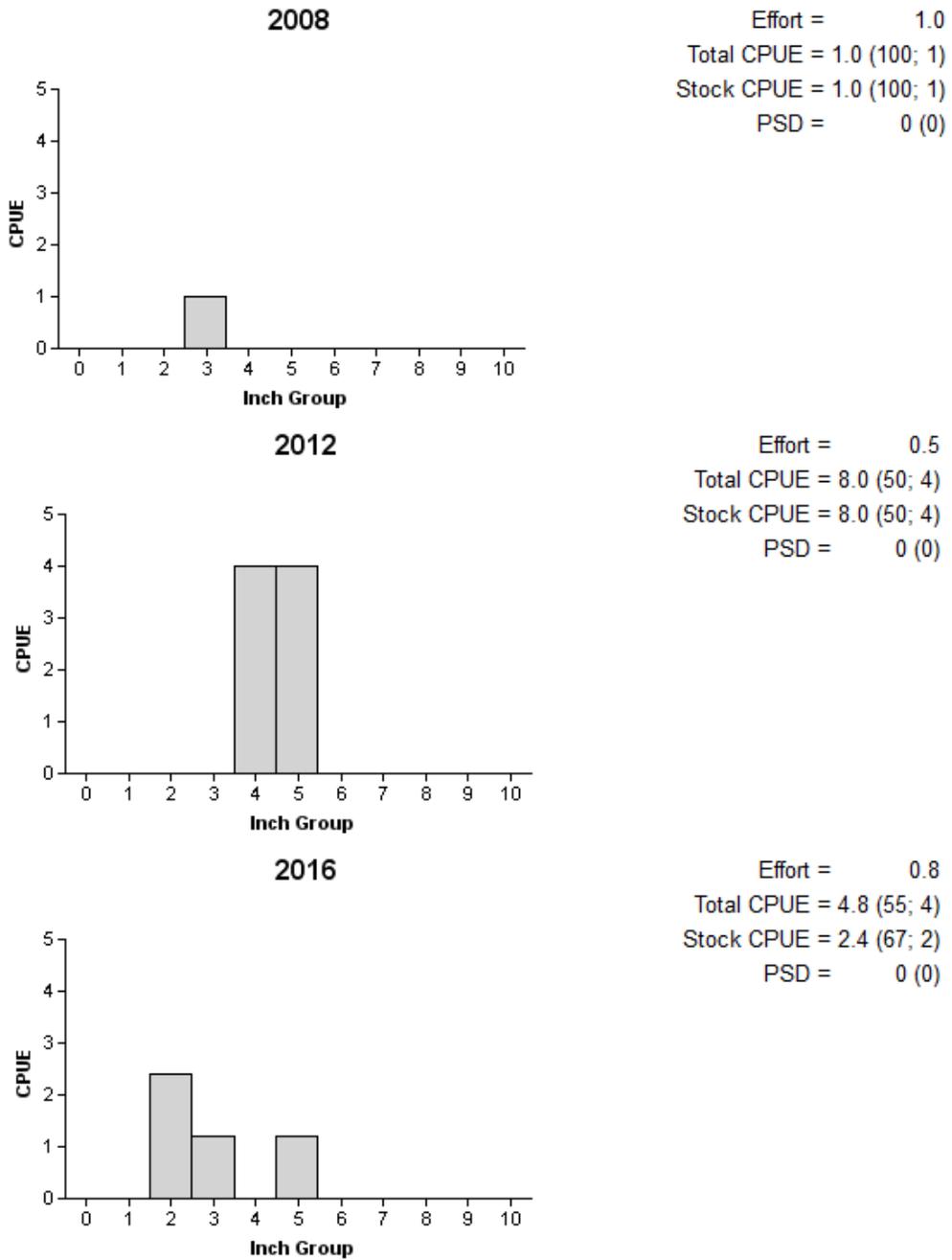


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys Palo Duro Reservoir, Texas, 2008, 2012, and 2016. No Bluegill were collected in the 2010 or 2014 surveys.

## Largemouth Bass

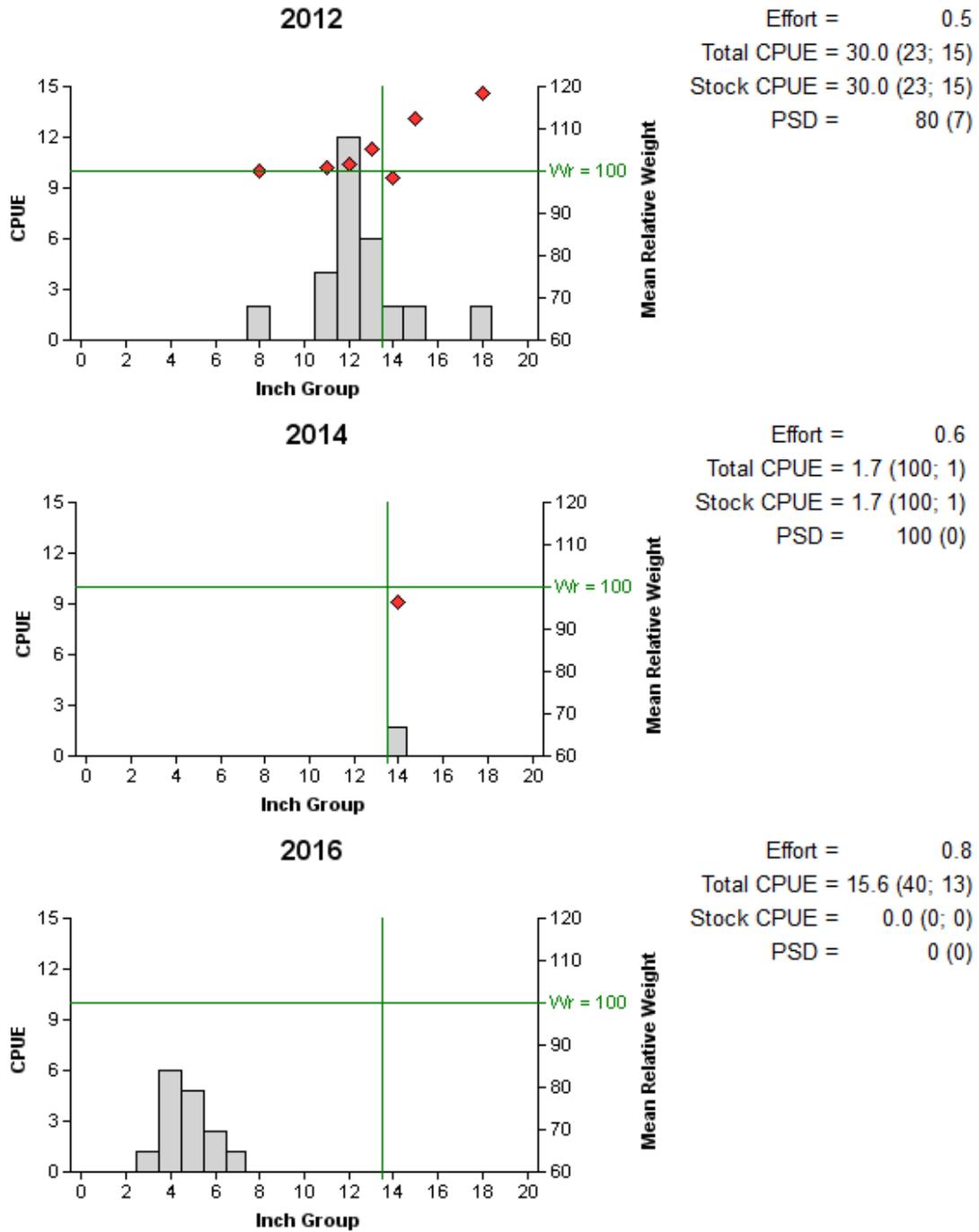


Figure 4. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Palo Duro Reservoir, Texas, 2012, 2014, and 2016. Vertical line indicates minimum length limit.

## White Crappie

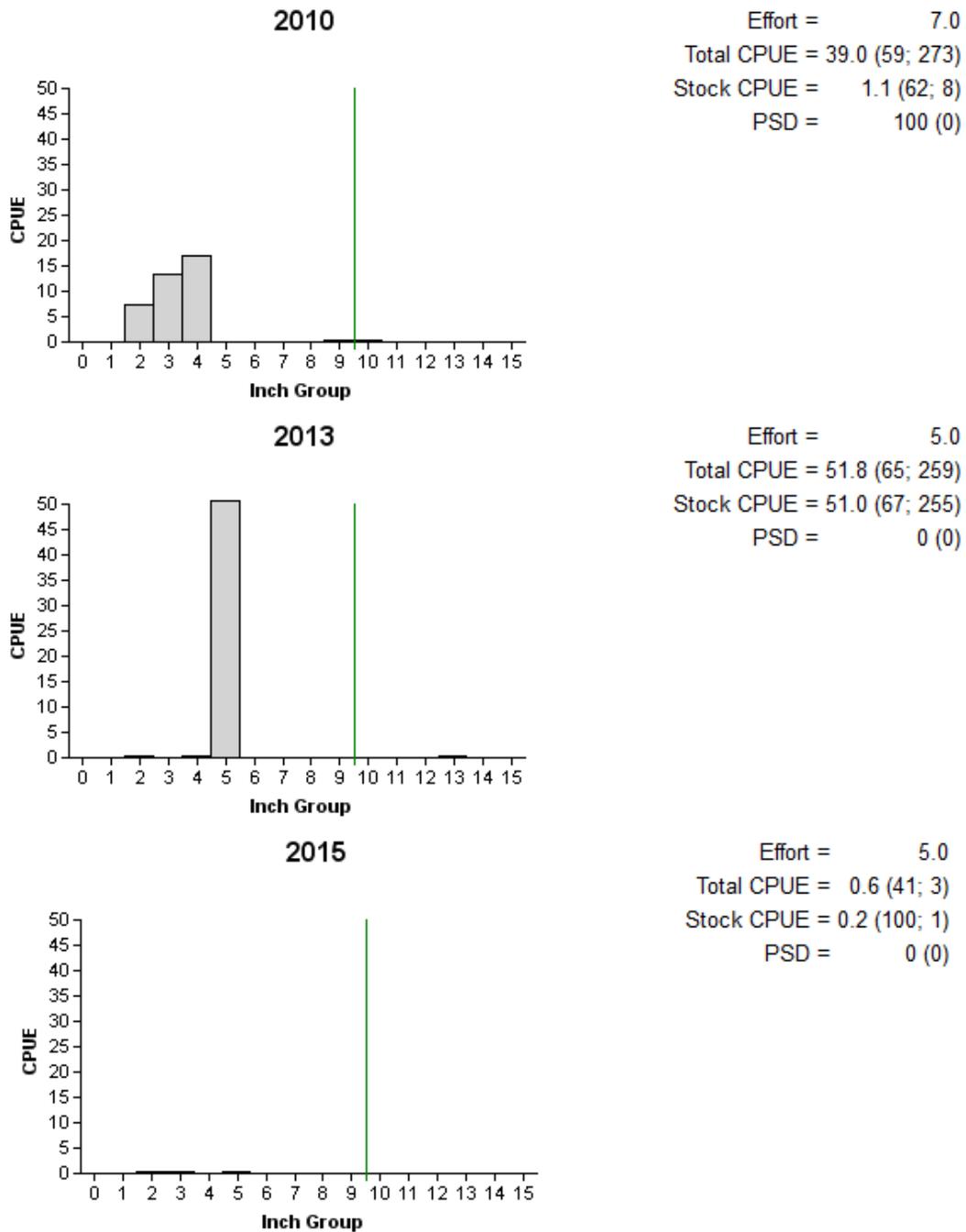


Figure 5. Number of White Crappie caught per net night (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Palo Duro Reservoir, Texas, 2010, 2013, and 2015. Vertical line indicates minimum length limit.

## Proposed Sampling Schedule

Table 6. Proposed sampling schedule for Palo Duro Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

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



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