

# Palo Duro Reservoir

## 2022 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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# Contents

Contents .....	i
Survey and Management Summary .....	1
Introduction.....	2
Reservoir Description .....	2
Angler Access.....	2
Management History .....	2
Methods.....	4
Results and Discussion.....	4
Fisheries Management Plan for Palo Duro Reservoir, Texas.....	5
Objective-Based Sampling Plan and Schedule (2023-2027).....	6
Literature Cited.....	7
Tables and Figures .....	8
Water Level .....	8
Reservoir Characteristics .....	8
Harvest Regulations .....	9
Stocking History.....	10
Proposed Sampling Schedule .....	13
Appendix A – Photos of Palo Duro Reservoir August 2022.....	14

## Survey and Management Summary

Fish populations in Palo Duro Reservoir were surveyed in 2019 using electrofishing. All other scheduled surveys were not possible due to extreme low water and no access by boat or vehicle. As of April 2023, the reservoir was completely dry, and all sportfish populations were lost. This report summarizes the results of the 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. The reservoir is prone to rapid declines in elevation and was completely dry in April 2023. Reservoir elevation has risen following several rain events in May/June 2023, but future water levels remain uncertain.

**Management History:** Palo Duro Reservoir has a history of sharp elevation declines following flood events. Management actions were not possible due to a lack of access and extremely low water. All sportfish populations have been managed with statewide regulations since it was impounded.

### Fish Community

- **There were no existing populations of sportfish or forage fish.**

**Management Strategies:** Fish stockings will be requested when elevation reaches 2,855 ft/msl. Initial survey efforts will occur 2 years following fish stockings. Once fish populations are detected and reestablished, survey objectives, fisheries metrics, and survey schedule will be reevaluated, and a more detailed survey plan will be developed.

## Introduction

This document is a summary of fisheries data collected from Palo Duro Reservoir from 2019-2023. 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. Low water levels have prevented boat access and the reservoir is prone to extended periods of extremely low elevation. Data collected in 2019 is presented as a historic record but that data is no longer applicable.

## 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. The reservoir was completely dry in April 2023, but water levels have risen to 2852 ft/MSL as of June 6, 2023, following a series of rain events. Historically, reservoir elevations have quickly deteriorated following any notable rise and the lakebed is prone to seepage resulting in extremely low water levels punctuated by short-term increases (Figure1). The reservoir is owned and operated by the Palo Duro Water District and was constructed for municipal water supply. The dam was completed, and the reservoir began filling in 1991. Other descriptive characteristics for Palo Duro Reservoir are in Table 1.

## Angler Access

The shoreline was accessible by bank anglers but vegetative growth in the dry lakebed negatively impacted shoreline angling access. Additionally, due to low water levels, boat access was not possible. Extension of ramps was not feasible primarily due to the distance needed to reach water and the shallow slope. Boat ramp characteristics are presented in Table 2.

## Management History

**Previous management strategies and actions:** Management strategies and actions from the previous survey report (Huber and Clayton 2019) included:

1. Monitor reservoir levels and adjust management actions in response to elevation increase.

**Action:** Water elevations were monitored and have deteriorated. An exploratory electrofishing survey was performed in 2019 but water levels continued to decline and all sportfish populations were lost in April 2023.

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. Beginning in September 2021, the statewide regulation for Blue and Channel Catfish changed to no minimum length limit with a 25 fish daily bag of which, only 10 fish can be 20 inches or greater. 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. Channel Catfish fingerlings were stocked in 2019 following an elevation rise to approximately 2855 ft/msl, but lake elevations quickly fell and the reservoir dried in April 2023. The complete stocking history can be viewed in Table 4

**Vegetation management history:** An effort was made in August 2022 to perform habitat and vegetation surveys. At that time the waterbody was estimated to be 6.5 acres. The survey was cancelled due to low water and lack of access by boat or vehicle.

**Water transfer:** Palo Duro Reservoir was scheduled to be used as a water supply for six member cities. That plan has been abandoned due to the lack of available water. 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 (Huber and Clayton 2019). 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 2022).

**Electrofishing** – Largemouth Bass, sunfishes, and Gizzard Shad were collected by electrofishing (30 mins at 6, 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.

**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 ( $RSE = 100 \times SE \text{ of the estimate/estimate}$ ) was calculated for all CPUE.

**Habitat** – A structural habitat survey was attempted in August of 2022; the survey was cancelled due to extreme low water and no access.

**Water level** – Source for water level data was the United States Geological Survey (USGS 2023)

## Results and Discussion

**Habitat:** A habitat and vegetation survey was attempted in August 2022. Upon arrival, staff found that the waterbody had dried to an estimated 6.5 acres. The small pool of water was not accessible by boat or vehicle and the survey was cancelled. The last habitat survey was conducted in 2014 (Munger and Clayton 2019) and the predominant habitat types were silt and scattered standing timber. Photos of the reservoir taken August 2022 are provided in appendix A.

**Fish species:** An exploratory electrofishing survey was performed in Fall 2019 that consisted of 6, 5-minute stations. Electrofishing catch rates of Gizzard Shad were 3,882/h. Index of vulnerability for Gizzard Shad was 100 indicating that all shad were available to any available predators. Total CPUE of Bluegill was 4.0/h and Total CPUE of White Crappie was 2.0/h. All other documented fish were nongame species. This data is provided as a historical record because the waterbody completely dried in April 2023 which resulted in the loss of all forage and sportfish in the reservoir.

# Fisheries Management Plan for Palo Duro Reservoir, Texas

Prepared – July 2023

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

## MANAGEMENT STRATEGIES

1. Monitor reservoir water level to keep the public informed of current conditions.
2. A sharp rise in elevation occurred in 2019 and the reservoir reached approximately 2855 ft/msl. However, water levels fell quickly, and boat access was lost in 2022. Based on review of the reservoir hydrograph, an elevation of at least 2855 ft/msl should be attained before management actions are initiated. If the specified elevation is reached it is likely that water levels will be adequate to provide a modest fishery for 3-5 years with typical yearly inflows. At that time staff will make the decision to request fish stockings if appropriate and take advantage of the available habitat. It is important to note that based on historic data, any substantial water level increase will likely be temporary.
3. Following a stocking event, fish populations will be monitored as per the sampling plan specified below.

**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 (2023-2027)

Reservoir Status Disclaimer: Water levels have impacted the fishery and efforts by personnel to conduct necessary reservoir management activities. At conservation pool the reservoir is 2,413 acres. Personnel were able to access and survey the waterbody in 2019, but the reservoir dried completely in April 2023. Heavy spring rains in 2023 resulted in an improvement in elevation to approximately 2,852 ft/MSL but water levels have already begun to fall.

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.

Survey objectives, fisheries metrics, and sampling objectives

Palo Duro Reservoir has a history of rapid declines in elevation following flood events. The reservoir completely dried in April 2023, but elevations have improved due to widespread spring rain events. Based on review of the historic hydrograph, no management activities will be attempted until a minimum of 2855 ft/msl is attained. At that time, sportfish stockings will be requested. If the reservoir attains the specified elevation, it is likely that minimal boat access and fair bank access will be available for 3-4 years. Initial survey efforts will occur 2 years following those stockings. Future sampling will be exploratory to determine presence/absence of all fish species. Minimal effort will be used to determine presence/absence with a maximum effort of 12 random electrofishing stations and 5 gill nets stations. Nighttime electrofishing is preferred but daytime sampling may be required based on ability to launch and navigate. Once fish populations are detected and reestablished; survey objectives, fisheries metrics, and survey schedule will be reevaluated, and a more detailed survey plan will be developed.



## Literature Cited

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## Tables and Figures

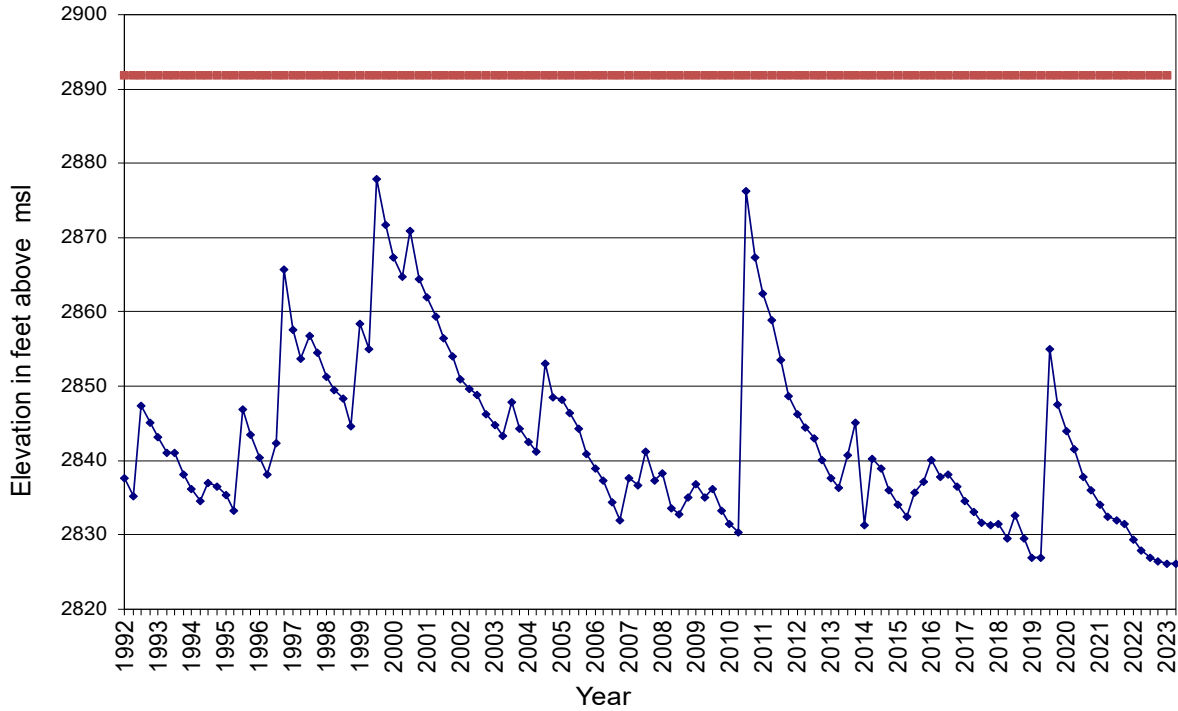


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Palo Duro Reservoir, Texas. The red line indicates the top of conservation pool (2892 ft above msl).

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	N/A
Conductivity	N/A

Table 2. Boat ramp characteristics for Palo Duro Reservoir, Texas, August 2022. 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
North Ramp	36.3549 -101.17997	Y	100	2,860	Unusable. Extension is not feasible.
South Ramp	36.34682 -101.1696	Y	100	2,871	Unusable. Extension is not feasible.
North Low Water Ramp	36.358736 -101.169893	Y	10	2,828	Unusable. Extension is not feasible.
South Low Water Ramp	36.35034 -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 Catfish, their hybrids and subspecies	25 (only 10 $\geq$ 20 inches)	None
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum
Walleye	5 (only 2 < 16 inches)	None

Table 4. Stocking history of Palo Duro Reservoir, Texas. FRY = fry, FGL = fingerling; 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
	2019	2,556	FGL
	Total	294,010	
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 2019–2023.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Exploratory	Presence/Absence	Trend Data
Bluegill	Exploratory	Presence/Absence	Trend Data
Gizzard Shad	Exploratory	Presence/Absence	Trend Data
<i>Gill Netting</i>			
Walleye	Exploratory	Presence/Absence	Trend Data
Blue Catfish	Exploratory	Presence/Absence	Trend Data
Channel Catfish	Exploratory	Presence/Absence	Trend Data
White Bass	Exploratory	Presence/Absence	Trend Data
<i>Trap Netting</i>			
Crappie	Exploratory	Presence/Absence	Trend Data

## Proposed Sampling Schedule

Table 4. Proposed sampling schedule for Palo Duro Reservoir, Texas pending adequate elevation. Survey period is June through May.

	Survey year			
	2023-2024	2024-2025	2025-2026	2026-2027
Angler Access				X
Structural Habitat				X
Vegetation				X
Electrofishing – Fall				X
Report				X

## Appendix A – Photos of Palo Duro Reservoir August 2022



View of remaining water at Palo Duro Reservoir. Taken from top of dam August 18, 2022.





Second View of Palo Duro reservoir, taken August 18, 2022. The reservoir spillway can be seen in the lower left corner of the image.



View of Palo Duro Reservoir from the South Low Water Ramp. Taken August 18, 2022.



View looking up at the South Low Water Ramp at Palo Duro Reservoir. Taken August 18, 2022.



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