PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2014 Fisheries Management Survey Report

Palo Duro Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish Populations in Palo Duro Reservoir were surveyed with electrofishing in 2014. Historical data are presented with the 2014 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:** Palo Duro Reservoir is a 2,413-acre (current pool is approximately 95 acres) impoundment on Palo Duro Creek approximately 13 miles north of Spearman in Hansford County, Texas. The reservoir is owned and operated by the Palo Duro River Authority for municipal water supply. The reservoir drainage area has experienced a drought of record since 2000 resulting in extremely low water levels punctuated by three short-term increases. The reservoir has two boat ramps which are currently out of the water. Two temporary launch sites are in place. There are no handicap-specific facilities.

- **Management History:** Important sport fish include White Bass, White Crappie, Blue Catfish and Walleye. White Crappie have a history of overabundance in the system and poor growth. Walleye stocking was attempted to mitigate the crappie problem. Florida Largemouth Bass were stocked in 1991 and 1993.

- **Fish Community**
  - **Prey Species:** Electrofishing catch of Gizzard Shad was high with good availability as prey to most sport fish. No Bluegills were caught by electrofishing in 2014.

  - **Catfishes:** Blue Catfish were abundant in the reservoir and provide a quality fishery. Channel Catfish abundance declined during the low water conditions.

  - **White Bass:** White Bass were collected in gill nets for the first time in 2005 and were still present and reproducing in the reservoir. Abundance of White Bass remains low with only a few harvestable-size fish.

  - **Largemouth Bass:** Only one Largemouth Bass was collected by electrofishing in 2014. Their abundance has historically been low.

  - **White Crappie:** White Crappie were abundant in the reservoir, but there were few legal-size fish.

  - **Walleye:** Walleye are present in the reservoir and show indications of natural reproduction despite low water conditions.

- **Management Strategies:** Continue stocking Walleye to increase the population and provide some control of the White Crappie population. Conduct trap net surveys in 2015 and 2017, electrofishing surveys in 2016 and 2018, and gill net surveys in 2017 and 2019. Conduct habitat and access surveys in 2018.

INTRODUCTION

This document is a summary of fisheries data collected from Palo Duro Reservoir in 2014-2015. 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 species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2014 data for comparison.

Reservoir Description

Palo Duro Reservoir is a 2,413-acre impoundment (current pool was approximately 95 acres) on Palo Duro Creek approximately 13 miles north of Spearman in Hansford County, Texas. The reservoir is owned and operated by the Palo Duro River Authority 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 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 restricted boat access most years since 2000. 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. 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 2011) included:

1. The reservoir has a history of White Crappie becoming overabundant with poor growth and size structure. Walleye may be an effective predator to control the abundance of White Crappie. Recommended stocking Walleye and monitoring Walleye population.
   Action: The reservoir was stocked with Walleye in 2011, 2014, and 2015. Gill net surveys were conducted when water levels were suitable.
2. Be aware of the risk of introduced invasive species and monitor for any indication of infestations.
   Action: No infestations were observed during regular sampling surveys and the water authority has been supplied with clean, drain, and dry signs to post at the reservoir.

Harvest regulation history: Sport fish in Palo Duro Reservoir have been managed with statewide regulations since the reservoir was impounded in 1991 (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 had been halted from then to 2011 in order to preserve the genetic mark. Walleye were stocked to increase the probability of natural reproduction and to increase predation on the abundant White Crappie population. The complete stocking history is in Table 4.

Vegetation/habitat management history: Habitat in Palo Duro Reservoir was surveyed in 1997. Habitat was typified by nondescript eroded bank shoreline with flooded terrestrial vegetation and very little aquatic vegetation (Munger 1998). 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

Fishes were collected in 2014 by electrofishing (0.58 h at 7, 5-min stations). Gill netting and trap netting were not conducted due to low water conditions. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Surveys were planned and attempted to achieve survey and sampling objectives in accordance with the objective-based sampling plan presented in Appendix C. All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2014).

A structural habitat survey was conducted in 2014. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2014).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD)] as defined 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 and relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics. Source for water level data was the United States Geological Survey (USGS 2015).

RESULTS AND DISCUSSION

Habitat: A habitat survey was conducted in 2014 with data presented in Table 5. The majority of the shoreline habitat was silt with scattered dead trees.

Prey species: Electrofishing catch rates of Gizzard Shad and Bluegill in 2014 were 682.3/h and 0.0/h, respectively. Index of vulnerability for Gizzard Shad was 99%, indicating that almost all the Gizzard Shad were available to existing predators (Figure 2). Gizzard Shad abundance in Palo Duro Reservoir has fluctuated considerably. Rapidly changing water levels impact availability of spawning habitat for Gizzard Shad and the condition and abundance of adult Gizzard Shad the previous fall also influences the quantity of young-of-the-year shad produced (Willis 1987).

No Bluegill were collected during electrofishing in 2014, and only four fish were caught in 2012 (Figure 3). Total CPUE of Bluegill has historically been below 10.0/h except in 1997 and 2000 following large increases in water level (Munger; 1998, 2003). Low Bluegill abundance in the reservoir may be due to the negative influence of Gizzard Shad through direct competition and habitat alteration (Aday, et al. 2003).

Blue Catfish: The gill net catch rate of Blue Catfish was 12.2/nn in 2011 and 20.0/nn in 2013. Blue Catfish appear to be able to survive the fluctuating water level and the majority of the population was 20 inches long or longer with average relative weights of over 100 for most size classes (Figure 4). Anecdotal reports from the water authority indicated anglers at the reservoir were primarily seeking Blue Catfish.

Channel Catfish: Channel Catfish were present in the reservoir in very low numbers with a gill net CPUE of 1.2/nn in 2011 and 1.0/nn in 2013 (Figure 5). The Channel Catfish population appears to have been negatively impacted by drought conditions. Channel and Blue Catfish typically have limited habitat overlap (Edds, et al. 2002) but the limited available habitat in Palo Duro Reservoir may have brought the species into more direct competition. Under these conditions Blue Catfish may outcompete Channel Catfish and become the dominant catfish species.

White Bass: White Bass were not stocked by Texas Parks and Wildlife Department and no White Bass were collected prior to 2005. They were first collected in gill nets in 2005 (CPUE 0.6/nn). They were collected again in 2011 at 4.4/nn and 2013 at 1.0/nn (Figure 6). There appears to be no major change in relative abundance since their introduction. The presence of fish less than 10 inches in length indicates they have been able to spawn successfully under poor habitat conditions.

Largemouth Bass: Largemouth Bass have historically had very poor populations in Palo Duro Reservoir. Initial genetic surveys indicated the native population may have had a unique genetic mark so further stocking was avoided to preserve the population genetics (Munger 2003). The population has been in decline from the high electrofishing CPUE of 58.9/h in 2000 (Munger 2003) to no fish collected during electrofishing surveys in 2010, 15 fish collected in 2012 and only one fish collected in 2014 (Figure 7). Stocking was resumed in 2011. The higher catch rates in 2000 and 2012 happened to follow years with water level rises of over 20 feet.

White Crappie: White Crappie were abundant in the reservoir. The trap net catch rate of White Crappie was 39.0/nn in 2010 and 51.8/nn in 2013 (Figure 8). The population was dominated by small fish and the length frequency has not changed since 2003. Relative weights for individual fish over 9 inches were all over 100. The high density and slow growth of White Crappie is a concern and could be related to Gizzard Shad abundance just as Aday, et al. (2003) indicated the negative impact Gizzard Shad had on Bluegill.

Walleye: Walleye were collected in gill nets in 2013 at a rate of 6.3/nn (Figure 9). No age and growth data was collected in 2013, but based on typical growth rates of Walleye in the panhandle the collected fish would be 1-2 years old (Munger 2002). Since Walleye were last stocked in 2005 and 2011 prior to sampling, it is likely that most of the fish collected were from natural reproduction in the reservoir though

slower growing male Walleye stocked in 2011 could be part of the 13-17-inch fish collected in 2013. This natural reproduction supplemented by occasional stocking should provide a quality sport fishery and help control the Gizzard Shad and White Crappie populations.

Objective based sampling: There were variances from the desired objective based sampling plan due to water levels. Low water levels prevented the use of gill or trap nets during 2014 and 2015 and reduced the possible electrofishing stations to 7.

Fisheries management plan for Palo Duro Reservoir, Texas

Prepared – July 2015.

ISSUE 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.

MANAGEMENT STRATEGIES

1. Stock Walleye fingerlings (50/acre) or fry (2,000/acre) biennially until natural reproduction maintains the population.
2. Trap net White Crappie to monitor the population and collect age information.
3. Gill net Walleye to monitor for natural reproduction and collect age samples to determine natural reproduction during non-stocking years.

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. 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 marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

ISSUE 3: Boating access has been eliminated at low water ramps and extension of those boat ramps is not feasible because the lake bottom levels out at the end of the ramp.

MANAGEMENT STRATEGY

1. Encourage interested anglers to either bank fish or to use small watercraft that do not require a ramp.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes trap netting in 2015 and 2017, electrofishing in fall 2016 and 2018, gill netting in spring 2017 and 2019, and habitat surveys in 2018 (Table 6). A complete objective based sampling plan is presented below.

Objective-Based Sampling Plan for Palo Duro Reservoir FY 2016-2019

Sport fish, forage fish, and other important fishes

Sport fishes in Palo Duro Reservoir include **Blue Catfish, Channel Catfish White Bass, Largemouth Bass, White Crappie** and **Walleye**. The primary forage species is **Gizzard Shad**.

Negligible fisheries

Largemouth Bass: Largemouth Bass are present in Palo Duro reservoir, but population abundance is extremely low (CPUE ranged from 0.0 to 10.0 between 2002 and 2010) due to extended periods of low and declining water levels and probable high predation due to limited nursery habitat. No Largemouth Bass were collected in the 2010 electrofishing survey and only 30/h were collected in 2012.

Channel Catfish: Channel Catfish exist in the reservoir but are a minor fishery relative to Blue Catfish. The gill net catch rate for Channel Catfish was 1.2 /nn in 2011 and 1.0 in 2013.

Bluegill: Bluegill were not collected by electrofishing in 2010 and CPUE was only 8/h in 2012. The low catch rates indicate they are not a major forage species and their small size makes them unlikely to be a targeted game species.

Survey objectives, fisheries metrics, and sampling objectives

Reservoir Status/Disclaimer: Current water levels directly impact our ability to sample fisheries within Palo Duro Reservoir. At current water levels (2,832 ft MSL 5/4/15) the total area of Palo Duro Reservoir is approximately 95 acres. At this level, water is not deep enough to set gill nets or trap nets. Approximately half of the area is covered with timber which prevents the use of either gear. The estimates of projected effort are based on the ability to sample the entire reservoir basin and will be adjusted based on the available samplable acreage.

Walleye: Walleye were sampled with gill nets in 2010 and 2013 with catch rates of 0.0/nn and 6.3/nn, respectively. This population is rebuilding and currently relies on survival of stocked fish until natural reproduction resumes. Continuation of gill net sampling will determine the status (presence including size structure, or absence) of Walleye stocked in 2011. Continuation of electrofishing sampling will determine reproductive success by presence or absence of YOY fish. Gill net sampling effort based on achieving sampling objectives for size structure estimation (PSD; 50 fish minimum with 80% confidence) is 10-15 stations. Electrofishing exploratory sampling effort will be based on achieving sampling objectives for Gizzard Shad. Sampling effort for fall 2016 and 2018 will be 10 random electrofishing stations. Spring 2017 and 2019 sampling will be 10 random gill net stations.

Blue Catfish: Blue Catfish were collected by gill nets in 2010 at 12.2/nn and in 2013 at 20.0/nn. Anecdotal information indicates this is the primary game species sought by area anglers. Continuation of sampling by gill nets will allow for monitoring of large-scale changes in relative abundance and size structure. Gill net sampling effort needed to achieve sampling objectives for relative abundance (CPUE-T; RSE25 with 80%

confidence) is 10 random stations and effort for size structure estimation (PSD; 50 fish minimum with 80% confidence) is 5 random gill net stations. Sampling effort will be based on that required to meet objectives for Walleye and White Bass and will be 10 random gill nets in spring 2017 and 2019.

White Bass: White Bass were stocked into Palo Duro Reservoir by anglers and have been collected by gill nets during surveys in 2010 and 2013. The gill net catch rate in 2010 was 4.4/nn and 1.0/nn in 2013. Based on other area White Bass populations, this population is expected to increase to a gill net catch rate of over 10.0/nn. Continuation of gill net sampling will allow for monitoring of any large-scale changes in relative abundance and size structure. Sampling effort to achieve sampling objectives for relative abundance (CPUE-T; RSE <40 with 80% confidence) is 28 random gill nets and size structure estimation (PSD; 50 fish minimum with 80% confidence) is 10-15 random gill net stations. Sampling effort is similar to the effort needed for Walleye and will be 10 random gill nets in spring 2017 and 2019.

White Crappie: White Crappie are very abundant in Palo Duro Reservoir. The electrofishing survey in 2012 had a White Crappie catch rate 152/h. Trap net surveys in 2010 and 2013 had catch rates of 39/nn and 52/nn, respectively. Anecdotal information indicates this species is very popular with area anglers. Fisheries surveys indicate that few fish are reaching the 10-inch legal limit. The majority of fish surveyed in 2010-2013 were 5 inches in length indicating a growth bottleneck. Continuation of trap net sampling will allow for monitoring of large-scale changes in relative abundance and size structure and should provide a large enough sample to determine mean age at stock size (5 inches). Sampling effort based on achieving sampling objectives for relative abundance (CPUE-T; RSE25 with 80% confidence) is 5 random trap net stations. Sampling effort based on achieving sampling objectives for size structure estimation and aging of stock-size (5-inch) fish (PSD; 50 fish minimum with 90% confidence) is 5 random trap net stations. Sampling effort need to collect 13 legal-size (10-inch) fish to determine mean age at length would exceed 35 net nights and, at the current water elevation and samplable area, would require 1 trap net/acre. Sampling effort for fall 2015 and 2017 will be 5-10 random trap net stations.

Gizzard Shad: Gizzard Shad are the primary forage at Palo Duro Reservoir. Trend data on CPUE and size structure of Gizzard Shad has been collected approximately biennially with electrofishing since 1992. Electrofishing catch rates in 2012 and 2014 were 172/h and 682/h, respectively. Continuation of sampling will allow for monitoring of large-scale changes in relative abundance and size structure. Sampling effort based on achieving sampling objectives for relative abundance (CPUE-T; RSE25 with 80% confidence) would be 30 random 5-minute electrofishing stations and size structure estimation (PSD and IOV; 100 fish minimum with 95% confidence) would be achieved by 5 to 10 5-minute electrofishing stations. Sampling effort in fall 2016 and 2018 will be 10 random electrofishing stations.

Largemouth Bass, Channel Catfish, and Bluegill: While these species do not have significant fisheries at this time, exploratory monitoring data will be collected while sampling for other species (gill nets and electrofishing) and will be used to inform us of any large-scale changes to these populations that may require closer attention. Catch-per-unit-effort will be the measure of their presence, with no specific CPUE RSE required. Sampling effort will correspond with objectives needed to meet objectives for previously mentioned species.

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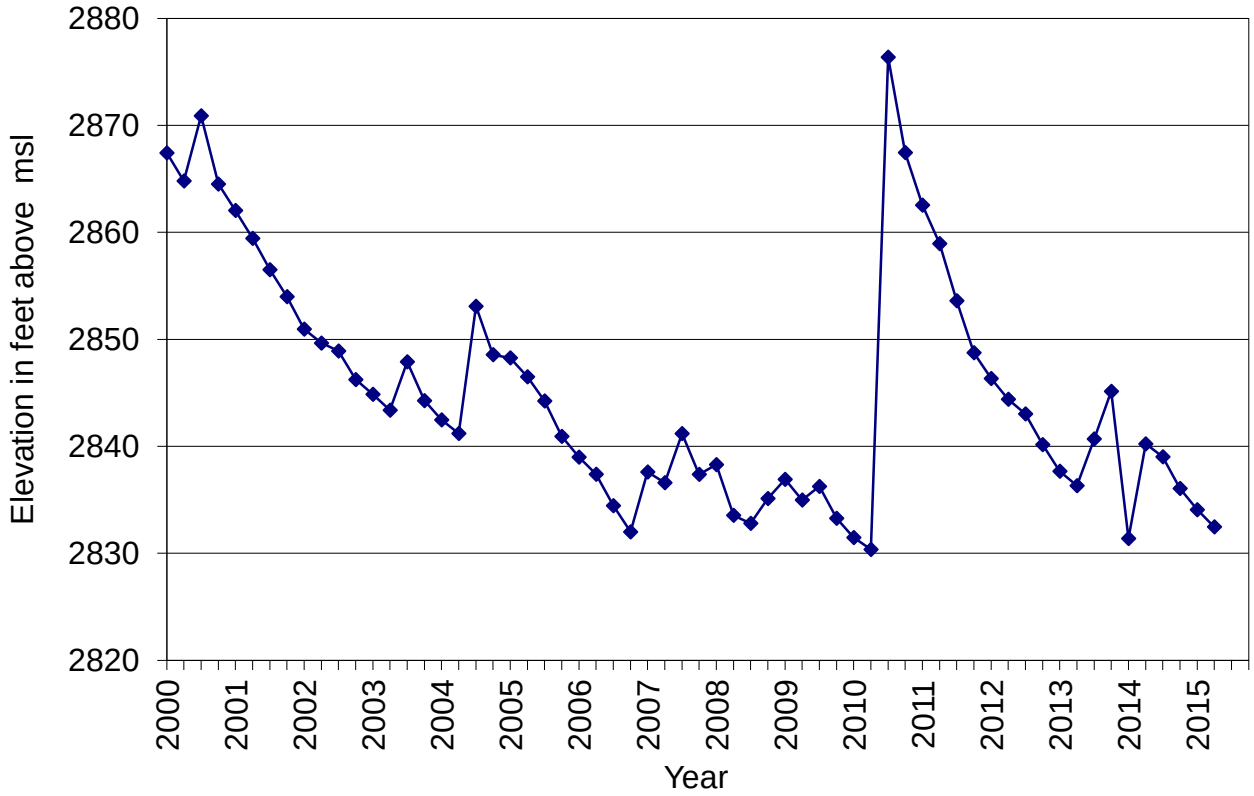


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Palo Duro Reservoir, Texas. Conservation elevation is 2,892 MSL and the lowest elevation within the basin is 2,820 MSL.

Table 1. Characteristics of Palo Duro Reservoir, Texas.

Characteristic	Description
Year constructed	1991
Controlling authority	Palo Duro River Authority
County	Hansford
Reservoir type	Mainstream
Shoreline development index (SDI)	6.30
Conductivity	900 µS/cm

Table 2. Boat ramp characteristics for Palo Duro Reservoir, Texas, August, 2014. Reservoir elevation at time of survey was 2,832 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft msl)	Condition
North Ramp	36.3549 -101.17997	Y	100	2,860	Unusable. Extension is not feasible. 28 ft above water level
South Ramp	36.34682 -101.1696	Y	100	2,871	Unusable. Extension is not feasible. 39 ft above water level
North Low Water Ramp	36.358736 -101.169893	Y	10	2,828	Usable with caution. Extension is not feasible
South Low Water Ramp	36.35034 -101.16401	Y	10	2,829	Usable with caution. 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

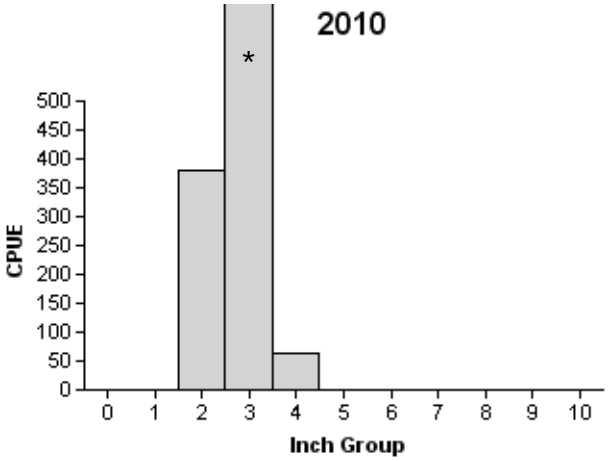
Table 4. Stocking history of Palo Duro Reservoir, Texas. Size categories are: FRY =<1 inch, FGL = 1-3 inches, and ADL = adults.

Year	Number	Size
	Gizzard Shad	
1992	67	ADL
	Blue Catfish	
1991	25,607	FGL
1998	64,838	FGL
1999	81,500	FGL
2002	102,951	FGL
Species Total	274,896	
	Channel Catfish	
1991	34,414	FGL
1996	53,026	FGL
1999	46,865	FGL
2010	204,014	FGL
Species Total	338,319	
	Bluegill	
1991	165,344	FGL
1992	74,084	FGL
Species Total	239,428	
	Coppernose Bluegill	
1991	82,293	FGL
	Smallmouth Bass	
1993	12,581	FGL
	Largemouth Bass	
1992	124,562	FGL
2011	140,765	FGL
Species Total	265,327	
	Florida Largemouth Bass	
1991	40,030	FGL
1993	177	ADL
Species Total	40,207	
	White Crappie	
1992	250	ADL
	Yellow Perch	
1991	4,094	FGL
1992	20,000	FGL
Species Total	24,094	
	Walleye	
1992	134,640	FRY
1993	1,000,000	FRY
2000	69,000	FRY
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	200,000	FRY
Species Total	10,750,017	

Table 5. Survey of structural habitat types, Palo Duro Reservoir, Texas, 2014. Shoreline habitat type units are in miles and standing timber in acres. Reservoir surface area was approximately 100 acres when surveyed.

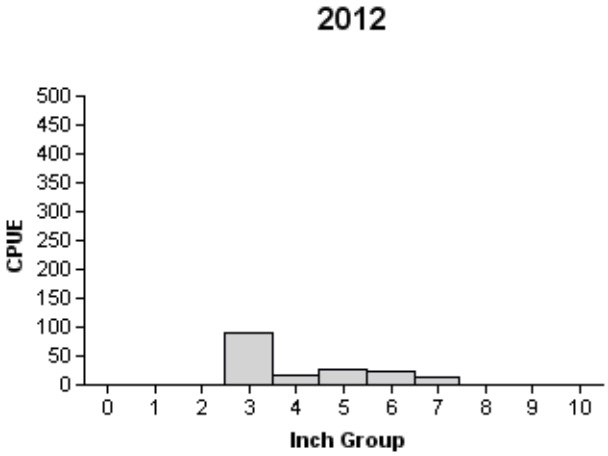
Habitat type	Estimated	% of total
Silt	9.71	96.4
Cobble	0.25	2.5
Gravel	0.11	1.1
Total	10.07	100
Standing timber	30	30.0

Gizzard Shad

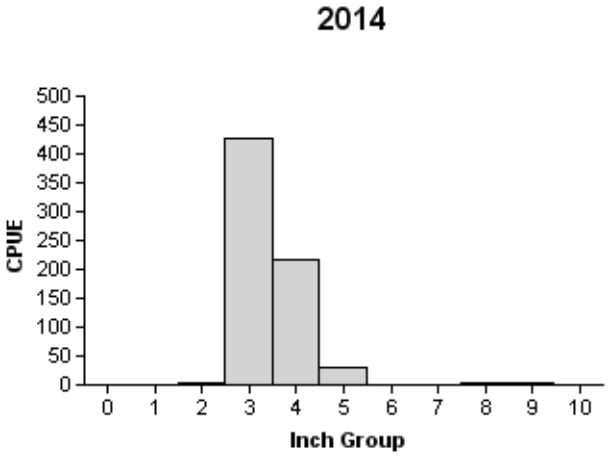


Effort =	1.0
Total CPUE =	1,450.0 (32;
Stock CPUE =	1450)
IOV =	0.0 (0; 0)
	100 (0)

*CPUE for 3 inch fish was 1,007/h



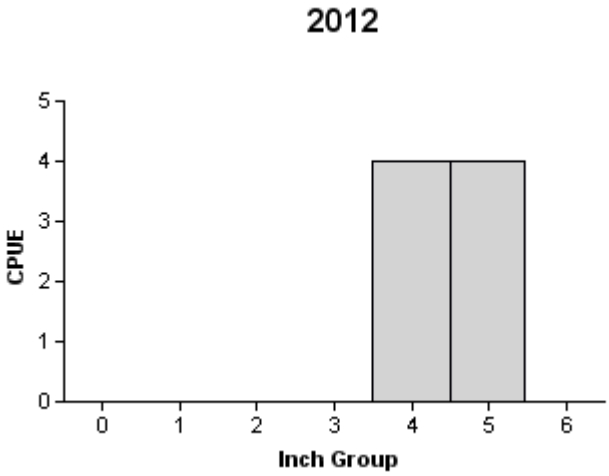
Effort =	0.5
Total CPUE =	172.0 (24; 86)
Stock CPUE =	12.0 (63; 6)
IOV =	100 (0)



Effort =	0.6
Total CPUE =	682.3 (14; 398)
Stock CPUE =	6.9 (75; 4)
IOV =	99 (1)

Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N are in parentheses) for fall electrofishing surveys, Palo Duro Reservoir, Texas, 2010, 2012 and 2014. RSE is used for CPUE values and SE is used for IOV and PSD values.

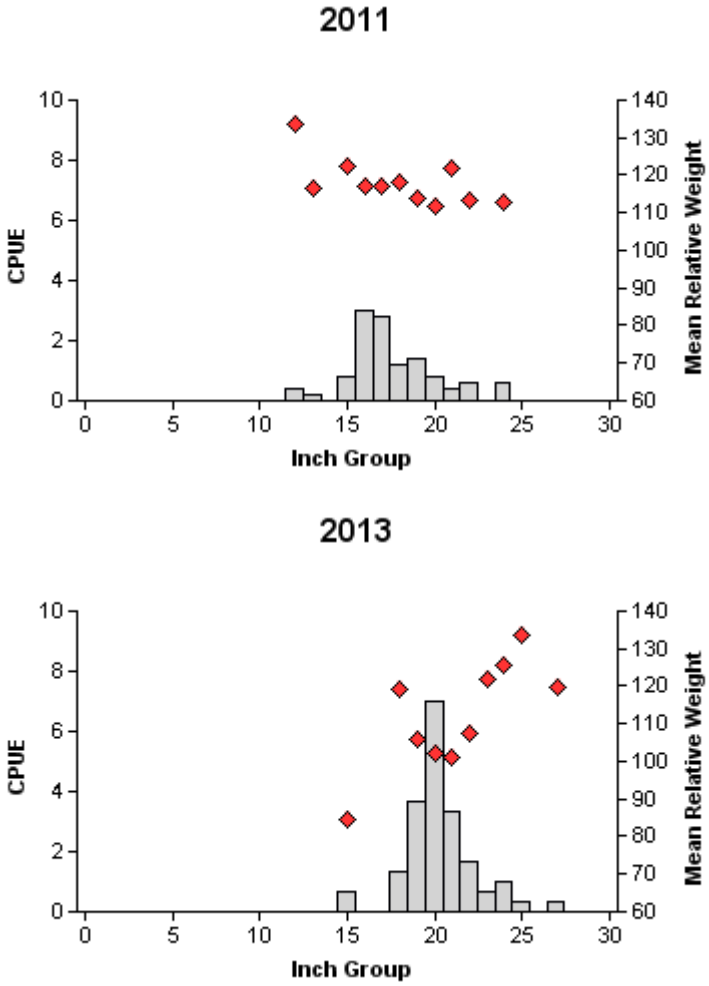
Bluegill



Effort = 0.5
Total CPUE = 8.0 (50; 4)
Stock CPUE = 8.0 (50; 4)
PSD = 0 (67)

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

Blue Catfish

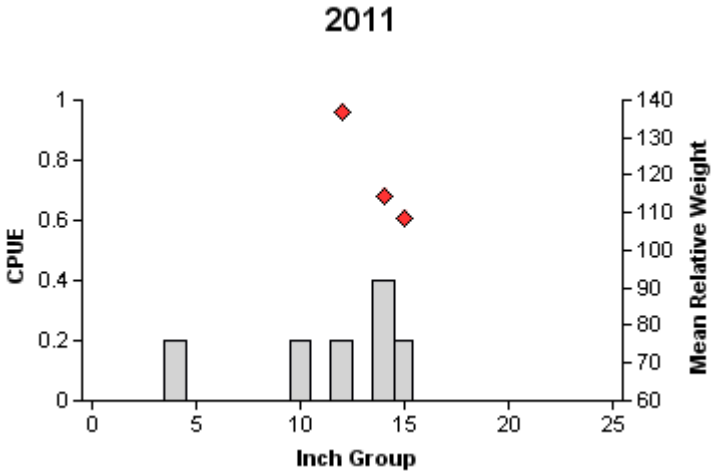


Effort = 5.0
Total CPUE = 12.2 (22; 61)
Stock CPUE = 12.2 (22; 61)
PSD = 20 (5)

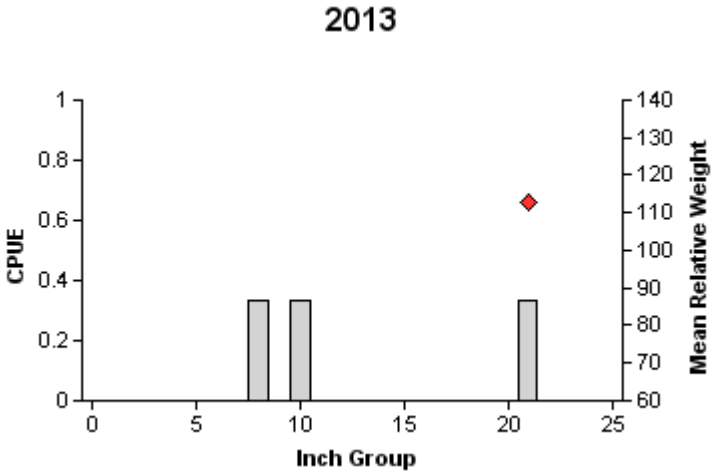
Effort = 3.0
Total CPUE = 20.0 (13; 60)
Stock CPUE = 20.0 (13; 60)
PSD = 72 (3)

Figure 4. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Palo Duro Reservoir, Texas, 2011 and 2013. RSE is used for CPUE values and SE is used for PSD values.

Channel Catfish



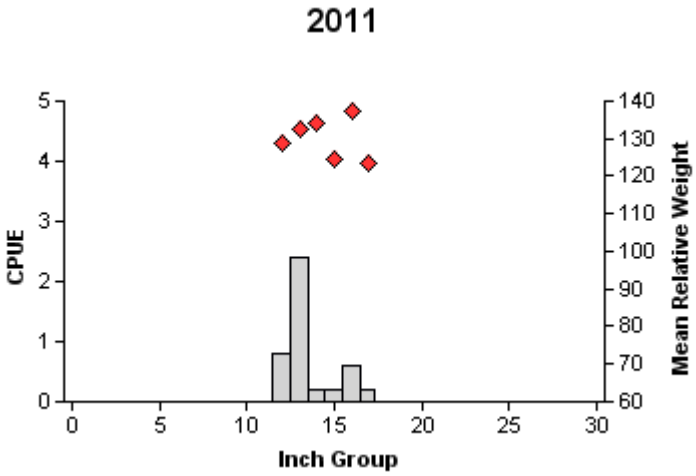
Effort = 5.0
Total CPUE = 1.2 (31; 6)
Stock CPUE = 0.8 (47; 4)
PSD = 0 (88)



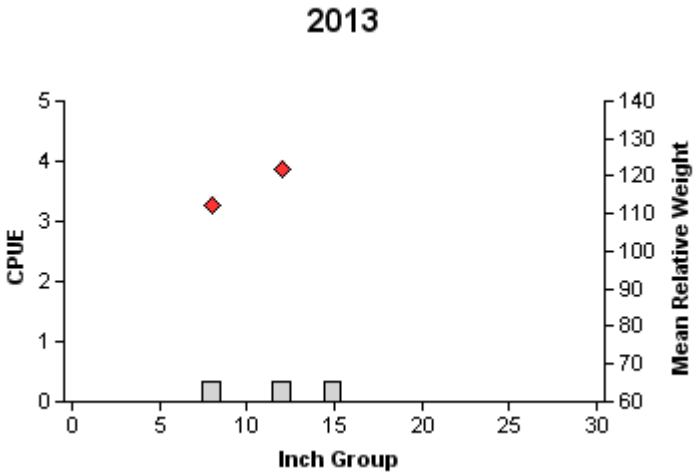
Effort = 3.0
Total CPUE = 1.0 (58; 3)
Stock CPUE = 0.3 (100; 1)
PSD = 100 (0)

Figure 5. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Palo Duro Reservoir, Texas, 2011 and 2013. RSE is used for CPUE values and SE is used for PSD values.

White Bass



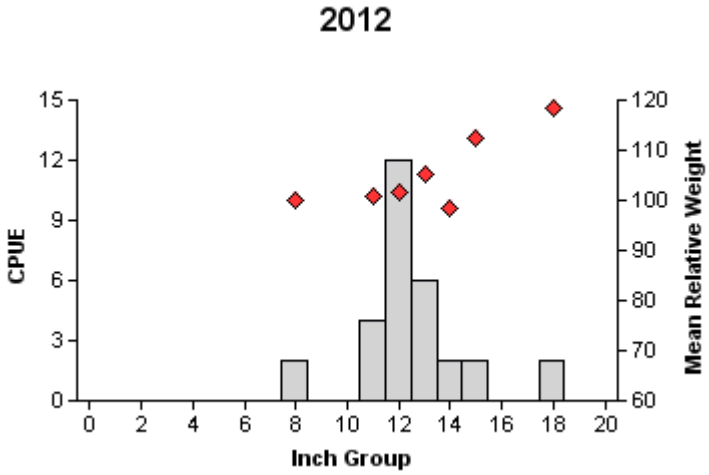
Effort = 5.0
Total CPUE = 4.4 (68; 22)
Stock CPUE = 4.4 (68; 22)
PSD = 100 (0)



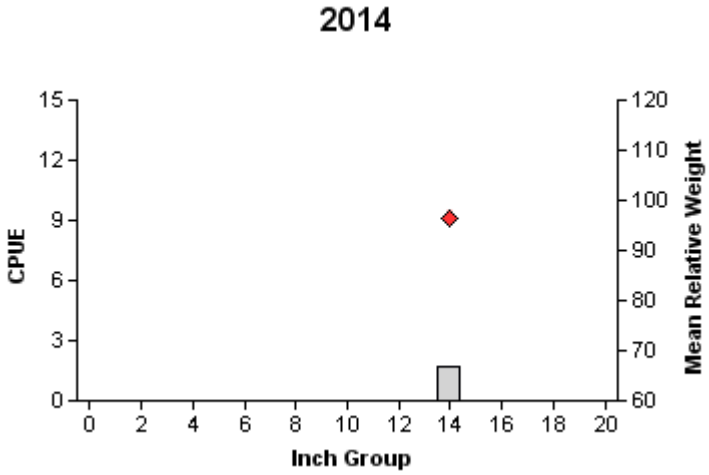
Effort = 3.0
Total CPUE = 1.0 (58; 3)
Stock CPUE = 1.0 (58; 3)
PSD = 67 (19)

Figure 6. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Palo Duro Reservoir, Texas, 2011 and 2013. RSE is used for CPUE values and SE is used for PSD values.

Largemouth Bass



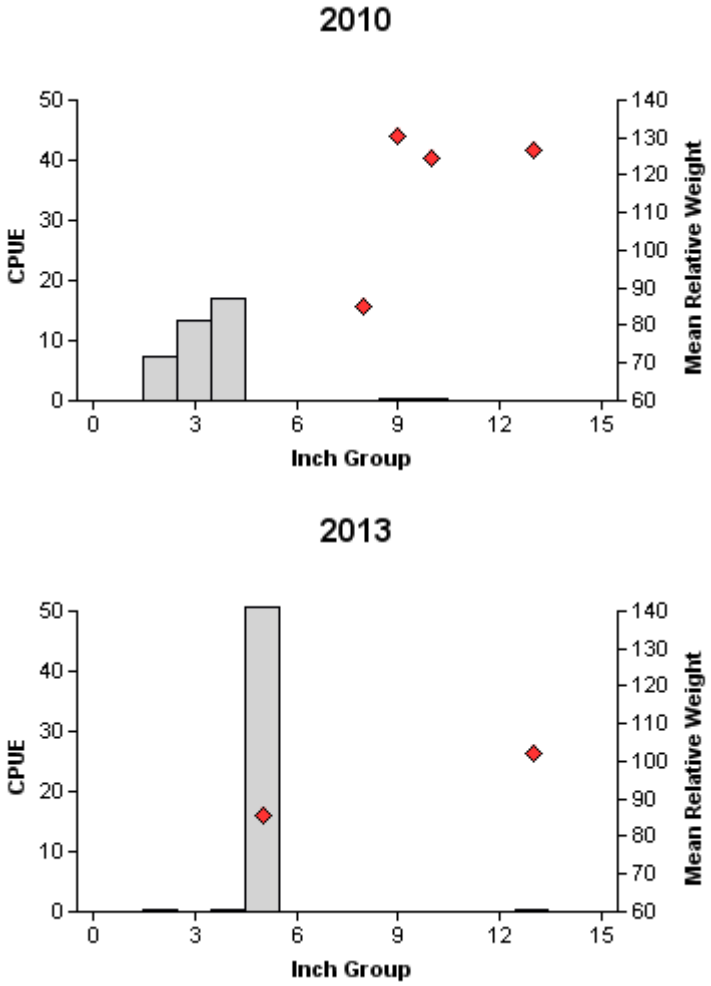
Effort = 0.5
Total CPUE = 30.0 (23; 15)
Stock CPUE = 30.0 (23; 15)
PSD = 80 (7)



Effort = 0.6
Total CPUE = 1.7 (100; 1)
Stock CPUE = 1.7 (100; 1)
PSD = 100 (0)

Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for fall electrofishing surveys, Palo Duro Reservoir, Texas, 2012 and 2014. No Largemouth Bass were collected in the 2010 survey. RSE is used for CPUE values and SE is used for RSD values.

White Crappie

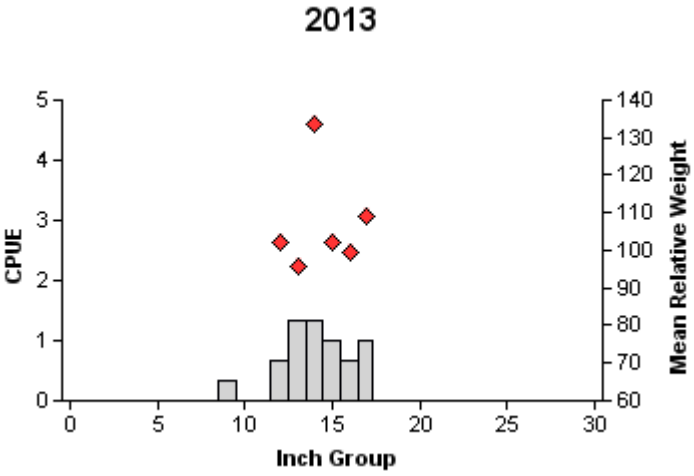


Effort =	7.0
Total CPUE =	39.0 (59; 273)
Stock CPUE =	1.1 (62; 8)
PSD =	100 (0)

Effort =	5.0
Total CPUE =	51.8 (65; 259)
Stock CPUE =	51.0 (67; 255)
PSD =	0 (0)

Figure 8. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for fall trap net surveys, Palo Duro Reservoir, Texas, 2010, and 2013. RSE is used for CPUE values and SE is used for PSD values.

Walleye



Effort =	3.0
Total CPUE =	6.3 (76; 19)
Stock CPUE =	6.0 (75; 18)
PSD =	44 (6)

Figure 9. Number of Walleye caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Palo Duro Reservoir, Texas, 2013. RSE is used for CPUE values and SE is used for RSD values.

Table 6. Proposed sampling schedule for Palo Duro Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. S denotes standard survey and A an additional survey. The number in parentheses indicates expected sampling effort.

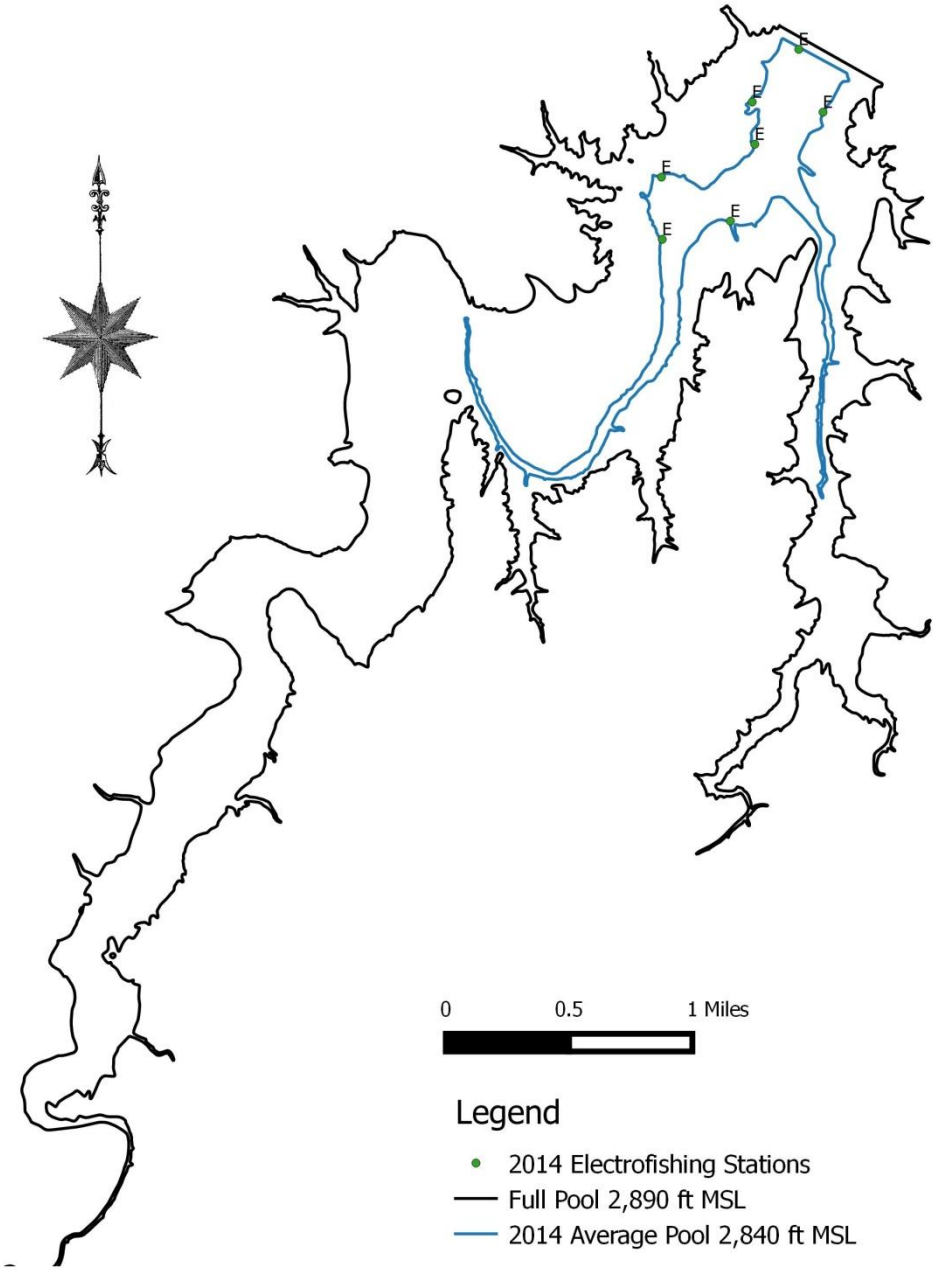
Survey Year	Electrofishing	Trap Net	Gill Net	Vegetation Survey	Access Survey	Report
Fall 2015-Spring 2016		A (5-10)				
Fall 2016-Spring 2017	A (10)		A (10)			
Fall 2017-Spring 2018		A (5-10)				
Fall 2018-Spring 2019	S (10)		S (10)	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from Palo Duro Reservoir, Texas, 2014-2015. Effort was 0.58 hours for electrofishing.

Species	Electrofishing CPUE	N Electrofishing
Gizzard Shad	682.29	398
Common Carp	77.14	45
Channel Catfish	3.43	2
Green Sunfish	1.71	1
Longear Sunfish	3.43	2
Largemouth Bass	1.71	1
White Crappie	30.86	18
Walleye	1.71	1

APPENDIX B



Location of sampling sites, Palo Duro Reservoir, Texas. Electrofishing stations are indicated by an E. The elevation for electrofishing was 2,840 feet above MSL (blue line). Full pool at 2,890 feet above MSL is indicated by the black line.

Appendix C

Objective-Based Sampling Plan for Palo Duro Reservoir
FY 2015

Sport fish, forage fish, and other important fishes

Sport fishes in Palo Duro Reservoir include **blue catfish, channel catfish white bass, largemouth bass, white crappie** and **walleye**. The primary forage species is **gizzard shad**.

Negligible fisheries

Largemouth bass: Largemouth bass are present in Palo Duro reservoir, but population abundance is extremely low (CPUE ranged from 0.0 to 10.0 between 2002 and 2010) due to extended periods of low and declining water levels and probable high predation due to limited nursery habitat. No largemouth bass were collected in the 2010 electrofishing survey and only 30/h were collected in 2012.

Channel catfish: Channel catfish exist in the reservoir but are a minor fishery relative to blue catfish. The gill net catch rate for channel catfish was approximately 1/nn in 2011 and 2013.

Bluegill: Bluegill were not collected by electrofishing in 2010 were collected at only 8/h in 2012. The low catch rates indicate they are not a major forage species and small size makes them unlikely to be a targeted game species.

Survey objectives, fisheries metrics, and sampling objectives

Reservoir Status/Disclaimer: Current water levels directly impact our ability to sample fisheries within Palo Duro Reservoir. At current water levels (8/13/14) the total area of Palo Duro Reservoir is approximately 242 acres. Only the lower 1/3 of the basin has water levels deep enough to set gill nets or trap nets. Approximately half of that area is covered with timber which prevents the use of either gear. The total estimated acreage that is samplable with gill or trap nets is about 40 acres. The estimates of projected effort are based on the ability to sample the entire reservoir basin and will be adjusted based on the available samplable acreage.

Walleye: Walleye were sampled with gill nets in 2010 and 2013 with catch rates of 0.0/nn and 6.3/nn, respectively. This population is rebuilding and currently relies on survival of stocked fish until natural reproduction resumes. Continuation of gill net sampling will determine the status (presence including size structure, or absence) of walleye stocked in 2011. Continuation of electrofishing sampling will determine reproductive success by presence or absence of YOY fish. Gill net sampling effort based on achieving sampling objectives for size structure estimation (PSD; 50 fish minimum with 80% confidence) is 10-15 stations. Electrofishing exploratory sampling effort will be based on achieving sampling objectives for gizzard shad. Sampling effort for fall 2014 will be 10 random electrofishing stations. Spring 2015 sampling will be 10 random gill net stations.

Blue catfish: Blue catfish were collected by gill nets in 2010 at 12.2/nn and in 2013 at 20.0/nn. Anecdotal information indicates this is the primary game species sought by area anglers. Continuation of sampling by gill nets will allow for monitoring of large-scale changes in relative abundance and size structure. Gill net sampling effort needed to achieve sampling objectives for relative abundance (CPUE-T; RSE25 with 80% confidence) is 10 random stations and effort for size structure estimation (PSD; 50 fish minimum with 80% confidence) is 5 random gill net stations. Sampling effort will be based on that required to meet objectives for walleye and white bass and will be 10 random gill nets in spring 2015.

White bass: White bass were stocked into Palo Duro Reservoir by anglers and have been collected by gill nets during surveys in 2010 and 2013. The gill net catch rate in 2010 was 4.4/nn and 1.0/nn in 2013. Based

on other area white bass populations, this population is expected to increase to a gill net catch rate of over 10.0/nn. Continuation of gill net sampling will allow for monitoring of any large-scale changes in relative abundance and size structure. Sampling effort to achieve sampling objectives for relative abundance (CPUE-T; RSE <40 with 80% confidence) is 28 random gill nets and size structure estimation (PSD; 50 fish minimum with 80% confidence) is 10-15 random gill net stations. Sampling effort is similar to the effort needed for walleye and will be 10 random gill nets in spring 2015.

White crappie: White crappie are very abundant in Palo Duro Reservoir. The electrofishing survey in 2012 had a white crappie catch rate 152/h. Trap net surveys in 2010 and 2013 had catch rates of 39/nn and 52/nn, respectively. Anecdotal information indicates this species is very popular with area anglers. Fisheries surveys indicate that few fish are reaching the 10-inch legal limit. The majority of fish surveyed in 2010-2013 were 5 inches in length indicating a growth bottleneck. Continuation of trap net sampling will allow for monitoring of large-scale changes in relative abundance and size structure and should provide a large enough sample to determine mean age at stock size (5 inches). Sampling effort based on achieving sampling objectives for relative abundance (CPUE-T; RSE25 with 80% confidence) is 5 random trap net stations. Sampling effort based on achieving sampling objectives for size structure estimation and aging of stock-size (5-inch) fish (PSD; 50 fish minimum with 90% confidence) is 5 random trap net stations. Sampling effort need to collect 13 legal-size (10-inch) fish to determine mean age at length would exceed 35 net nights and, at the current water elevation and samplable area, would require 1 trap net/acre. Sampling effort for fall 2014 will be 5-10 random trap net stations.

Gizzard shad: Gizzard shad are the primary forage at Palo Duro Reservoir. Trend data on CPUE and size structure of gizzard shad has been collected approximately biennially with electrofishing since 1992. Electrofishing catch rates in 2010 and 2012 were 1,450/h and 172/h, respectively. Continuation of sampling will allow for monitoring of large-scale changes in relative abundance and size structure. Sampling effort based on achieving sampling objectives for relative abundance (CPUE-T; RSE25 with 80% confidence) would be 30 random 5-minute electrofishing stations and size structure estimation (PSD and IOV; 100 fish minimum with 95% confidence) would be achieved by 5-10 5-minute electrofishing stations. Sampling effort in fall 2014 will be 10 random electrofishing stations.

Largemouth bass, channel catfish, and bluegill: While these species do not have significant fisheries at this time, exploratory monitoring data will be collected while sampling for other species (gill nets and electrofishing) and will be used to inform us of any large-scale changes to these populations that may require closer attention. Catch-per-unit-effort will be the measure of their presence, with no specific CPUE RSE required. Sampling effort will correspond with objectives needed to meet objectives for previously mentioned species.